



**FAG**



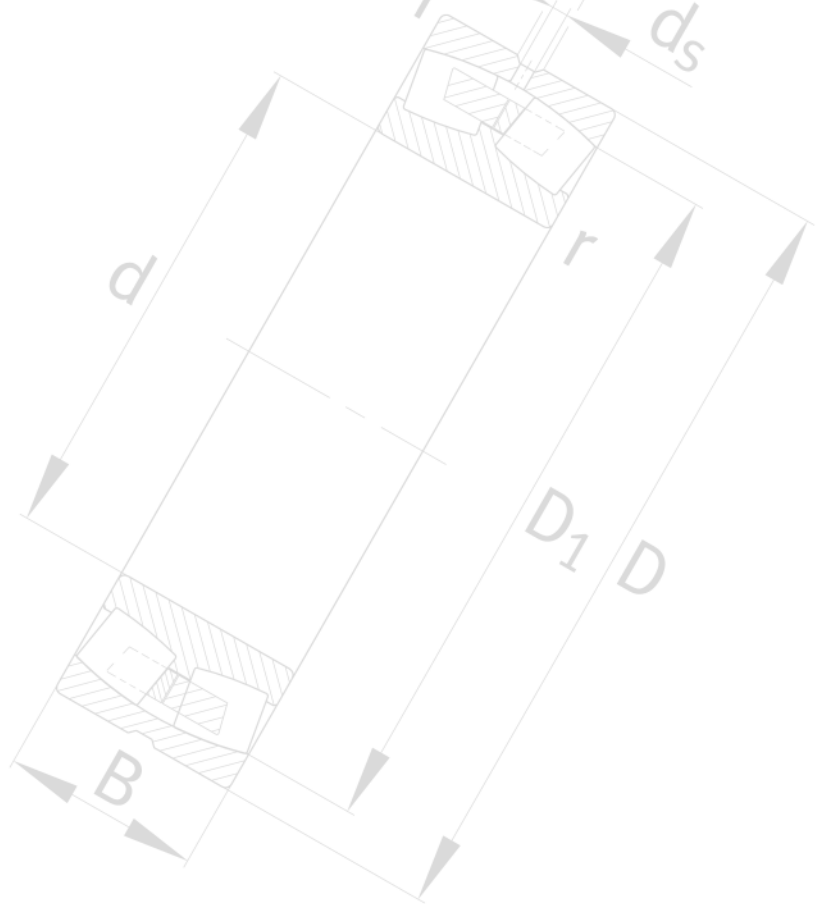
# Rolling Bearings

Ball bearings  
Roller bearings  
Needle roller bearings  
Track rollers  
Bearings for screw drives  
Insert bearings, housing units  
Bearing housings  
Accessories

**SCHAEFFLER**







## Rolling bearings

Ball bearings

Roller bearings

Needle roller bearings

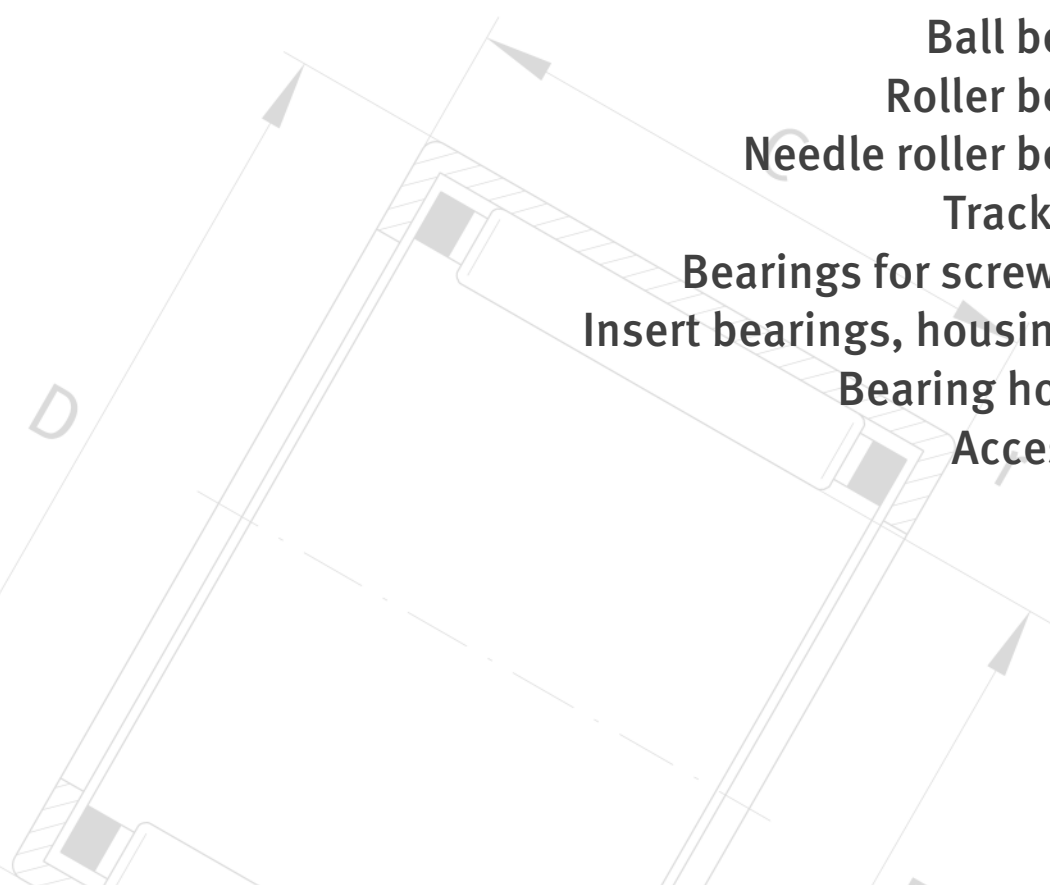
Track rollers

Bearings for screw drives

Insert bearings, housing units

Bearing housings

Accessories



All data have been prepared with a great deal of care and checked for their accuracy. However, no liability can be assumed for any incorrect or incomplete data. We reserve the right to make technical changes.

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# Foreword

## Schaeffler Technologies

Schaeffler Technologies with its brands INA and FAG is a leading worldwide supplier of rolling bearings, spherical plain bearings, plain bearings, linear products, accessories specific to bearings and comprehensive maintenance products and services.

It has approximately 40 000 catalogue products manufactured as standard, providing an extremely wide portfolio that gives secure coverage of applications from all 60 designated industrial market sectors.

The central factors responsible for success are our outstanding strength in innovation, our global focus on local customer proximity, highly developed manufacturing methods, extremely high quality standards in all processes and our ability to transform specific customer requirements quickly and accurately into cost-effective solutions. Against this background of expertise, knowledge and experience together with our wide range of catalogue items, we see ourselves as a high performance, customer-focussed partner.

## Research and Development

As a company looking to the future, we are especially active in the field of research and development. The key areas in this respect include not only research into fundamental principles, materials technology, tribology and calculation but also extensive inspection and test methods as well as activities to optimise manufacturing technology. This is oriented towards ensuring the continuous development, improvement and application of our products in the long term.

We carry out research and development on a global basis. Our development centres are linked with each other worldwide and are thus in a position to exchange current information on a very short timescale as well as access and communicate the most recent data. This ensures that a uniform level of knowledge and information is available worldwide.

In addition to continued development of standard products, we work closely in research and development activities with our customers where specific customer solutions are required. They can thus benefit from the best product for their application, with the maximum possible performance capacity at a cost-effective price.

## Quality Manufacturing technology Environmental protection

“Zero defects” is our quality objective. We have matched all our processes to this target. In addition, our experience in forming, forging, heat treatment, surface technologies, grinding, honing and assembly ensures that our products fulfil the required quality level.

Ongoing quality inspections are a defined component of the manufacturing process. These are integrated directly as a feedback function in the manufacturing process. This ensures that all products continuously fulfil the same high standard of quality.

The quality of our products and processes is certified; for example, all manufacturing facilities comply with DIN-EN ISO 9001:2000, ISO/TS 16 949:2002.

With the validation and certification of our manufacturing sites, we are taking a pioneering role in environmental protection. All larger manufacturing sites are certified to ISO 14001 and are also validated in accordance with the more stringent EC ECO Management and Audit Scheme (EMAS).

# Foreword

## Worldwide presence

Through a closely knit network of development and manufacturing sites, sales companies and an international distribution structure, we are represented throughout the world. This global presence ensures effective linkage between the major markets in Europe, India, South East Asia/Pacific Region, East Asia, North and South America. As a result, we have an on-site presence with service and technical advice in close proximity to the customer.

We take orders from all over the world and make deliveries worldwide too. Furthermore, we support our customers worldwide in resolving their bearing arrangement requirements, respond to technical queries and develop specific bearing arrangement solutions in local partnership with our customers.

## Rolling Bearing Catalogue

### HR 1

## The Engineering Compendium

Catalogue HR 1 describes the rolling bearings in accordance with DIN ISO that are required for original equipment manufacture, distribution and the aftermarket, specific rolling bearing accessories and further rolling bearing types and design variants.

It shows which products can be considered for a bearing arrangement, the factors that must be taken into consideration in the design, the tolerances required on the adjacent construction and how the bearing arrangement is sealed. It gives detailed information on the calculation of bearing rating life, on temperatures and loads, on the lubricants that are most suitable for the bearing arrangement and, last but not least, the correct methods of fitting and maintaining the products.

The data in the catalogue represent the current level of technology and manufacture as of August 2008. They reflect not only progress in rolling bearing technology but also the experience gathered in practical use. Any information in publications that does not concur with the data in this catalogue is therefore invalid.

## A new edition required early

To date, more than 140 000 copies of the first edition published in 2006 have been distributed. This is an impressive indication of the importance of the catalogue as a fundamental information and advisory tool for all technical issues relating to the wide-ranging field of rotary rolling bearings. In a short space of time, it has become established worldwide as an importance handbook and engineering compendium for the calculation and design of rolling bearing arrangements.

Due to the rapid pace of development in rolling bearing engineering, it has now become necessary to issue a revised and expanded new edition at an early stage. A brief description of the important and interesting new content is given here. Further information can be found in the relevant sections of the catalogue.

## Significant innovations

- Technical principles
  - Rating life calculation updated; expanded adjusted rating life now in accordance with ISO 281:2007, with new values for  $a_1$ , life adjustment factor  $a_{ISO}$  instead of  $a_{DIN}$
  - Refined calculation of the axial load carrying capacity of cylindrical roller bearings, bearings of TB design now included
  - Performance data of products recalculated in some cases (basic load ratings, fatigue limit load, limiting speed, reference speed).
- Friction and increases in temperature
  - Bearing factors for tapered roller bearings and self-aligning ball bearings updated
  - Diagram with bearing factor  $f_2$  for bearings of TB design included.
- Lubrication
  - Updated overview of greases in use.
- Bearing data
  - Axial internal clearance added
  - High performance steel Cronitect added
  - Dimensional and geometrical tolerances: dimensions for tapered roller bearings added
  - Limit values for chamfer dimensions updated.
- Design of bearing arrangements
  - Table with guide values for roughness of bearing seats added
  - Deviations for enveloping circle diameter included (tolerance zone F6, F8)
  - Values for ISO fundamental tolerances (IT grades) to ISO 286-1:1988 included
  - Raceways for bearings without inner and/or outer ring: surface hardening depth SHD (instead of Rht)
  - Storage of rolling bearings revised
  - Information on Arcanol rolling bearing greases updated.
- Products
  - Additional sizes and designs of cylindrical roller bearings, tapered roller bearings, spherical roller bearings and axial spherical roller bearings of X-life quality included
  - Deep groove ball bearings: corrosion-resistant bearings are no longer described, see instead TPI 64; radial internal clearance added; further bearing sizes of series 618, 619 and 64 added
  - Angular contact ball bearings, double row: sealed bearings 32..-B and 33..-B added
  - Spindle bearings: section Equivalent dynamic load replaced by section Operating life; bearing tolerances updated
  - Four point contact bearings: internal clearance C4 added
  - Cylindrical roller bearings: section restructured; series NU4 and NJ4 included; new full complement design TB with higher axial load carrying capacity included
  - High precision cylindrical roller bearings: section Equivalent dynamic load replaced by section Operating life; shaft and housing tolerances updated

# Foreword

- Tapered roller bearings: X-life design for bearings of series T7FC; open bearings (included matched pair versions) as well as sealed bearings JK0S added, inch size bearings expanded
  - Spherical roller bearings: X-life design E1 with sheet steel cage now also included in series 240 and 241; new vibrating screen design T41D (partially replacing T41A)
  - Drawn cup needle roller bearings: minimum radial load included; suitable inner rings for full complement drawn cup needle roller bearings included
  - Machined needle roller bearings: designations for mounting dimensions revised, roughness values for shaft design for bearings without inner ring revised
  - Drawn cup roller clutches: calculation of minimum wall thicknesses for metal and plastic housings added; tolerances (roundness and parallelism) for raceway on shaft revised
  - Axial angular contact ball bearings: section Equivalent dynamic load replaced by section Operating life
  - Axial spherical roller bearings: X-life design E1 with sheet steel cage replaces the previous design E in many bearings of series 293 and 294
  - High precision bearings for combined loads: rigidity values for rolling element set included
  - Radial insert ball bearings, housing units: changes to grease in bearings with suffix FA101 and in series GE..-KLL-B, GLB..-KRR-B
  - Bearing housings: outside diameter D now given in all tables
  - Fasteners and retainers: shaft nuts HMZ added
  - Arcanol rolling bearing greases: rolling bearing grease LOAD150 included; available containers updated; table with grease characteristics updated.
- Other products ■ Equipment and services for the mounting and maintenance of rolling bearings: new equipment for vibration diagnosis.
- Market sectors ■ Bearing arrangements and components for Fluid Technology added; bearings for food and packaging industry expanded.

## New Attention symbol

This catalogue essentially describes standard products. Since these are used in numerous applications, we cannot make a judgement as to whether any malfunctions will cause harm to persons or property.

## Follow instructions

It is always and fundamentally the responsibility of the designer and user to ensure that all specifications are observed and that all necessary information is communicated to the end user. This applies in particular to applications in which product failure and malfunction may constitute a hazard to human beings.



In line with ANSI 535.6-2006, we have replaced the old Attention symbol by the new symbol.

In case of non-compliance, damage or malfunctions in the product or the adjacent construction may occur.



## Maximum customer benefit

X-life is the premium brand of Schaeffler Group Industrial. It brings together the strengths of the two brands and gives completely new design opportunities for design engineers.

X-life is an all-encompassing concept: advice, product development, service and sales are fully integrated with each other in all phases of the product cycle. As a service surround system, it includes a comprehensive lubrication concept. X-life stands for continuous quality improvement and local customer focus applied worldwide.

## Advantages of the X-life grade

The use of state of the art manufacturing technologies has resulted in a better, more uniform surface over the whole contact face between the rolling elements and raceway. As a result, under identical load there is a significant reduction in the stress conditions present on the rolling elements and raceway. The improved surface quality gives reduced friction and lower bearing temperatures, running resistance is lower and less strain is placed on the lubricant.

Thanks to such improvements, the basic dynamic load ratings are significantly higher than those of the previous design. As a result, the basic rating life is higher; i. e. the operating life of the bearings is considerably longer under the same operating conditions. Alternatively, higher loads can be applied while maintaining the same rating life values.

With their optimised characteristics, X-life bearings open up completely new application prospects, such as downsizing of the bearing arrangement. Furthermore, the improved price/performance ratio ultimately increases the overall cost-effectiveness of the bearing arrangement.

X-life bearings are described in the sections on product features and are indicated in the dimension tables by the symbol XL.

## Product ranges for specific market sectors

Special product ranges are available for specific market sectors. In addition to standard products, these include a large number of special solutions. The range extends from simple, application-specific bearings via complete, ready-to-fit systems to special solutions that can be used to fulfil the most complex bearing technology requirements with high functional security and cost-effectiveness.

Contact our External Sales at the earliest possible stage and benefit from the broad knowledge and considerable experience of these specialists for your project.

# Foreword

## **medias<sup>®</sup> professional** Electronic information system

**medias<sup>®</sup> professional**, the proven selection and information system, contains the INA/FAG catalogue products in electronic format. As with the printed catalogue, this gives our customers product information on both brands in a single data source. This saves time and gives easier handling.

**medias<sup>®</sup> professional** is available online in several languages, is easy to navigate and is particularly clear thanks to the use of numerous pictures, diagrams and models. There are also highly representative application examples, classified by market sector.

Datasheets on the bearing series can be generated as PDF files. It includes a lubricant database and also the web2CAD link for direct download and inclusion of 3D models.

**medias<sup>®</sup> professional** focusses on the individual bearing. The complete shaft can be simulated and any influences arising from its deformation on the bearings can be determined using the calculation program BEARINX<sup>®</sup>. This program can also be made available to direct customers as BEARINX<sup>®</sup>-Online via the Internet (for conditions, see the INA/FAG homepage).

In conclusion, **medias<sup>®</sup> professional** is a comprehensive, reliable system to help you help yourself, giving answer to many questions on rolling bearing technology by electronic means, quickly and at any location.

## **Other technical publications**

This catalogue contains a large proportion of the core range of rotary rolling bearings of the brands INA and FAG. In addition, we develop and manufacture many other products and systems of interest in terms of technical progress and cost-effectiveness for rotary and linear bearing arrangements as well as for the automotive sector. These are covered in separate technical publications that can be obtained upon request.



## **INA and FAG**

### **When it comes to motion**

Catalogue HR 1 stands for pioneering bearing technology, application-focussed advice, the highest product and performance density and continuous development.

The benefits to you:

- Selection of products from a vast product range
- Maximum benefit, since the most suitable product is used in the right place
- Worldwide product availability
- Short delivery times
- Long term supply capability
- Security of planning for the long view
- Simplified stockholding
- Market-competitive prices
- Global service
- Comprehensive, application-focussed advice.

### **Together we move the world**

For us, technical progress means never standing still. In partnership with you, we are continually working on new solutions so that your vision and our technical ideas can continue to become a reality, to your benefit.

With our products and our knowledge, we can together continue to fulfil the challenges of your market in relation to rolling bearing arrangements. This catalogue is an important instrument in achieving this goal.



# Contents

	Page
Product index .....	12
Technical principles.....	34
Product overview .....	202
Deep groove ball bearings.....	204
Angular contact ball bearings .....	257
Spindle bearings.....	302
Four point contact bearings .....	348
Self-aligning ball bearings.....	360
Cylindrical roller bearings.....	391
Tapered roller bearings .....	514
Barrel roller bearings.....	556
Spherical roller bearings .....	572
Needle roller and cage assemblies .....	664
Drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end.....	680
Machined needle roller bearings .....	699
Drawn cup roller clutches .....	788
Sealing rings.....	804
Product overview .....	812
Axial deep groove ball bearings.....	814
Axial angular contact ball bearings.....	842
Axial cylindrical roller bearings, axial cylindrical roller and cage assemblies, axial bearing washers .....	856
Axial needle roller and cage assemblies, axial bearing washers, axial needle roller bearings .....	872
Axial spherical roller bearings .....	882
Crossed roller bearings .....	896
Track rollers.....	923
Bearings for screw drives .....	1005
High precision bearings for combined loads .....	1107
Radial insert ball bearings, housing units .....	1155
Bearing housings .....	1320
Fasteners and retainers.....	1450
Rolling elements .....	1507
Arcanol rolling bearing greases .....	1534
Other products .....	1541
Market sectors.....	1602
Addresses .....	1631

# Product index

	Page
10	Self-aligning ball bearings, cylindrical bore ..... 362
112	Self-aligning ball bearings, extended inner ring ..... 362
12	Self-aligning ball bearings, cylindrical bore ..... 362
12..-K	Self-aligning ball bearings, tapered bore ..... 362
12..-K + H	Self-aligning ball bearings, adapter sleeve ..... 362
13	Self-aligning ball bearings, cylindrical bore ..... 362
13..-K	Self-aligning ball bearings, tapered bore ..... 362
13..-K + H	Self-aligning ball bearings, adapter sleeve ..... 362
160	Deep groove ball bearings, single row ..... 206
2..-KRR	Deep groove ball bearings, extended inner ring ..... 1162
2..-NPP-B	Self-aligning deep groove ball bearings ..... 1161
202	Barrel roller bearings, cylindrical bore ..... 558
202..-K	Barrel roller bearings, tapered bore ..... 558
202..-K + H	Barrel roller bearings, adapter sleeve ..... 558
203	Barrel roller bearings, cylindrical bore ..... 558
203..-K	Barrel roller bearings, tapered bore ..... 558
203..-K + H	Barrel roller bearings, adapter sleeve ..... 558
213..-E1	Spherical roller bearings, cylindrical bore ..... 574
213..-E1-K	Spherical roller bearings, tapered bore ..... 574
213..-E1-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve ..... 575
213..-E1-K + H	Spherical roller bearings, tapered bore, adapter sleeve ..... 575
22	Self-aligning ball bearings, cylindrical bore ..... 362
22..-2RS	Self-aligning ball bearings, lip seals ..... 362
22..-K	Self-aligning ball bearings, tapered bore ..... 362
22..-K + H	Self-aligning ball bearings, adapter sleeve ..... 362
22..-K-2RS	Self-aligning ball bearings, lip seals, tapered bore ..... 362
22..-K-2RS + H	Self-aligning ball bearings, lip seals, tapered bore, adapter sleeve ..... 362

	Page
222	Spherical roller bearings, cylindrical bore ..... 574
222..-E1	Spherical roller bearings, cylindrical bore ..... 574
222..-E1-K	Spherical roller bearings, tapered bore ..... 574
222..-E1-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve..... 575
222..-E1-K + H	Spherical roller bearings, tapered bore, adapter sleeve..... 575
222..-K	Spherical roller bearings, tapered bore ..... 574
222..-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve..... 575
222..-K + H	Spherical roller bearings, tapered bore, adapter sleeve..... 575
223	Spherical roller bearings, cylindrical bore ..... 574
223..-E1	Spherical roller bearings, cylindrical bore ..... 574
223..-E1-K	Spherical roller bearings, tapered bore ..... 574
223..-E1-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve..... 575
223..-E1-K + H	Spherical roller bearings, tapered bore, adapter sleeve..... 575
223..-K	Spherical roller bearings, tapered bore ..... 574
223..-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve..... 575
223..-K + H	Spherical roller bearings, tapered bore, adapter sleeve..... 575
23	Self-aligning ball bearings, cylindrical bore ..... 362
23..-2RS	Self-aligning ball bearings, lip seals..... 362
23..-K	Self-aligning ball bearings, tapered bore..... 362
23..-K + H	Self-aligning ball bearings, adapter sleeve..... 362
230	Spherical roller bearings, cylindrical bore ..... 574
230..-E1(A)	Spherical roller bearings, cylindrical bore ..... 574
230..-E1(A)-K	Spherical roller bearings, tapered bore ..... 574
230..-E1(A)-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve..... 575
230..-E1(A)-K + H	Spherical roller bearings, tapered bore, adapter sleeve..... 575
230..-K	Spherical roller bearings, tapered bore ..... 574
230..-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve..... 575
230..-K + H	Spherical roller bearings, tapered bore, adapter sleeve..... 575

# Product index

	Page
231	Spherical roller bearings, cylindrical bore..... 574
231..-E1(A)	Spherical roller bearings, cylindrical bore..... 574
231..-E1(A)-K	Spherical roller bearings, tapered bore..... 574
231..-E1(A)-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve ..... 575
231..-E1(A)-K + H	Spherical roller bearings, tapered bore, adapter sleeve ..... 575
231..-K	Spherical roller bearings, tapered bore..... 574
231..-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve ..... 575
231..-K + H	Spherical roller bearings, tapered bore, adapter sleeve ..... 575
232	Spherical roller bearings, cylindrical bore..... 574
232..-E1(A)	Spherical roller bearings, cylindrical bore..... 574
232..-E1(A)-K	Spherical roller bearings, tapered bore..... 574
232..-E1(A)-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve ..... 575
232..-E1(A)-K + H	Spherical roller bearings, tapered bore, adapter sleeve ..... 575
232..-K	Spherical roller bearings, tapered bore..... 574
232..-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve ..... 575
232..-K + H	Spherical roller bearings, tapered bore, adapter sleeve ..... 575
233..-A	Spherical roller bearings, cylindrical bore..... 574
2344	Axial angular contact ball bearings, double direction ..... 844
2347	Axial angular contact ball bearings, double direction ..... 844
239	Spherical roller bearings, cylindrical bore..... 574
239..-K	Spherical roller bearings, tapered bore..... 574
239..-K + AH	Spherical roller bearings, tapered bore, withdrawal sleeve ..... 575
239..-K + H	Spherical roller bearings, tapered bore, adapter sleeve ..... 575
240	Spherical roller bearings, cylindrical bore..... 574
240..-E1	Spherical roller bearings, cylindrical bore..... 574
240..-E1-K30	Spherical roller bearings, tapered bore..... 574
240..-E1-K30 + AH	Spherical roller bearings, tapered bore, withdrawal sleeve ..... 575
240..-K30	Spherical roller bearings, tapered bore..... 574
240..-K30 + AH	Spherical roller bearings, tapered bore, withdrawal sleeve ..... 575

	Page
241	Spherical roller bearings, cylindrical bore ..... 574
241..-E1	Spherical roller bearings, cylindrical bore ..... 574
241..-E1-K30	Spherical roller bearings, tapered bore ..... 574
241..-E1-K30 + AH	Spherical roller bearings, tapered bore, withdrawal sleeve..... 575
241..-K30	Spherical roller bearings, tapered bore ..... 574
241..-K30 + AH	Spherical roller bearings, tapered bore, withdrawal sleeve..... 575
292..-E	Axial spherical roller bearings, increased capacity design..... 884
293..-E (E1)	Axial spherical roller bearings, increased capacity design..... 884
294..-E (E1)	Axial spherical roller bearings, increased capacity design..... 884
30..-B	Angular contact ball bearings, double row..... 282
30..-B-2RSR	Angular contact ball bearings, double row, lip seals ..... 282
30..-B-ZZ	Angular contact ball bearings, double row, gap seals ..... 282
302	Tapered roller bearings, single row ..... 516
303	Tapered roller bearings, single row ..... 516
313	Tapered roller bearings, single row ..... 516
313..-N11CA	Tapered roller bearings, matched in pairs ..... 516
32	Angular contact ball bearings, double row, filling slot..... 282
32..-B	Angular contact ball bearings, double row..... 282
32..-B-2RSR	Angular contact ball bearings, double row, lip seals ..... 282
32..-B-ZZ	Angular contact ball bearings, double row, gap seals ..... 282
320	Tapered roller bearings, single row ..... 516
322	Tapered roller bearings, single row ..... 516
323	Tapered roller bearings, single row ..... 516
323..-A	Tapered roller bearings, single row, modified internal construction ..... 516
323..-B	Tapered roller bearings, single row, increased contact angle ..... 516
329	Tapered roller bearings, single row ..... 516
33	Angular contact ball bearings, double row, filling slot..... 282
33..-B	Angular contact ball bearings, double row..... 282
33..-B-2RSR	Angular contact ball bearings, double row, lip seals ..... 282
33..-B-ZZ	Angular contact ball bearings, double row, gap seals ..... 282
33..-DA	Angular contact ball bearings, double row, split inner ring ..... 282
330	Tapered roller bearings, single row ..... 516
331	Tapered roller bearings, single row ..... 516
332	Tapered roller bearings, single row ..... 516

# Product index

	Page
38..-B	Angular contact ball bearings, double row ..... 282
38..-B-2RSR	Angular contact ball bearings, double row, lip seals ..... 282
38..-B-2Z	Angular contact ball bearings, double row, gap seals..... 282
42..-B	Deep groove ball bearings, double row..... 206
43..-B	Deep groove ball bearings, double row..... 206
511	Axial deep groove ball bearings, single direction, flat housing locating washer..... 816
512	Axial deep groove ball bearings, single direction, flat housing locating washer..... 816
513	Axial deep groove ball bearings, single direction, flat housing locating washer..... 816
514	Axial deep groove ball bearings, single direction, flat housing locating washer..... 816
522	Axial deep groove ball bearings, double direction, flat housing locating washers ..... 816
523	Axial deep groove ball bearings, double direction, flat housing locating washers ..... 816
532	Axial deep groove ball bearings, single direction, spherical housing locating washer, without seating washer ..... 816
532 + U2	Axial deep groove ball bearings, single direction, spherical housing locating washer, with seating washer ..... 816
533	Axial deep groove ball bearings, single direction, spherical housing locating washer, without seating washer ..... 816
533 + U3	Axial deep groove ball bearings, single direction, spherical housing locating washer, with seating washer ..... 816
542	Axial deep groove ball bearings, double direction, spherical housing locating washers, without seating washers ..... 816
542 + U2	Axial deep groove ball bearings, double direction, spherical housing locating washers, with seating washers ..... 816
543	Axial deep groove ball bearings, double direction, spherical housing locating washers, without seating washers ..... 816
543 + U3	Axial deep groove ball bearings, double direction, spherical housing locating washers, with seating washers ..... 816



	Page
60	Deep groove ball bearings, single row ..... 206
60..-2RSR	Deep groove ball bearings, single row, lip seals ..... 206
60..-Z2	Deep groove ball bearings, single row, gap seals..... 206
618	Deep groove ball bearings, single row ..... 206
618..-2RSR	Deep groove ball bearings, single row, lip seals ..... 206
618..-Z2	Deep groove ball bearings, single row, gap seals..... 206
619	Deep groove ball bearings, single row ..... 206
619..-2RSR	Deep groove ball bearings, single row, lip seals ..... 206
619..-Z2	Deep groove ball bearings, single row, gap seals..... 206
62	Deep groove ball bearings, single row ..... 206
62(622)..-2RSR	Deep groove ball bearings, single row, lip seals ..... 206
62..-Z2	Deep groove ball bearings, single row, gap seals..... 206
63	Deep groove ball bearings, single row ..... 206
63(623)..-2RSR	Deep groove ball bearings, single row, lip seals ..... 206
63..-Z2	Deep groove ball bearings, single row, gap seals..... 206
64	Deep groove ball bearings, single row ..... 206
70..-B	Angular contact ball bearings, single row ..... 262
70..-B-2RS	Angular contact ball bearings, single row, lip seals..... 262
718..-B	Angular contact ball bearings, single row ..... 262
72..-B	Angular contact ball bearings, single row ..... 262
72..-B-2RS	Angular contact ball bearings, single row, lip seals..... 262
73..-B	Angular contact ball bearings, single row ..... 262
73..-B-2RS	Angular contact ball bearings, single row, lip seals..... 262
7602	Axial angular contact ball bearings, single row, for sets ..... 1013
7602..-2RS	Axial angular contact ball bearings, single row, for sets, lip seals ..... 1013
7603	Axial angular contact ball bearings, single row, for sets ..... 1013
7603..-2RS	Axial angular contact ball bearings, single row, for sets, lip seals ..... 1013
811	Axial cylindrical roller bearings, single row ..... 858
812	Axial cylindrical roller bearings, single row ..... 858
893	Axial cylindrical roller bearings, double row ..... 858
894	Axial cylindrical roller bearings, double row ..... 858

# Product index

	Page
AH(X)23	Withdrawal sleeves..... 1452
AH(X)3	Withdrawal sleeves..... 1452
AH(X)30	Withdrawal sleeves..... 1452
AH(X)31	Withdrawal sleeves..... 1452
AH(X)32	Withdrawal sleeves..... 1452
AH2	Withdrawal sleeves..... 1452
AH240	Withdrawal sleeves..... 1452
AH241	Withdrawal sleeves..... 1452
AH33	Withdrawal sleeves..... 1452
AH39	Withdrawal sleeves..... 1452
AM	Precision locknuts, axial locking ..... 1094
Arcanol	Rolling bearing greases..... 1536
AS	Axial bearing washers ..... 874
AXK	Axial needle roller and cage assemblies ..... 874
AXW	Axial needle roller bearings, centring spigot ..... 874
AY..-NPP-B	Insert bearings, spherical outer ring, grub screws in inner ring ..... 1160
B70	Standard spindle bearings ..... 304
B719	Standard spindle bearings ..... 304
B72	Standard spindle bearings ..... 304
BE	Self-aligning deep groove ball bearings, steel aligning ring ..... 1162
BK	Drawn cup needle roller bearings with closed end, cage ..... 682
BK..-RS	Drawn cup needle roller bearings with closed end, lip seal ..... 682
BND	Plummer block housings, unsplit ..... 1323
BSB	Axial angular contact ball bearings, single row, for sets ..... 1013
BSB..-2RS	Axial angular contact ball bearings, single row, for sets, lip seals..... 1013

	Page
CRB	Insert bearings, rubber interliner, locking collar ..... 1163
DKLFA..-2RS	Axial angular contact ball bearings, triple row, flattened flange, for screw mounting, lip seals..... 1013
DRS	Seal carrier assemblies for needle roller/axial cylindrical roller bearings ZARF..... 1094
E..-KLL	Insert bearings, cylindrical outer ring, locking collar ..... 1198
E..-KRR	Insert bearings, cylindrical outer ring, locking collar ..... 1198
E..-KRR-B	Insert bearings, spherical outer ring, locking collar..... 1160
F112	Flanged housings ..... 1323
F5 (F505 to F513)	Flanged housings ..... 1322
F5 (F515 to F522)	Flanged housings ..... 1322
FLCTE	Two-bolt flanged housing units, cast iron, locking collar, P seals ..... 1214
FLCTEY	Two-bolt flanged housing units, cast iron, grub screws in inner ring, P seals ..... 1214
G	Sealing rings, single lip ..... 806
G..-KRR-B-AS2/V	Insert bearings, spherical outer ring, locking collar, inch size bore ..... 1164
GAY..-NPP-B	Insert bearings, spherical outer ring, grub screws in inner ring ..... 1160
GAY..-NPP-B-FA164	Insert bearings, spherical outer ring, grub screws in inner ring, for high temperatures ..... 1160
GE..-KLL-B	Insert bearings, spherical outer ring, locking collar..... 1160
GE..-KRR-B	Insert bearings, spherical outer ring, locking collar..... 1160
GE..-KRR-B-2C	Insert bearings, spherical outer ring, locking collar, flinger shields..... 1160
GE..-KRR-B-FA101	Insert bearings, spherical outer ring, locking collar, for high and low temperatures ..... 1160
GE..-KRR-B-FA125.5	Insert bearings, spherical outer ring, locking collar, Corrotect® ..... 1184
GE..-KRR-B-FA164	Insert bearings, spherical outer ring, locking collar, for high temperatures ..... 1184
GE..-KTT-B	Insert bearings, spherical outer ring, locking collar, T seals..... 1160

# Product index

		Page
GLCTE	Two-bolt flanged housing units, cast iron, locking collar, P seals.....	1214
GLE..-KRR-B	Insert bearings, spherical outer ring, drive slot in inner ring .....	1161
GNE..-KRR-B	Insert bearings, spherical outer ring, locking collar, heavy series.....	1160
GR	Sealing rings, single lip, external steel reinforcement .....	806
GRA	Three/four-bolt flanged housing units, sheet steel, locking collar, P seals.....	1217
GRA..-NPP-B-AS2/V	Insert bearings, spherical outer ring, locking collar, inch size bore .....	1164
GRAE..-NPP-B	Insert bearings, spherical outer ring, locking collar .....	1160
GRAE..-NPP-B-FA125.5	Insert bearings, spherical outer ring, locking collar, Corrotect® .....	1184
GRRY..-VA	Three/four-bolt flanged housing units, corrosion-resistant sheet steel, corrosion-resistant bearing, grub screws in inner ring, R seals.....	1217
GS811	Housing locating washers .....	858
GS812	Housing locating washers .....	858
GS893	Housing locating washers .....	858
GS894	Housing locating washers .....	858
GSH..-2RSR-B	Insert bearings, spherical outer ring, adapter sleeve.....	1161
GVK..-KTT-B-AS2/V	Insert bearings, spherical outer ring, square bore .....	1161
GY..-KRR-B-AS2/V	Insert bearings, spherical outer ring, grub screws in inner ring, inch size bore .....	1164
GYE..-KRR-B	Insert bearings, spherical outer ring, grub screws in inner ring .....	1160
GYE..-KRR-B-VA	Insert bearings, spherical outer ring, grub screws in inner ring, corrosion-resistant.....	1160

	Page
H2	Adapter sleeves, with nut and retainer ..... 1452
H23	Adapter sleeves, with nut and retainer ..... 1452
H240	Adapter sleeves, with nut and retainer ..... 1452
H241	Adapter sleeves, with nut and retainer ..... 1452
H3	Adapter sleeves, with nut and retainer ..... 1452
H30	Adapter sleeves, with nut and retainer ..... 1452
H31	Adapter sleeves, with nut and retainer ..... 1452
H32	Adapter sleeves, with nut and retainer ..... 1452
H33	Adapter sleeves, with nut and retainer ..... 1452
H39	Adapter sleeves, with nut and retainer ..... 1452
HCB70	Standard spindle bearings, ceramic balls..... 304
HCB719	Standard spindle bearings, ceramic balls..... 304
HCB72	Standard spindle bearings, ceramic balls..... 304
HCS70	High speed spindle bearings, ceramic balls, sealed ..... 304
HCS719	High speed spindle bearings, ceramic balls, sealed ..... 304
HF	Drawn cup roller clutches, without bearing arrangement, without knurling, steel springs ..... 790
HF..-KF	Drawn cup roller clutches, without bearing arrangement, plastic springs..... 790
HF..-KF-R	Drawn cup roller clutches, without bearing arrangement, with knurling, plastic springs ..... 790
HF..-R	Drawn cup roller clutches, without bearing arrangement, with knurling, steel springs ..... 790
HFL	Drawn cup roller clutches, with bearing arrangement, without knurling, steel springs ..... 790
HFL..-KF	Drawn cup roller clutches, with bearing arrangement, plastic springs..... 790
HFL..-KF-R	Drawn cup roller clutches, with bearing arrangement, with knurling, plastic springs ..... 790
HFL..-R	Drawn cup roller clutches, with bearing arrangement, with knurling, steel springs ..... 790

# Product index

	Page
HK	Drawn cup needle roller bearings with open ends, cage ..... 682
HK...2RS	Drawn cup needle roller bearings with open ends, lip seals ..... 682
HK...RS	Drawn cup needle roller bearings with open ends, lip seal ..... 682
HM	Locknuts ..... 1452
HM30	Locknuts ..... 1452
HM31	Locknuts ..... 1452
HMZ	Shaft nuts ..... 1452
HN	Drawn cup needle roller bearings, full complement ..... 682
HSS70	High speed spindle bearings, sealed ..... 304
HSS719	High speed spindle bearings, sealed ..... 304
IR	Inner rings, precision machined ..... 778
IR...IS1	Inner rings, precision machined, lubrication hole ..... 778
JK0S	Integral tapered roller bearings, sealed ..... 516
K	Tapered roller bearings, single row, inch sizes ..... 516
K	Needle roller and cage assemblies, single row ..... 666
K...ZW	Needle roller and cage assemblies, double row ..... 666
K811	Axial cylindrical roller and cage assemblies, single row ..... 858
K812	Axial cylindrical roller and cage assemblies, single row ..... 858
K893	Axial cylindrical roller and cage assemblies, double row ..... 858
K894	Axial cylindrical roller and cage assemblies, double row ..... 858
KLRU	Track rollers with plastic tyre, spherical outside surface ..... 987
KLRZ	Track rollers with plastic tyre, cylindrical outside surface ..... 987
KM	Locknuts ..... 1452
KML	Locknuts ..... 1452
KR	Stud type track rollers, cage, gap seals ..... 936
KR...PP	Stud type track rollers, cage, axial plain washers ..... 936
KR52...2RS	Stud type track rollers, double row, lip seals ..... 986
KRE...PP	Stud type track rollers, eccentric collar, cage, axial plain washers ..... 937
KRV...PP	Stud type track rollers, full complement, axial plain washers ..... 936

	Page
<b>KSR..-B0</b>	Roller chain idler sprocket units, radial insert ball bearing ..... 1312
<b>KSR..-L0</b>	Roller chain idler sprocket units, deep groove ball bearing ..... 1312
<b>KSR..-L0..-22</b>	Roller chain idler sprocket units, plastic sprocket, deep groove ball bearing ..... 1312
<b>KUG</b>	Steel balls, to DIN 5 401-1/ISO 3 290 ..... 1512
<b>LASE..-N</b>	Plummer block housing units, cast iron, locking collar, L seals..... 1214
<b>LCJT..-N</b>	Two-bolt flanged housing units, cast iron, locking collar, L seals..... 1214
<b>LOE</b>	Plummer block housings, split, for oil lubrication ..... 1322
<b>LR</b>	Inner rings, ground ..... 778
<b>LR2</b>	Yoke type track rollers, single row, lip seals ..... 986
<b>LR50</b>	Yoke type track rollers, double row, lip seals ..... 986
<b>LR52</b>	Yoke type track rollers, double row, lip or gap seals..... 986
<b>LR53</b>	Yoke type track rollers, double row, lip or gap seals..... 986
<b>LR6</b>	Yoke type track rollers, single row, lip seals ..... 986
<b>LR60</b>	Yoke type track rollers, single row, lip seals ..... 986
<b>LS</b>	Bearing washers..... 858
<b>LSL1923</b>	Cylindrical roller bearings with disc cage..... 448
<b>MB</b>	Tab washers ..... 1452
<b>MBL</b>	Tab washers ..... 1452
<b>MS30</b>	Retaining brackets, with screw..... 1452
<b>MS31</b>	Retaining brackets, with screw..... 1452
<b>MSTU</b>	Take-up housing units, sheet steel, locking collar, P seals, without relubrication facility..... 1216
<b>N2..-E</b>	Cylindrical roller bearings with cage, non-locating bearings ..... 396
<b>N3..-E</b>	Cylindrical roller bearings with cage, non-locating bearings ..... 396
<b>NA22..-2RSR</b>	Yoke type track rollers, without axial guidance, inner ring, lip seals ..... 930

## Product index

	Page
NA48	Needle roller bearings with ribs, inner ring ..... 704
NA49	Needle roller bearings with ribs, inner ring ..... 704
NA49..-2RSR	Needle roller bearings with ribs, inner ring, lip seals ..... 704
NA49..-RSR	Needle roller bearings with ribs, inner ring, lip seal ..... 704
NA69	Needle roller bearings with ribs, inner ring ..... 704
NA69..-ZW	Needle roller bearings with ribs, inner ring, double row ..... 704
NAO	Needle roller bearings with ribs, inner ring, single row ..... 738
NAO..-ZW-ASR1	Needle roller bearings without ribs, inner ring, double row ..... 738
NATR	Yoke type track rollers, axial guidance, cage, gap seals ..... 931
NATR..-PP	Yoke type track rollers, axial guidance, cage, axial plain washers ..... 931
NATV	Yoke type track rollers, axial guidance, full complement needle roller set, gap seals ..... 931
NATV..-PP	Yoke type track rollers, axial guidance, full complement needle roller set, axial plain washers ..... 931
NJ2..-E	Cylindrical roller bearings with cage, semi-locating ..... 396
NJ2..-E + HJ	Cylindrical roller bearings with cage, locating, L-section ring ..... 396
NJ22..-E	Cylindrical roller bearings with cage, semi-locating ..... 396
NJ22..-E + HJ	Cylindrical roller bearings with cage, locating, L-section ring ..... 396
NJ23..-E	Cylindrical roller bearings with cage, semi-locating ..... 396
NJ23..-E + HJ	Cylindrical roller bearings with cage, locating, L-section ring ..... 396
NJ3..-E	Cylindrical roller bearings with cage, semi-locating ..... 396
NJ3..-E + HJ	Cylindrical roller bearings with cage, locating, L-section ring ..... 396
NJ4	Cylindrical roller bearings with cage, semi-locating ..... 396
NJ4 + HJ	Cylindrical roller bearings with cage, locating, L-section ring ..... 396
NK	Needle roller bearings with ribs, without inner ring ..... 704
NKI	Needle roller bearings with ribs, inner ring ..... 704
NKIA	Needle roller/angular contact ball bearings, inner ring ..... 760
NKIB	Needle roller/angular contact ball bearings, inner ring ..... 760
NKIS	Needle roller bearings with ribs, inner ring ..... 704
NKS	Needle roller bearings with ribs, without inner ring ..... 704



	Page
<b>NKX</b>	Needle roller/axial deep groove ball bearings, without inner ring, without end cap ..... 760
<b>NKX..-Z</b>	Needle roller/axial deep groove ball bearings, without inner ring, with end cap ..... 760
<b>NKXR</b>	Needle roller/axial cylindrical roller bearings, without inner ring, without end cap ..... 760
<b>NKXR..-Z</b>	Needle roller/axial cylindrical roller bearings, without inner ring, with end cap ..... 760
<b>NN30..-AS-K-M-SP</b>	High precision cylindrical roller bearings, non-locating, double row ..... 502
<b>NNTR..-2ZL</b>	Yoke type track rollers, axial guidance, full complement cylindrical roller set, central rib, sealing shields with lamellar ring ..... 931
<b>NRB</b>	Needle rollers, to DIN 5 402-3/ISO 3 096, type B, flat end faces, profiled ends ..... 1530
<b>NU10</b>	Cylindrical roller bearings with cage, non-locating ..... 396
<b>NU19</b>	Cylindrical roller bearings with cage, non-locating ..... 396
<b>NU2..-E</b>	Cylindrical roller bearings with cage, non-locating ..... 396
<b>NU22..-E</b>	Cylindrical roller bearings with cage, non-locating ..... 396
<b>NU23..-E</b>	Cylindrical roller bearings with cage, non-locating ..... 396
<b>NU3..-E</b>	Cylindrical roller bearings with cage, non-locating ..... 396
<b>NU4</b>	Cylindrical roller bearings with cage, non-locating ..... 396
<b>NUKR</b>	Stud type track rollers, full complement cylindrical roller set, labyrinth seals ..... 936
<b>NUKRE</b>	Stud type track rollers, eccentric collar, full complement cylindrical roller set, labyrinth seals ..... 937
<b>NUP2..-E</b>	Cylindrical roller bearings with cage, locating, rib washer ..... 396
<b>NUP22..-E</b>	Cylindrical roller bearings with cage, locating, rib washer ..... 396
<b>NUP23..-E</b>	Cylindrical roller bearings with cage, locating, rib washer ..... 396
<b>NUP3..-E</b>	Cylindrical roller bearings with cage, locating, rib washer ..... 396
<b>NUTR</b>	Yoke type track rollers, axial guidance, full complement cylindrical roller set, labyrinth seals ..... 931
<b>NX</b>	Needle roller/axial deep groove ball bearings, without inner ring, without end cap ..... 760
<b>NX..-Z</b>	Needle roller/axial deep groove ball bearings, without inner ring, with end cap ..... 760

# Product index

	Page
<b>PASE..-N</b>	Plummer block housing units, cast iron, locking collar, P seals..... 1214
<b>PASE..-N-FA125</b>	Plummer block housing units, cast iron, locking collar, P seals, Corrotect® ..... 1242
<b>PASEY..-N</b>	Plummer block housing units, cast iron, grub screws in inner ring, P seals..... 1214
<b>PB</b>	Plummer block housing units, sheet steel, locking collar, P seals..... 1217
<b>PBS</b>	Plummer block housing units, sheet steel, locking collar, P seals..... 1217
<b>PBY</b>	Plummer block housing units, sheet steel, grub screws in inner ring, P seals..... 1217
<b>PCCJ</b>	Four-bolt flanged housing units, cast iron, centring spigot, double row angular contact ball bearing, P seals..... 1215
<b>PCF</b>	Four-bolt flanged housing units, cast iron, locking collar, P seals..... 1215
<b>PCFT</b>	Two-bolt flanged housing units, cast iron, locking collar, P seals..... 1214
<b>PCFTR</b>	Three-bolt flanged housing units, cast iron, locking collar, P seals..... 1215
<b>PCJ..-N</b>	Four-bolt flanged housing units, cast iron, locking collar, P seals..... 1215
<b>PCJ..-N-FA125</b>	Four-bolt flanged housing units, cast iron, locking collar, P seals, Corrotect® ..... 1270
<b>PCJT..-N</b>	Two-bolt flanged housing units, cast iron, locking collar, P seals..... 1214
<b>PCJT..-N-FA125</b>	Two-bolt flanged housing units, cast iron, locking collar, P seals, Corrotect® ..... 1258
<b>PCJTY..-N</b>	Two-bolt flanged housing units, cast iron, grub screws in inner ring, P seals..... 1214
<b>PCJY..-N</b>	Four-bolt flanged housing units, cast iron, grub screws in inner ring, P seals..... 1215

	Page
<b>PCSLT</b>	Two-bolt flanged housing units, sheet steel, locking collar, P seals ..... 1217
<b>PE</b>	Insert bearings, steel aligning ring, locking collar, P seals ..... 1162
<b>PHE</b>	Take-up housing units, cast iron, locking collar, P seals ..... 1216
<b>PHEY</b>	Take-up housing units, cast iron, grub screws in inner ring, P seals ..... 1216
<b>PHUSE</b>	Take-up housing units, cast iron and sheet steel, locking collar, P seals ..... 1216
<b>PME..-N</b>	Four-bolt flanged housing units, cast iron, centring spigot, locking collar, P seals..... 1215
<b>PMEY..-N</b>	Four-bolt flanged housing units, cast iron, centring spigot, grub screws in inner ring, P seals..... 1215
<b>PNA</b>	Aligning needle roller bearings, inner ring ..... 752
<b>PSFT</b>	Take-up housing units, cast iron, locking collar, P seals ..... 1216
<b>PSHE..-N</b>	Plummer block housing units, cast iron, locking collar, P seals ..... 1214
<b>PSHEY..-N</b>	Plummer block housing units, cast iron, grub screws in inner ring, P seals ..... 1214
<b>PTUE</b>	Take-up housing units, cast iron, locking collar, P seals ..... 1216
<b>PTUEY</b>	Take-up housing units, cast iron, grub screws in inner ring, P seals ..... 1216
<b>PWKR..-2RS</b>	Stud type track rollers, full complement cylindrical roller set, central rib, protected lip seals ..... 936
<b>PWKRE..-2RS</b>	Stud type track rollers, eccentric collar, full complement cylindrical roller set, central rib, protected lip seals ..... 937
<b>PWTR..-2RS</b>	Yoke type track rollers, axial guidance, full complement cylindrical roller set, central rib, protected lip seals ..... 931
<b>QJ2</b>	Four point contact bearings, without retaining slots ..... 350
<b>QJ2..-N2</b>	Four point contact bearings, with retaining slots ..... 350
<b>QJ3</b>	Four point contact bearings, without retaining slots ..... 350
<b>QJ3..-N2</b>	Four point contact bearings, with retaining slots ..... 350
<b>RA</b>	Three/four-bolt flanged housing units, sheet steel, locking collar, P seals ..... 1217

# Product index

	Page
<b>RA...NPP</b>	Insert bearings, cylindrical outer ring, locking collar, inch size bore ..... 1164
<b>RA...NPP-B</b>	Insert bearings, spherical outer ring, locking collar, inch size bore ..... 1164
<b>RABRA(B)</b>	Insert bearings, rubber interliner, locking collar ..... 1163
<b>RAE...NPP</b>	Insert bearings, cylindrical outer ring, locking collar ..... 1162
<b>RAE...NPP-B</b>	Insert bearings, spherical outer ring, locking collar ..... 1160
<b>RAE...NPP-NR</b>	Insert bearings, cylindrical outer ring with two slots, locking collar, snap ring ..... 1163
<b>RAL...NPP</b>	Insert bearings, cylindrical outer ring, locking collar, inch size bore, light series ..... 1164
<b>RALE...NPP</b>	Insert bearings, cylindrical outer ring, locking collar, light series ..... 1162
<b>RALE...NPP-B</b>	Insert bearings, spherical outer ring, locking collar, light series ..... 1160
<b>RALT</b>	Two-bolt flanged housing units, sheet steel, locking collar, P seals, light series ..... 1217
<b>RALTR</b>	Three-bolt flanged housing units, sheet steel, locking collar, P seals, light series, without relubrication facility..... 1217
<b>RASE...FA164</b>	Plummer block housing units, cast iron, locking collar, R seals, for high temperatures..... 1242
<b>RASE...N</b>	Plummer block housing units, cast iron, locking collar, R seals ..... 1214
<b>RASE...N-FA125</b>	Plummer block housing units, cast iron, locking collar, R seals, Corrotect® ..... 1242
<b>RASEA...N</b>	Plummer block housing units, cast iron, adapter sleeve, R seals ..... 1214
<b>RASEL...N</b>	Plummer block housing units, cast iron, drive slot in inner ring, R seals..... 1214
<b>RASEY...JIS</b>	Plummer block housing units, cast iron, grub screws in inner ring, R seals, to JIS standard ..... 1214
<b>RASEY...N</b>	Plummer block housing units, cast iron, grub screws in inner ring, R seals..... 1214
<b>RAT</b>	Two-bolt flanged housing units, sheet steel, locking collar, P seals..... 1217
<b>RATR</b>	Three-bolt flanged housing units, sheet steel, locking collar, P seals..... 1217
<b>RATRY</b>	Three-bolt flanged housing units, sheet steel, grub screws in inner ring, P seals..... 1217

	Page
<b>RATY</b>	Two-bolt flanged housing units, sheet steel, grub screws in inner ring, P seals ..... 1217
<b>RAY</b>	Three/four-bolt flanged housing units, sheet steel, grub screws in inner ring, P seals ..... 1217
<b>RCJ..-FA164</b>	Four-bolt flanged housing units, cast iron, locking collar, R seals, for high temperatures ..... 1270
<b>RCJ..-N</b>	Four-bolt flanged housing units, cast iron, locking collar, R seals ..... 1215
<b>RCJ..-N-FA125</b>	Four-bolt flanged housing units, cast iron, locking collar, R seals, Corrotect® ..... 1270
<b>RCJL..-N</b>	Four-bolt flanged housing units, cast iron, drive slot in inner ring, R seals ..... 1215
<b>RCJO</b>	Four-bolt flanged housing units, cast iron, locking collar, R seals, heavy series ..... 1215
<b>RCJT..-FA164</b>	Two-bolt flanged housing units, cast iron, locking collar, R seals, for high temperatures ..... 1260
<b>RCJT..-N</b>	Two-bolt flanged housing units, cast iron, locking collar, R seals ..... 1214
<b>RCJT..-N-FA125</b>	Two-bolt flanged housing units, cast iron, locking collar, R seals, Corrotect® ..... 1258
<b>RCJTA..-N</b>	Two-bolt flanged housing units, cast iron, adapter sleeve, R seals ..... 1214
<b>RCJTY..-JIS</b>	Two-bolt flanged housing units, cast iron, grub screws in inner ring, R seals, to JIS standard ..... 1214
<b>RCJTY..-N</b>	Two-bolt flanged housing units, cast iron, grub screws in inner ring, R seals ..... 1214
<b>RCJTZ</b>	Two-bolt flanged housing units, cast iron, centring spigot, locking collar, R seals..... 1214
<b>RCJY..-JIS</b>	Four-bolt flanged housing units, cast iron, grub screws in inner ring, R seals, to JIS standard ..... 1215
<b>RCJY..-N</b>	Four-bolt flanged housing units, cast iron, grub screws in inner ring, R seals ..... 1215
<b>RCRA(B)</b>	Insert bearings, rubber interliner, locking collar ..... 1163
<b>RCSMA(B)</b>	Insert bearings, rubber interliner, locking collar ..... 1163
<b>RCSMF</b>	Two-bolt flanged housing units, sheet steel, rubber interliner, locking collar, P seals..... 1217

# Product index

	Page
RFE	Four-bolt flanged housing units, cast iron, centring spigot, locking collar, R seals ..... 1215
RHE	Take-up housing units, cast iron, locking collar, R seals ..... 1216
RME..-N	Four-bolt flanged housing units, cast iron, centring spigot, locking collar, R seals ..... 1215
RMEO	Four-bolt flanged housing units, cast iron, centring spigot, locking collar, R seals, heavy series ..... 1215
RMEY..-N	Four-bolt flanged housing units, cast iron, centring spigot, grub screws in inner ring, R seals ..... 1215
RNA22..-2RSR	Yoke type track rollers, without axial guidance, without inner ring, lip seals ..... 930
RNA48	Needle roller bearings with ribs, without inner ring ..... 704
RNA49	Needle roller bearings with ribs, without inner ring ..... 704
RNA49..-2RSR	Needle roller bearings with ribs, without inner ring, lip seals ..... 704
RNA49..-RSR	Needle roller bearings with ribs, without inner ring, lip seal ..... 704
RNA69	Needle roller bearings with ribs, without inner ring, single row ..... 704
RNA69..-ZW	Needle roller bearings with ribs, without inner ring, double row ..... 704
RNAO	Needle roller bearings without ribs, without inner ring, single row ..... 738
RRY..-VA	Three/four-bolt flanged housing units, corrosion-resistant sheet steel, corrosion-resistant bearing, grub screws in inner ring, R seals ..... 1217
RNAO..-ZW-ASR1	Needle roller bearings without ribs, without inner ring, double row, lubrication hole in outer ring ..... 738
RPB	Plummer block housing units, sheet steel, rubber interliner, locking collar, P seals ..... 1217
RPNA	Aligning needle roller bearings, without inner ring ..... 752
RRTR	Three-bolt flanged housing units, sheet steel, locking collar, R seals ..... 1217
RRY..-VA	Three/four-bolt flanged housing units, corrosion-resistant sheet steel, corrosion-resistant bearing, grub screws in inner ring, R seals ..... 1217
RSAO	Plummer block housing units, cast iron, locking collar, R seals, heavy series ..... 1214
RSHE..-N	Plummer block housing units, cast iron, locking collar, R seals ..... 1214
RSHEY..-N	Plummer block housing units, cast iron, grub screws in inner ring, R seals ..... 1214

	Page
<b>RSRA..-KO</b>	Idler pulley units, deep groove ball bearing ..... 1312
<b>RSRA..-LO</b>	Idler pulley units, deep groove ball bearing ..... 1312
<b>RSRB..-LO</b>	Idler pulley units, deep groove ball bearing ..... 1312
<b>RSRD..-LO</b>	Idler pulley units, deep groove ball bearing ..... 1312
<b>RSTO</b>	Yoke type track rollers, without axial guidance, without inner ring ..... 930
<b>RTC</b>	Axial/radial bearings, double direction ..... 1112
<b>RTUE</b>	Take-up housing units, cast iron, locking collar, R seals ..... 1216
<b>RTUEO</b>	Take-up housing units, cast iron, locking collar, R seals, heavy series ..... 1216
<b>RTUEY</b>	Take-up housing units, cast iron, grub screws in inner ring, R seals ..... 1216
<b>S30</b>	Plummer block housings, split ..... 1322
<b>SD</b>	Sealing rings, double lip ..... 806
<b>SD31</b>	Plummer block housings, split ..... 1322
<b>SK...KRR-B</b>	Insert bearings, spherical outer ring, hexagonal bore ..... 1161
<b>SL0148</b>	Cylindrical roller bearings, full complement, locating, double row ..... 480
<b>SL0149</b>	Cylindrical roller bearings, full complement, locating, double row ..... 480
<b>SL0248</b>	Cylindrical roller bearings, full complement, non-locating, double row ..... 480
<b>SL0249</b>	Cylindrical roller bearings, full complement, non-locating, double row ..... 480
<b>SL04..-PP</b>	Cylindrical roller bearings, full complement, snap ring grooves, locating, lip seals ..... 480
<b>SL0450..-PP</b>	Cylindrical roller bearings, full complement, snap ring grooves, locating, lip seals ..... 480
<b>SL1818</b>	Cylindrical roller bearings, full complement, semi-locating, single row ..... 462
<b>SL1822</b>	Cylindrical roller bearings, full complement, semi-locating, single row ..... 462
<b>SL1829</b>	Cylindrical roller bearings, full complement, semi-locating, single row ..... 462
<b>SL1830</b>	Cylindrical roller bearings, full complement, semi-locating, single row ..... 462
<b>SL1850</b>	Cylindrical roller bearings, full complement, semi-locating, double row ..... 480
<b>SL1923</b>	Cylindrical roller bearings, full complement, semi-locating, single row ..... 462
<b>SNV</b>	Plummer block housings, split ..... 1322
<b>STO</b>	Yoke type track rollers, without axial guidance, inner ring ..... 930
<b>SX</b>	Crossed roller bearings, dimension series 18 ..... 898

# Product index

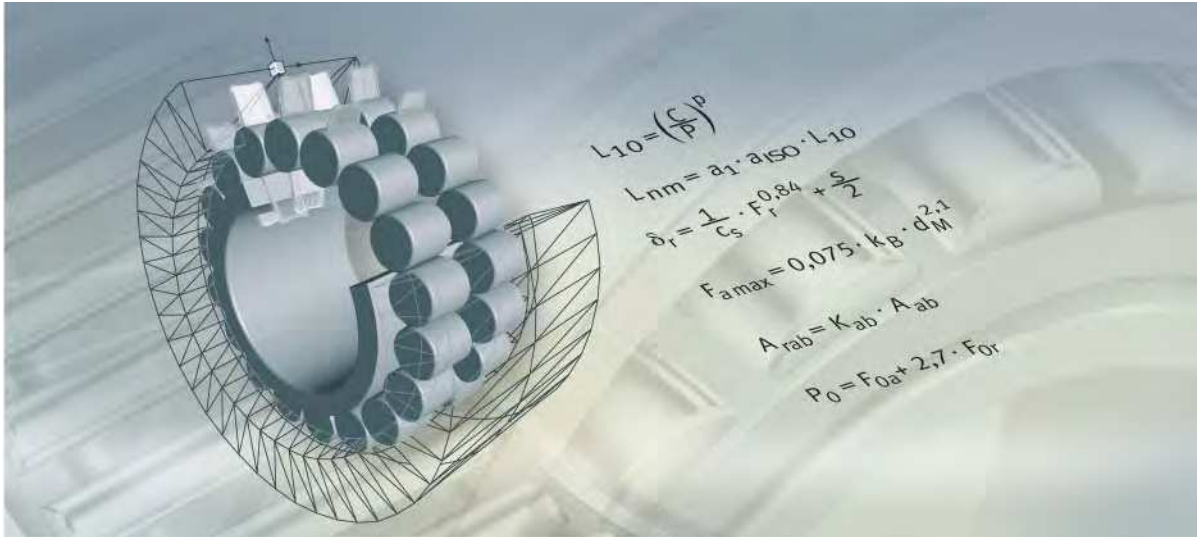
	Page
<b>T</b>	Tapered roller bearings, single row..... 516
<b>TASE..-N</b>	Plummer block housing units, cast iron, locking collar, T seals..... 1214
<b>TCJ</b>	Four-bolt flanged housing units, cast iron, locking collar, T seals..... 1215
<b>TCJT..-N</b>	Two-bolt flanged housing units, cast iron, locking collar, T seals..... 1214
<b>TFE</b>	Four-bolt flanged housing units, cast iron, centring spigot, locking collar, T seals ..... 1215
<b>THE</b>	Take-up housing units, cast iron, locking collar, T seals..... 1216
<b>TME..-N</b>	Four-bolt flanged housing units, cast iron, centring spigot, locking collar, T seals ..... 1215
<b>TSHE..-N</b>	Plummer block housing units, cast iron, locking collar, T seals..... 1214
<b>TTUE</b>	Take-up housing units, cast iron, locking collar, T seals..... 1216
<b>VK..-KTT-B</b>	Insert bearings, spherical outer ring, square bore ..... 1161
<b>VR3</b>	Plummer block housings, unsplit ..... 1323
<b>WS811</b>	Shaft locating washers..... 858
<b>WS812</b>	Shaft locating washers..... 858
<b>WS893</b>	Shaft locating washers..... 858
<b>WS894</b>	Shaft locating washers..... 858
<b>YRT</b>	Axial/radial bearings, double direction ..... 1112
<b>YRTM</b>	Axial/radial bearings with integral angular measuring system..... 1146
<b>YRT<sub>Speed</sub></b>	Axial/radial bearings, double direction, for higher speeds ..... 1112
<b>ZARF</b>	Needle roller/axial cylindrical roller bearings, for screw mounting ..... 1066
<b>ZARF..-L</b>	Needle roller/axial cylindrical roller bearings, for screw mounting, extended shaft locating washer..... 1066



	Page
<b>ZARN</b>	Needle roller/axial cylindrical roller bearings ..... 1066
<b>ZARN..-L</b>	Needle roller/axial cylindrical roller bearings, extended shaft locating washer..... 1066
<b>ZKLDF</b>	Axial angular contact ball bearings, double direction..... 1112
<b>ZKLF..-2RS</b>	Axial angular contact ball bearings, double row, for screw mounting, lip seals ..... 1012
<b>ZKLF..-2RS-2AP</b>	Axial angular contact ball bearings, double row, for screw mounting, matched pair, lip seals..... 1012
<b>ZKLF..-2RS-PE</b>	Axial angular contact ball bearings, double row, for screw mounting, lip seals, less stringent tolerances ..... 1012
<b>ZKLF..-2Z</b>	Axial angular contact ball bearings, double direction, for screw mounting, gap seals..... 1012
<b>ZKLFA..-2RS</b>	Axial angular contact ball bearings, double row, flattened flange, for screw mounting, lip seals..... 1013
<b>ZKLFA..-2Z</b>	Axial angular contact ball bearings, double row, flattened flange, for screw mounting, gap seals..... 1013
<b>ZKLN..-2RS</b>	Axial angular contact ball bearings, double row, lip seals ..... 1012
<b>ZKLN..-2RS-2AP</b>	Axial angular contact ball bearings, double row, matched pair, lip seals ..... 1012
<b>ZKLN..-2RS-PE</b>	Axial angular contact ball bearings, double row, lip seals, less stringent tolerances ..... 1012
<b>ZKLN..-2Z</b>	Axial angular contact ball bearings, double row, gap seals..... 1012
<b>ZKLR..-2RS</b>	Angular contact ball bearing units, for screw mounting, lip seals ..... 1013
<b>ZKLR..-2Z</b>	Angular contact ball bearing units, for screw mounting, gap seals..... 1013
<b>ZL2..-DRS</b>	Stud type track rollers, single row, lip seal on stud side..... 986
<b>ZL52..-DRS</b>	Stud type track rollers, double row, lip seal on stud side..... 986
<b>ZLE52..-2Z</b>	Stud type track rollers, eccentric collar, double row, sealing shields ..... 986
<b>ZM(A)</b>	Precision locknuts, radial locking..... 1094
<b>ZRB</b>	Cylindrical rollers, to DIN 5 402-1, profiled ends or logarithmic profile ..... 1520
<b>ZSL1923</b>	Cylindrical roller bearings with spacers ..... 448



**FAG**



## Technical principles

Load carrying capacity and life

Rigidity

Friction and increases in temperature

Speeds

Lubrication

Bearing data

Design of bearing arrangements

Fitting and dismantling

# Technical principles

	Page
<b>Load carrying capacity and life</b>	Fatigue theory as a principle ..... 40
	Dimensioning of rolling bearings..... 41
	Dynamic load carrying capacity and life..... 41
	Life calculation ..... 42
	Basic rating life ..... 42
	Adjusted rating life..... 43
	Expanded adjusted rating life..... 46
	Equivalent operating values..... 51
	Variable load and speed ..... 51
	Required basic rating life ..... 53
	Operating life ..... 56
	Axial load carrying capacity of cylindrical roller bearings ..... 57
	Bearings of TB design..... 57
	Permissible and maximum axial load ..... 57
	Static load carrying capacity ..... 59
Static load safety factor..... 59	
<b>Rigidity</b>	Deflection ..... 61
<b>Friction and increases in temperature</b>	Friction..... 63
	Heat dissipation ..... 63
	Determining the friction values..... 64
	Cylindrical roller bearings under axial load ..... 69
<b>Speeds</b>	Thermal reference speed ..... 71
	Reference conditions ..... 71
	Limiting speed..... 72
	Thermally safe operating speed ..... 72
	Calculation of the thermally safe operating speed..... 73

# Technical principles

	Page
<b>Lubrication</b>	
Principles .....	76
Functions of the lubricant .....	76
Selection of the type of lubrication .....	77
Design of lubricant feed .....	78
Grease lubrication .....	79
Composition of a grease .....	79
Type of grease .....	80
Consistency of greases .....	80
Selection of suitable grease .....	81
Greases with special suitability .....	84
Grease operating life .....	86
Relubrication intervals .....	93
Miscibility .....	95
Storage life .....	95
Oil lubrication .....	96
Operating temperatures .....	96
Selection of suitable oil .....	96
Compatibility .....	99
Miscibility .....	99
Cleanliness .....	99
Lubrication methods .....	100
Oil changes .....	107

	Page
<b>Bearing data</b>	
Radial internal clearance .....	108
Enveloping circle.....	108
Operating clearance .....	109
Operating clearance value.....	109
Calculation of operating clearance .....	109
Axial internal clearance .....	111
Calculation example .....	112
Bearing materials .....	113
High Nitrogen Steel .....	113
High performance steels Cronidur and Cronitect .....	113
Ceramic materials .....	113
Materials and bearing components .....	114
Cages.....	114
Sheet metal cages.....	114
Solid section cages .....	115
Type of guidance.....	117
Operating temperature .....	118
Track rollers .....	118
Sealed bearings.....	118
Anti-corrosion protection .....	119
Corrotect® coating.....	119
Dimensional and geometrical tolerances.....	120
High precision bearings .....	120
Measurement methods .....	120
Radial bearings, excluding tapered roller bearings.....	122
Axial bearings.....	133
Chamfer dimensions.....	136
Radial bearings, excluding tapered roller bearings.....	136
Tapered roller bearings .....	138
Axial bearings.....	139

# Technical principles

	Page
<b>Design of bearing arrangements</b>	Selection of bearing arrangement..... 140
	Locating/non-locating bearing arrangement ..... 140
	Adjusted bearing arrangement..... 144
	Floating bearing arrangement ..... 146
	Fits ..... 147
	Criteria for selection of fits..... 147
	Conditions of rotation..... 148
	Shaft and housing tolerances..... 149
	Tolerance zones ..... 149
	Reference to tables
	of shaft and housing tolerances..... 149
	Tables of shaft and housing fits ..... 153
	Enveloping circle ..... 168
	Geometrical tolerances of bearing seating surfaces ..... 169
	Accuracy of bearing seating surfaces ..... 169
	Values for IT grades ..... 172
	Raceways for bearings without inner and/or outer ring..... 174
	Materials for raceways..... 174
	Axial location of bearings..... 176
	Design guidelines..... 176
	Adjusted and floating bearing arrangements..... 180
Seals ..... 181	
Non-contact seals in the adjacent construction ..... 181	
Non-contact seals in the bearing..... 184	
Contact seals in the adjacent construction..... 185	
Contact seals in the bearing ..... 187	

	Page
<b>Fitting and dismantling</b>	
Handling .....	188
Storage of rolling bearings .....	188
Storage of Arcanol rolling bearing greases .....	189
Unpacking of rolling bearings.....	190
Compatibility, miscibility.....	190
Cleaning of rolling bearings.....	190
Assembly .....	191
Guidelines for fitting .....	191
Fitting of rolling bearings with cylindrical seats.....	192
Fitting of rolling bearings with tapered bore .....	195
Guidelines for dismantling .....	196
Dismantling of rolling bearings on cylindrical seats .....	197
Dismantling of rolling bearings with tapered bore .....	198

# Load carrying capacity and life

Schaeffler Group Industrial introduced the “Expanded calculation of the adjusted rating life” in 1997. This method was standardised for the first time in DIN ISO 281 Appendix 1 and has been a constituent part of the international standard ISO 281 since 2007.

As part of the international standardisation work, the life adjustment factor  $a_{DIN}$  was renamed as  $a_{ISO}$  but without any change to the calculation method.

## Fatigue theory as a principle

The basis of the rating life calculation in accordance with ISO 281 is Lundberg and Palmgren's fatigue theory which always gives a final rating life.

However, modern, high quality bearings can exceed by a considerable margin the values calculated for the basic rating life under favourable operating conditions. Ioannides and Harris have developed a further model of fatigue in rolling contact that expands on the Lundberg/Palmgren theory and gives a better description of the performance capability of modern bearings.

The method “Expanded calculation of the adjusted rating life” takes account of the following influences:

- the bearing load
- the fatigue limit of the material
- the extent to which the surfaces are separated by the lubricant
- the cleanliness in the lubrication gap
- additives in the lubricant
- the internal load distribution and frictional conditions in the bearing.



The influencing factors, especially those relating to contamination, are extremely complex. A great deal of experience is essential for an accurate assessment. As a result the Engineering Service of Schaeffler Group Industrial should be consulted for further advice. The tables and diagrams can only give guide values.



## **Dimensioning of rolling bearings**

The required size of a rolling bearing is dependent on the demands made on its:

- rating life
- load carrying capacity
- operational reliability.

## **Dynamic load carrying capacity and life**

The dynamic load carrying capacity is described in terms of the basic dynamic load ratings. The basic dynamic load ratings are based on DIN ISO 281.

The basic dynamic load ratings for rolling bearings are matched to empirically proven performance standards and those published in previous FAG and INA catalogues.

The fatigue behaviour of the material determines the dynamic load carrying capacity of the rolling bearing.

The dynamic load carrying capacity is described in terms of the basic dynamic load rating and the basic rating life.

The fatigue life is dependent on:

- the load
- the operating speed
- the statistical probability of the first appearance of failure.

The basic dynamic load rating  $C$  applies to rotating rolling bearings. It is:

- a constant radial load  $C_r$  for radial bearings
- a constant, concentrically acting axial load  $C_a$  for axial bearings.

The basic dynamic load rating  $C$  is that load of constant magnitude and direction which a sufficiently large number of apparently identical bearings can endure for a basic rating life of one million revolutions.

# Load carrying capacity and life

## Calculation of the rating life

The methods for calculating the rating life are:

- basic rating life  $L_{10}$  and  $L_{10h}$  to ISO 281, see page 42
- adjusted rating life  $L_{na}$  to DIN ISO 281:1990 (no longer a constituent part of ISO 281), see page 43
- expanded adjusted rating life  $L_{nm}$  to ISO 281, see page 46.

## Basic rating life

The basic rating life  $L_{10}$  and  $L_{10h}$  is calculated as follows:

$$L_{10} = \left( \frac{C}{P} \right)^p$$

$$L_{10h} = \frac{16\,666}{n} \cdot \left( \frac{C}{P} \right)^p$$

$L_{10}$   $10^6$  revolutions

The basic rating life in millions of revolutions is the life reached or exceeded by 90% of a sufficiently large group of apparently identical bearings before the first evidence of material fatigue develops

$L_{10h}$  h  
The basic rating life as defined for  $L_{10}$  but expressed in operating hours

C N  
Basic dynamic load rating

P N  
Equivalent dynamic bearing load for radial and axial bearings

p –  
Life exponent;

for roller bearings:  $p = 10/3$

for ball bearings:  $p = 3$

n  $\text{min}^{-1}$

Operating speed.

## Equivalent dynamic load

The equivalent dynamic load  $P$  is a calculated value. This value is constant in size and direction; it is a radial load for radial bearings and an axial load for axial bearings.

The load value  $P$  gives the same rating life as the combined load occurring in practice.

$$P = X \cdot F_r + Y \cdot F_a$$

P N  
Equivalent dynamic bearing load

$F_r$  N  
Radial dynamic bearing load

$F_a$  N  
Axial dynamic bearing load

X –  
Radial factor given in the dimension tables or product description

Y –  
Axial factor given in the dimension tables or product description.



This calculation cannot be applied to radial needle roller bearings, axial needle roller bearings and axial cylindrical roller bearings. Combined loads are not permissible with these bearings.

## Adjusted rating life

The adjusted rating life  $L_{na}$  can be calculated if, in addition to the load and speed, other influences are known such as:

- special material characteristics
- lubrication

or

- if a requisite reliability other than 90% is specified.

This calculation method was replaced in ISO 281:2007 by the calculation of the expanded adjusted rating life  $L_{nm}$ , see page 46.

$$L_{na} = a_1 \cdot a_2 \cdot a_3 \cdot L_{10}$$

$L_{na}$   $10^6$  revolutions

Adjusted rating life for special material characteristics and operating conditions with a requisite reliability of  $(100 - n) \%$

$L_{10}$   $10^6$  revolutions

Basic rating life

$a_1$  –

Life adjustment factor for a requisite reliability other than 90%.

In ISO 281:2007, the values for the life adjustment factor  $a_1$  have been redefined, see table Life adjustment factor  $a_1$ , page 46

$a_2$  –

Life adjustment factor for special material characteristics.

For standard rolling bearing steels:  $a_2 = 1$

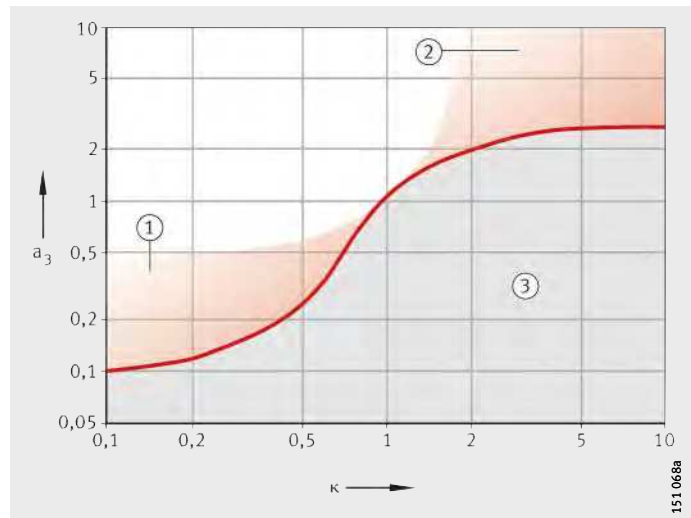
$a_3$  –

Life adjustment factor for special operating conditions; in particular lubrication, *Figure 1*.

The viscosity ratio  $\kappa$  is determined according to the formula on page 44.

- ① Good cleanliness and suitable additives
  - ② Very high cleanliness and low load
  - ③ Contamination in the lubricant
- $a_3$  = life adjustment factor  
 $\kappa$  = viscosity ratio

*Figure 1*  
Life adjustment factor  $a_3$



151.0688

# Load carrying capacity and life

**Viscosity ratio** The viscosity ratio  $\kappa$  is an indication of the quality of lubricant film formation:

$$\kappa = \frac{\nu}{\nu_1}$$

$\nu$   $\text{mm}^2\text{s}^{-1}$   
Kinematic viscosity of the lubricant at operating temperature  
 $\nu_1$   $\text{mm}^2\text{s}^{-1}$   
Reference viscosity of the lubricant at operating temperature.

The reference viscosity  $\nu_1$  is determined from the mean bearing diameter  $d_M = (D + d)/2$  and the operating speed  $n$ , *Figure 2*, page 45.

The nominal viscosity of the oil at +40 °C is determined from the required operating viscosity  $\nu$  and the operating temperature  $\vartheta$ , *Figure 3*, page 45. In the case of greases,  $\nu$  is the operating viscosity of the base oil.

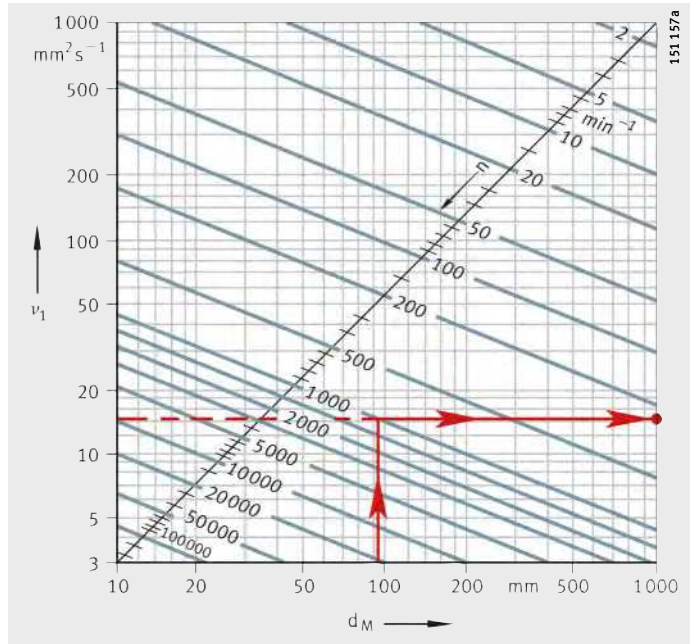
In the case of heavily loaded bearings with a high proportion of sliding contact, the temperature in the contact area of the rolling elements may be up to 20 K higher than the temperature measured on the stationary ring (without the influence of any external heat).



Taking account of EP additives in calculation of the expanded adjusted rating life  $L_{nm}$ : see page 47.

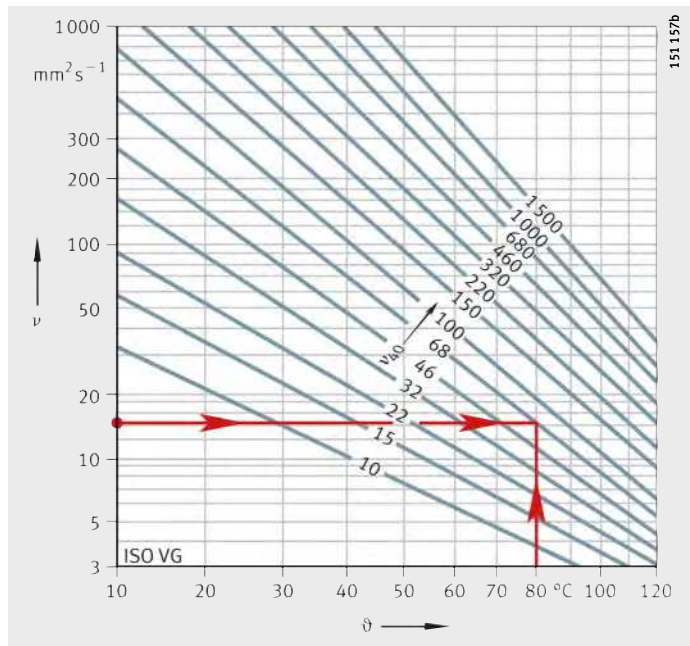
$\nu_1$  = reference viscosity  
 $d_M$  = mean bearing diameter  
 $n$  = speed

**Figure 2**  
 Reference viscosity  $\nu_1$



**Figure 3**  
 V/T diagram for mineral oils

$\nu$  = operating viscosity  
 $\vartheta$  = operating temperature  
 $\nu_{40}$  = viscosity at +40 °C



# Load carrying capacity and life

## Expanded adjusted rating life

The calculation of the expanded adjusted rating life  $L_{nm}$  was standardised in DIN ISO 281 Appendix 1. Since 2007, it has been standardised in the worldwide standard ISO 281. Computer-aided calculation in accordance with DIN ISO 281 Appendix 4 has been specified since 2008 in ISO/TS 16 281.

$L_{nm}$  is calculated as follows:

$$L_{nm} = a_1 \cdot a_{ISO} \cdot L_{10}$$

$L_{nm}$  Expanded adjusted rating life to ISO 281  
 $10^6$  revolutions

$a_1$  Life adjustment factor for a requisite reliability other than 90%, see table

$a_{ISO}$  Life adjustment factor for operating conditions

$L_{10}$  Basic rating life, see page 42.  
 $10^6$  revolutions

The values for the life adjustment factor  $a_1$  were redefined in ISO 281:2007 and differ from the previous data.

## Life adjustment factor $a_1$

Requisite reliability	Expanded adjusted rating life	Life adjustment factor
%	$L_{nm}$	$a_1$
90	$L_{10m}$	1
95	$L_{5m}$	0,64
96	$L_{4m}$	0,55
97	$L_{3m}$	0,47
98	$L_{2m}$	0,37
99	$L_{1m}$	0,25
99,2	$L_{0,8m}$	0,22
99,4	$L_{0,6m}$	0,19
99,6	$L_{0,4m}$	0,16
99,8	$L_{0,2m}$	0,12
99,9	$L_{0,1m}$	0,093
99,92	$L_{0,08m}$	0,087
99,94	$L_{0,06m}$	0,08
99,95	$L_{0,05m}$	0,077

### Life adjustment factor $a_{ISO}$

The standardised method for calculating the life adjustment factor  $a_{ISO}$  essentially takes account of:

- the load on the bearing
- the lubrication conditions (viscosity and type of lubricant, speed, bearing size, additives)
- the fatigue limit of the material
- the type of bearing
- the residual stress in the material
- the environmental conditions
- contamination in the lubricant.

$$a_{ISO} = f \left[ \frac{e_c \cdot C_u}{P}, \kappa \right]$$

$a_{ISO}$  – Life adjustment factor for operating conditions, Figure 4, page 48 to Figure 7, page 49

$e_c$  – Life adjustment factor for contamination, see table, page 50

$C_u$  – Fatigue limit load

$P$  – Equivalent dynamic bearing load

$\kappa$  – Viscosity ratio, see page 44

For  $\kappa > 4$ , calculation should be carried out using  $\kappa = 4$ .

For  $\kappa < 0,1$ , this calculation method cannot be used.

### Taking account of EP additives in the lubricant

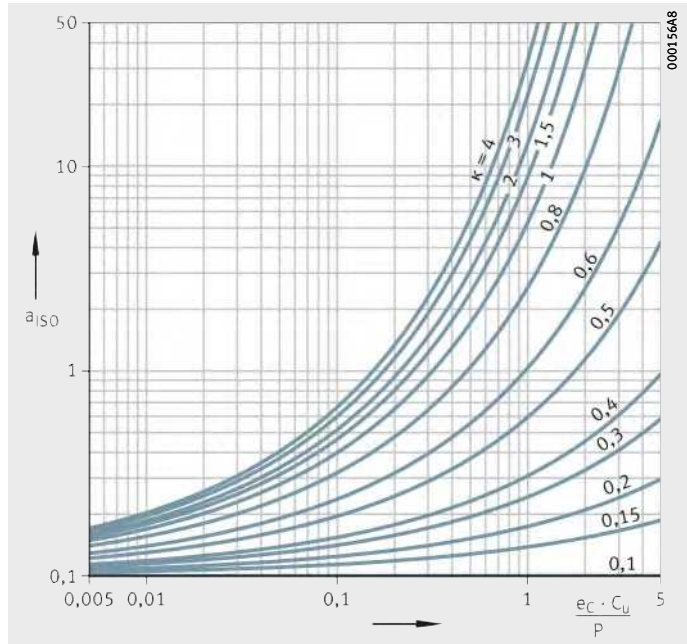
In accordance with ISO 281, EP additives can be taken into consideration in the following way:

- For a viscosity ratio  $\kappa < 1$  and a contamination factor  $e_c \geq 0,2$ , calculation can be carried out using the value  $\kappa = 1$  for lubricants with EP additives that have proven effective.

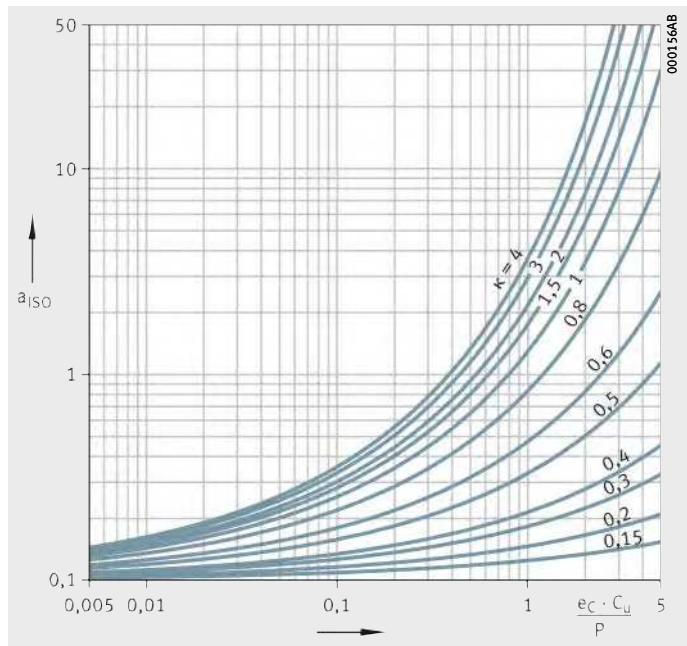
With severe contamination (contamination factor  $e_c < 0,2$ ), the effectiveness of the additives under these contamination conditions must be proven. The effectiveness of the EP additives can be demonstrated in the actual application or on a rolling bearing test rig FE 8 to DIN 51 819-1.

If the EP additives are proven effective and calculation is carried out using the value  $\kappa = 1$ , the life adjustment factor must be restricted to  $a_{ISO} \leq 3$ . If the value  $a_{ISO}$  calculated for the actual  $\kappa$  is greater than 3, this value can be used in calculation.

# Load carrying capacity and life



**Figure 4**  
Life adjustment factor  $a_{ISO}$   
for radial roller bearings



**Figure 5**  
Life adjustment factor  $a_{ISO}$   
for axial roller bearings



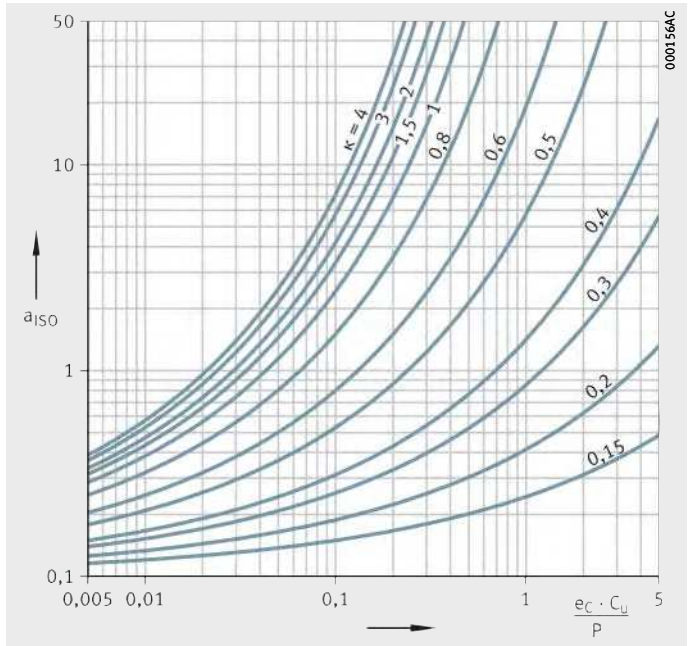


Figure 6  
Life adjustment factor  $a_{150}$   
for radial ball bearings

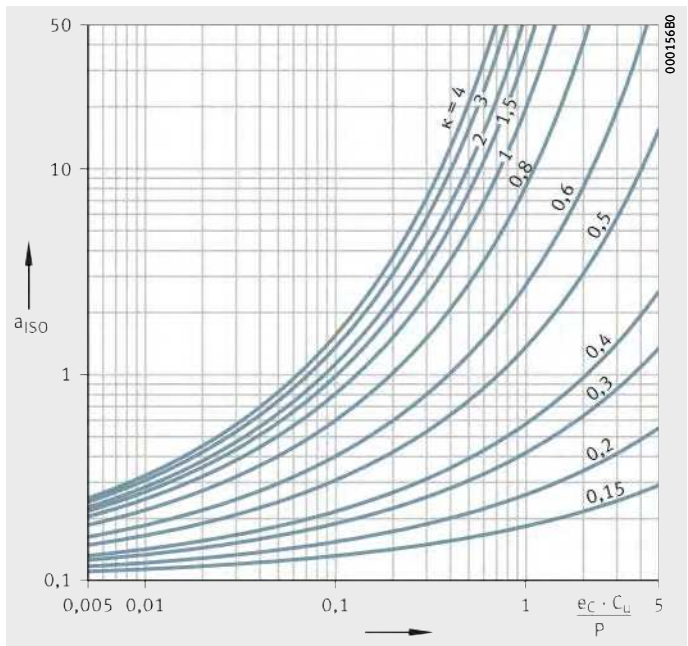


Figure 7  
Life adjustment factor  $a_{150}$   
for axial ball bearings

# Load carrying capacity and life

## Fatigue limit load

The fatigue limit load  $C_u$  in accordance with ISO 281 is defined as the load below which, under laboratory conditions, no fatigue occurs in the material.

## Life adjustment factor for contamination

The life adjustment factor for contamination  $e_c$  takes into consideration the influence of contamination in the lubrication gap on the rating life, see table.

The rating life is reduced by solid particles in the lubrication gap and is dependent on:

- the type, size, hardness and number of particles
- the relative lubrication film thickness
- the bearing size.

Due to the complex nature of the interaction between these influencing factors, only an approximate guide value can be attained. The values in the tables are valid for contamination by solid particles (factor  $e_c$ ). They do not take account of other contamination such as that caused by water or other fluids.



Under severe contamination ( $e_c \rightarrow 0$ ) the bearings may fail due to wear. In this case, the operating life is substantially less than the calculated life.

## Factor $e_c$

Contamination	Factor $e_c$	
	$d_M < 100 \text{ mm}^1$	$d_M \geq 100 \text{ mm}^1$
Extreme cleanliness ■ Particle size within lubricant film thickness ■ Laboratory conditions	1	1
High cleanliness ■ Oil filtered through extremely fine filter ■ Sealed, greased bearings	0,8 to 0,6	0,9 to 0,8
Standard cleanliness ■ Oil filtered through fine filter	0,6 to 0,5	0,8 to 0,6
Slight contamination ■ Slight contamination of oil	0,5 to 0,3	0,6 to 0,4
Typical contamination ■ Bearing contaminated with abraded material from other machine elements	0,3 to 0,1	0,4 to 0,2
Heavy contamination ■ Bearing environment is heavily contaminated ■ Bearing arrangement is insufficiently sealed	0,1 to 0	0,1 to 0
Very heavy contamination	0	0

<sup>1)</sup>  $d_M$  = mean bearing diameter  $(d + D)/2$ .

## Equivalent operating values

The rating life formulae assume a constant bearing load  $P$  and constant bearing speed  $n$ . If the load and speed are not constant, equivalent operating values can be determined that induce the same fatigue as the actual conditions.



The equivalent operating values calculated here already take account of the life adjustment factors  $a_3$  or  $a_{ISO}$ . They must not be applied again when calculating the adjusted rating life.

## Variable load and speed

If the load and speed vary over a time period  $T$ , the speed  $n$  and equivalent bearing load  $P$  are calculated as follows:

$$n = \frac{1}{T} \int_0^T n(t) \cdot dt$$

$$P = \sqrt[p]{\frac{\int_0^T \frac{1}{a(t)} \cdot n(t) \cdot F^p(t) \cdot dt}{\int_0^T n(t) \cdot dt}}$$

## Variation in steps

If the load and speed vary in steps over a time period  $T$ ,  $n$  and  $P$  are calculated as follows:

$$n = \frac{q_1 \cdot n_1 + q_2 \cdot n_2 + \dots + q_z \cdot n_z}{100}$$

$$P = \sqrt[p]{\frac{\frac{1}{a_i} \cdot q_i \cdot n_i \cdot F_i^p + \dots + \frac{1}{a_z} \cdot q_z \cdot n_z \cdot F_z^p}{q_i \cdot n_i + \dots + q_z \cdot n_z}}$$

## Variable load at constant speed

If the function  $F$  describes the variation in the load over a time period  $T$  and the speed is constant,  $P$  is calculated as follows:

$$P = \sqrt[p]{\frac{1}{T} \int_0^T \frac{1}{a(t)} \cdot F^p(t) \cdot dt}$$

## Load varying in steps and constant speed

If the load varies in steps over a time period  $T$  and the speed is constant,  $P$  is calculated as follows:

$$P = \sqrt[p]{\frac{\frac{1}{a_i} \cdot q_i \cdot F_i^p + \dots + \frac{1}{a_z} \cdot q_z \cdot F_z^p}{100}}$$

## Constant load at variable speed

If the speed varies but the load remains constant, the following applies:

$$n = \frac{1}{T} \int_0^T \frac{1}{a(t)} \cdot n(t) \cdot dt$$

# Load carrying capacity and life

## Constant load with speed varying in steps

If the speed varies in steps, the following applies:

$$n = \frac{\frac{1}{a_i} \cdot q_i \cdot n_i + \dots + \frac{1}{a_z} \cdot q_z \cdot n_z}{100}$$

## Under oscillating bearing motion

The equivalent speed is calculated as follows:

$$n = n_{osc} \cdot \frac{\varphi}{180^\circ}$$



The formula is valid only if the angle of oscillation is greater than twice the angular pitch of the rolling elements. If the angle of oscillation is smaller, there is a risk of false brinelling.

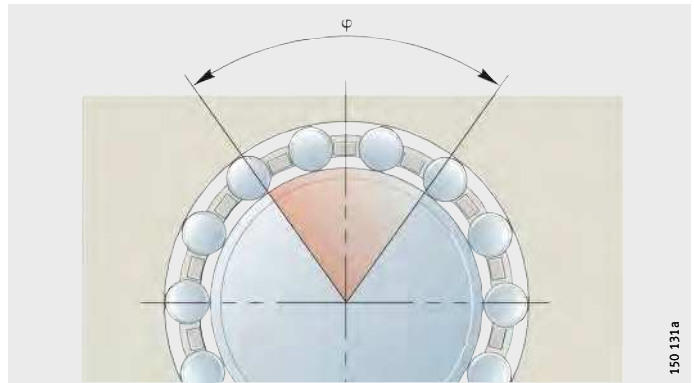


Figure 8  
Angle of oscillation  $\varphi$

## Symbols, units and definitions

$n$	$\text{min}^{-1}$
Mean speed	
$T$	$\text{min}$
Time period under consideration	
$P$	$N$
Equivalent bearing load	
$p$	-
Life exponent;	
for roller bearings: $p = 10/3$	
for ball bearings: $p = 3$	
$a_i, a(t)$	-
Life adjustment factor $a_{150}$ for current operating condition, see page 47	
$n_i, n(t)$	$\text{min}^{-1}$
Bearing speed for current operating condition	
$q_i$	%
Duration of operating condition as a proportion of the total operating period;	
$q_i = (\Delta t_i / T) \cdot 100$	
$F_i, F(t)$	$N$
Bearing load during the current operating condition	
$n_{osc}$	$\text{min}^{-1}$
Frequency of oscillating motion	
$\varphi$	$^\circ$
Angle of oscillation, Figure 8.	

## Required rating life

If no information is available on the rating life, the guide values from the following tables may be used.



Do not overspecify the bearing. If the calculated life is  $> 60\,000$  h, this normally means that the bearing arrangement is overspecified. Pay attention to the minimum load for the bearings; see the design and safety guidelines in the product sections.

### Motor vehicles

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Motorcycles	400	2 000	400	2 400
Passenger car powertrains	500	1 100	500	1 200
Passenger car gearboxes protected against contamination	200	500	200	500
Passenger car wheel bearings	1 400	5 300	1 500	7 000
Light commercial vehicles	2 000	4 000	2 400	5 000
Medium commercial vehicles	2 900	5 300	3 600	7 000
Heavy commercial vehicles	4 000	8 800	5 000	12 000
Buses	2 900	11 000	3 600	16 000
Internal combustion engines	900	4 000	900	5 000

### Rail vehicles

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Wheelset bearings for freight wagons	7 800	21 000	–	–
Tram carriages	–	–	35 000	50 000
Passenger carriages	–	–	20 000	35 000
Goods wagons	–	–	20 000	35 000
Tipper wagons	–	–	20 000	35 000
Powered units	–	–	35 000	50 000
Locomotives, external bearings	–	–	35 000	50 000
Locomotives, internal bearings	–	–	75 000	110 000
Gearboxes for rail vehicles	14 000	46 000	20 000	75 000

### Shipbuilding

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Marine thrust blocks	–	–	20 000	50 000
Marine shaft bearings	–	–	50 000	200 000
Large marine gearboxes	14 000	46 000	20 000	75 000
Small marine gearboxes	4 000	14 000	5 000	20 000
Boat propulsion systems	1 700	7 800	2 000	10 000

### Agricultural machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Tractors	1 700	4 000	2 000	5 000
Self-propelled machinery	1 700	4 000	2 000	5 000
Seasonal machinery	500	1 700	500	2 000

# Load carrying capacity and life

## Construction machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Dozers, loaders	4 000	7 800	5 000	10 000
Excavators, travelling gear	500	1 700	500	2 000
Excavators, slewing gear	1 700	4 000	2 000	5 000
Vibratory road rollers, imbalance generators	1 700	4 000	2 000	5 000
Vibrator bodies	500	1 700	500	2 000

## Electric motors

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Electric motors for household appliances	1 700	4 000	–	–
Series motors	21 000	32 000	35 000	50 000
Large motors	32 000	63 000	50 000	110 000
Electric traction motors	14 000	21 000	20 000	35 000

## Rolling mills, steelworks equipment

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Roll stands	500	14 000	500	20 000
Rolling mill gearboxes	14 000	32 000	20 000	50 000
Roller tables	7 800	21 000	10 000	35 000
Centrifugal casting machines	21 000	46 000	35 000	75 000

## Machine tools

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Headstock spindles, milling spindles	14 000	46 000	20 000	75 000
Drilling spindles	14 000	32 000	20 000	50 000
Grinding spindles	7 800	21 000	10 000	35 000
Workpiece spindles in grinding machines	21 000	63 000	35 000	110 000
Machine tool gearboxes	14 000	32 000	20 000	50 000
Presses, flywheels	21 000	32 000	35 000	50 000
Presses, eccentric shafts	14 000	21 000	20 000	35 000
Electric tools and compressed air tools	4 000	14 000	5 000	20 000

## Woodworking machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Milling spindles and cutter blocks	14 000	32 000	20 000	50 000
Saw frames, main bearings	–	–	35 000	50 000
Saw frames, connecting rod bearings	–	–	10 000	20 000
Circular saws	4 000	14 000	5 000	20 000

### Gearboxes in general machine building

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Universal gearboxes	4 000	14 000	5 000	20 000
Geared motors	4 000	14 000	5 000	20 000
Large gearboxes, stationary	14 000	46 000	20 000	75 000

### Conveying equipment

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Belt drives, mining	–	–	75 000	150 000
Conveyor belt rollers, mining	46 000	63 000	75 000	110 000
Conveyor belt rollers, general	7 800	21 000	10 000	35 000
Belt drums	–	–	50 000	75 000
Bucket wheel excavators, travel drive	7 800	21 000	10 000	35 000
Bucket wheel excavators, bucket wheel	–	–	75 000	200 000
Bucket wheel excavators, bucket wheel drive	46 000	83 000	75 000	150 000
Winding cable sheaves	32 000	46 000	50 000	75 000
Sheaves	7 800	21 000	10 000	35 000

### Pumps, fans, compressors

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Ventilators, fans	21 000	46 000	35 000	75 000
Large fans	32 000	63 000	50 000	110 000
Piston pumps	21 000	46 000	35 000	75 000
Centrifugal pumps	14 000	46 000	20 000	75 000
Hydraulic axial and radial piston engines	500	7 800	500	10 000
Gear pumps	500	7 800	500	10 000
Compressors	4 000	21 000	5 000	35 000

### Centrifuges, stirrers

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Centrifuges	7 800	14 000	10 000	20 000
Large stirrers	21 000	32 000	35 000	50 000

### Textile machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Spinning machines, spinning spindles	21 000	46 000	35 000	75 000
Weaving and knitting machines	14 000	32 000	20 000	50 000

# Load carrying capacity and life

## Plastics processing

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Plastics worm extruders	14 000	21 000	20 000	35 000
Rubber and plastics calenders	21 000	46 000	35 000	75 000

## Crushers, mills, screens

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Jaw crushers	–	–	20 000	35 000
Gyratory crushers, roll crushers	–	–	20 000	35 000
Rigid hammer mills, hammer mills, impact crushers	–	–	50 000	110 000
Tube mills	–	–	50 000	100 000
Vibration grinding mills	–	–	5 000	20 000
Grinding track mills	–	–	50 000	110 000
Vibrating screens	–	–	10 000	20 000
Briquette presses	–	–	35 000	50 000
Rotary furnace track rollers	–	–	50 000	110 000

## Paper and printing machinery

Mounting location	Recommended rating life in h			
	Ball bearings		Roller bearings	
	from	to	from	to
Paper machinery, wet section	–	–	110 000	150 000
Paper machinery, dry section	–	–	150 000	250 000
Paper machinery, refiners	–	–	80 000	120 000
Paper machinery, calenders	–	–	80 000	110 000
Printing machinery	32 000	46 000	50 000	75 000

## Operating life

The operating life is defined as the life actually achieved by the bearing. It may differ significantly from the calculated value.

This may be due to wear or fatigue as a result of:

- deviations in operating conditions
- misalignment between the shaft and housing
- insufficient or excessive operating clearance
- contamination
- insufficient lubrication
- excessive operating temperature
- oscillating bearing motion with very small angles of oscillation (false brinelling)
- high vibration and false brinelling
- very high shock loads (static overloading)
- prior damage during installation.



Due to the wide variety of possible installation and operating conditions, it is not possible to precisely predetermine the operating life. The most reliable way of arriving at a close estimate is by comparison with similar applications.



## Axial load carrying capacity of cylindrical roller bearings

Radial cylindrical roller bearings used as semi-locating and locating bearings can support axial forces in one or both directions in addition to radial forces.

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces
- the tilting of the bearing.



Ribs subjected to load must be supported across their entire height.

The permissible axial load  $F_{a\ per}$  must not be exceeded, in order to avoid unacceptably high temperatures.

The limiting load  $F_{a\ max}$  must not be exceeded, in order to avoid unacceptable pressure at the contact surfaces.

The ratio  $F_a/F_r$  must not exceed a value of 0,4.

For bearings of TB design, the value 0,6 is permissible.

Continuous axial loading without simultaneous radial loading is not permissible.

### Bearings of TB design

In the case of bearings of TB design, the axial load carrying capacity has been significantly improved through the use of new calculation and manufacturing methods.

Optimum contact conditions between the roller and rib are ensured by means of a special curvature of the roller end faces. As a result, axial surface pressures on the rib are significantly reduced and a lubricant film with improved load-carrying capabilities is achieved. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated. The axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.

### Permissible and maximum axial load

$F_{a\ per}$  and  $F_{a\ max}$  are calculated as follows:

#### Bearings of standard design

$$F_{a\ per} = k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{0,6} \leq F_{a\ max}$$

#### Bearings of TB design

$$F_{a\ per} = 1,5 \cdot k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{-0,6} \leq F_{a\ max}$$

#### Bearings of standard and TB design

$$F_{a\ max} = 0,075 \cdot k_B \cdot d_M^{2,1}$$

$F_{a\ per}$   
Permissible axial load N

$F_{a\ max}$   
Axial limiting load N

$k_S$  –  
Factor dependent on the lubrication method,  
see table Factor  $k_S$  for lubrication method, page 58

$k_B$  –  
Factor dependent on the bearing series,  
see table Bearing factor  $k_B$ , page 58

$d_M$  mm  
Mean bearing diameter  $(d + D)/2$

$n$   $\text{min}^{-1}$   
Operating speed.

# Load carrying capacity and life

## Misalignment of the bearing



Misalignment caused by shaft deflection for example, may lead to alternating stresses on the inner ring ribs. In this instance, the axial load must be restricted to  $F_{as}$  in accordance with the formula where the bearing is tilted up to a maximum of 2 angular minutes.

$$F_{as} = 20 \cdot d_M^{1,42}$$

For more severe tilting, a separate strength analysis is required.

## Factor $k_S$ for lubrication method

Lubrication methods <sup>1)</sup>	Factor $k_S$
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ( $\nu < 0,5 \cdot \nu_1$ )	7,5 to 10
Little heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressure oil lubrication)	12 to 18
Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ( $\nu > 2 \cdot \nu_1$ )	16 to 24

<sup>1)</sup> The precondition for these  $k_S$  values is the reference viscosity  $\nu_1$  according to the section Oil lubrication. Doped oils should be used such as CLP (DIN 51 517) and HLP (DIN 51 524) of ISO-VG classes 32 to 460 and ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

## Bearing factor $k_B$

Series	Factor $k_B$
SL1818, SL0148	4,5
SL1829, SL0149	11
SL1830, SL1850	17
SL1822	20
LSL1923, ZSL1923	28
SL1923	30
NJ2..-E, NJ22..-E, NUP2..-E, NUP22..-E	15
NJ3..-E, NJ23..-E, NUP3..-E, NUP23..-E	20
NJ4	22

## Static load carrying capacity

Very high static loads or shock loads can cause plastic deformation on the raceways and rolling elements. This deformation limits the static load carrying capacity of the rolling bearing with respect to the permissible noise level during operation of the bearing.

If a rolling bearing operates with only infrequent rotary motion or completely without rotary motion, its size is determined in accordance with the basic static load rating  $C_0$ .

According to DIN ISO 76, this is:

- a constant radial load  $C_{0r}$  for radial bearings
- a constant, concentrically acting axial load  $C_{0a}$  for axial bearings.

The basic static load rating  $C_0$  is that load under which the Hertzian pressure at the most heavily loaded point between the rolling elements and raceways reaches the following values:

- for roller bearings, 4 000 N/mm<sup>2</sup>
- for ball bearings, 4 200 N/mm<sup>2</sup>
- for self-aligning ball bearings, 4 600 N/mm<sup>2</sup>.

Under normal contact conditions, this load causes a permanent deformation at the contact points of approx. 1/10 000 of the rolling element diameter.

## Static load safety factor



In addition to dimensioning on the basis of the fatigue limit life, it is advisable to check the static load safety factor.

The guide values and shock loads occurring in operation to table must be taken into consideration, see table, page 60.

The static load safety factor  $S_0$  is the ratio between the basic static load rating  $C_0$  and the equivalent static load  $P_0$ :

$$S_0 = \frac{C_0}{P_0}$$

$S_0$  –  
Static load safety factor

$C_0$  ( $C_{0r}$ ,  $C_{0a}$ ) N  
Basic static load rating

$P_0$  ( $P_{0r}$ ,  $P_{0a}$ ) N  
Equivalent static load on the radial or axial bearing, see page 60.



Guide values for axial spherical roller bearings and high precision bearings: see corresponding product description.

For drawn cup needle roller bearings,  $S_0 \geq 3$  is necessary.

# Load carrying capacity and life

## Guide values for static load safety factor

Operating conditions	Static load safety factor $S_0$	
	for roller bearings	for ball bearings
Smooth, low-vibration, normal operation with minimal demands for smooth running; bearings with slight rotary motion	$\geq 1$	$\geq 0,5$
Normal operation with higher requirements for smooth running	$\geq 2$	$\geq 1$
Operation with pronounced shock loads	$\geq 3$	$\geq 2$
Bearing arrangement with high requirements for running accuracy and smooth running	$\geq 4$	$\geq 3$

## Equivalent static load

The equivalent static load  $P_0$  is a calculated value. It corresponds to a radial load in radial bearings and a concentric axial load in axial bearings.

$P_0$  induces the same load at the centre point of the most heavily loaded contact point between the rolling element and raceway as the combined load occurring in practice.

$$P_0 = X_0 \cdot F_{0r} + Y_0 \cdot F_{0a}$$

$P_0$  N  
Equivalent static bearing load

$F_{0r}$  N  
Radial static bearing load

$F_{0a}$  N  
Axial static bearing load

$X_0$  –  
Radial factor given in the dimension tables or product description

$Y_0$  –  
Axial factor given in the dimension tables or product description.

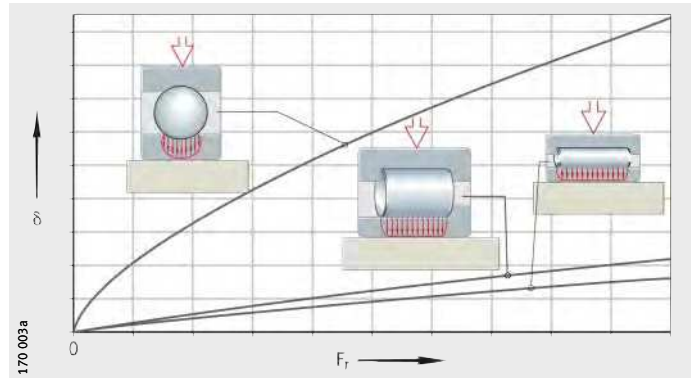


This calculation cannot be applied to radial needle roller bearings, axial needle roller bearings and axial cylindrical roller bearings. Combined loads are not permissible with these bearings.

For radial needle roller bearings and all radial cylindrical roller bearings,  $P_0 = F_{0r}$ .

# Rigidity

The rigidity is determined by the type, size and operating clearance of the bearing. This increases with the number of rolling elements supporting the load. Rolling bearings with line contact have a higher rigidity than rolling bearings with point contact, *Figure 1*.



$\delta$  = displacement  
 $F_r$  = radial bearing load

*Figure 1*  
 Rigidity,  
 as a function of bearing type

## Deflection

Rolling bearings have a progressive deflection rate. The displacement values can be determined using approximation formulae.



The formulae are valid for bearings without misalignment and with a rigid surrounding structure. In axial bearings, a concentrically acting load is assumed.

$$\delta_r = \frac{1}{c_s} \cdot F_r^{0,84} + \frac{s}{2}$$

$$\delta_a = \frac{1}{c_s} \cdot \left[ (F_{av} + F_a)^{0,84} - F_{av}^{0,84} \right]$$

$$c_s = K_c \cdot d^{0,65}$$

$c_s$  Rigidity parameter  $N^{0,84} / \mu m$

$d$  Bearing bore diameter  $mm$

$\delta_r$  Radial displacement between shaft axis and centre of bore, *Figure 2, page 62*

$\delta_a$  Axial displacement between shaft locating washer and housing locating washer, *Figure 3, page 62*

$s$  Radial operating clearance of fitted, unloaded bearing  $\mu m$

$F_r$  Radial bearing load  $N$

$F_a$  Axial bearing load  $N$

$F_{av}$  Axial preload force  $N$

$K_c$  Factor for determining the rigidity parameter, see table, page 62.

$K_c$  —

Factor for determining the rigidity parameter, see table, page 62.

# Rigidity

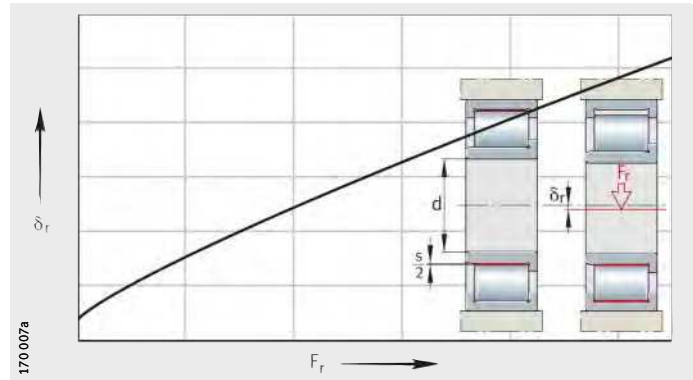
Factor  $K_c$

Bearing series	Factor $K_c$	Series	Factor $K_c$
SL1818	12,8	NJ2...-E	11,1
SL1829, SL1830, SL1923	16	NJ3...-E	11,3
SL1850, SL0148, SL0248, SL0249	29,2	NJ22...-E	15,4
NA48	24,9	NJ23...-E	16,9
NA49	23,5	NU10	9,5
NA69	37,3	NU19	11,3
NKIS	21,3	NN30...-AS-K	18,6
NKI	$4,4 \cdot B^{0,8}/d^{0,2}$	ZNR31-22	21,1
HK, BK	$4,2 \cdot C^{0,8}/d^{0,2}$	ZNR31-23	23,2
K811, 811, K812, 812	36,7	ZNR31-30	30
K893, 893, K894, 894	59,7	ZNR31-31	29,3
		ZNR31-32	28,9

## Radial cylindrical roller bearings

$\delta_r$  = radial displacement  
 $F_r$  = radial bearing load

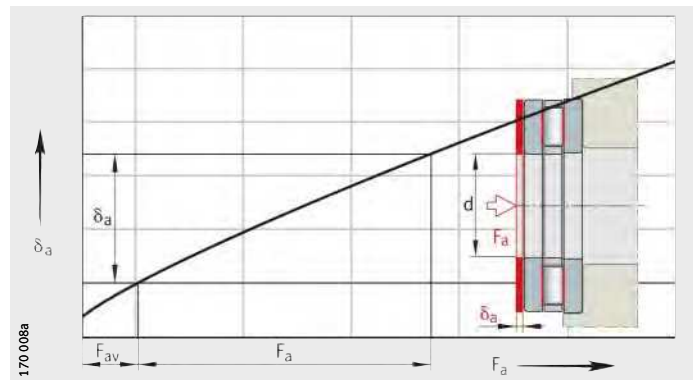
Figure 2  
 Radial displacement



## Axial cylindrical roller bearing

$\delta_a$  = axial displacement  
 $F_a$  = axial bearing load  
 $F_{av}$  = axial preload force

Figure 3  
 Axial displacement



# Friction and increases in temperature

**Friction** The friction in a rolling bearing is made up of several components, see table. Due to the large number of influencing factors, such as dynamics in speed and load, tilting and skewing resulting from installation, actual frictional torques and frictional power may deviate significantly from the calculated values. If the frictional torque is an important design criterion, please consult the Schaeffler Engineering Service.

**Frictional component and influencing factor**

Frictional component	Influencing factor
Rolling friction	Magnitude of load
Sliding friction of rolling elements Sliding friction of cage	Magnitude and direction of load Speed and lubrication conditions, running-in condition
Fluid friction (flow resistance)	Type and speed Type, quantity and operating viscosity of lubricant
Seal friction	Type and preload of seal

The idling friction is dependent on the lubricant quantity, speed, operating viscosity of the lubricant, seals and the running-in condition of the bearing.

**Heat dissipation**

Friction is converted into heat. This must be dissipated from the bearing. The equilibrium between the frictional energy and heat dissipation allows calculation of the thermally safe operating speed  $n_{per}$ , see page 72.

**Heat dissipation by the lubricant**

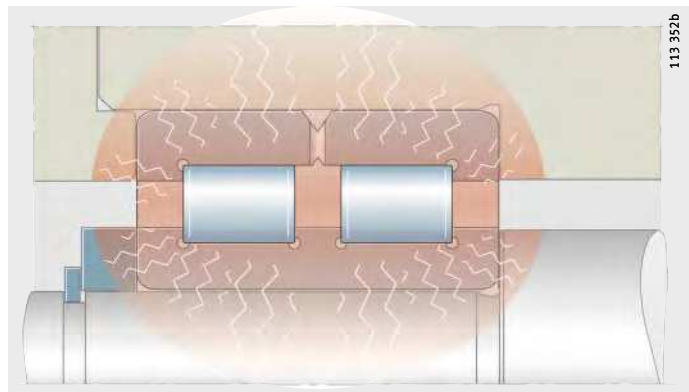
Lubricating oil dissipates a portion of the heat. Recirculating oil lubrication with additional cooling is particularly effective. Grease does not give dissipation of heat.

**Heat dissipation via the shaft and housing**

Heat dissipation via the shaft and housing is dependent on the temperature difference between the bearing and the surrounding structure, *Figure 1*.



Adjacent additional sources of heat or thermal radiation must be taken into consideration.



*Figure 1*  
Temperature distribution between bearing, shaft and housing

# Friction and increases in temperature

## Determining the friction values

The speed and load must also be known. The type of lubrication, lubrication method and viscosity of lubricant at operating temperature are further important factors in calculation.

Total frictional torque  $M_R$   
(calculation of axially loaded cylindrical roller bearings, see page 69):

$$M_R = M_0 + M_1$$

Frictional energy  $N_R$ :

$$N_R = M_R \cdot \frac{n}{9550}$$

Frictional torque as a function of speed for  $v \cdot n \geq 2000$ :

$$M_0 = f_0 \cdot (v \cdot n)^{2/3} \cdot d_M^3 \cdot 10^{-7}$$

Frictional torque as a function of speed for  $v \cdot n < 2000$ :

$$M_0 = f_0 \cdot 160 \cdot d_M^3 \cdot 10^{-7}$$

Frictional torque as a function of load for needle roller and cylindrical roller bearings:

$$M_1 = f_1 \cdot F \cdot d_M$$

Frictional torque as a function of load for ball bearings, tapered roller bearings and spherical roller bearings:

$$M_1 = f_1 \cdot P_1 \cdot d_M$$

$M_R$  Total frictional torque Nmm

$M_0$  Frictional torque as a function of speed Nmm

$M_1$  Frictional torque as a function of load Nmm

$N_R$  Frictional energy W

$n$  Operating speed  $\text{min}^{-1}$

$f_0$  Bearing factor for frictional torque as a function of speed, see Figure 2, page 65 and tables from page 66 to page 68

$f_1$  Bearing factor for frictional torque as a function of load, see tables from page 66 to page 68

$v$  Kinematic viscosity of lubricant at operating temperature. In the case of grease, the decisive factor is the viscosity of the base oil at operating temperature

$F_r, F_a$  Radial load for radial bearings, axial load for axial bearings N

$P_1$  Decisive load for frictional torque. For ball bearings, tapered roller bearings and spherical roller bearings, see page 68 N

$d_M$  Mean bearing diameter  $(d + D)/2$ . mm



### Bearing factors

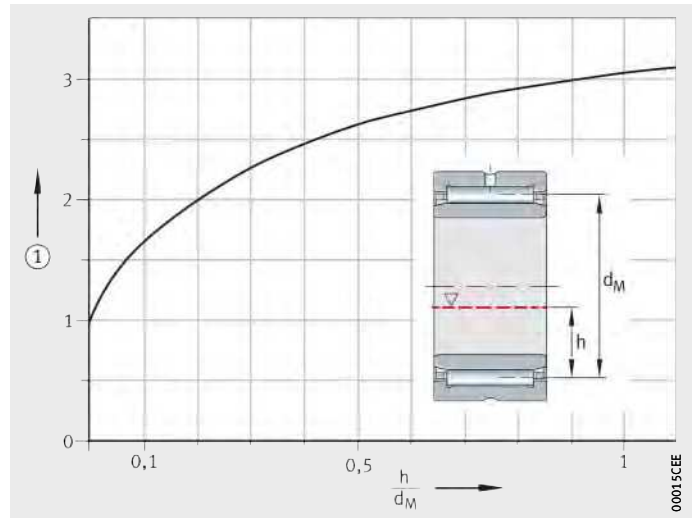
The bearing factors  $f_0$  and  $f_1$  are mean values from series of tests and appropriate data according to ISO 15 312.

They are valid for bearings after running-in and with uniform distribution of lubricant. In the freshly greased state, the bearing factor  $f_0$  can be two to five times higher.

If oil bath lubrication is used, the oil level must reach the centre of the lowest rolling element. If the oil level is higher,  $f_0$  may be up to three times the value given in the table, *Figure 2*.

$f_0$  = bearing factor  
 $h$  = oil level  
 $d_M$  = mean bearing diameter  $(d + D)/2$

*Figure 2*  
Increase in the bearing factor,  
as a function of the oil level



## Friction and increases in temperature

**Bearing factors  
for needle roller bearings,  
drawn cup needle roller bearings,  
needle roller and cage assemblies**

Series	Bearing factor $f_0$		Bearing factor $f_1$
	Grease, oil mist	Oil bath, recirculating oil	
NA48	3	5	0,0005
NA49	4	5,5	
RNA48	3	5	
RNA49	4	5,5	
NA69	7	10	
RNA69			
NKI, NK, NKIS, NKS, NAO, RNO, K	$(12 \cdot B)/(33 + d)$	$(18 \cdot B)/(33 + d)$	
HK, BK	$(24 \cdot B)/(33 + d)$	$(36 \cdot B)/(33 + d)$	
HN	$(30 \cdot B)/(33 + d)$	$(45 \cdot B)/(33 + d)$	

**Bearing factors  
for cylindrical roller bearings,  
full complement**

Series	Bearing factor $f_0$		Bearing factor $f_1$
	Grease, oil mist	Oil bath, recirculating oil	
SL1818	3	5	0,00055
SL1829	4	6	
SL1830	5	7	
SL1822	5	8	
SL0148, SL0248	6	9	
SL0149, SL0249	7	11	
SL1923	8	12	
SL1850	9	13	

**Bearing factors  
for cylindrical roller bearings  
with cage**

Series	Bearing factor $f_0$		Bearing factor $f_1$
	Grease, oil mist	Oil bath, recirculating oil	
LSL1923	1	3,7	0,00020
ZSL1923	1	3,8	0,00025
2..-E	1,3	2	0,00030
3..-E			0,00035
4			0,00040
10, 19			0,00020
22..-E			2
23..-E	2,7	4	0,00040
30	1,7	2,5	0,00040

**Bearing factors  
for axial roller bearings**

Series	Bearing factor $f_0$		Bearing factor $f_1$
	Grease, oil mist	Oil bath, recirculating oil	
AXK, AXW	3	4	0,0015
811, K811	2	3	
812, K812			
893, K893			
894, K894			

**Bearing factors  
for combined bearings**

Series	Bearing factor $f_0$		Bearing factor $f_1$
	Grease, oil mist	Oil bath, recirculating oil	
ZARN, ZARF	3	4	0,0015
NKXR	2	3	
NX, NKX	2	3	$0,001 \cdot (F_a/C_0)^{0,33}$
ZKLN, ZKLF	4	6	
NKIA, NKIB	3	5	0,0005

**Bearing factors  
for tapered roller bearings**

Series	Bearing factor $f_0$		Bearing factor $f_1$
	Grease, oil mist	Oil bath, recirculating oil	
302, 303, 320, 329, 330, T4CB, T7FC	2	3	0,0004
313, 322, 323, 331, 332, T2EE, T2ED, T5ED	3	4,5	

**Bearing factors  
for axial and radial  
spherical roller bearings**

Series	Bearing factor $f_0$		Bearing factor $f_1$
	Grease, oil mist	Oil bath, recirculating oil	
213	2,3	3,5	$0,0005 \cdot (P_0/C_0)^{0,33}$
222		4	
223	3	4,5	$0,0008 \cdot (P_0/C_0)^{0,33}$
230, 239			$0,00075 \cdot (P_0/C_0)^{0,5}$
231	3,7	5,5	$0,0012 \cdot (P_0/C_0)^{0,5}$
232	4	6	$0,0016 \cdot (P_0/C_0)^{0,5}$
240	4,3	6,5	$0,0012 \cdot (P_0/C_0)^{0,5}$
241	4,7	7	$0,0022 \cdot (P_0/C_0)^{0,5}$
292..-E	1,7	2,5	0,00023
293..-E	2	3	0,00030
294..-E	2,2	3,3	0,00033

**Bearing factors  
for deep groove ball bearings**

Series	Bearing factor $f_0$		Bearing factor $f_1$
	Grease, oil mist	Oil bath, recirculating oil	
618, 618..-2Z, (2RSR)	1,1	1,7	$0,0005 \cdot (P_0/C_0)^{0,5}$
160	1,1	1,7	$0,0007 \cdot (P_0/C_0)^{0,5}$
60, 60..-2RSR, 60..-2Z, 619, 619..-2Z, (2RSR)	1,1	1,7	
622..-2RSR	1,1	–	$0,0009 \cdot (P_0/C_0)^{0,5}$
623..-2RSR	1,1	–	
62, 62..-2RSR, 62..-2Z	1,3	2	
63, 63..-2RSR, 63..-2Z	1,5	2,3	
64	1,5	2,3	
42..-B	2,3	3,5	$0,0010 \cdot (P_0/C_0)^{0,5}$
43..-B	4	6	

## Friction and increases in temperature

### Bearing factors for angular contact ball bearings

Series	Bearing factor $f_0$		Bearing factor $f_1$
	Grease, oil mist	Oil bath, recirculating oil	
70...-B, 70...-B-2RS	1,3	2	$0,001 \cdot (P_0/C_0)^{0,33}$
718...-B, 72...-B, 72...-B-2RS			
73...-B, 73...-B-2RS	2	3	
30...-B, 30...-B-2RSR, 30...-B-2Z	2,3	3,5	
32...-B, 32...-B-2RSR, 32...-B-2Z, 32			
38...-B, 38...-B-2RSR, 38...-B-2Z			
33...-B, 33...-B-2RSR, 33, 33...-DA	4	6	

### Bearing factors for self-aligning ball bearings

Series	Bearing factor $f_0$		Bearing factor $f_1$
	Grease, oil mist	Oil bath, recirculating oil	
12	1	2,5	$0,0003 \cdot (P_0/C_0)^{0,4}$
13	1,3	3,5	
22	1,7	3	
23	2	4	

### Bearing factors for four point contact bearings

Series	Bearing factor $f_0$		Bearing factor $f_1$
	Grease, oil mist	Oil bath, recirculating oil	
QJ2, QJ3	2,7	4	$0,001 \cdot (P_0/C_0)^{0,33}$

### Bearing factors for axial deep groove ball bearings

Series	Bearing factor $f_0$		Bearing factor $f_1$
	Grease, oil mist	Oil bath, recirculating oil	
511, 512, 513, 514, 532, 533	1	1,5	$0,0012 \cdot (F_a/C_0)^{0,33}$
522, 523, 524, 542, 543	1,3	2	

### Decisive load for ball bearings, tapered roller bearings and spherical roller bearings

Bearing type	Single bearing $P_1$	Bearing pair $P_1$
Deep groove ball bearings	$3,3 \cdot F_a - 0,1 \cdot F_r$	–
Angular contact ball bearings, single row	$F_a - 0,1 \cdot F_r$	$1,4 \cdot F_a - 0,1 \cdot F_r$
Angular contact ball bearings, double row	$1,4 \cdot F_a - 0,1 \cdot F_r$	–
Four point contact bearings	$1,5 \cdot F_a + 3,6 \cdot F_r$	–
Tapered roller bearings	$2 \cdot Y \cdot F_a$ or $F_r$ , use the greater value	$1,21 \cdot Y \cdot F_a$ or $F_r$ , use the greater value
Spherical roller bearings	$1,6 \cdot F_a/e$ if $F_a/F_r > e$ $F_r \{1 + 0,6 \cdot [F_a/(e \cdot F_r)]^3\}$ if $F_a/F_r \leq e$ .	



If  $P_1 \leq F_r$ , then  $P_1 = F_r$ .

## Cylindrical roller bearings under axial load

In cylindrical roller bearings under axial load, sliding friction between the end faces of the rolling elements and the ribs on the rings leads to an additional frictional torque  $M_2$ .

The total frictional torque is therefore:

$$M_R = M_0 + M_1 + M_2$$

$$M_2 = f_2 \cdot F_a \cdot d_M$$

$$A = k_B \cdot 10^{-3} \cdot d_M^{2,1}$$

$M_R$	Nmm
Total frictional torque	
$M_0$	Nmm
Frictional torque as a function of speed	
$M_1$	Nmm
Frictional torque as a function of radial load	
$M_2$	Nmm
Frictional torque as a function of axial load	
$f_2$	–
Factor as a function of bearing series, <i>Figure 3</i> and <i>Figure 4</i> , page 70	
A	–
Bearing parameter according to formula	
$F_a$	N
Axial dynamic bearing load	
$k_B$	–
Factor as a function of bearing series, see table, page 70	
$d_M$	mm
Mean bearing diameter $(d + D)/2$ .	



The bearing factors  $f_2$  are subject to wide scatter. They are valid for recirculating oil lubrication with an adequate quantity of oil. The curves must not be extrapolated, *Figure 3* and *Figure 4*, page 70.

### Bearings of TB design

In the case of bearings of TB design, the axial load carrying capacity was significantly improved through the use of new calculation and manufacturing methods.

Optimum contact conditions between the roller and rib are ensured by means of a special curvature of the roller end faces. As a result, axial surface pressures on the rib are significantly reduced and a lubricant film with improved load-carrying capabilities is achieved. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated.

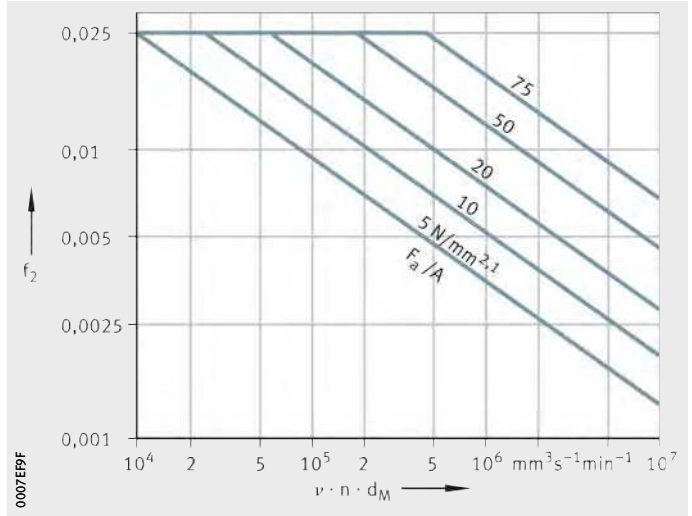
In addition, the axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.

# Friction and increases in temperature

## Cylindrical roller bearings of standard design

$f_2$  = bearing factor  
 $F_a$  = axial dynamic bearing load  
 $A$  = bearing parameter  
 $\nu$  = operating viscosity  
 $n$  = operating speed  
 $d_M$  = mean bearing diameter  
 $\nu \cdot n \cdot d_M$  = operating parameter

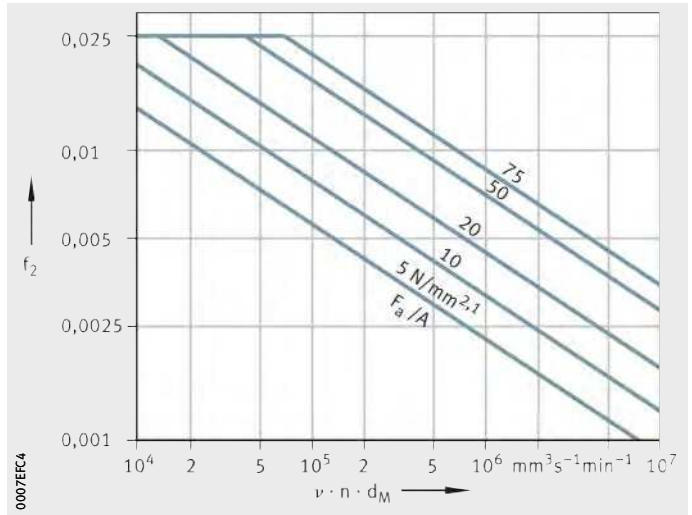
**Figure 3**  
 Bearing factor  $f_2$ ,  
 as a function of operating parameter



## Cylindrical roller bearings of TB design

$f_2$  = bearing factor  
 $F_a$  = axial dynamic bearing load  
 $A$  = bearing parameter  
 $\nu$  = operating viscosity  
 $n$  = operating speed  
 $d_M$  = mean bearing diameter  
 $\nu \cdot n \cdot d_M$  = operating parameter

**Figure 4**  
 Bearing factor  $f_2$ ,  
 as a function of operating parameter



## Bearing factor $k_B$

Bearing series	Factor $k_B$
SL1818, SL0148	4,5
SL1829, SL0149	11
SL1830, SL1850	17
SL1822	20
LSL1923, ZSL1923	28
SL1923	30
NJ2..-E, NJ22..-E, NUP2..-E, NUP22..-E	15
NJ3..-E, NJ23..-E, NUP3..-E, NUP23..-E	20
NJ4	22

# Speeds

On the basis of DIN 732-1, calculation of the thermal reference speed  $n_B$  has been standardised in ISO 15 312. The calculation of reference speeds has been matched to this standard. As a result, the values are different from the previous catalogue data.

The symbols used in the formulae have been matched to the international standard.

## Thermal reference speed

The thermal reference speed  $n_B$  is used as an ancillary value when calculating the thermally safe operating speed  $n_{per}$ . This is the speed at which, under defined reference conditions, a bearing operating temperature of +70 °C is achieved.

## Reference conditions

The reference conditions are based on the usual operating conditions of the most significant bearing types and sizes.

They are defined as follows in ISO 15 312:

- mean ambient temperature  $\vartheta_{Ar} = +20$  °C
- mean bearing temperature at the outer ring  $\vartheta_r = +70$  °C
- load on radial bearings  $P_{1r} = 0,05 \cdot C_{0r}$
- load on axial bearings  $P_{1a} = 0,02 \cdot C_{0a}$
- the operating viscosities (axial bearings in accordance with DIN 732-1). These are selected for radial bearings such that similar reference speeds are achieved for both oil and grease lubrication
  - radial bearings:  $12 \text{ mm}^2\text{s}^{-1}$  (ISO VG 32)
  - axial spherical roller bearings:  $24 \text{ mm}^2\text{s}^{-1}$  (ISO VG 68)
  - axial cylindrical roller bearings and axial needle roller bearings:  $48 \text{ mm}^2\text{s}^{-1}$  (ISO VG 220)
- heat dissipation through the bearing seating surfaces, see formulae:

for radial bearings, bearing seat  $A_r \leq 50\,000 \text{ mm}^2$ :

$$q_r = 0,016 \text{ W/mm}^2$$

for radial bearings, bearing seat  $A_r > 50\,000 \text{ mm}^2$ :

$$q_r = 0,016 \cdot \left( \frac{A_r}{50\,000} \right)^{-0,34} \text{ W/mm}^2$$

for axial bearings, bearing seat  $A_r \leq 50\,000 \text{ mm}^2$ :

$$q_r = 0,020 \text{ W/mm}^2$$

for axial bearings, bearing seat  $A_r > 50\,000 \text{ mm}^2$ :

$$q_r = 0,020 \cdot \left( \frac{A_r}{50\,000} \right)^{-0,16} \text{ W/mm}^2$$

# Speeds

## Limiting speed

The limiting speed  $n_G$  is based on practical experience and takes account of additional criteria such as smooth running, sealing function and centrifugal forces.



The limiting speed must not be exceeded even under favourable operating and cooling conditions.

## Thermally safe operating speed

The thermally safe operating speed  $n_{per}$  is calculated according to DIN 732-2 (draft). The basis for the calculation is the heat balance in the bearing, the equilibrium between the frictional energy as a function of speed and the heat dissipation as a function of temperature. When conditions are in equilibrium, the bearing temperature is constant.

The permissible operating temperature determines the thermally safe operating speed  $n_{per}$  of the bearing. The preconditions for calculation are correct fitting, normal operating clearance and constant operating conditions.

The calculation method is not valid for:

- sealed bearings with contact seals, since the maximum speed is restricted by the permissible sliding speed at the seal lip
- yoke and stud type track rollers
- aligning needle roller bearings
- axial deep groove and axial angular contact ball bearings.



The limiting speed  $n_G$  must always be observed.



## Calculation of the thermally safe operating speed

The thermally safe operating speed  $n_{per}$  is a product of the reference speed  $n_B$  and the speed ratio  $f_n$ :

$$n_{per} = n_B \cdot f_n$$

The speed ratio is derived from *Figure 1*, page 74:

$$k_L \cdot f_n^{5/3} + k_P \cdot f_n = 1$$

In the normal operating range covering  $0,01 < k_L < 10$  and  $0,01 < k_P < 10$ ,  $f_n$  can be calculated using an approximation formula:

$$f_n = \frac{490,77}{1 + 498,78 \cdot k_L^{0,599} + 852,88 \cdot k_P^{0,963} - 504,5 \cdot k_L^{0,055} \cdot k_P^{0,832}}$$

Heat dissipation via the bearing seating surfaces  $\dot{Q}_S$ , *Figure 2*, page 74:

$$\dot{Q}_S = k_q \cdot A_r \cdot \Delta \vartheta_A$$

Heat dissipation by the lubricant  $\dot{Q}_L$ :

$$\dot{Q}_L = 0,0286 \frac{\text{kW}}{\text{l/min} \cdot \text{K}} \cdot \dot{V}_L \cdot \Delta \vartheta_L$$

Total dissipated heat flow  $\dot{Q}$ :

$$\dot{Q} = \dot{Q}_S + \dot{Q}_L - \dot{Q}_E$$

Lubricant film parameter  $k_L$ :

$$k_L = 10^{-6} \cdot \frac{\pi}{30} \cdot n_B \cdot \frac{10^{-7} \cdot f_0 \cdot (v \cdot n_B)^2 \cdot d_M^3}{\dot{Q}}$$

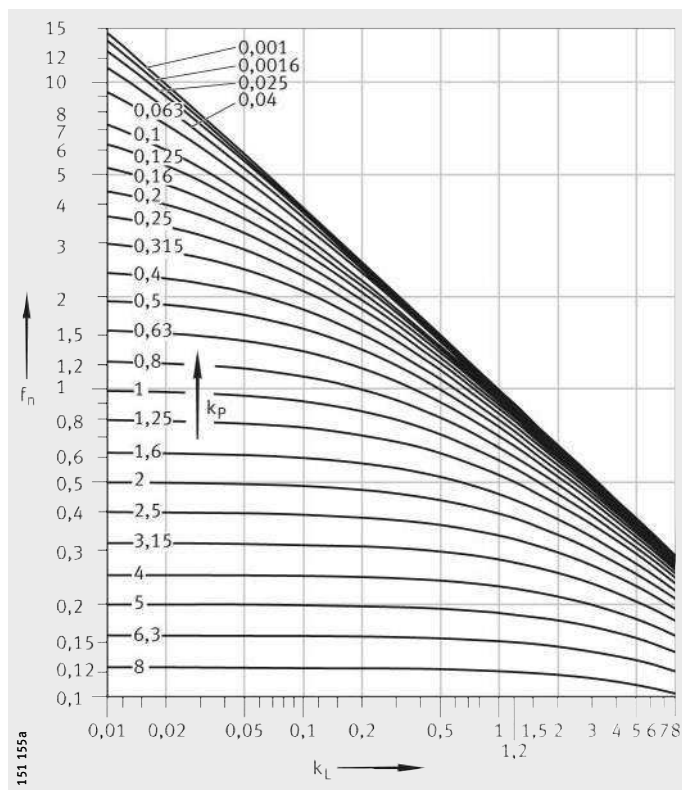
Load parameter  $k_P$ :

$$k_P = 10^{-6} \cdot \frac{\pi}{30} \cdot n_B \cdot \frac{f_1 \cdot P_1 \cdot d_M}{\dot{Q}}$$

# Speeds

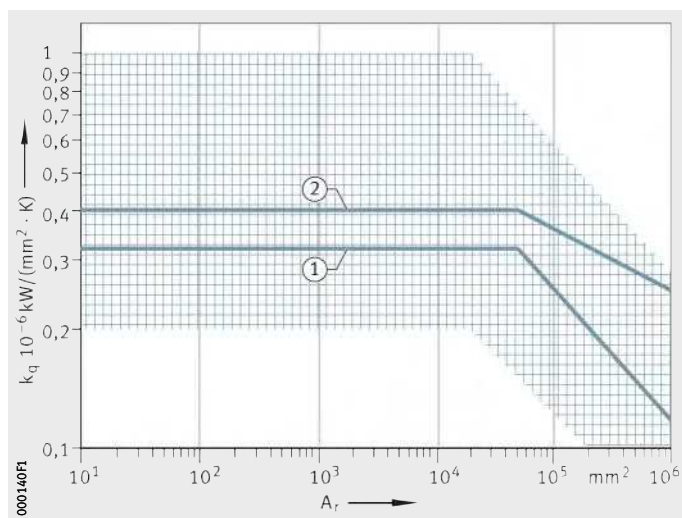
$f_n$  = speed ratio  
 $k_L$  = lubricant film parameter  
 $k_p$  = load parameter

Figure 1  
Speed ratio



- ① Reference condition for radial bearings
  - ② Reference condition for axial bearings
- $k_q$  = heat transfer coefficient  
 $A_r$  = bearing seating surface

Figure 2  
Heat transfer coefficient,  
as a function of the  
bearing seating surface



## Symbols, units and definitions

$A_r$   $\text{mm}^2$

Bearing seating surface for radial bearings:

$$A_r = \pi \times B \times (D + d)$$

axial bearings:

$$A_r = \pi/2 \times (D^2 - d^2)$$

tapered roller bearings:

$$A_r = \pi \times T \times (D + d)$$

axial spherical roller bearings:  $A_r = \pi/4 \times (D^2 + d_1^2 - D_1^2 - d^2)$

**Symbols, units and definitions**  
continued

B	mm
Bearing width	
d	mm
Bearing bore diameter	
D	mm
Bearing outside diameter	
d <sub>1</sub>	mm
Outside diameter of shaft locating washer	
D <sub>1</sub>	mm
Inside diameter of housing locating washer	
d <sub>M</sub>	mm
Mean bearing diameter (D + d)/2	
f <sub>0</sub>	–
Bearing parameter for frictional torque as a function of speed, see table Friction and increases in temperature, page 63	
f <sub>1</sub>	–
Bearing factor for frictional torque as a function of load, see table Friction and increases in temperature, page 63	
f <sub>n</sub>	–
Speed ratio, <i>Figure 1</i> , page 74	
k <sub>L</sub>	–
Lubricant film parameter	
k <sub>p</sub>	–
Load parameter	
k <sub>q</sub>	10 <sup>-6</sup> kW/(mm <sup>2</sup> · K)
Heat transfer coefficient of bearing seating surface, <i>Figure 2</i> , page 74. This is dependent on the housing design and size, the housing material and the mounting position. Under normal conditions, the heat transfer coefficient for bearing seating surfaces up to 25 000 mm <sup>2</sup> is between 0,2 · 10 <sup>-6</sup> kW/(mm <sup>2</sup> · K) and 1,0 · 10 <sup>-6</sup> kW/(mm <sup>2</sup> · K)	
n <sub>per</sub>	min <sup>-1</sup>
Thermally safe operating speed	
n <sub>B</sub>	min <sup>-1</sup>
Reference speed according to dimension tables	
P <sub>1</sub>	N
Radial load for radial bearings, axial load for axial bearings	
q <sub>r</sub>	W/mm <sup>2</sup>
Heat flow density	
Q̇	kW
Total dissipated heat flow	
Q̇ <sub>E</sub>	kW
Heat flow due to heating by external source	
Q̇ <sub>L</sub>	kW
Heat flow dissipated by the lubricant	
Q̇ <sub>S</sub>	kW
Heat flow dissipated via the bearing seating surfaces	
T	mm
Total width of tapered roller bearing	
V̇ <sub>l</sub>	l/min
Oil flow	
Δθ <sub>A</sub>	K
Difference between mean bearing temperature and ambient temperature	
Δθ <sub>l</sub>	K
Difference between oil input temperature and oil output temperature	
ν	mm <sup>2</sup> s <sup>-1</sup>
Kinematic viscosity of lubricant at operating temperature.	

# Lubrication

## Basic principles

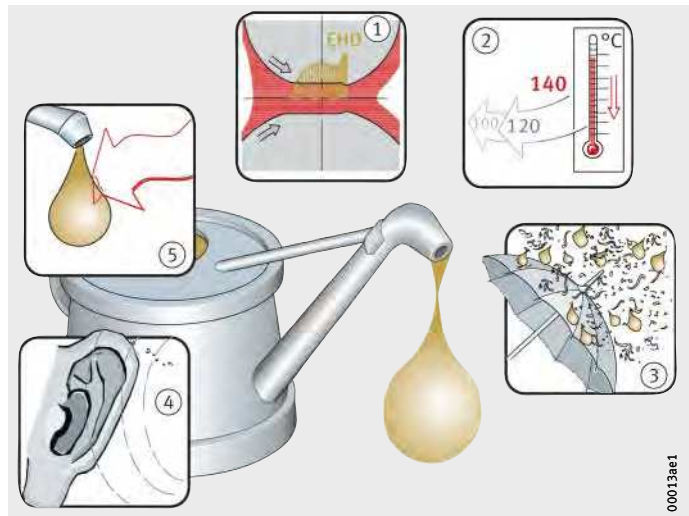
Lubrication and maintenance are important for the reliable operation and long operating life of rolling bearings.

## Functions of the lubricant

The lubricant should, *Figure 1*:

- form a lubricant film on the contact surfaces that is sufficiently capable of supporting loads and thus preventing wear and premature fatigue ①
- dissipate heat in the case of oil lubrication ②
- give additional sealing of the bearing, in the case of grease lubrication, against the entry of both solid and fluid contaminants ③
- reduce the running noise ④
- protect the bearing against corrosion ⑤.

- ① Formation of a lubricant film capable of supporting loads
- ② Heat dissipation in the case of oil lubrication
- ③ Sealing of the bearing against external contaminants in the case of grease lubrication
- ④ Damping of running noise
- ⑤ Protection against corrosion



*Figure 1*  
Functions of the lubricant

## **Selection of the type of lubrication**

It should be determined as early as possible in the design process whether bearings should be lubricated using grease or oil.

The following factors are decisive in determining the type of lubrication and quantity of lubricant:

- the operating conditions
- the type and size of the bearing
- the adjacent construction
- the lubricant feed.

### **Criteria for grease lubrication**

In the case of grease lubrication, the following criteria must be considered:

- very little design work required
- the sealing action
- the reservoir effect
- long operating life with little maintenance work (lifetime lubrication possible in certain circumstances)
- if relubrication is required, it may be necessary to provide collection areas for old grease and feed ducts
- no heat dissipation by the lubricant
- no rinsing out of wear debris and other particles.

### **Criteria for oil lubrication**

In the case of oil lubrication, the following criteria must be considered:

- good lubricant distribution and supply to contact areas
- dissipation of heat possible from the bearing (significant principally at high speeds and/or loads)
- rinsing out of wear debris
- very low friction losses with minimal quantity lubrication
- more work required on feed and sealing.

Under extreme operating conditions (such as very high temperatures, vacuum, aggressive media), it may be possible to use special lubrication methods such as solid lubricants in consultation with the engineering service.

# Lubrication

## Design of lubricant feed

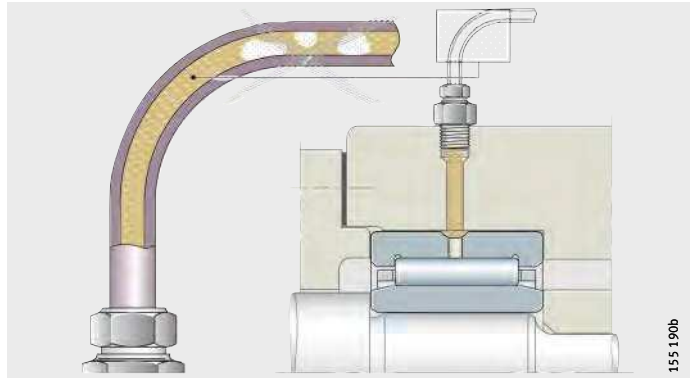
The feed lines and lubrication holes in the housings and shafts, *Figure 2* and *Figure 3*:

- should lead directly to the lubrication hole in the rolling bearing
- should be as short as possible
- must be provided individually for each bearing.

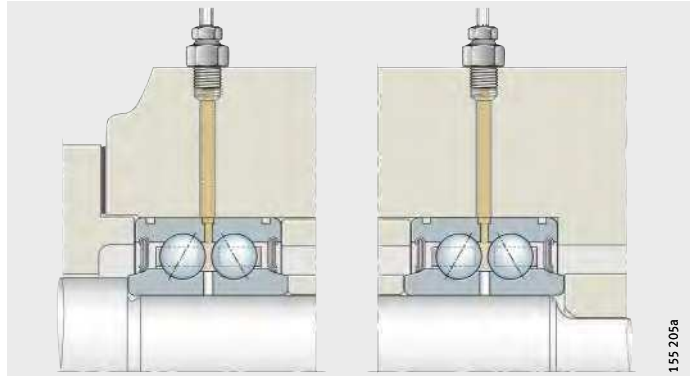


Ensure that the feeds are filled, *Figure 2*; the feed line should be bled if necessary.

Follow the instructions provided by the lubrication device manufacturer.



*Figure 2*  
Lubricant feed lines



*Figure 3*  
Arrangement of feed to more than  
one bearing on a shaft

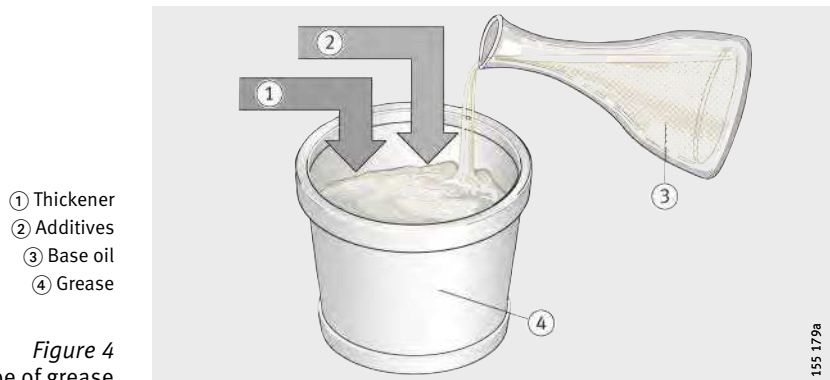
## Grease lubrication

Greases can be differentiated in terms of their thickeners and base oils. The base oils of greases are covered by the information in the section Oil lubrication, page 96.

## Composition of a grease

Conventional greases have metal soaps as thickeners and a mineral base oil. They also contain additives. These have a specific influence on, for example, the characteristics in relation to wear prevention, corrosion prevention or resistance to ageing. These combinations of additives are not, however, fully effective across every temperature and load range.

Greases exhibit widely varying behaviour in response to environmental influences such as temperature and moisture.



Lubricants must always be checked for their compatibility with:

- other lubricants
- anti-corrosion agents
- thermoplastics, thermosets and elastomers
- light and non-ferrous metals
- coatings
- colouring agents and paints
- and the environment.

When considering compatibility with the environment, attention must be paid to toxicity, biodegradability and water pollution class.

# Lubrication

## Type of grease

The characteristics of a grease are dependent on:

- the base oil
- the viscosity of the base oil  
(this is important for the speed range)
- the thickener  
(the shear strength is significant for the speed range)
- the additives.

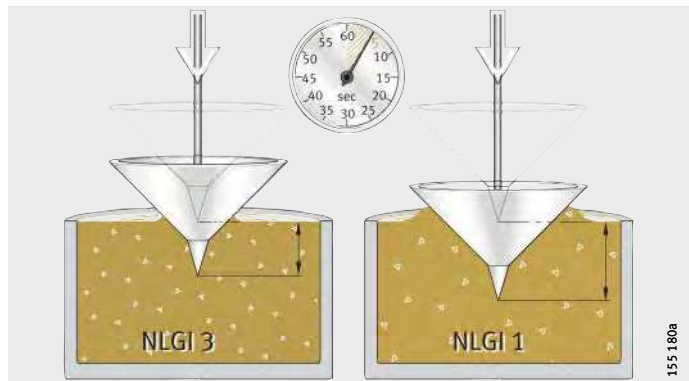
## Consistency of greases

Greases are subdivided into consistency classes (NLGI classes to DIN 51 818).

For rolling bearings, classes 1, 2, 3 should be used in preference, *Figure 5*.

NLGI classes

*Figure 5*  
Consistency of greases



155 180a



## Selection of suitable grease

Rolling bearing greases K to DIN 51 825 are suitable.

Greases should be selected in accordance with the operating conditions of the bearing:

- temperature
- pressure conditions, see page 83
- speed, see page 83
- the presence of water and moisture, see page 83.

## Operating temperature range

The operating temperature range of the grease must correspond to the range of possible operating temperatures in the rolling bearing.

Grease manufacturers indicate an operating temperature range for their rolling bearing greases K to DIN 51 825.

The upper value is determined in accordance with DIN 51 821 by means of testing on the FAG rolling bearing grease test rig FE 9.

At the upper operating temperature, a 50% failure probability rate ( $F_{50}$ ) of at least 100 hours must be achieved in this test.

The lower value is defined in accordance with DIN 51 825 by means of flow pressure. The flow pressure of a grease is the pressure required to press a stream of grease through a defined nozzle. For greases of type K, the flow pressure at the lower operating temperature must be less than 1 400 mbar.

The use of flow pressure in determining the lower operating temperature only indicates, however, whether the grease can be moved at this temperature. This cannot be used to make any statement about its suitability for use in rolling bearings at low temperatures.

In addition to the lower operating temperature of a grease, therefore, the low temperature frictional torque is also determined in accordance with ASTM D 1478 or IP 186/93. At the lower operating temperature, the starting torque must not exceed 1 000 Nmm and the running torque must not exceed 100 Nmm.

# Lubrication

Schaeffler Group Industrial recommends that greases should be used such that the normally occurring bearing temperature falls within the standard operating range, in order to achieve a reliable lubricating action and an acceptable grease operating life, *Figure 6*.

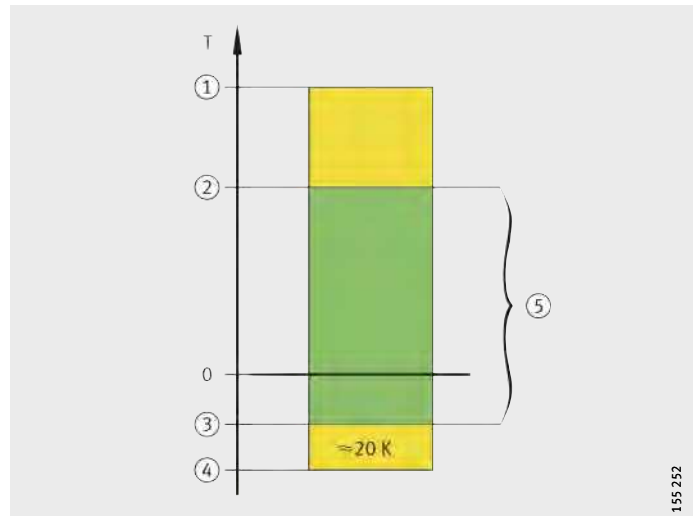
At low temperatures, greases release very little base oil. This can result in lubricant starvation. Schaeffler Group Industrial therefore recommends that greases are not used below the lower continuous limit temperature  $T_{\text{lowerlimit}}$ , *Figure 6*. This is approx. 20 K above the lower operating temperature of the grease as stated by the grease manufacturer.

The upper continuous limit temperature  $T_{\text{upperlimit}}$  must not be exceeded if a temperature-induced reduction in grease operating life is to be avoided; see section Grease operating life, page 86.



At consistently low temperatures (for example in cold store applications), it must be ensured that the grease releases sufficient oil in relation to the bearing type.

- ① Upper operating temperature according to grease manufacturer
- ②  $T_{\text{upperlimit}}$
- ③  $T_{\text{lowerlimit}}$
- ④ Lower operating temperature according to grease manufacturer
- ⑤ Standard operating range  
T = operating temperature



*Figure 6*  
Operating temperature range

### Pressure properties

The viscosity at operating temperature must be sufficiently high for the formation of a lubricant film capable of supporting loads. At high loads, greases with EP characteristics (“extreme pressure”) and high base oil viscosity should be used (KP grease to DIN 51 825). Such greases should also be used for bearings with substantial sliding or line contact.

Silicone greases should only be used at low loads ( $P \leq 3\% C$ ).



Greases with solid lubricants should preferably be used for applications with mixed or boundary friction conditions. The solid lubricant particle size must not exceed 5  $\mu\text{m}$ .

### Speed

Greases should be selected in accordance with the speed parameter  $n \cdot d_M$  for grease, see table, page 85:

- For rolling bearings running at high speeds or with a low starting torque, greases with a high speed parameter should be used
- For bearings running at low speeds, greases with a low speed parameter should be used.

Under centrifugal accelerations  $> 500 g$ , separation (of the thickener and base oil) may occur.

In this case, please consult the lubricant manufacturer.



The consistency of polycarbamide greases can be altered by shear stresses to a greater extent than that of metal soap greases.

### Water and moisture

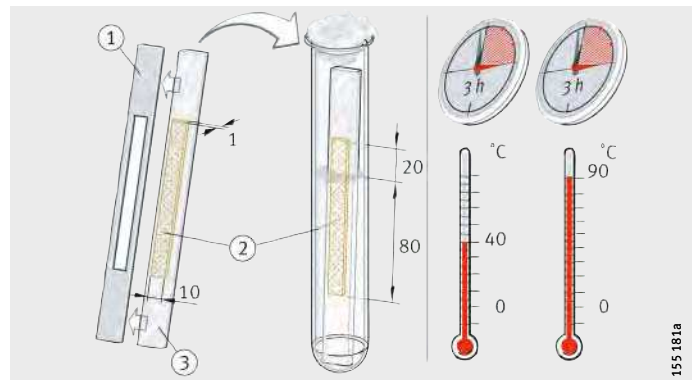
Water in the grease has a highly detrimental effect on the operating life of the bearing:

- the static behaviour of greases in the presence of water is assessed in accordance with DIN 51 807, see *Figure 7*
- the anti-corrosion characteristics can be tested according to DIN 51 802 (Emcor test) – information is given in the grease manufacturer’s data sheets.

- ① Blank
- ② Grease specimen
- ③ Glass slide

*Figure 7*

Behaviour in the presence of water in accordance with DIN 51 807



155 181a

# Lubrication

## Greases with special suitability

Many of the rolling bearings supplied by Schaeffler Group Industrial are prefilled with grease. The greases used have proved particularly suitable for the applications in mechanical-dynamic tests, see table.

### Greases

Designation <sup>5)</sup>	Classification	Type of grease
<b>GA01</b>	Ball bearing grease for $T < +180$ °C	Polycarbamide Ester oil
<b>GA02</b>	Ball bearing grease for $T < +160$ °C	Polycarbamide SHC
<b>GA13</b>	Standard ball bearing and insert bearing grease for $D > 62$ mm	Lithium soap Mineral oil
<b>GA14</b>	Low-noise ball bearing grease for $D \leq 62$ mm	Lithium soap Mineral oil
<b>GA15</b>	Low-noise ball bearing grease for high speeds	Lithium soap Ester oil
<b>GA22</b>	Free-running grease with low frictional torque	Lithium soap Ester oil
<b>L014</b> <sup>1)</sup>	Initial greasing for insert bearings for low temperatures	Gel Ester oil
<b>L086</b> <sup>1)</sup>	Initial greasing for insert bearings for wide temperature range and low loads	Sodium complex soap Silicone oil
<b>L069</b> <sup>1)</sup>	Insert bearing grease for wide temperature range	Polycarbamide Ester oil
<b>GA08</b>	Grease for line contact	Lithium complex soap Mineral oil
<b>GA26</b>	Standard grease for drawn cup roller clutches	Calcium/lithium soap Mineral oil
<b>GA28</b>	Screw drive bearing grease	Lithium soap Ester oil
<b>GA11</b>	Rolling bearing grease resistant to media for temperatures up to $+250$ °C	PTFE Alkoxyfluoroether
<b>GA47</b>	Rolling bearing grease resistant to media for temperatures up to $+140$ °C	Barium complex soap Mineral oil

1) Since January 2008, the grease L069 has been used in insert bearings instead of L014 and L086.

2) The upper continuous limit temperature  $T_{upperlimit}$  must not be exceeded if a temperature-induced reduction in grease operating life is to be avoided.

3) Dependent on bearing type.

4) Operating temperature range determined not according to DIN 51 825 but to MIL specification.

5) GA.. stands for **Grease Application Group**.., based on Grease Spec 00.

Operating temperature range °C	Upper continuous limit temperature $T_{upperlimit}^{2)}$ °C	NLGI class	Speed parameter $n \cdot d_M$ $min^{-1} \cdot mm$	ISO-VG class (base oil) <sup>3)</sup>	Designation <sup>5)</sup>	Recommended Arcanol grease for relubrication
-40 to +180	+115	2 to 3	600 000	68 to 220	<b>GA01</b>	-
-40 to +160	+85	2 to 3	500 000	68 to 220	<b>GA02</b>	-
-30 to +140	+75	3	500 000	68 to 150	<b>GA13</b>	<b>MULTI3</b>
-30 to +140	+75	2	500 000	68 to 150	<b>GA14</b>	<b>MULTI2</b>
-50 to +150	+70	2 to 3	1 000 000	22 to 32	<b>GA15</b>	-
-50 to +120	+70	2	1 000 000	10 to 22	<b>GA22</b>	-
-54 to +204 <sup>4)</sup>	+80	1 to 2	900 000	22 to 46	<b>L014<sup>1)</sup></b>	-
-40 to +180	+115	3	150 000	68 to 150	<b>L086<sup>1)</sup></b>	-
-40 to +180	+120	2	700 000	68 to 220	<b>L069<sup>1)</sup></b>	-
-30 to +140	+95	2 to 3	500 000	150 to 320	<b>GA08</b>	<b>LOAD150</b>
-20 to +80	+60	2	500 000	10 to 22	<b>GA26</b>	-
-30 to +160	+110	2	600 000	15 to 100	<b>GA28</b>	<b>MULTITOP</b>
-40 to +250	+180	2	300 000	460 to 680	<b>GA11</b>	<b>TEMP200</b>
-20 to +140	+70	1 to 2	350 000	150 to 320	<b>GA47</b>	-

### Arcanol rolling bearing greases

For users who wish to charge their rolling bearings with grease themselves, there is a range of particularly suitable Arcanol rolling bearing greases.

The greases in the range are graded in terms of their performance capability such that they can be used to cover almost all areas of application, see section Arcanol greases, page 1538.

# Lubrication

## Grease operating life

The grease operating life  $t_{fG}$  applies where this is below the calculated bearing life and the bearings are not lubricated.

A guide value can be determined in approximate terms as follows:

$$t_{fG} = t_f \cdot K_T \cdot K_P \cdot K_R \cdot K_U \cdot K_S$$

$t_{fG}$  h  
Guide value for grease operating life

$t_f$  h  
Basic grease operating life

$K_T, K_P, K_R, K_U, K_S$  –  
Correction factors for temperature, load, oscillation, environment, vertical shaft, see page 89 to page 92.



Where a grease operating life  $> 3$  years is required, this should be agreed in consultation with the lubricant manufacturer.

Observe the guidelines on calculating the grease operating life on page 88.

## Basic grease operating life

This applies under the preconditions in the table.

### Preconditions for the basic lubrication interval

	Precondition
Bearing temperature	$<$ Upper continuous limit temperature $T_{upperlimit}$
Load ratio	$C_0/P = 20$
Speed and load	Constant
Load in main direction	Radial in radial bearings, axial in axial bearings
Axis of rotation	Horizontal for radial bearings
Inner ring	Rotating
Environmental influences	No disruptive influences

The basic grease operating life  $t_f$  is dependent on the bearing-specific speed parameter  $k_f \cdot n \cdot d_M$  and is calculated using *Figure 8*.

$k_f$  –  
Factor for bearing type, see table Factor  $k_f$ , page 87

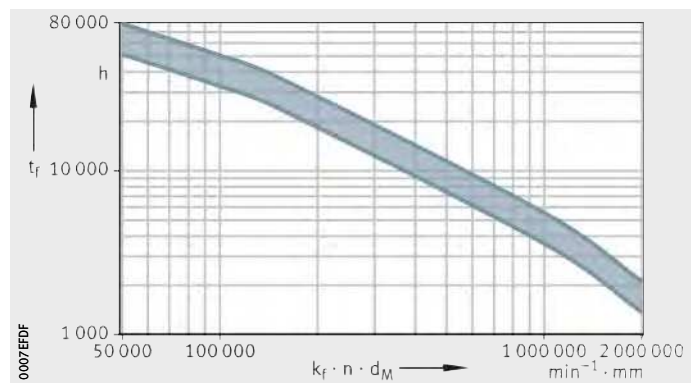
$n$   $\text{min}^{-1}$   
Operating speed or equivalent speed

$d_M$  mm  
Mean bearing diameter  $(d + D)/2$ .

## Calculation of basic grease operating life

$t_f$  = basic grease operating life  
 $k_f \cdot n \cdot d_M$  = bearing-specific speed parameter

*Figure 8*  
Calculation of basic grease operating life



**Factor  $k_f$   
as a function of bearing type**

Bearing type	Factor $k_f$
Deep groove ball bearings, single row	1
Deep groove ball bearings, double row	1,5
Angular contact ball bearings, single row	1,6
Angular contact ball bearings, double row	2
Four point contact bearings	1,6
Self-aligning ball bearings	1,45
Axial deep groove ball bearings	5,5
Axial angular contact ball bearings, double row	1,4
Cylindrical roller bearings, single row, with constant axial load	3,25
Cylindrical roller bearings, single row, with or without alternating axial load	2
Cylindrical roller bearings, double row <sup>1)</sup>	3,5
Cylindrical roller bearings, full complement	5,3
Tapered roller bearings	4
Barrel roller bearings	10
Spherical roller bearings without central rib	8
Spherical roller bearings with central rib	10,5
Needle roller and cage assemblies, needle roller bearings	3,6
Drawn cup needle roller bearings	4,2
Yoke and stud type track rollers, with cage or full complement cylindrical roller set	20
Yoke and stud type track rollers with full complement needle roller set	40
Ball bearing track rollers, single row	1
Ball bearing track rollers, double row	2
Yoke type track rollers PWTR, stud type track rollers PWKR	6
Cylindrical roller bearings LSL, ZSL	3,1
Crossed roller bearings	4,4
Axial needle roller bearings, axial cylindrical roller bearings	58
Radial insert ball bearings, housing units	1

<sup>1)</sup> Not valid for high precision cylindrical roller bearings NN30.  
In this case, please use the calculation scheme in the publication  
Super Precision Bearings, SP 1.

# Lubrication

## Guidelines on calculating the grease operating life Combined rolling bearings



The radial and axial bearing components must be calculated separately; the decisive value is the shorter grease operating life.

### Rotating outer ring

If the outer ring rotates, there may be a reduction in the grease operating life.

In the case of yoke and stud type track rollers:

- the angular misalignment must be zero
- the effect of the rotating outer ring on the grease operating life is taken into consideration in the bearing type factor  $k_f$ .

### Restrictions



The grease operating life cannot be determined using the above method:

- if the grease can leave the bearing arrangement
  - there is excessive evaporation of the base oil
  - in bearing positions without seals
  - in axial bearings with a horizontal axis of rotation
- if air is sucked into the rolling bearing during operation
  - this can cause the grease to oxidise
- in combined rotary and linear motion
  - the grease is distributed over the whole stroke length
- if contamination, water or other fluids enter the bearings
- for spindle bearings
- for drawn cup roller clutches
- for screw drive bearings
- for high precision bearings for combined loads
- for high precision cylindrical roller bearings NN30.

The additional guidelines on lubrication in the product sections must be observed.



**Correction factors for determining  
the grease operating life**  
Temperature factor  $K_T$

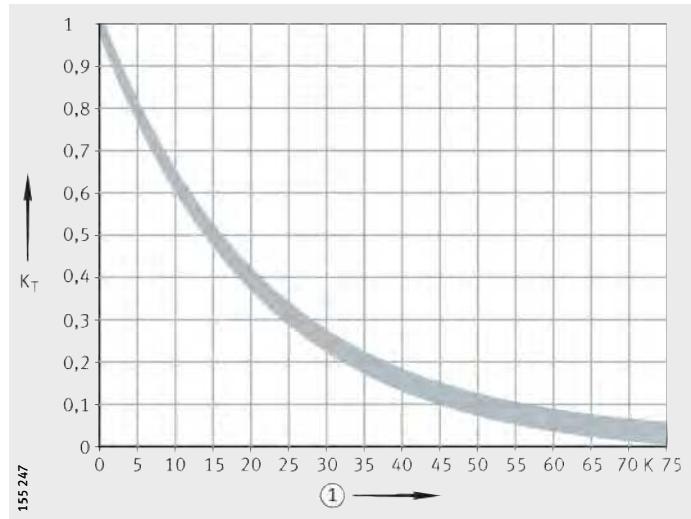
If the bearing temperature is higher than the continuous limit temperature  $T_{upperlimit}$ ,  $K_T$  must be determined from the diagram, *Figure 9*.



The diagram should not be used if the bearing temperature is higher than the upper operating temperature of the grease used, see table Greases, page 84. If necessary, a different grease should be selected or contact should be made with the Schaeffler engineering service.

① K above  $T_{upperlimit}$   
 $K_T$  = temperature factor

*Figure 9*  
Temperature factor  $K_T$



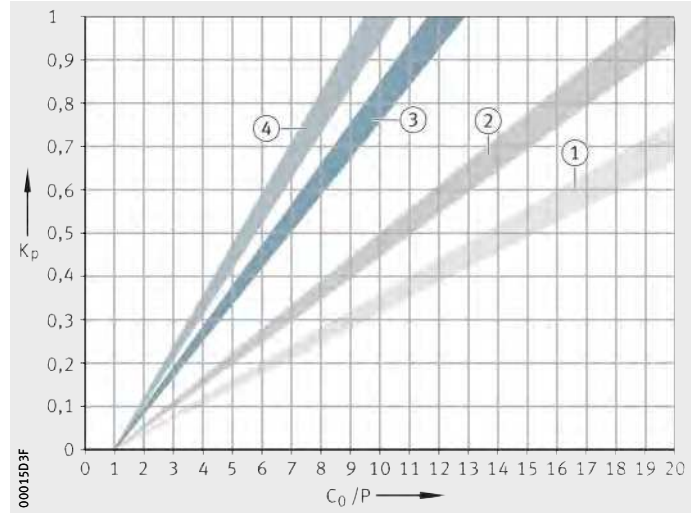
# Lubrication

Load factor  $K_p$

The factor  $K_p$  is dependent on the bearing and describes the reduction at higher load (this places greater strain on the grease), see *Figure 10* and table.

This is based on high-quality lithium soap greases

①, ②, ③, ④ see table  $K_p$  factor  
 $C_0/P$  = ratio between basic static load rating and equivalent dynamic bearing load  
 $K_p$  = load factor



*Figure 10*  
 $K_p$  factor for bearings

$K_p$  factor

Curve <sup>1)</sup>	Bearing type
①	Axial angular contact ball bearings, double row
	Axial deep groove ball bearings
	Axial needle roller bearings, axial cylindrical roller bearings
	Crossed roller bearings
②	Spherical roller bearings with central rib
	Needle roller and cage assemblies, needle roller bearings
	Drawn cup needle roller bearings
	Cylindrical roller bearings, double row (excluding NN30)
	Yoke type track rollers PWTR, stud type track rollers PWKR
	Yoke and stud type track rollers with cage or full complement cylindrical roller set
③	Cylindrical roller bearings LSL, ZSL
	Tapered roller bearings
	Spherical roller bearings without central rib (E1)
	Barrel roller bearings
	Cylindrical roller bearings, full complement
	Cylindrical roller bearings, single row (constant or alternating load)
	Four point contact bearings
④	Deep groove ball bearings (single or double row)
	Angular contact ball bearings (single or double row)
	Self-aligning ball bearings
	Ball bearing track rollers (single or double row)
	Radial insert ball bearings, housing units

<sup>1)</sup> Curves: see *Figure 10*.

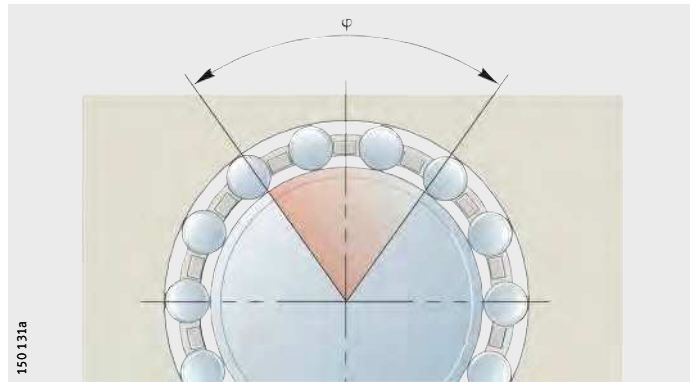
Oscillation factor  $K_R$

The factor  $K_R$  applies for an angle of oscillation  $\varphi < 180^\circ$ , *Figure 11* and *Figure 12*. Oscillating motion places a greater strain on the grease than does rotating motion.

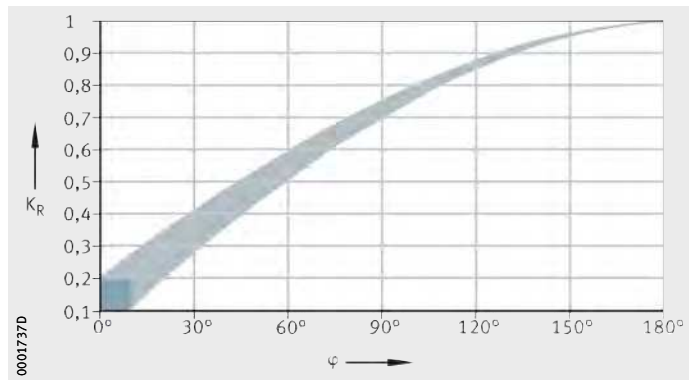


In order to reduce fretting corrosion, the lubrication interval should be reduced.

If the rolling elements do not undergo complete rotation, please contact the Schaeffler engineering service.



*Figure 11*  
Angle of oscillation  $\varphi$



$K_R$  = oscillation factor  
 $\varphi$  = angle of oscillation

*Figure 12*  
Oscillation factor  $K_R$

# Lubrication

Environment factor  $K_U$

The factor  $K_U$  takes account of the influences of moisture, shaking forces, slight vibration (leading to fretting corrosion) and shocks, see table Environment factor  $K_U$ .



It does not take account of extreme environmental influences such as water, aggressive media, contamination, radiation and extreme vibrations such as those occurring in vibratory machines.

In relation to contamination, the influence of contamination on rating life calculation must also be noted, see section Load carrying capacity and life, page 40.

Environment factor  $K_U$

Environmental influence	Factor $K_U$
Slight	1
Moderate	0,8
Heavy	0,5

Factor  $K_S$   
for vertical shafts

If increased escape of grease is expected, for example in the case of radial bearings with a vertical axis of rotation, the factor  $K_S$  according to the table must be taken into consideration.

Factor  $K_S$   
for vertical shaft

Arrangement of shaft	Factor $K_S$
Vertical (depending on sealing)	0,5 to 0,7
Other arrangement	1

## Relubrication intervals

Where rolling bearings are relubricated, attention must be paid to the lubrication interval in order to ensure reliable function of the bearings.



The precise lubrication interval should be determined by tests conducted under application conditions.

To do this:

- sufficiently long observation periods must be used
- the condition of the grease must be checked at regular intervals.

For reasons of operational reliability, relubrication intervals of > 1 year are not recommended.

## Lubrication interval guide value

Experience shows that a guide value for most applications is:

$$t_{FR} = 0,5 \cdot t_{FG}$$

$t_{FR}$  h  
Guide value for relubrication interval

$t_{FG}$  h  
Guide value for grease operating life, see page 79.

## Relubrication conditions

The grease used for relubrication must be the same as that used in initial greasing.

If different greases are used, their miscibility and compatibility must be checked; see Miscibility, page 95.

## Relubrication quantity

Due to the compact construction of the bearings, relubrication should be carried out using 50% to 80% of the initial greasing quantity (recommendation).

If feed lines filled with air are present, the filling volume of the feed lines should be included in calculation of the relubrication quantity.

## Relubrication

Relubrication should always be carried out as follows:

- with the bearing still warm from operation and rotating if safe to do so
- before the bearing comes to rest if safe to do so
- before extended breaks in operation.

Relubrication should continue until a fresh collar of grease appears at the seal gaps. Old grease must be allowed to leave the bearing unhindered.

# Lubrication

## Grease reservoir

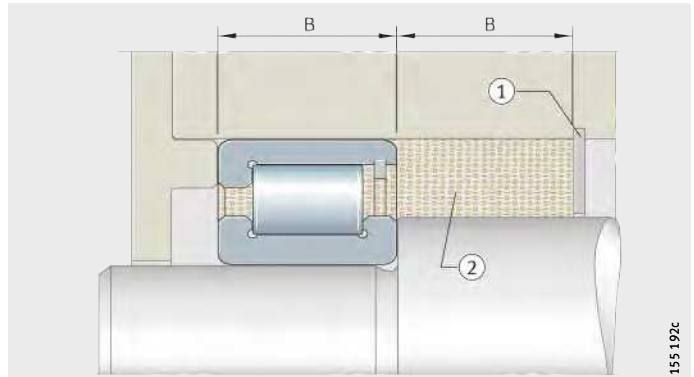
The initial greasing quantity is between 30% and 100% of the available volume in the bearing, dependent on the bearing type and operating conditions.

A grease reservoir can extend the grease operating life. The grease in the reservoir must be in constant contact with the grease on the raceway. The grease operating life does not increase proportionally with the size of the grease reservoir.

The volume of the grease reservoir should correspond to the volume in the bearing between the inner and outer ring (not taking account of the cage and rolling elements), *Figure 13* and *Figure 14*.

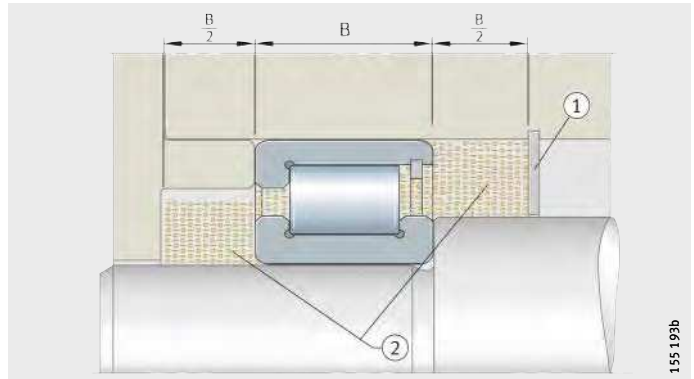
Evaporation of the base oil should be prevented by design measures, for example by sealing shields, *Figure 13* and *Figure 14*.

- ① Sealing shield
- ② Grease reservoir



*Figure 13*  
Grease reservoir on one side

- ① Sealing shield
- ② Grease reservoir



*Figure 14*  
Grease reservoir on both sides

**Miscibility** Mixtures of greases should be avoided if at all possible.

**Preconditions** If they are unavoidable, the following preconditions must be fulfilled:

- the base oil must be the same
- the thickener types must match
- the base oil viscosities must be similar (they must not differ by more than one ISO-VG class)
- the consistency must be identical (NLGI class).



Miscibility of greases must always be agreed in consultation with the lubricant manufacturer.

Even when these preconditions are fulfilled, impairment of the performance capability of the mixed grease cannot be ruled out.

If a decision is taken to change to a different grease grade, the grease should be rinsed out if this is possible.

Further relubrication should be carried out after a shortened period.

If incompatible greases are mixed, this can lead to considerable structural changes. Substantial softening of the grease mixture may also occur.

Definite statements on miscibility can only be obtained by means of suitable tests.

**Storage** In general, the greases used can be stored for 3 years.

**Preconditions** The preconditions are:

- a closed room or store
- temperatures between 0 °C and +40 °C
- relative humidity no more than 65%
- no influence of chemical agents (vapours, gases, fluids)
- the rolling bearings are sealed.

Lubricants age due to environmental influences. The information provided by lubricant manufacturers must always be observed.



After long periods of storage, the start-up frictional torque of greased bearings can be temporarily higher than normal.

The lubricity of the grease may also have deteriorated.

Since the lubrication characteristics of greases vary and different raw materials may be used for greases of the same name, we cannot offer any guarantees either for the lubricants used by customers for relubrication or for their characteristics.

# Lubrication

## Oil lubrication

For the lubrication of rolling bearings, mineral oils and synthetic oils are essentially suitable.

Oils with a mineral oil base are used most frequently. They must fulfil at least the requirements according to DIN 51 517 or DIN 51 524.

Special oils, often synthetic oils, are used under extreme operating conditions or where there are special requirements relating to oil resistance.

In these cases, please consult the lubricant manufacturer or the Schaeffler engineering service.

## Operating temperatures



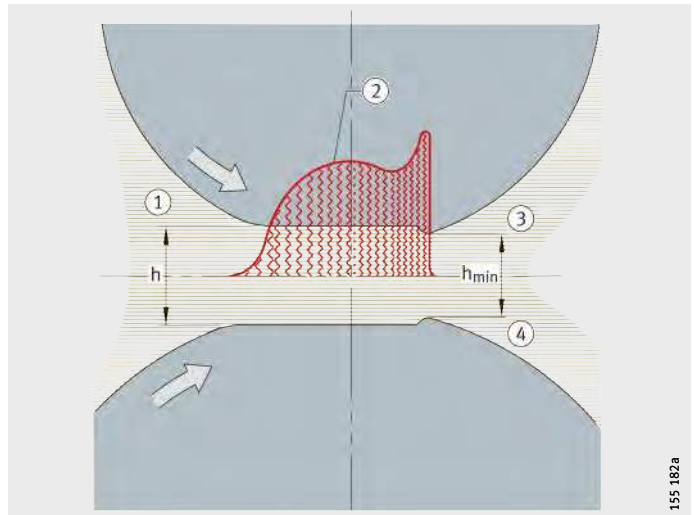
The information provided by the lubricant manufacturer should be taken as authoritative.

## Selection of suitable oil

The achievable bearing life and security against wear are higher with better separation of the contact surfaces by a lubricant film, *Figure 15* and section Load carrying capacity and life, page 40.

- ① Entry zone
- ② Pressure curve according to EHD theory
- ③ Exit zone
- ④ Lubricant

*Figure 15*  
Lubricant film in the contact zones





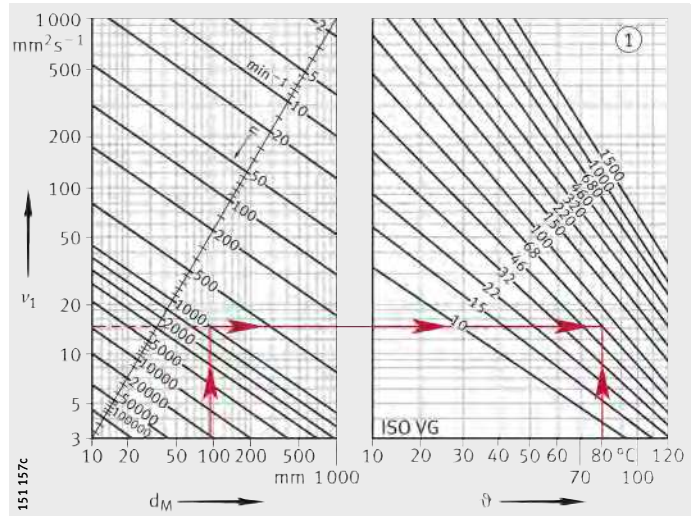
**Reference viscosity for mineral oils**

The guide value for  $\nu_1$  is dependent on the mean bearing diameter  $d_M$  and the speed  $n$ . It takes account of the EHD theory of lubricant film formation and practical experience.

Depending on the operating speed, the oil at operating temperature must have at least the reference viscosity  $\nu_1$ , *Figure 16*.

- ① Viscosity  $\text{mm}^2\text{s}^{-1}$  at  $+40\text{ }^\circ\text{C}$
- $n$  = operating speed
- $\nu_1$  = reference viscosity
- $d_M$  = mean bearing diameter  $(d + D)/2$
- $\vartheta$  = operating temperature

*Figure 16*  
Reference viscosity and V/T diagram for mineral oils



**Calculation of reference viscosity**

The reference viscosity  $\nu_1$  is determined as follows:

- Assign  $\nu_1$  to a nominal viscosity with ISO-VG between 10 and 1 500 (mid-point viscosity to DIN 51 519)
- Round intermediate values to the nearest ISO-VG (due to the steps between groups).



This method cannot be used for synthetic oils, since these have different V/P (viscosity/pressure) and V/T (viscosity/temperature) characteristics.

In these cases, please consult the Schaeffler engineering service.

# Lubrication

## Influence of temperature on viscosity

As the temperature increases, the viscosity of the oil decreases. This temperature-dependent change in the viscosity is described using the viscosity index VI. For mineral oils, the VI index should be at least 95.

When selecting the viscosity, the lower operating temperature must be taken into consideration, since the increasing viscosity will reduce the flowability of the lubricant. As a result, the level of power losses may increase.

Very long life can be achieved with a viscosity ratio  $\kappa = \nu/\nu_1 = 3$  to 4 ( $\nu$  = operating viscosity). Highly viscous oils do not, however, bring only advantages. In addition to the power losses arising from lubricant friction, there may be problems with the feed and removal of oil at low or even at normal temperatures.

The oil selected must be sufficiently viscous that it gives the highest possible fatigue life. It must also be ensured that the bearings are always supplied with adequate quantities of oil.

## Pressure properties and anti-wear additives

If the bearings are subjected to high loads or if the operating viscosity  $\nu$  is less than the reference viscosity  $\nu_1$ , oils with anti-wear additives (type P to DIN 51 502) should be used.

Such oils are also necessary for rolling bearings with a substantial proportion of sliding contact (for example bearings with line contact).

These additives form boundary layers to reduce the harmful effects of metallic contact occurring at various areas (wear).

The suitability of these additives varies and is normally heavily dependent on temperature. Their effectiveness can only be assessed by means of testing in the rolling bearing (for example on our test rig FE8 to DIN 51 819).



Silicone oils should only be used for low loads ( $P \leq 0,03 \cdot C$ ).

**Compatibility** Before an oil is used, its behaviour must be checked in relation to plastics, seal materials (elastomers) and light and non-ferrous metals.

This must always be checked under dynamic loading and at operating temperature.

Synthetic oils must always be checked for their compatibility. The lubricant manufacturer must be consulted on this at the same time.

**Miscibility** The mixing of different oils should be avoided wherever possible. In particular, the presence of different additive packages may lead to undesirable interactions.

In general, oils with a mineral oil base and the same classification are miscible, for example type HLP with type HLP. The viscosities should vary by no more than one ISO-VG class.



Synthetic oils must always be checked for their compatibility. The lubricant manufacturer must be consulted on this at the same time.

Miscibility must be checked in advance for each individual case.

**Cleanliness** The cleanliness of the oil influences the rating life of bearings, see also section Load carrying capacity and life, page 40. Schaeffler therefore recommends that an oil filter should be provided; attention must be paid to the filtration rate. The filter mesh should be  $< 25 \mu\text{m}$ .

# Lubrication

## Lubrication methods

The essential lubrication methods are:

- drip feed oil lubrication
- pneumatic oil lubrication  
(in order to protect the environment, this should be used as a substitute for oil mist lubrication)
- oil bath lubrication  
(immersion or sump lubrication)
- recirculating oil lubrication.

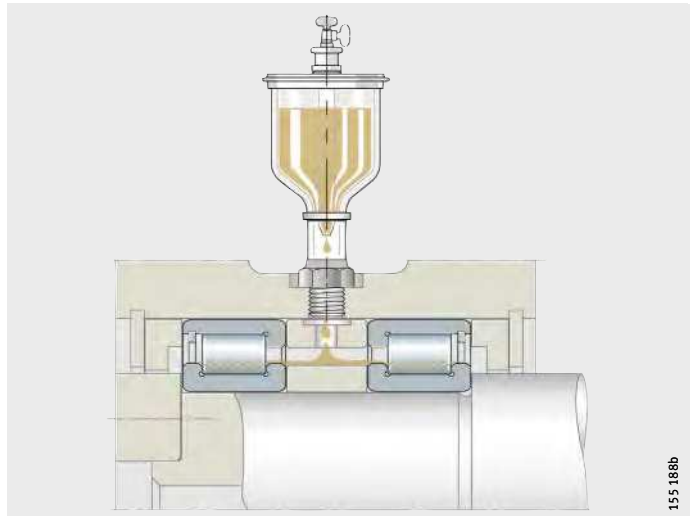
## Drip feed oil lubrication

This is suitable for bearings running at high speeds, *Figure 17*.

The oil quantity required is dependent on the type and size of bearing, the operating speed and the load.

The guide value is between 3 drops/min and 50 drops/min for each rolling element raceway (one drop weighs approx. 0,025 g).

Excess oil must be allowed to flow out of the bearing arrangement.



*Figure 17*  
Drip feed oil lubrication  
(schematic)

### Pneumatic oil lubrication

This method is particularly suitable for radial bearings running at high speeds and under low loads ( $n \cdot d_M = 800\,000$  to  $3\,000\,000 \text{ min}^{-1} \cdot \text{mm}$ ), *Figure 18*.

Clean compressed air free from moisture feeds oil to the bearing. This generates an excess pressure. This prevents contaminants from entering the bearing.

With a pneumatic oil lubrication system designed for minimal quantity lubrication, low frictional torque and a low operating temperature can be achieved.

Parameters for design of the lubrication system should be requested from the equipment manufacturers.



Pneumatic oil lubrication of axial bearings should be avoided if possible.

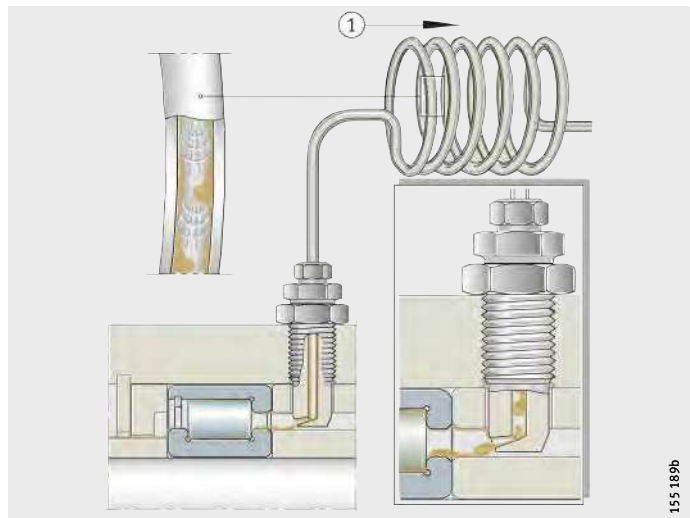
The oil quantity required for adequate supply is dependent on the bearing type.

Pneumatic oil lubrication has little cooling effect.

Follow the instructions provided by the manufacturers of the lubrication systems.

① To the pneumatic oil unit

*Figure 18*  
Pneumatic oil lubrication  
(schematic)



# Lubrication

## Oil bath lubrication

The oil level should reach the centre line of the lowest rolling element, *Figure 19*. If the oil level is higher than this, the bearing temperature may increase at high circumferential speeds and losses due to splashing may occur. Furthermore, foaming of the oil may occur.

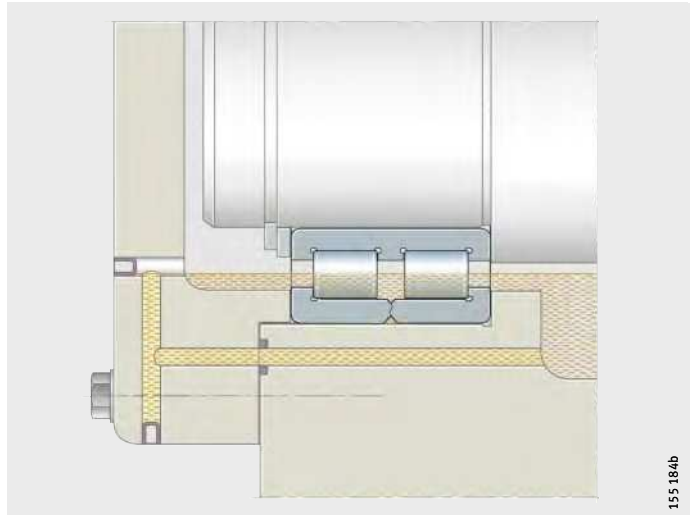
In general, it is suitable for speeds up to  $n \cdot d_M = 300\,000 \text{ min}^{-1} \cdot \text{mm}$ .

At  $n \cdot d_M < 150\,000 \text{ min}^{-1} \cdot \text{mm}$ , the bearing may be completely immersed.

In bearings with an asymmetrical cross-section, oil return ducts must be provided due to the pumping effect so that recirculation can be achieved.

In axial bearings, the oil level must cover the inside diameter of the axial cage.

The oil quantity in the housing must be adequately proportioned, otherwise very short oil change intervals will be necessary.



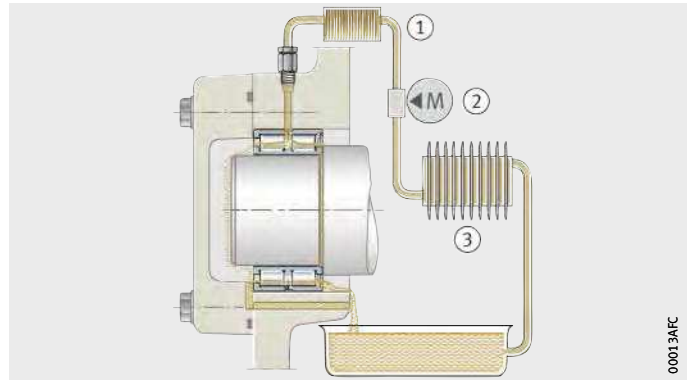
*Figure 19*  
Oil bath lubrication  
(schematic)

## Recirculating oil lubrication

In recirculating oil lubrication, the oil is subjected to additional cooling, *Figure 20*. The oil can therefore dissipate heat from the bearing. The quantity of oil required for heat dissipation is dependent on the cooling conditions, see section Speeds, page 71.

- ① Filter
- ② Pump
- ③ Cooling system

*Figure 20*  
Recirculating oil lubrication  
(schematic)

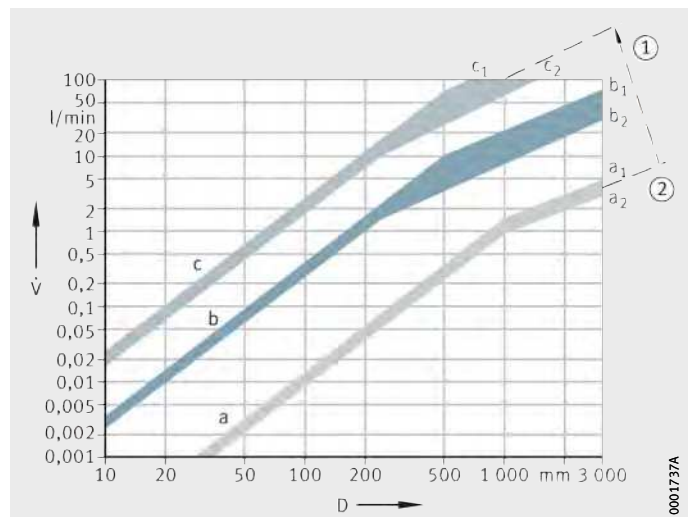


The oil quantities  $\dot{V}$  are matched to the operating conditions, *Figure 21*. The diagram indicates oil quantities that can be fed through the bearing without pressure and banking up to the lower edge of the shaft.

For bearings with an asymmetrical cross-section (such as angular contact ball bearings, tapered roller bearings, axial spherical roller bearings), larger throughput quantities are permissible due to the pumping effect than for bearings with a symmetrical cross-section. Large quantities can be used to dissipate wear debris or heat.

- ① Increasing oil quantity required for heat dissipation
  - ② No heat dissipation necessary
- $D$  = outside bearing diameter  
 $\dot{V}$  = oil quantity
- $a$  = oil quantity sufficient for lubrication  
 $b$  = upper limit for bearings of symmetrical design  
 $c$  = upper limit for bearings of asymmetrical design  
 $a_1; b_1; c_1; D/d > 1,5$   
 $a_2; b_2; c_2; D/d \leq 1,5$

*Figure 21*  
Oil quantities



# Lubrication

## Design of adjacent construction for oil lubrication

The lubrication holes in the housing and shaft must align with those in the rolling bearings. Adequate cross-sections must be provided for annular slots, pockets, etc.

The oil must be able to flow out without pressure (this prevents oil build-up and additional heating of the oil).

In axial bearings, the oil must always be fed from the inside to the outside.

## Outlet cross-section guide values for oil lubrication

The cross-section of the oil outlet hole should be significantly larger than that of the inlet, *Figure 22*.

The cross-section  $A_{rab}$  is dependent on the oil quantity and the viscosity:

$$A_{rab} = K_{ab} \cdot A_{ab}$$

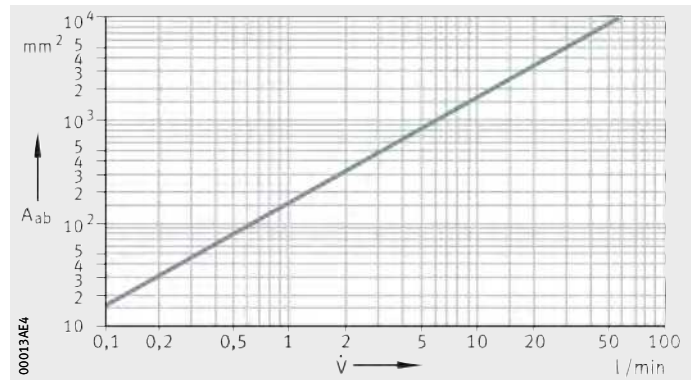
$A_{rab}$                        $\text{mm}^2$   
Outlet cross-section taking account of viscosity

$K_{ab}$                         –  
Correction factor for viscosity, see table

$A_{ab}$                          $\text{mm}^2$   
Outlet cross-section, *Figure 22*.

$A_{ab}$  = cross-section for pressure-free oil runoff  
 $\dot{V}$  = oil quantity

*Figure 22*  
Outlet cross-section (guide values)



## Correction factor $K_{ab}$

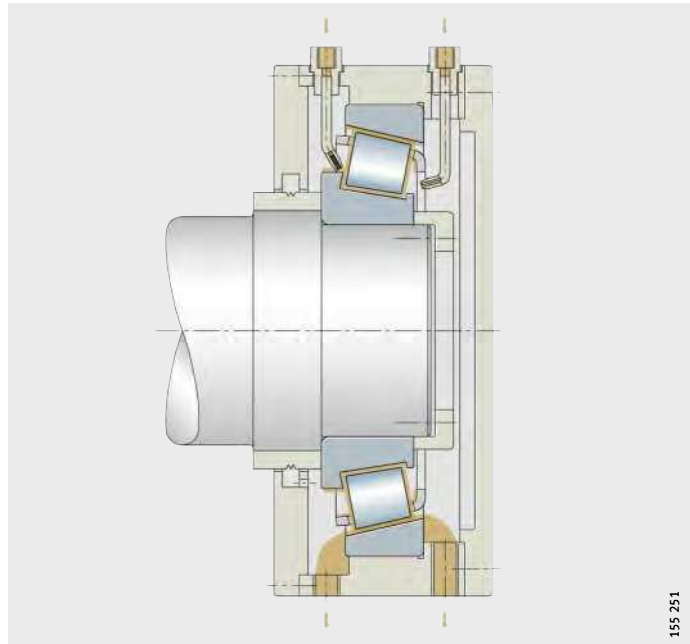
Viscosity $\text{mm}^2 \cdot \text{s}^{-1}$	Factor $K_{ab}$
to 30	1
30 to 60	1,2 to 1,6
60 to 90	1,8 to 2,2
90 to 120	2,4 to 2,8
120 to 150	3 to 3,4



### Oil injection lubrication

In bearings running at high speeds, the oil is injected into the gap between the cage and bearing ring, *Figure 23*. Injection lubrication using large recirculation quantities is associated with high power loss.

Heating of the bearings can only be held within limits with a considerable amount of effort. The appropriate upper limit for the speed parameter  $n \cdot d_M = 1\,000\,000 \text{ min}^{-1} \cdot \text{mm}$  for recirculating lubrication with suitable bearings (for example spindle bearings) can be exceeded to a considerable degree when using injection lubrication.



*Figure 23*  
Oil injection lubrication  
(oil feed from both sides  
for tapered roller bearing  
running at high speeds)

# Lubrication

## Heat dissipation by the lubricant

Oil can dissipate frictional heat from the bearing. It is possible to calculate the heat flow  $\dot{Q}_L$  that is dissipated by the lubricant and the necessary lubricant volume flow  $\dot{V}_L$ .

### Heat flow

$$\dot{Q} = 10^{-6} \cdot \frac{\pi}{30} \cdot n \cdot (M_0 + M_1) + \dot{Q}_E$$

$$\dot{Q}_L = \dot{Q} - \dot{Q}_S$$

### Approximate calculation

$$\dot{V}_L = \frac{\dot{Q}_L}{0,0286 \cdot \Delta\vartheta_L}$$

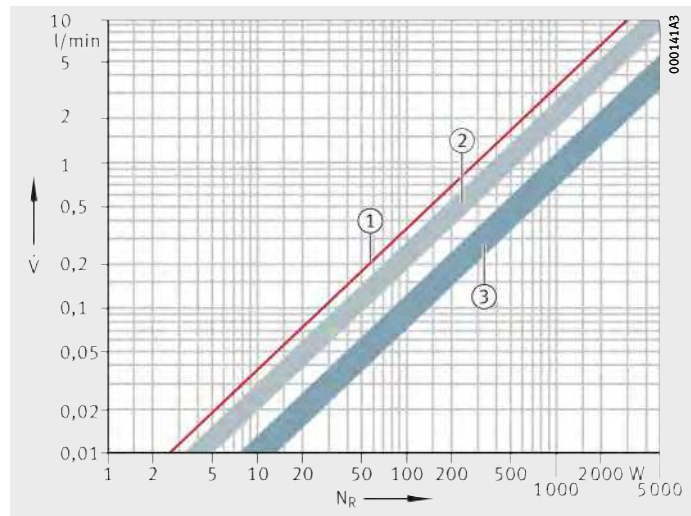
$\dot{Q}_L$	kW
Heat flow dissipated by the lubricant	
$\dot{Q}$	kW
Total dissipated heat flow	
$\dot{Q}_S$	kW
Heat flow dissipated via the bearing seating surfaces	
$\dot{Q}_E$	kW
Heat flow due to heating by external source	
$n$	$\text{min}^{-1}$
Operating speed or equivalent speed	
$M_0$	Nmm
Frictional torque as a function of speed	
$M_1$	Nmm
Frictional torque as a function of load	
$\dot{V}_L$	l/min
Lubricant volume flow	
$\Delta\vartheta_L$	K
Difference between oil inlet and oil outlet temperature.	

## Guide values for the oil quantity in cooling and lubrication

If these values cannot be calculated, the guide values according to *Figure 24* apply for a temperature difference of  $\Delta\vartheta_L = 10 \text{ K}$ .

- ① No account is taken of thermal conduction, radiation or convection
  - ② Empirical values for normal cooling conditions
  - ③ Empirical values for very good cooling conditions
- $\dot{V}$  = oil quantity  
 $N_R$  = frictional energy

*Figure 24*  
 Guide values for the oil quantity in cooling and lubrication



## Oil changes

At temperatures in the bearing of less than +50 °C and with only slight contamination, an oil change once per year is generally sufficient.

Guide values for oil change intervals are given in *Figure 25*.



The precise oil change intervals should be agreed in consultation with the oil manufacturer.

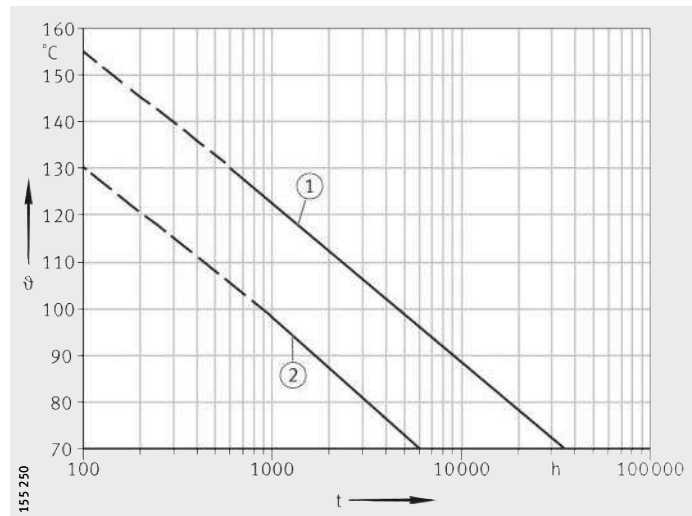
## Severe operating conditions

Under severe conditions, the oil should be changed more frequently. This applies, for example, in the case of higher temperatures and low oil quantities with a high circulation index.

The circulation index indicates how often the entire oil volume available is recirculated and pumped per hour:

$$\text{Circulation index} = \frac{\text{Pump displacement m}^3/\text{h}}{\text{Container volume m}^3}$$

- ① Synthetic gearbox oils
  - ② Mineral gearbox oils
- t = oil change interval  
ϑ = oil sump temperature
- Source: FVA Project No. 171



*Figure 25*  
Oil change intervals

# Bearing data

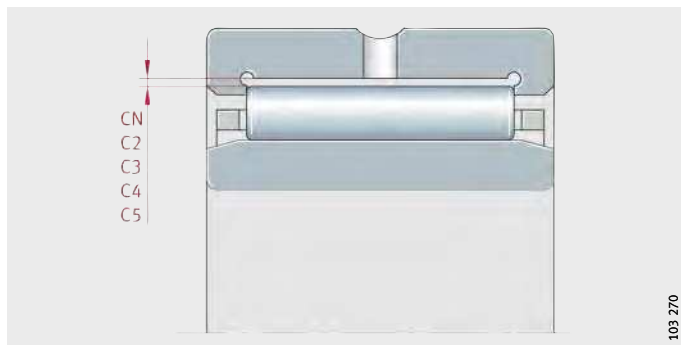
## Radial internal clearance

The radial internal clearance applies to bearings with an inner ring before the bearing is fitted. It is defined as the amount by which the inner ring can be moved in a radial direction from one extreme position to the other in relation to the outer ring, *Figure 1*.

In accordance with DIN 620-4, ISO 5 753, the radial internal clearance is divided into groups, see *Figure 1* and table.

CN, C2, C3, C4, C5  
Internal clearance groups

*Figure 1*  
Radial internal clearance



## Radial internal clearance groups

Internal clearance group	Description	Standard	Application
CN	Normal radial internal clearance CN is not included in bearing designations	DIN 620-4 ISO 5 753	For normal operating conditions with shaft and housing tolerances, see section Operating clearance and Design of bearing arrangements
C2	Internal clearance < CN		For heavy alternating loads combined with oscillating motion
C3	Internal clearance > CN	ISO 5 753	For bearing rings with press fits and large temperature differential between inner and outer ring
C4	Internal clearance > C3		
C5	Internal clearance > C4		

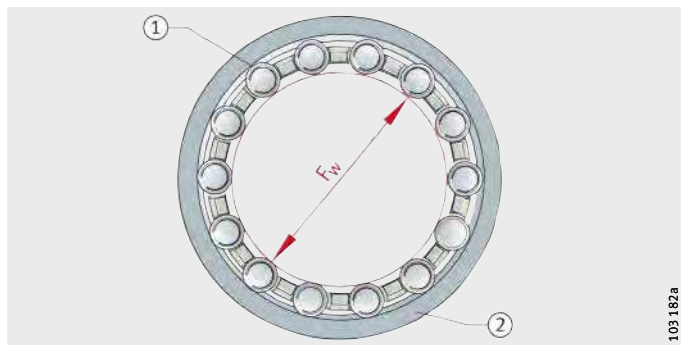
## Enveloping circle

For bearings without an inner ring, the enveloping circle  $F_w$  is used. This is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway, *Figure 2*. The enveloping circle for unfitted bearings is in the tolerance zone F6 (except for drawn cup needle roller bearings).

Deviations for F6 and F8, see table, page 168.

① Needle roller  
② Outer raceway  
 $F_w$  = enveloping circle diameter

*Figure 2*  
Enveloping circle





# Bearing data

## Reduction in radial internal clearance due to fit

The radial internal clearance is reduced due to the fit as a result of expansion of the inner ring and contraction of the outer ring:

$$\Delta s_p = \Delta d + \Delta D$$

$\Delta d$   $\mu\text{m}$

Expansion of the inner ring

$\Delta D$   $\mu\text{m}$

Contraction of the outer ring.

## Expansion of the inner ring

The expansion of the inner ring is calculated as follows:

$$\Delta d \approx 0,9 \cdot U \cdot d / F \approx 0,8 \cdot U$$

$d$   $\text{mm}$

Bore diameter of the inner ring

$U$   $\mu\text{m}$

Theoretical interference of the fitted parts with firm seating.

The theoretical oversize of the fitted parts with a firm seating is determined from the mean deviations and the upper and lower deviations of the tolerance zones of the fitted parts reduced by  $1/3$  of their acceptable value. The amount of surface smoothing during assembly must be subtracted from this

$F$   $\text{mm}$

Raceway diameter of the inner ring.



For very thin-walled housings and light metal housings, the reduction in the radial internal clearance must be determined by means of mounting trials.

## Contraction of the outer ring

The contraction of the outer ring is calculated as follows:

$$\Delta D \approx 0,8 \cdot U \cdot E / D \approx 0,7 \cdot U$$

$E$   $\text{mm}$

Raceway diameter of the outer ring

$D$   $\text{mm}$

Outside diameter of the outer ring.

## Reduction in radial internal clearance due to temperature

The radial internal clearance can alter considerably if there is a substantial temperature differential between the inner and outer ring.

$$\Delta s_T = \alpha \cdot d_M \cdot 1000 \cdot (\vartheta_{IR} - \vartheta_{AR})$$

$\Delta s_T$   $\mu\text{m}$

Reduction in radial internal clearance due to temperature

$\alpha$   $\text{K}^{-1}$

Coefficient of thermal expansion of steel:  $\alpha = 0,000011 \text{ K}^{-1}$

$d_M$   $\text{mm}$

Mean bearing diameter  $(d + D)/2$

$\vartheta_{IR}$   $^{\circ}\text{C}, \text{K}$

Temperature of the inner ring

$\vartheta_{AR}$   $^{\circ}\text{C}, \text{K}$

Temperature of the outer ring

(usual temperature difference between inner and outer ring: 5 K to 10 K).



A larger radial internal clearance should be used for shafts running at high speeds, since adequate thermal compensation between the bearing, shaft and housing does not occur in this situation.

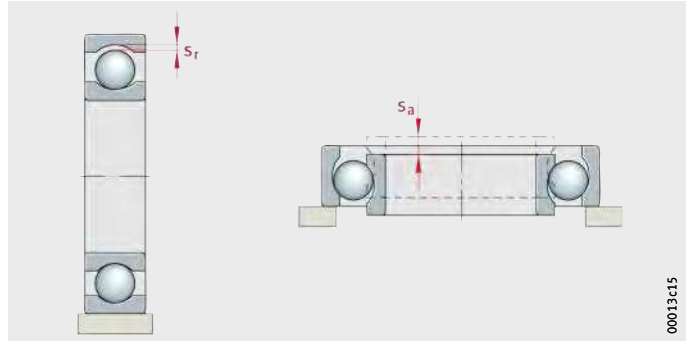
$\Delta s_T$  can be significantly higher in this case than for continuous operation.

## Axial internal clearance

The axial internal clearance  $s_a$  is the extent to which one bearing ring can be displaced in relation to the other, without load, along the bearing axis, *Figure 4*.

$s_a$  = axial internal clearance  
 $s_r$  = radial internal clearance

*Figure 4*  
 Axial internal clearance  
 in comparison  
 with radial internal clearance



With various bearing types, the radial internal clearance  $s_r$  and the axial internal clearance  $s_a$  are dependent on each other. Guide values for the correlation between the radial and axial internal clearance are shown for some bearing types in the table.

### Correlation between axial internal clearance and radial internal clearance

Bearing type		Ratio between axial and radial internal clearance $s_a/s_r$
Self-aligning ball bearings		$2,3 \cdot Y_0^{1)}$
Spherical roller bearings		$2,3 \cdot Y_0^{1)}$
Tapered roller bearings	Single row, arranged in pairs	$4,6 \cdot Y_0^{1)}$
	Matched pairs (N11CA)	$2,3 \cdot Y_0^{1)}$
Angular contact ball bearings	Double row Series 32 and 33	1,4
	Series 32...-B and 33...-B	2
	Single row Series 72...-B and 73...-B, arranged in pairs	1,2
Four point contact bearings		1,4

<sup>1)</sup>  $Y_0$  factor in accordance with dimension table.

# Bearing data

## Calculation example

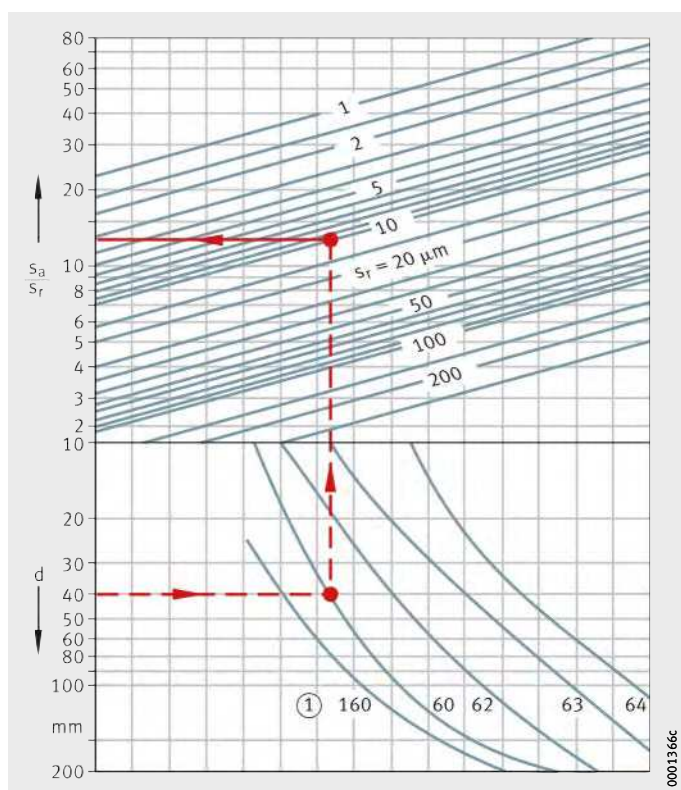
For deep groove ball bearings, the calculation of the axial internal clearance is shown in the following example:

Deep groove ball bearing	6008-C3
Bore diameter d	40 mm
Radial internal clearance before fitting	15 $\mu\text{m}$ to 33 $\mu\text{m}$
Actual radial internal clearance	24 $\mu\text{m}$
Mounting tolerance Shaft	k5
Housing	J6
Reduction in radial internal clearance during fitting	14 $\mu\text{m}$
Radial internal clearance after fitting	24 $\mu\text{m}$ - 14 $\mu\text{m}$ = 10 $\mu\text{m}$
Ratio $s_a/s_r$ , Figure 5	13

Axial internal clearance  $s_a = 13 \cdot 10 \mu\text{m} = 130 \mu\text{m}$

- ① Bearing series
- $s_a$  = axial internal clearance
- $s_r$  = radial internal clearance
- d = bearing bore diameter

**Figure 5**  
Relationship between radial and axial internal clearance in deep groove ball bearings





### **Bearing materials**

INA and FAG rolling bearings fulfil the requirements for fatigue strength, wear resistance, hardness, toughness and structural stability.

The material used for the rings and rolling elements is generally a low-alloy, through hardening chromium steel of high purity. For bearings subjected to considerable shock loads and reversed bending stresses, case hardening steel is also used (supplied by agreement).

In recent years, the improved quality of rolling bearing steels has been the principal factor in achieving considerable increases in basic load ratings.

The results of research as well as practical experience confirm that bearings made from the steel currently used as standard can achieve their endurance limit if loads are not excessively high and the lubrication and cleanliness conditions are favourable.

### **High Nitrogen Steel**

With special bearings made from HNS (High Nitrogen Steel), it is possible to achieve adequate service life even under the most challenging conditions (high temperatures, moisture, contamination); these are supplied by agreement.

### **High performance steels Cronidur and Cronitect**

For increased performance requirements, highly corrosion-resistant, nitrogen-alloyed martensitic HNS steels are available such as Cronidur and the newly developed steel Cronitect.

In contrast to Cronidur, Cronitect has nitrogen introduced into the structure by means of a surface layer hardening process.

In terms of corrosion resistance, wear resistance and fatigue strength, both steels are considerably superior to conventional corrosion-resistant steels for rolling bearings, see also TPI 64, Corrosion-resistant products.

### **Ceramic materials**

Ceramic hybrid spindle bearings contain balls made from silicon nitride. These ceramic balls are substantially lighter than steel balls. The centrifugal forces and friction are significantly lower.

Hybrid bearings allow very high speeds, even with grease lubrication, as well as long operating life and low operating temperatures.

# Bearing data

## Materials and bearing components

### Materials and bearing components

The following table shows suitable materials and their use in bearing technology.

Material	Bearing components (example)
Through hardening steel – rolling bearing steel to ISO 683-17	Outer and inner ring, axial washer
HNS – High Nitrogen Steel	Outer and inner ring
Corrosion-resistant steel – rolling bearing steel to ISO 683-17	Outer and inner ring
Case hardening steel	For example, outer ring of yoke type track rollers
Flame or induction hardening steel	Roller stud of stud type track rollers
Steel strip to EN 10139, SAE J403	Outer ring of drawn cup needle roller bearings
Silicon nitride	Ceramic balls
Brass alloy	Cage
Aluminium alloy	Cage
Polyamide (thermoplastic)	Cage
NBR, FPM, PUR	Sealing ring

### Cages

The most important functions of the cage are:

- to separate the rolling elements from each other in order to minimise friction and heat generation
- to maintain the rolling elements at the same distance from each other in order to ensure uniform load distribution
- to prevent the rolling elements from falling out where bearings can be dismantled or swivelled out
- to guide the rolling elements in the load zone of the bearing.

Rolling bearing cages are subdivided into sheet metal and solid section cages.

### Sheet metal cages

These cages are predominantly made from steel and for some bearings from brass, *Figure 6*, page 116. In comparison with solid section cages made from metal, they are of lower mass.

Since a sheet metal cage only fills a small proportion of the gap between the inner and outer ring, lubricant can easily reach the interior of the bearing and is held on the cage.

In general, a sheet steel cage is only included in the bearing designation if it is not defined as a standard version of the bearing.

## Solid section cages

These cages are made from metal, laminated fabric or plastic, *Figure 7*, page 116. They can be identified from the bearing designation.

### Solid section cages made from metal or laminated fabric

Solid section cages made from metal are used where there are requirements for high cage strength and at high temperatures. Solid section cages are also used if the cage must be guided on ribs. Rib-guided cages for bearings running at high speeds are made in many cases from light materials such as light metal or laminated fabric in order to achieve low inertia forces.

### Solid section cages made from polyamide PA66

Solid section cages made from polyamide 66 are produced using injection moulding, *Figure 8*, page 116. As a result, cage types can generally be realised that allow designs with particularly high load carrying capacity. The elasticity and low mass of polyamide are favourable under shock type bearing loads, high accelerations and decelerations and tilting of the bearing rings in relation to each other. Polyamide cages have very good sliding and emergency running characteristics.

Cages made from glass fibre reinforced polyamide 66 are suitable for long term temperatures up to +120 °C.



When using oil lubrication, additives in the oil can impair the cage operating life. The interrelationship between the cage operating life, the long term temperature of the stationary bearing ring and the lubricant is shown in *Figure 9*, page 117. Aged oil can also impair the cage operating life at high temperatures, so attention must be paid to compliance with the oil change intervals.

# Bearing data

## Cage designs

- ① Lug cage for deep groove ball bearings
- ② Riveted cage for deep groove ball bearings
- ③ Window cage for spherical roller bearings

*Figure 6*  
Sheet steel cages



- ① Riveted solid section cage for deep groove ball bearings
- ② Window cage for angular contact ball bearings
- ③ Riveted cage with crosspiece rivets for cylindrical roller cages

*Figure 7*  
Solid section brass cages



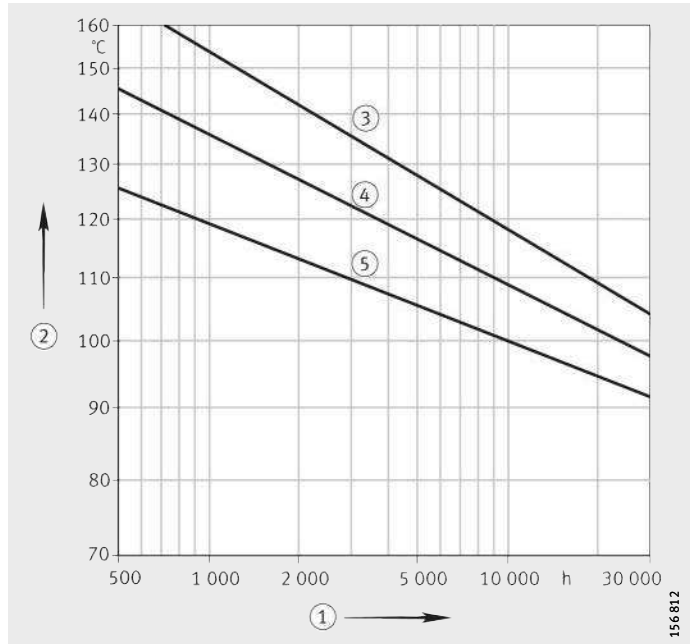
- ① Window cage for single row angular contact ball bearings
- ② Window cage for spherical roller bearings

*Figure 8*  
Solid section cages made from glass fibre reinforced polyamide



- ① Operating life of window cages
- ② The curves are valid for the long term temperature of the stationary bearing ring  
If the temperature is not continuously high, the cage operating life is longer
- ③ Rolling bearing grease K to DIN 51 825, engine oil or machine oil
- ④ Gearbox oil
- ⑤ Hypoid oil

**Figure 9**  
Operating life of window cages made from polyamide PA66-GF25



### Guidance method

A further means of distinguishing between cages is their guidance method, *Figure 10*. Most cages are guided by the rolling elements and do not have a suffix for the guidance method.

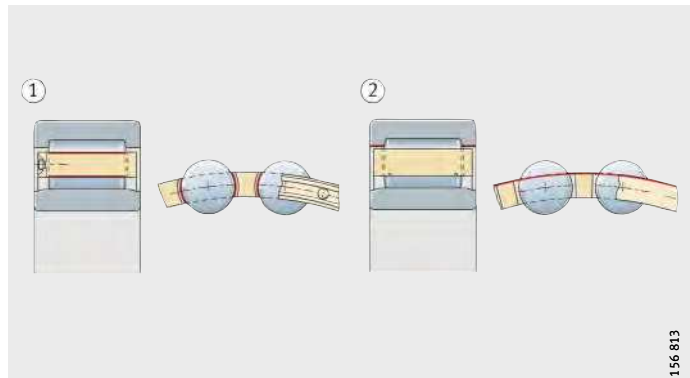
If guidance is by the bearing outer ring, the suffix A is used. Cages that are guided on the inner ring have the suffix B.

Under normal operating conditions, the cage design defined as the standard cage is generally suitable. Standard cages that may differ within a bearing series according to the bearing size are described in the product sections.

Under special operating conditions, a cage that is suitable for the specific conditions must be selected.

- Rolling bearing cages
- ① Guided by rolling elements
  - ② Guided by ribs

**Figure 10**  
Guidance of cages



# Bearing data

## Operating temperature

Rolling bearings are thermally stabilised such that, depending on the bearing type, they are generally dimensionally stable up to +120 °C (certain series up to +150 °C).

Operating temperatures above +150 °C require special heat treatment. Bearings treated in this way are available by agreement and are identified by the suffix S1, S2, S3 and S4 to DIN 623-1, see table.



Further temperature data in the product descriptions must be observed.

## Suffixes for bearings for high temperatures

Suffix	S1	S2	S3	S4
Max. operating temperature	+200 °C	+250 °C	+300 °C	+350 °C

## Track rollers

An operating temperature of +70 °C is regarded as a normal operating temperature. The additional information on temperature in the product descriptions must be observed.

## Sealed bearings

The permissible temperature for sealed bearings is dependent on the requirements for the operating life of the grease filling and on the action of the contact seals.

Sealed bearings are greased with specially tested, high performance, high quality greases. These greases can withstand +120 °C for short periods. At long term temperatures of +70 °C and above, a reduction in the operating life of standard greases with a lithium soap base must be expected.

In many cases, adequate operating life values are only achieved at high temperatures through the use of special greases.

In these cases, it must also be checked whether seals made from especially heat-resistant materials must be used. The operating limit of normal contact seals is +100 °C.



If high temperature synthetic materials are used for seals and greases, it must be noted that the particularly high performance materials containing fluoride may give off harmful gases and vapours when heated to approx. +300 °C and above. This may occur, for example, if a welding torch is used in the dismantling of a bearing.

High temperatures are critical especially in the case of seals made from fluoro rubber (FKM, FPM, e.g. Viton) or greases containing fluoride such as the rolling bearing greases Arcanol TEMP200 and greases to GA11. If high temperatures are unavoidable, attention must be paid to the valid safety data sheet for the specific fluoride-containing material, which can be obtained upon request.

## Anti-corrosion protection

Bearings are not resistant to corrosion by water or agents containing alkalis or acids but are often exposed to these corrosion-inducing agents. In these applications, anti-corrosion protection is therefore a decisive factor in achieving a long operating life of the bearings.

In principle, corrosion-resistant steels to ISO 693-17 can be used for components at risk of corrosion. These bearings have the prefix S. For higher requirements, the high performance steels Cronidur and Cronitect are available, see page 113.

## Corrotect® coating

In many applications, the special coating Corrotect® is more cost-effective than corrosion-resistant steel.

Corrotect® is an extremely thin, electroplated surface coating (coating thickness 0,5 µm to 3 µm). The coating is effective against moisture, contaminated water, salt spray and weakly alkaline and weakly acidic cleaning agents.

## Advantages of the coating

The advantages of the special coating Corrotect® are all-round rust protection, including the turned surfaces of chamfers and radii, *Figure 11*. It also gives long term prevention of rust penetration beneath seals and smaller bright spots are protected against rust by the cathodic protection effect. In comparison with uncoated parts, operating life is significantly increased by the anti-corrosion protection. Uncoated bearings can be easily replaced by coated bearings of the same dimensions, there is no decrease in load carrying capacity, in contrast to corrosion-resistant steels. During storage, there is no need to use organic-based preservatives.

- ① With Corrotect® coating
- ② Uncoated



*Figure 11*  
Bearing rings after the salt spray test

## Fitting of coated bearings



Before bearings with Corrotect® coating are fitted, compatibility with the media should always be checked.

In order to reduce the press-in forces, the surface of the parts should be lightly greased, since the tolerances are increased by the thickness of the coating.

# Bearing data

## Dimensional and geometrical tolerances

Unless stated otherwise, the tolerances for radial rolling bearings correspond to DIN 620-2 (ISO 492), the tolerances for axial rolling bearings correspond to DIN 620-3 (ISO 199), *Figure 12*.

The accuracy corresponds to tolerance class PN.

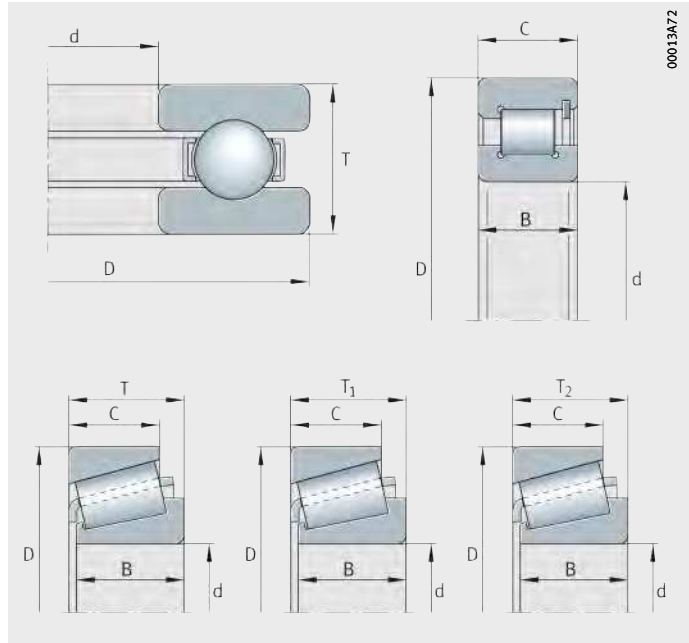
For bearings with increased accuracy, the tolerances are restricted to values in the classes P6, P5, P4 and P2. Tolerance tables for the individual tolerance classes: see page 122 to page 135.

## High precision bearings

The standardised tolerance classes are not applied to high precision bearings, which are produced to the tolerance classes P4S, SP and UP. These tolerances are listed in the product descriptions for the high precision bearings.

## Measurement methods

Measurement methods according to DIN 620-1 (ISO 1 132-2) are valid for the acceptance inspection of rolling bearings.



*Figure 12*  
Main dimensions to DIN 620



## Tolerance symbols and definitions

Tolerance symbol	Toleranced characteristic to DIN 1 132 and DIN 620
d	Nominal bore diameter
$\Delta_{dmp}$	Deviation of mean bore diameter in a single plane
$\Delta_{d1mp}$	Deviation of mean large end diameter in tapered bores
$V_{dsp}$	Variation of single bore diameter in a single plane
$V_{dmp}$	Variation of mean bore diameter
D	Nominal outside diameter
$\Delta_{Dmp}$	Deviation of mean outside diameter in a single plane
$V_{Dsp}$	Variation of single outside diameter in a single plane
$V_{Dmp}$	Variation of mean outside diameter
B	Nominal inner ring width
$\Delta_{Bs}$	Deviation of a single inner ring width
$V_{Bs}$	Variation of inner ring width
C	Nominal outer ring width
$\Delta_{Cs}$	Deviation of a single outer ring width
$V_{Cs}$	Variation of outer ring width
$K_{ia}$	Radial runout of inner ring of assembled bearing
$K_{ea}$	Radial runout of outer ring of assembled bearing
$S_d$	Runout of inner ring face to the bore
$S_D$	Runout of outer ring outside surface generatrix to the face
$S_{ia}$	Axial runout of inner ring of assembled bearing
$S_{ea}$	Axial runout of outer ring of assembled bearing
$S_i$	Variation of washer thickness of shaft locating washer
$S_e$	Variation of washer thickness of housing locating washer
T	Nominal bearing height of a single direction axial bearing
T	Total width of tapered roller bearing
$T_{1s}$	Total width of tapered roller bearing over inner ring and normal outer ring measured at one point
$T_{2s}$	Total width of tapered roller bearing over inner ring and normal outer ring measured at one point
$\Delta_{Ts}, \Delta_{T1s}, \Delta_{T2s}$	Deviation in total width from nominal dimension of tapered roller bearing measured at one point

# Bearing data

## Radial bearings, excluding tapered roller bearings

Tolerance class PN  
Inner ring  
Tolerances in  $\mu\text{m}$

d		$\Delta_{\text{dmp}}$		$V_{\text{dsp}}$ Diameter series			$V_{\text{dmp}}$	$K_{\text{ia}}$
mm		Deviation		9	0, 1	2, 3, 4		
over	incl.	upper	lower	max.	max.	max.	max.	max.
0,6 <sup>1)</sup>	2,5	0	-8	10	8	6	6	10
2,5	10	0	-8	10	8	6	6	10
10	18	0	-8	10	8	6	6	10
18	30	0	-10	13	10	8	8	13
30	50	0	-12	15	12	9	9	15
50	80	0	-15	19	19	11	11	20
80	120	0	-20	25	25	15	15	25
120	180	0	-25	31	31	19	19	30
180	250	0	-30	38	38	23	23	40
250	315	0	-35	44	44	26	26	50
315	400	0	-40	50	50	30	30	60
400	500	0	-45	56	56	34	34	65
500	630	0	-50	63	63	38	38	70
630	800	0	-75	-	-	-	-	80
800	1 000	0	-100	-	-	-	-	90
1 000	1 250	0	-125	-	-	-	-	100
1 250	1 600	0	-160	-	-	-	-	120
1 600	2 000	0	-200	-	-	-	-	140

Tolerance class PN  
Inner ring  
continued  
Tolerances in  $\mu\text{m}$

d		$\Delta_{\text{Bs}}$				$V_{\text{Bs}}$
mm		Normal deviation		Modified deviation <sup>2)</sup>		
over	incl.	upper	lower	upper	lower	max.
0,6 <sup>1)</sup>	2,5	0	-40	0	-	12
2,5	10	0	-120	0	-250	15
10	18	0	-120	0	-250	20
18	30	0	-120	0	-250	20
30	50	0	-120	0	-250	20
50	80	0	-150	0	-380	25
80	120	0	-200	0	-380	25
120	180	0	-250	0	-500	30
180	250	0	-300	0	-500	30
250	315	0	-350	0	-500	35
315	400	0	-400	0	-630	40
400	500	0	-450	0	-	50
500	630	0	-500	0	-	60
630	800	0	-750	0	-	70
800	1 000	0	-1 000	0	-	80
1 000	1 250	0	-1 250	0	-	100
1 250	1 600	0	-1 600	0	-	120
1 600	2 000	0	-2 000	0	-	140

<sup>1)</sup> This diameter is included in the group.

<sup>2)</sup> Only for bearings manufactured specifically for use as matched pairs.

**Tolerance class PN  
Outer ring<sup>1)</sup>  
Tolerances in  $\mu\text{m}$**

D  mm		$\Delta_{\text{Dmp}}$  Deviation		$V_{\text{Dsp}}$				$V_{\text{Dmp}}^{3)}$	$K_{\text{ea}}$
				Open bearings Diameter series			Bearings with sealing shields or sealing washers		
				9	0, 1	2, 3, 4			
over	incl.	upper	lower	max.	max.	max.	max.	max.	
2,5 <sup>2)</sup>	6	0	-8	10	8	6	10	6	15
6	18	0	-8	10	8	6	10	6	15
18	30	0	-9	12	9	7	12	7	15
30	50	0	-11	14	11	8	16	8	20
50	80	0	-13	16	13	10	20	10	25
80	120	0	-15	19	19	11	26	11	35
120	150	0	-18	23	23	14	30	14	40
150	180	0	-25	31	31	19	38	19	45
180	250	0	-30	38	38	23	-	23	50
250	315	0	-35	44	44	26	-	26	60
315	400	0	-40	50	50	30	-	30	70
400	500	0	-45	56	56	34	-	34	80
500	630	0	-50	63	63	38	-	38	100
630	800	0	-75	94	94	55	-	55	120
800	1 000	0	-100	125	125	75	-	75	140
1 000	1 250	0	-125	-	-	-	-	-	160
1 250	1 600	0	-160	-	-	-	-	-	190
1 600	2 000	0	-200	-	-	-	-	-	220
2 000	2 500	0	-250	-	-	-	-	-	250

<sup>1)</sup>  $\Delta_{\text{CS}}$ ,  $\Delta_{\text{C1S}}$ ,  $V_{\text{CS}}$  and  $V_{\text{C2S}}$  are identical to  $\Delta_{\text{BS}}$  and  $V_{\text{BS}}$  for the inner ring of the corresponding bearing (table Tolerance class PN Inner ring, page 122).

<sup>2)</sup> This diameter is included in the group.

<sup>3)</sup> Applies before assembly of the bearing and after removal of internal and/or external snap rings.

# Bearing data

## Radial bearings, excluding tapered roller bearings

Tolerance class P6  
Inner ring  
Tolerances in  $\mu\text{m}$

d		$\Delta_{\text{dmp}}$		$V_{\text{dsp}}$ Diameter series			$V_{\text{dmp}}$	$K_{\text{ia}}$
mm		Deviation		9	0, 1	2, 3, 4		
over	incl.	upper	lower	max.	max.	max.	max.	max.
0,6 <sup>1)</sup>	2,5	0	-7	9	7	5	5	5
2,5	10	0	-7	9	7	5	5	6
10	18	0	-7	9	7	5	5	7
18	30	0	-8	10	8	6	6	8
30	50	0	-10	13	10	8	8	10
50	80	0	-12	15	15	9	9	10
80	120	0	-15	19	19	11	11	13
120	180	0	-18	23	23	14	14	18
180	250	0	-22	28	28	17	17	20
250	315	0	-25	31	31	19	19	25
315	400	0	-30	38	38	23	23	30
400	500	0	-35	44	44	26	26	35
500	630	0	-40	50	50	30	30	40

Tolerance class P6  
Inner ring  
continued  
Tolerances in  $\mu\text{m}$

d		$\Delta_{\text{Bs}}$				$V_{\text{Bs}}$
mm		Normal deviation		Modified deviation <sup>2)</sup>		
over	incl.	upper	lower	upper	lower	max.
0,6 <sup>1)</sup>	2,5	0	-40	-	-	12
2,5	10	0	-120	0	-250	15
10	18	0	-120	0	-250	20
18	30	0	-120	0	-250	20
30	50	0	-120	0	-250	20
50	80	0	-150	0	-380	25
80	120	0	-200	0	-380	25
120	180	0	-250	0	-550	30
180	250	0	-300	0	-500	30
250	315	0	-350	0	-500	35
315	400	0	-400	0	-630	40
400	500	0	-450	-	-	45
500	630	0	-500	-	-	50

1) This diameter is included in the group.

2) Only for bearings manufactured specifically for use as matched pairs.

**Tolerance class P6  
Outer ring<sup>1)</sup>  
Tolerances in  $\mu\text{m}$**

D mm		$\Delta_{\text{Dmp}}$ Deviation		$V_{\text{Dsp}}$				$V_{\text{Dmp}}^{3)}$	$K_{\text{ea}}$
				Open bearings Diameter series			Bearings with sealing shields or sealing washers		
over	incl.	upper	lower	9 max.	0, 1 max.	2, 3, 4 max.		max.	max.
2,5 <sup>2)</sup>	6	0	-7	9	7	5	9	5	8
6	18	0	-7	9	7	5	9	5	8
18	30	0	-8	10	8	6	10	6	9
30	50	0	-9	11	9	7	13	7	10
50	80	0	-11	14	11	8	16	8	13
80	120	0	-13	16	16	10	20	10	18
120	150	0	-15	19	19	11	25	11	20
150	180	0	-18	23	23	14	30	14	23
180	250	0	-20	25	25	15	-	15	25
250	315	0	-25	31	31	19	-	19	30
315	400	0	-28	35	35	21	-	21	35
400	500	0	-33	41	41	25	-	25	40
500	630	0	-38	48	48	29	-	29	50
630	800	0	-45	56	56	34	-	34	60
800	1000	0	-60	75	75	45	-	45	75

<sup>1)</sup>  $\Delta_{\text{Cs}}$ ,  $\Delta_{\text{C1s}}$ ,  $V_{\text{Cs}}$  and  $V_{\text{C2s}}$  are identical to  $\Delta_{\text{Bs}}$  and  $V_{\text{Bs}}$  for the inner ring of the corresponding bearing (table Tolerance class P6 Inner ring, page 124).

<sup>2)</sup> This diameter is included in the group.

<sup>3)</sup> Applies before assembly of the bearing and after removal of internal and/or external snap rings.

# Bearing data

## Radial bearings, excluding tapered roller bearings

Tolerance class P5  
Inner ring  
Tolerances in  $\mu\text{m}$

d		$\Delta_{\text{dmp}}$		$V_{\text{dsp}}$ Diameter series		$V_{\text{dmp}}$	$K_{\text{ia}}$	$S_{\text{d}}$
mm		Deviation		9	0, 1, 2, 3, 4			
over	incl.	upper	lower	max.	max.	max.	max.	max.
0,6 <sup>1)</sup>	2,5	0	-5	5	4	3	4	7
2,5	10	0	-5	5	4	3	4	7
10	18	0	-5	5	4	3	4	7
18	30	0	-6	6	5	3	4	8
30	50	0	-8	8	6	4	5	8
50	80	0	-9	9	7	5	5	8
80	120	0	-10	10	8	5	6	9
120	180	0	-13	13	10	7	8	10
180	250	0	-15	15	12	8	10	11
250	315	0	-18	18	14	9	13	13
315	400	0	-23	23	18	12	15	15

Tolerance class P5  
Inner ring  
continued  
Tolerances in  $\mu\text{m}$

d		$S_{\text{ia}}^{2)}$	$\Delta_{\text{Bs}}$				$V_{\text{Bs}}$
mm			Normal deviation		Modified deviation <sup>3)</sup>		
over	incl.		max.	upper	lower	upper	
0,6 <sup>1)</sup>	2,5	7	0	-40	0	-250	5
2,5	10	7	0	-40	0	-250	5
10	18	7	0	-80	0	-250	5
18	30	8	0	-120	0	-250	5
30	50	8	0	-120	0	-250	5
50	80	8	0	-150	0	-250	6
80	120	9	0	-200	0	-380	7
120	180	10	0	-250	0	-380	8
180	250	13	0	-300	0	-500	10
250	315	15	0	-350	0	-500	13
315	400	20	0	-400	0	-630	15

1) This diameter is included in the group.

2) Only for deep groove and angular contact ball bearings.

3) Only for bearings manufactured specifically for use as matched pairs.

**Tolerance class P5  
Outer ring<sup>1)</sup>  
Tolerances in  $\mu\text{m}$**

D mm		$\Delta_{\text{Dmp}}$ Deviation		$V_{\text{Dsp}}^{3)}$ Diameter series		$V_{\text{Dmp}}^{4)}$	$K_{\text{ea}}$	$S_{\text{D}}$	$S_{\text{ea}}^{5)}$	$V_{\text{Cs}}$
				9	0, 1, 2, 3, 4					
over	incl.	upper	lower	max.	max.	max.	max.	max.	max.	max.
2,5 <sup>2)</sup>	6	0	-5	5	4	3	5	8	8	5
6	18	0	-5	5	4	3	5	8	8	5
18	30	0	-6	6	5	3	6	8	8	5
30	50	0	-7	7	5	4	7	8	8	5
50	80	0	-9	9	7	5	8	8	10	6
80	120	0	-10	10	8	5	10	9	11	8
120	150	0	-11	11	8	6	11	10	13	8
150	180	0	-13	13	10	7	13	10	14	8
180	250	0	-15	15	11	8	15	11	15	10
250	315	0	-18	18	14	9	18	13	18	11
315	400	0	-20	20	15	10	20	13	-	13
400	500	0	-23	23	17	12	23	15	-	15
500	630	0	-28	28	21	14	25	18	-	18
630	800	0	-35	35	26	18	30	20	-	20

<sup>1)</sup>  $\Delta_{\text{Cs}}$  is identical to  $\Delta_{\text{Bs}}$  for the inner ring of the corresponding bearing (table Tolerance class P5 Inner ring, page 126).

<sup>2)</sup> This diameter is included in the group.

<sup>3)</sup> No values are defined for radial ball bearings with sealing shields or sealing washers.

<sup>4)</sup> Applies before assembly of the bearing and after removal of internal and/or external snap rings.

<sup>5)</sup> Only for deep groove and angular contact ball bearings.

# Bearing data

## Radial bearings, excluding tapered roller bearings

Tolerance class P4  
Inner ring  
Tolerances in  $\mu\text{m}$

d mm		$\Delta_{\text{dmp}}$ Deviation		$\Delta_{\text{ds}}$		$V_{\text{dsp}}$		$V_{\text{dmp}}$	$K_{\text{ia}}$
				Diameter series					
over	incl.	upper	lower	0, 1, 2, 3, 4 Deviation		9	0, 1, 2, 3, 4	max.	max.
0,6 <sup>1)</sup>	2,5	0	-4	0	-4	4	3	2	2,5
2,5	10	0	-4	0	-4	4	3	2	2,5
10	18	0	-4	0	-4	4	3	2	2,5
18	30	0	-5	0	-5	5	4	2,5	3
30	50	0	-6	0	-6	6	5	3	4
50	80	0	-7	0	-7	7	5	3,5	4
80	120	0	-8	0	-8	8	6	4	5
120	180	0	-10	0	-10	10	8	5	6
180	250	0	-12	0	-12	12	9	6	8

Tolerance class P4  
Inner ring  
continued  
Tolerances in  $\mu\text{m}$

d mm		$S_{\text{d}}$	$S_{\text{ia}}^{2)}$	$\Delta_{\text{Bs}}$				$V_{\text{Bs}}$
				Normal deviation		Modified deviation <sup>3)</sup>		
over	incl.	max.	max.	upper	lower	upper	lower	max.
0,6 <sup>1)</sup>	2,5	3	3	0	-40	0	-250	2,5
2,5	10	3	3	0	-40	0	-250	2,5
10	18	3	3	0	-80	0	-250	2,5
18	30	4	4	0	-120	0	-250	2,5
30	50	4	4	0	-120	0	-250	3
50	80	5	5	0	-150	0	-250	4
80	120	5	5	0	-200	0	-380	4
120	180	6	6	0	-250	0	-380	5
180	250	7	7	0	-300	0	-500	6

1) This diameter is included in the group.

2) Only for deep groove and angular contact ball bearings.

3) Only for bearings manufactured specifically for use as matched pairs.



**Tolerance class P4  
Outer ring  
Tolerances in  $\mu\text{m}$**

D mm		$\Delta_{\text{Dmp}}$ Deviation		$\Delta_{\text{Ds}}$		$V_{\text{Dsp}}^{2)}$		$V_{\text{Dmp}}$	$K_{\text{ea}}$
				Diameter series					
				0, 1, 2, 3, 4		9	0, 1, 2, 3, 4		
over	incl.	upper	lower	upper	lower	max.	max.	max.	max.
2,5 <sup>1)</sup>	6	0	-4	0	-4	4	3	2	3
6	18	0	-4	0	-4	4	3	2	3
18	30	0	-5	0	-5	5	4	2,5	4
30	50	0	-6	0	-6	6	5	3	5
50	80	0	-7	0	-7	7	5	3,5	5
80	120	0	-8	0	-8	8	6	4	6
120	150	0	-9	0	-9	9	7	5	7
150	180	0	-10	0	-10	10	8	5	8
180	250	0	-11	0	-11	11	8	6	10
250	315	0	-13	0	-13	13	10	7	11
315	400	0	-15	0	-15	15	11	8	13

**Tolerance class P4  
Outer ring  
continued  
Tolerances in  $\mu\text{m}$**

D mm		$S_{\text{D}}$ $S_{\text{D1}}$	$S_{\text{ea}}^{3)}$		$\Delta_{\text{Cs}}$	$V_{\text{Cs}}$
			max.	max.		
over	incl.					max.
2,5 <sup>1)</sup>	6	4	5	$\Delta_{\text{Cs}}$ and $V_{\text{Cs}}$ are identical to $\Delta_{\text{Bs}}$ and $V_{\text{Bs}}$ for the inner ring of the corresponding bearing (table Tolerance class P4 Inner ring, page 128)	2,5	
6	18	4	5		2,5	
18	30	4	5		2,5	
30	50	4	5		2,5	
50	80	4	5		3	
80	120	5	6		4	
120	150	5	7		5	
150	180	5	8		5	
180	250	7	10		7	
250	315	8	10		7	
315	400	10	13		8	

<sup>1)</sup> This diameter is included in the group.

<sup>2)</sup> No values are defined for bearings with sealing shields or sealing washers.

<sup>3)</sup> Only for deep groove and angular contact ball bearings.

## Bearing data

### Radial bearings, excluding tapered roller bearings

Tolerance class P2  
Inner ring  
Tolerances in  $\mu\text{m}$

d mm		$\Delta_{\text{dmp}}$ Deviation		$\Delta_{\text{ds}}$ Deviation		$V_{\text{dsp}}$	$V_{\text{dmp}}$	$K_{\text{ia}}$
over	incl.	upper	lower	upper	lower	max.	max.	max.
0,6 <sup>1)</sup>	2,5	0	-2,5	0	-2,5	2,5	1,5	1,5
2,5	10	0	-2,5	0	-2,5	2,5	1,5	1,5
10	18	0	-2,5	0	-2,5	2,5	1,5	1,5
18	30	0	-2,5	0	-2,5	2,5	1,5	2,5
30	50	0	-2,5	0	-2,5	2,5	1,5	2,5
50	80	0	-4	0	-4	4	2	2,5
80	120	0	-5	0	-5	5	2,5	2,5
120	150	0	-7	0	-7	7	3,5	2,5
150	180	0	-7	0	-7	7	3,5	5
180	250	0	-8	0	-8	8	4	5

Tolerance class P2  
Inner ring  
continued  
Tolerances in  $\mu\text{m}$

d mm		$S_{\text{d}}$	$S_{\text{ia}}$ <sup>2)</sup>	$\Delta_{\text{Bs}}$ Normal deviation		$V_{\text{Bs}}$
over	incl.	max.	max.	upper	lower	max.
0,6 <sup>1)</sup>	2,5	1,5	1,5	0	-40	1,5
2,5	10	1,5	1,5	0	-40	1,5
10	18	1,5	1,5	0	-80	1,5
18	30	1,5	2,5	0	-120	1,5
30	50	1,5	2,5	0	-120	1,5
50	80	1,5	2,5	0	-150	1,5
80	120	2,5	2,5	0	-200	2,5
120	150	2,5	2,5	0	-250	2,5
150	180	4	5	0	-300	4
180	250	5	5	0	-350	5

1) This diameter is included in the group.

2) Only for deep groove and angular contact ball bearings.

**Tolerance class P2  
Outer ring  
Tolerances in  $\mu\text{m}$**

D mm		$\Delta_{\text{Dmp}}$ Deviation		$\Delta_{\text{Ds}}$ Deviation		$V_{\text{Dsp}}^{2)}$	$V_{\text{Dmp}}$	$K_{\text{ea}}$
over	incl.	upper	lower	upper	lower	max.	max.	max.
2,5 <sup>1)</sup>	6	0	-2,5	0	-2,5	2,5	1,5	1,5
6	18	0	-2,5	0	-2,5	2,5	1,5	1,5
18	30	0	-4	0	-4	4	2	2,5
30	50	0	-4	0	-4	4	2	2,5
50	80	0	-4	0	-4	4	2	4
80	120	0	-5	0	-5	5	2,5	5
120	150	0	-5	0	-5	5	2,5	5
150	180	0	-7	0	-7	7	2,5	5
180	250	0	-8	0	-8	8	4	7
250	315	0	-8	0	-8	8	4	7
315	400	0	-10	0	-10	10	5	8

**Tolerance class P2  
Outer ring  
continued  
Tolerances in  $\mu\text{m}$**

D mm		$S_{\text{D}}$ $S_{\text{D1}}$	$S_{\text{ea}}^{3)}$	$\Delta_{\text{Cs}}$	$V_{\text{Cs}}$
over	incl.	max.	max.		max.
2,5 <sup>1)</sup>	6	1,5	1,5	$\Delta_{\text{Cs}}$ and $V_{\text{Cs}}$ are identical to $\Delta_{\text{Bs}}$ and $V_{\text{Bs}}$ for the inner ring of the corresponding bearing (table Tolerance class P2 Inner ring, page 130)	1,5
6	18	1,5	1,5		1,5
18	30	1,5	2,5		1,5
30	50	1,5	2,5		1,5
50	80	1,5	4		1,5
80	120	2,5	5		2,5
120	150	2,5	5		2,5
150	180	2,5	5		2,5
180	250	4	7		4
250	315	5	7		5
315	400	7	8		7

<sup>1)</sup> This diameter is included in the group.

<sup>2)</sup> No values are defined for bearings with sealing shields or sealing washers.

<sup>3)</sup> Only for deep groove and angular contact ball bearings.

# Bearing data

## Tolerances for tapered bores, taper 1:12 Tolerances in $\mu\text{m}$

Bore diameter		Tolerance class PN				
d mm		$\Delta_{dmp}$ Deviation $\mu\text{m}$		$V_{dp}^{1)}$ max.	$\Delta_{d1mp} - \Delta_{dmp}$ Deviation $\mu\text{m}$	
over	incl.	upper	lower		upper	lower
18	30	+21	0	13	+21	0
30	50	+25	0	15	+25	0
50	80	+30	0	19	+30	0
80	120	+35	0	25	+35	0
120	180	+40	0	31	+40	0
180	250	+46	0	38	+46	0
250	315	+52	0	44	+52	0
315	400	+57	0	50	+57	0
400	500	+63	0	56	+63	0
500	630	+70	0	–	+70	0
630	800	+80	0	–	+80	0
800	1 000	+90	0	–	+90	0

1) Valid in any radial cross-section of the bore.

## Tolerances for tapered bores, taper 1:30 Tolerances in $\mu\text{m}$

Bore diameter		Tolerance class PN				
d mm		$\Delta_{dmp}$ Deviation $\mu\text{m}$		$V_{dp}^{1)}$ max.	$\Delta_{d1mp} - \Delta_{dmp}$ Deviation $\mu\text{m}$	
over	incl.	upper	lower		upper	lower
–	80	+15	0	19	+35	0
80	120	+20	0	25	+40	0
120	180	+25	0	31	+50	0
180	250	+30	0	38	+55	0
250	315	+35	0	44	+60	0
315	400	+40	0	50	+65	0
400	500	+45	0	56	+75	0
500	630	+50	0	63	+85	0
630	800	+75	0	–	+100	0
800	1 000	+100	0	–	+100	0

1) Valid in any radial cross-section of the bore.

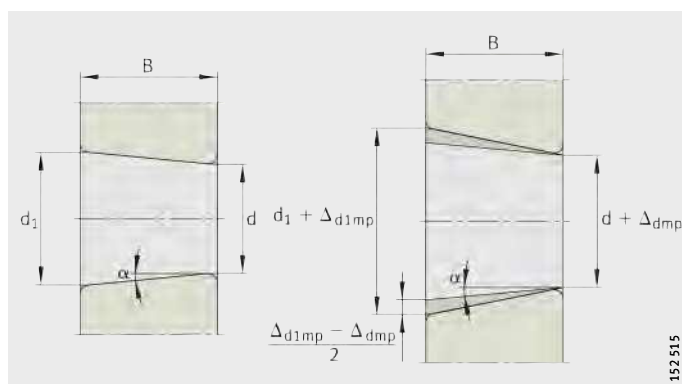
Taper 1:12  
Half of taper angle  $\alpha = 2^{\circ}23' 9,4''$ ;  
Theoretical large end diameter

$$d_1 = d + \frac{1}{12} \times B$$

Taper 1:30  
Half of taper angle  $\alpha = 0^{\circ}57' 17,4''$ ;  
Theoretical large end diameter

$$d_1 = d + \frac{1}{30} \times B$$

Figure 13  
Tolerances for tapered bores



152 515

**Axial bearings**  
**Bore diameter tolerances**  
**for shaft locating washers**  
**to ISO 199, DIN 620-3**  
**Tolerances in  $\mu\text{m}$**

d mm		PN (normal tolerance), P6 and P5			P4		
		$\Delta_{\text{dmp}}$ Deviation		$V_{\text{dp}}$	$\Delta_{\text{dmp}}$ Deviation		$V_{\text{dp}}$
over	incl.	upper	lower	max.	upper	lower	max.
-	18	0	-8	6	0	-7	5
18	30	0	-10	8	0	-8	6
30	50	0	-12	9	0	-10	8
50	80	0	-15	11	0	-12	9
80	120	0	-20	15	0	-15	11
120	180	0	-25	19	0	-18	14
180	250	0	-30	23	0	-22	17
250	315	0	-35	26	0	-25	19
315	400	0	-40	30	0	-30	23
400	500	0	-45	34	0	-35	26
500	630	0	-50	38	0	-40	30
630	800	0	-75	56	0	-50	-
800	1 000	0	-100	75	0	-	-
1 000	1 250	0	-125	95	0	-	-

**Outside diameter tolerances**  
**for housing locating washers**  
**to ISO 199, DIN 620-3**  
**Tolerances in  $\mu\text{m}$**

D mm		PN (normal tolerance), P6 and P5			P4		
		$\Delta_{\text{Dmp}}$ Deviation		$V_{\text{Dp}}$	$\Delta_{\text{Dmp}}$ Deviation		$V_{\text{Dp}}$
over	incl.	upper	lower	max.	upper	lower	max.
10	18	0	-11	8	0	-7	5
18	30	0	-13	10	0	-8	6
30	50	0	-16	12	0	-9	7
50	80	0	-19	14	0	-11	8
80	120	0	-22	17	0	-13	10
120	180	0	-25	19	0	-15	11
180	250	0	-30	23	0	-20	15
250	315	0	-35	26	0	-25	19
315	400	0	-40	30	0	-28	21
400	500	0	-45	34	0	-33	25
500	630	0	-50	38	0	-38	29
630	800	0	-75	55	0	-45	34
800	1 000	0	-100	75	-	-	-
1 000	1 250	0	-125	75	-	-	-
1 250	1 600	0	-160	120	-	-	-

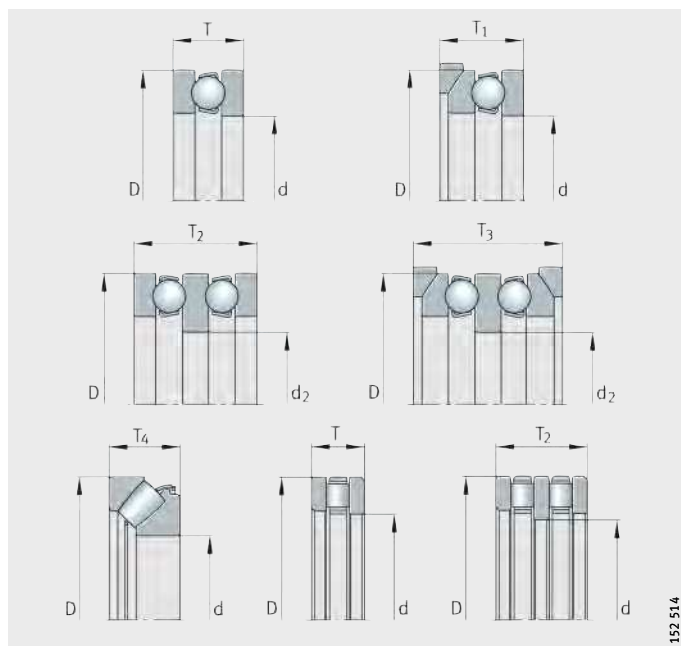
# Bearing data

Variation in washer thickness  
for shaft and housing locating washers  
Tolerances in  $\mu\text{m}$

d mm		S <sub>i</sub>				S <sub>e</sub> PN (normal tolerance), P6, P5, P4
		PN (normal tolerance)	P6	P5	P4	
over	incl.	max.	max.	max.	max.	Identical to S <sub>i</sub> for the shaft locating washer of the corresponding bearing
-	18	10	5	3	2	
18	30	10	5	3	2	
30	50	10	6	3	2	
50	80	10	7	4	3	
80	120	15	8	4	3	
120	180	15	9	5	4	
180	250	20	10	5	4	
250	315	25	13	7	5	
315	400	30	15	7	5	
400	500	30	18	9	6	
500	630	35	21	11	7	
630	800	40	25	13	8	
800	1 000	45	30	15	8	
1 000	1 250	50	35	18	9	

**Tolerances  
for nominal bearing height**

These tolerances are given in the table on page 135.  
The corresponding dimensional symbols are shown in *Figure 14*.



*Figure 14*  
Tolerances  
for nominal bearing height

152 514

**Tolerances  
for nominal bearing height  
Tolerances in  $\mu\text{m}$**

d mm		T Deviation		T <sub>1</sub> Deviation		T <sub>2</sub> Deviation	
over	incl.	upper	lower	upper	lower	upper	lower
-	30	20	-250	100	-250	150	-400
30	50	20	-250	100	-250	150	-400
50	80	20	-300	100	-300	150	-500
80	120	25	-300	150	-300	200	-500
120	180	25	-400	150	-400	200	-600
180	250	30	-400	150	-400	250	-600
250	315	40	-400	200	-400	350	-700
315	400	40	-500	200	-500	350	-700
400	500	50	-500	300	-500	400	-900
500	630	60	-600	350	-600	500	-1 100
630	800	70	-750	400	-750	600	-1 300
800	1 000	80	-1 000	450	-1 000	700	-1 500
1 000	1 250	100	-1 400	500	-1 400	900	-1 800

**Tolerance  
for nominal bearing height  
continued  
Tolerances in  $\mu\text{m}$**

d mm		T <sub>3</sub> Deviation		T <sub>4</sub> Deviation	
over	incl.	upper	lower	upper	lower
-	30	300	-400	20	-300
30	50	300	-400	20	-300
50	80	300	-500	20	-400
80	120	400	-500	25	-400
120	180	400	-600	25	-500
180	250	500	-600	30	-500
250	315	600	-700	40	-700
315	400	600	-700	40	-700
400	500	750	-900	50	-900
500	630	900	-1 100	60	-1 200
630	800	1 100	-1 300	70	-1 400
800	1 000	1 300	-1 500	80	-1 800
1 000	1 250	1 600	-1 800	100	-2 400

# Bearing data

## Chamfer dimensions

### Radial bearings, excluding tapered roller bearings

The chamfer dimensions correspond to DIN 620-6.

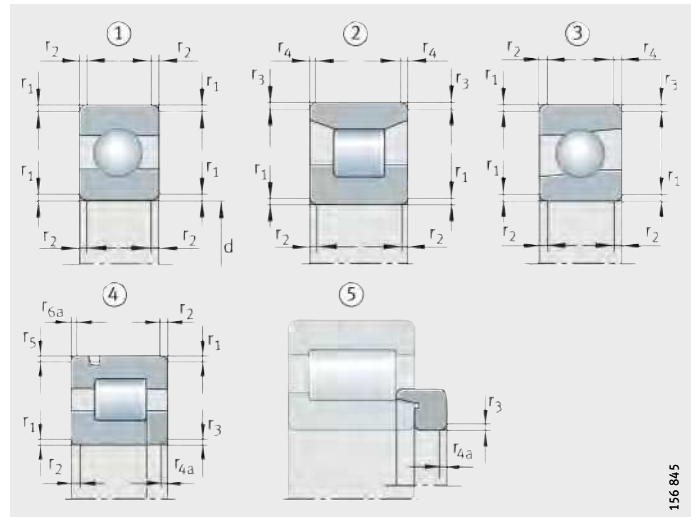
The minimum and maximum values for the bearings are given in the table Limit values for chamfer dimensions to DIN 620-6, page 137.

For drawn cup needle roller bearings with open ends HK, drawn cup needle roller bearings with closed end BK and aligning needle roller bearings PNA and RPNA, the chamfer dimensions deviate from DIN 620-6. The lower limit values for  $r$  are given in the dimension tables.

Chamfer dimensions for tapered roller bearings: see page 138, for axial bearings see page 139.

- ① Symmetrical ring cross-section with identical chamfers on both rings
- ② Symmetrical ring cross-section with different chamfers on both rings
- ③ Asymmetrical ring cross-section
- ④ Annular slot on outer ring, bearing with rib washer
- ⑤ L-section ring

Figure 15  
Chamfer dimensions  
for radial bearings  
excluding tapered roller bearings



156 845



**Limit values  
for chamfer dimensions  
to DIN 620-6**

r <sup>1)</sup> mm	d		r <sub>1</sub> to r <sub>6a</sub> min. mm	r <sub>1</sub> , r <sub>3</sub> , r <sub>5</sub> max. mm	r <sub>2</sub> , r <sub>4</sub> , r <sub>6</sub> <sup>2)</sup> max. mm	r <sub>4a</sub> , r <sub>6a</sub> max. mm
	over mm	incl. mm				
0,05	–	–	0,05	0,1	0,2	0,1
0,08	–	–	0,08	0,16	0,3	0,16
0,1	–	–	0,1	0,2	0,4	0,2
0,15	–	–	0,15	0,3	0,6	0,3
0,2	–	–	0,2	0,5	0,8	0,5
0,3	–	40	0,3	0,6	1	0,8
	40	–	0,3	0,8	1	0,8
0,5	–	40	0,5	1	2	1,5
	40	–	0,5	1,3	2	1,5
0,6	–	40	0,6	1	2	1,5
	40	–	0,6	1,3	2	1,5
1	–	50	1	1,5	3	2,2
	50	–	1	1,9	3	2,2
1,1	–	120	1,1	2	3,5	2,7
	120	–	1,1	2,5	4	2,7
1,5	–	120	1,5	2,3	4	3,5
	120	–	1,5	3	5	3,5
2	–	80	2	3	4,5	4
	80	220	2	3,5	5	4
	220	–	2	3,8	6	4
2,1	–	280	2,1	4	6,5	4,5
	280	–	2,1	4,5	7	4,5
2,5	–	100	2,5	3,8	6	5
	100	280	2,5	4,5	6	5
	280	–	2,5	5	7	5
3	–	280	3	5	8	5,5
	280	–	3	5,5	8	5,5
4	–	–	4	6,5	9	6,5
5	–	–	5	8	10	8
6	–	–	6	10	13	10
7,5	–	–	7,5	12,5	17	12,5
9,5	–	–	9,5	15	19	15
12	–	–	12	18	24	18
15	–	–	15	21	30	21
19	–	–	19	25	38	25

1) The nominal chamfer dimension r is identical to the smallest permissible chamfer dimension r<sub>min</sub>.

2) For bearings with a width of 2 mm or less, the values for r<sub>1</sub> apply.

# Bearing data

## Tapered roller bearings

The minimum and maximum values for metric tapered roller bearings are given in the table.

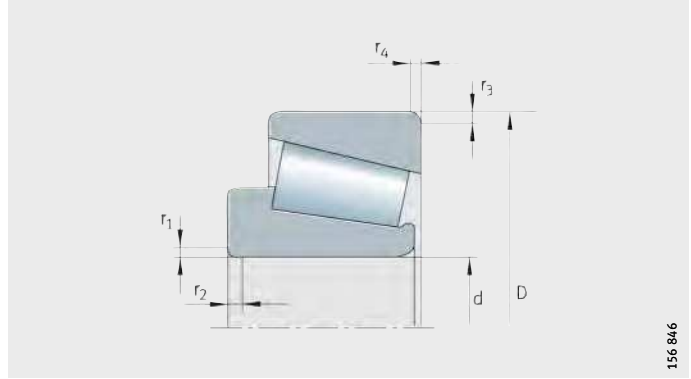


Figure 16  
Chamfer dimensions  
for metric tapered roller bearings

### Limit values for chamfer dimensions

r <sup>1)</sup> mm	d, D		r <sub>1</sub> to r <sub>4</sub> min. mm	r <sub>1</sub> , r <sub>3</sub> max. mm	r <sub>2</sub> , r <sub>4</sub> max. mm
	over mm	incl. mm			
0,3	–	40	0,3	0,7	1,4
	40	–	0,3	0,9	1,6
0,6	–	40	0,6	1,1	1,7
	40	–	0,6	1,3	2
1	–	50	1	1,6	2,5
	50	–	1	1,9	3
1,5	–	120	1,5	2,3	3
	120	250	1,5	2,8	3,5
	250	–	1,5	3,5	4
2	–	120	2	2,8	4
	120	250	2	3,5	4,5
	250	–	2	4	5
2,5	–	120	2,5	3,5	5
	120	250	2,5	4	5,5
	250	–	2,5	4,5	6
3	–	120	3	4	5,5
	120	250	3	4,5	6,5
	250	400	3	5	7
	400	–	3	5,5	7,5
4	–	120	4	5	7
	120	250	4	5,5	7,5
	250	400	4	6	8
	400	–	4	6,5	8,5
5	–	180	5	6,5	8
	180	–	5	7,5	9
6	–	180	6	7,5	10
	180	–	6	9	11

<sup>1)</sup> The nominal chamfer dimension r is identical to the smallest permissible chamfer dimension r<sub>min</sub>.

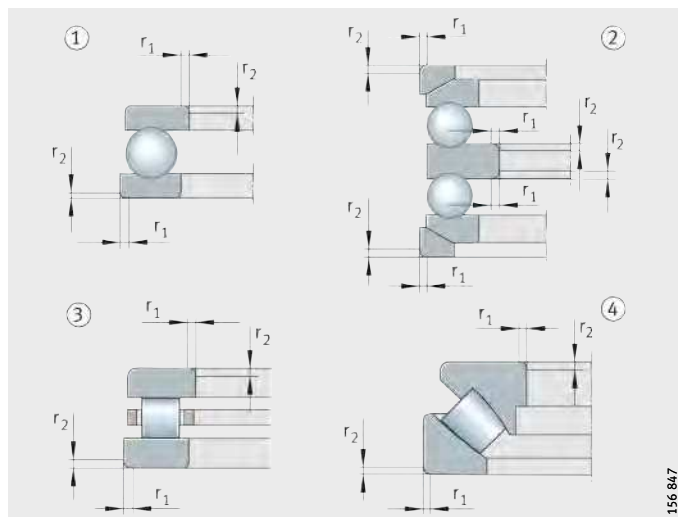
## Axial bearings

The minimum and maximum values for the bearings are given in the table. The table corresponds to DIN 620-6.

For axial deep groove ball bearings, the tolerances for the chamfer dimensions are identical in both axial and radial directions.

- ① Single direction axial deep groove ball bearing with flat housing locating washer
- ② Double direction axial deep groove ball bearing with crowned housing locating washers and seating washers
- ③ Single direction axial cylindrical roller bearing
- ④ Single direction axial spherical roller bearing

Figure 17  
Chamfer dimensions  
for axial bearings



### Limit values for chamfer dimensions

r <sup>1)</sup> mm	r <sub>1</sub> , r <sub>2</sub>	
	min. mm	max. mm
0,05	0,05	0,1
0,08	0,08	0,16
0,1	0,1	0,2
0,15	0,15	0,3
0,2	0,2	0,5
0,3	0,3	0,8
0,6	0,6	1,5
1	1	2,2
1,1	1,1	2,7
1,5	1,5	3,5
2	2	4
2,1	2,1	4,5
3	3	5,5
4	4	6,5
5	5	8
6	6	10
7,5	7,5	12,5
9,5	9,5	15
12	12	18
15	15	21
19	19	25

<sup>1)</sup> The nominal chamfer dimension r is identical to the smallest permissible chamfer dimension r<sub>min</sub>.

# Design of bearing arrangements

## **Selection of bearing arrangement**

The guidance and support of a rotating shaft requires at least two bearings arranged at a certain distance from each other. Depending on the application, a decision is made between a locating/non-locating bearing arrangement, an adjusted bearing arrangement and a floating bearing arrangement.

## **Locating/non-locating bearing arrangement**

On a shaft supported by two radial bearings, the distances between the bearing seats on the shaft and in the housing frequently do not coincide as a result of manufacturing tolerances. The distances may also change as a result of temperature increases during operation. These differences in distance are compensated in the non-locating bearing. Examples of locating/non-locating bearing arrangements: see *Figure 1*, page 142 to *Figure 4*, page 143.

## **Non-locating bearings**

Ideal non-locating bearings are cylindrical roller bearings with cage N and NU or needle roller bearings, *Figure 1* ②, ④, page 142. In these bearings, the roller and cage assembly can be displaced on the raceway of the bearing ring without ribs.

All other bearing types, for example deep groove ball bearings and spherical roller bearings, can only act as non-locating bearings if one bearing ring has a fit that allows displacement, *Figure 2*, page 142. The bearing ring subjected to point load therefore has a loose fit; this is normally the outer ring, see Conditions of rotation, page 148.

**Locating bearings** The locating bearing guides the shaft in an axial direction and supports external axial forces. In order to prevent axial stresses, shafts with more than two bearings have only one locating bearing. The type of bearing selected as a locating bearing depends on the magnitude of the axial forces and the accuracy with which the shafts must be axially guided.

A double row angular contact ball bearing, *Figure 3* ①, page 142, for example, will give closer axial guidance than a deep groove ball bearing or a spherical roller bearing. A pair of symmetrically arranged angular contact ball bearings or tapered roller bearings, *Figure 4*, page 143, used as locating bearings will provide extremely close axial guidance.

Angular contact ball bearings of the universal design, *Figure 5*, page 143, give particular advantages. The bearings can be fitted in pairs in any O or X arrangement without shims. Angular contact ball bearings of the universal design are matched such that, in an X or O arrangement, they have a low axial internal clearance (design UA), zero clearance (UO) or slight preload (UL).

Spindle bearings of the universal design UL, *Figure 6*, page 143, have slight preload when fitted in an X or O arrangement (designs with higher preload are available by agreement).

In gearboxes, a four point contact bearing is sometimes fitted directly adjacent to a cylindrical roller bearing to give a locating bearing arrangement, *Figure 3* ③, page 142. The four point contact bearing, without radial support of the outer ring, can only support axial forces. The radial force is supported by the cylindrical roller bearing.

If a lower axial force is present, a cylindrical roller bearing with cage NUP can also be used as a locating bearing, *Figure 4* ③, page 143.

**No adjustment or setting work  
with matched pairs  
of tapered roller bearings**

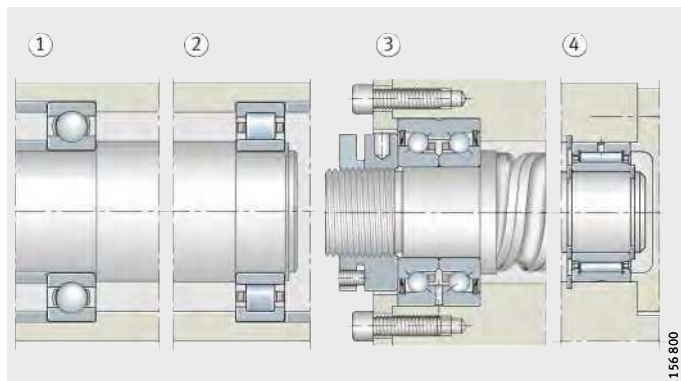
Fitting is also made easier with a matched pair of tapered roller bearings as a locating bearing (313..-N11CA), *Figure 7* ②, page 143. They are matched with appropriate axial internal clearance so that no adjustment or setting work is required.

# Design of bearing arrangements

## Examples of locating/non-locating bearing arrangements

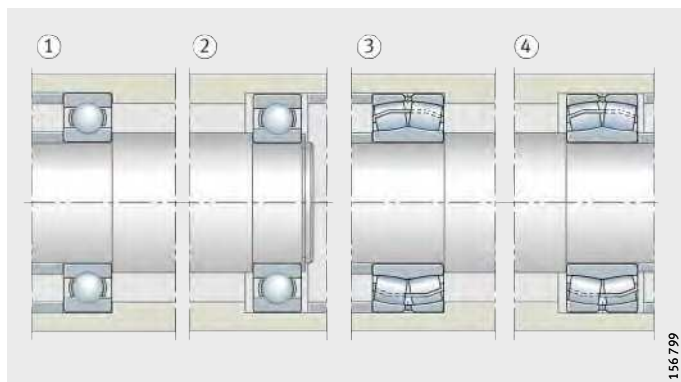
- Deep groove ball bearing
  - ① Locating bearing
- Cylindrical roller bearing NU
  - ② Non-locating bearing
- Axial angular contact ball bearing ZKLN
  - ③ Locating bearing
- Needle roller bearing NKIS
  - ④ Non-locating bearing

*Figure 1*  
Locating/non-locating bearing arrangements



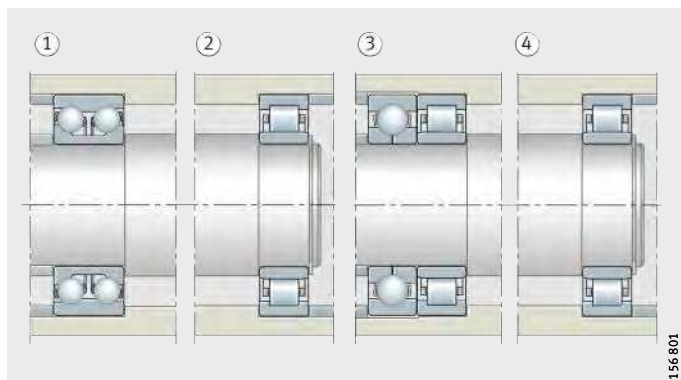
- Deep groove ball bearings
  - ① Locating bearing
  - ② Non-locating bearing
- Spherical roller bearings
  - ③ Locating bearing
  - ④ Non-locating bearing

*Figure 2*  
Locating/non-locating bearing arrangements

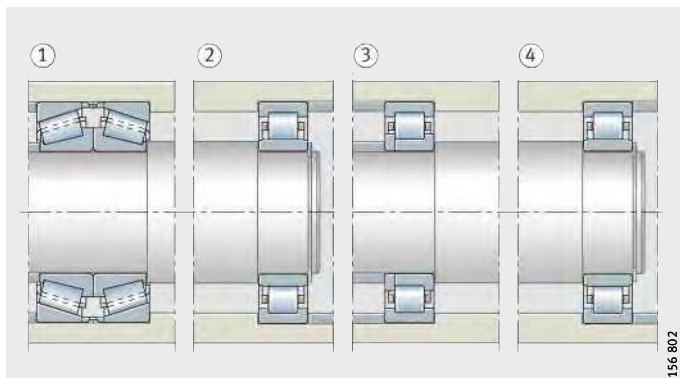


- Double row angular contact ball bearing
  - ① Locating bearing
- Cylindrical roller bearing NU
  - ② Non-locating bearing
- Four point contact bearing and cylindrical roller bearing
  - ③ Locating bearing
- Cylindrical roller bearing NU
  - ④ Non-locating bearing

*Figure 3*  
Locating/non-locating bearing arrangements

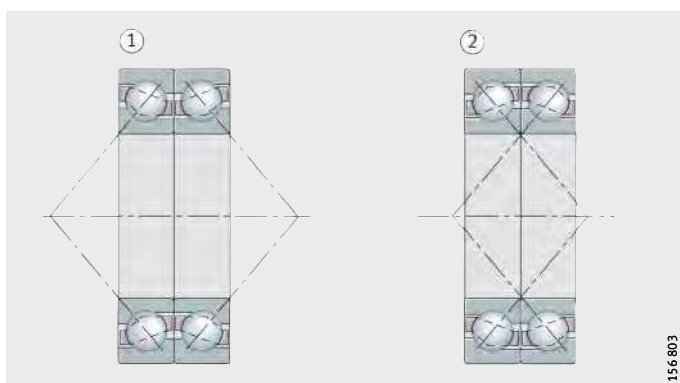


- Two tapered roller bearings
  - ① Locating bearing
- Cylindrical roller bearing NU
  - ② Non-locating bearing
- Cylindrical roller bearing NUP
  - ③ Locating bearing
- Cylindrical roller bearing NU
  - ④ Non-locating bearing



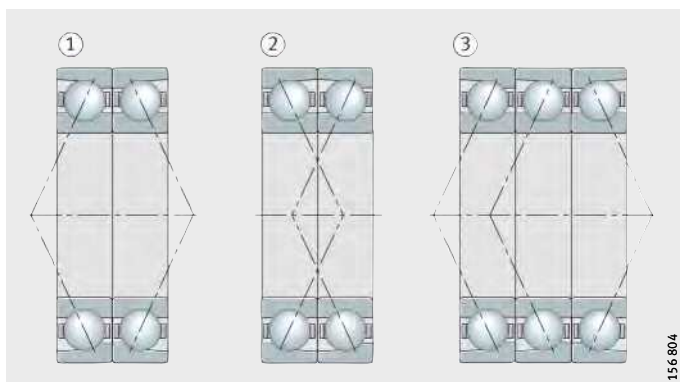
*Figure 4*  
Locating/non-locating bearing arrangements

- Pair of angular contact ball bearings of universal design
  - ① O arrangement
  - ② X arrangement



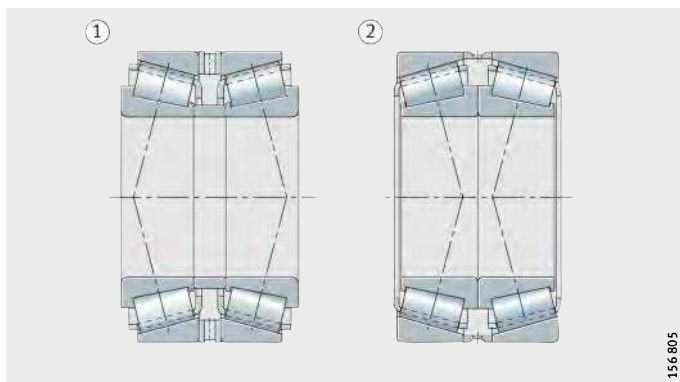
*Figure 5*  
Locating bearing arrangements

- Spindle bearings of universal design
  - ① O arrangement
  - ② X arrangement
  - ③ Tandem O arrangement



*Figure 6*  
Locating bearing arrangements

- Pair of tapered roller bearings
  - ① O arrangement
  - ② X arrangement



*Figure 7*  
Locating bearing arrangements

# Design of bearing arrangements

## Adjusted bearing arrangement

These bearing arrangements normally consist of two symmetrically arranged angular contact ball bearings or tapered roller bearings, *Figure 8*. During fitting, one bearing ring is displaced on its seat until the bearing arrangement achieves the required clearance or the necessary preload.

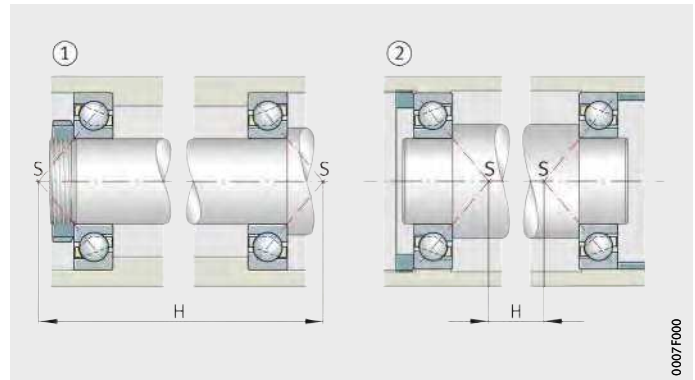
### Area of application

Due to this adjustment facility, the adjusted bearing arrangement is particularly suitable where close guidance is required, for example in pinion bearing arrangements with spiral toothed bevel gears and spindle bearing arrangements in machine tools.

### X and O arrangements

A fundamental distinction is drawn between the O arrangement, *Figure 8* ①, and the X arrangement, *Figure 8* ②, of the bearings. In the O arrangement, the cones and their apexes *S* formed by the contact lines point outwards; in the X arrangement, the cones point inwards. The support base *H*, in other words the distance between the apexes of the contact cones, is larger in the O arrangement than in the X arrangement. The O arrangement therefore gives the lower tilting clearance.

Angular contact ball bearings  
 ① O arrangement  
 ② X arrangement  
*S* = apexes of the contact cones  
*H* = support distance

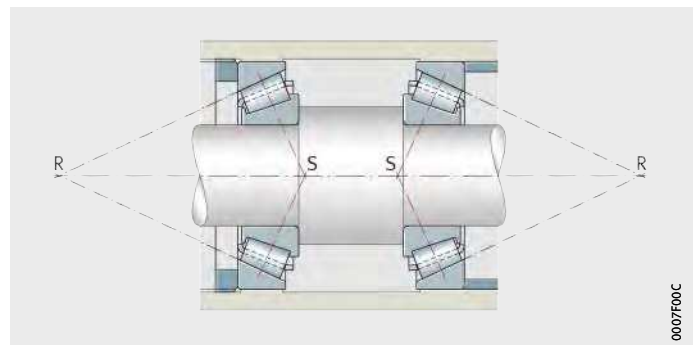


*Figure 8*  
Adjusted bearing arrangement

### Influence of thermal expansion in X and O arrangements

When setting the axial internal clearance, thermal expansion must be taken into consideration. In the X arrangement, *Figure 9*, a temperature differential between the shaft and housing always leads to a reduction in the internal clearance (assuming the following preconditions: shaft and housing of identical material, inner ring and complete shaft at identical temperature, outer ring and complete housing at identical temperature).

Tapered roller bearings in X arrangement  
*S* = apexes of the contact cones  
*R* = roller cone apexes



*Figure 9*  
Adjusted bearing arrangement



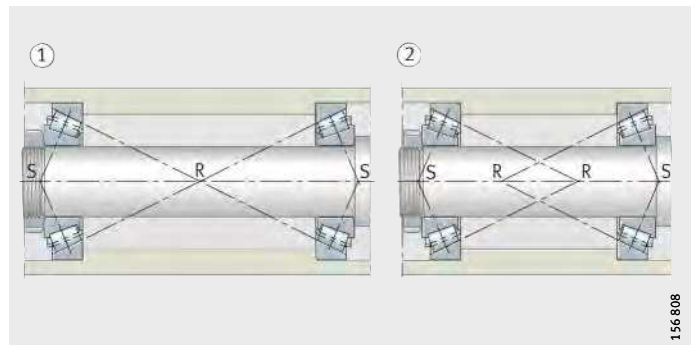
In the O arrangement, a distinction is drawn between three cases:

- The roller cone apexes R, i.e. the intersection points of the extended outer ring raceway with the bearing axis, coincide: the internal clearance set is maintained, *Figure 10* ①
- The roller cones overlap and there is a short distance between the bearings: the axial internal clearance is reduced, *Figure 10* ②
- The roller cones do not meet and there is a large distance between the bearings: the axial internal clearance is increased, *Figure 11*.

Tapered roller bearings in O arrangement

- ① Intersection points coincide
- ② Intersection points overlap

S = apexes of the contact cones  
R = roller cone apexes

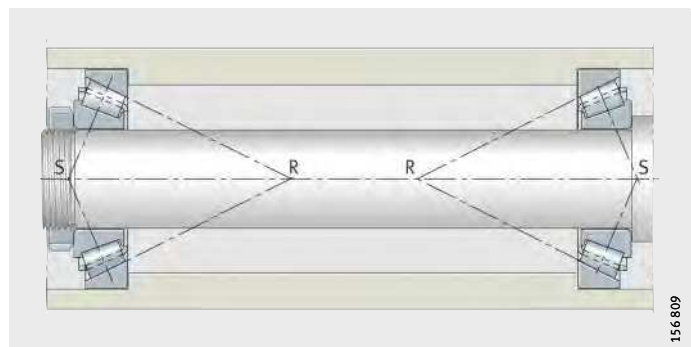


*Figure 10*

Adjusted bearing arrangement

Tapered roller bearings in O arrangement, without overlapping of roller cone apexes

S = apexes of the contact cones  
R = roller cone apexes



*Figure 11*

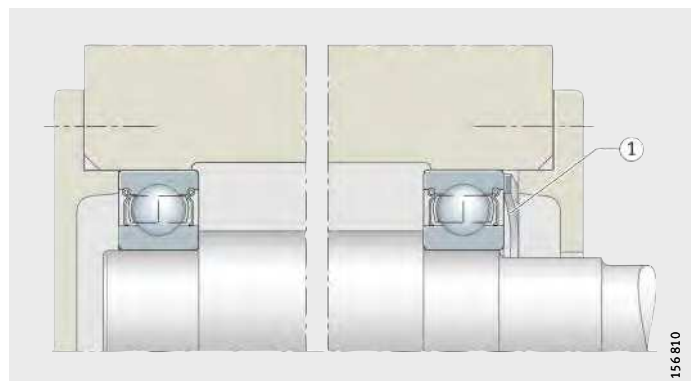
Adjusted bearing arrangement

**Elastic adjustment**

Adjusted bearing arrangements can also be achieved by preloading using springs, *Figure 12* ①. The elastic adjustment method compensates for thermal expansion. It can also be used where bearing arrangements are at risk of vibration while stationary.

Deep groove ball bearing preloaded by curved spring washer

- ① Curved spring washer



*Figure 12*

Adjusted bearing arrangement

# Design of bearing arrangements

## Floating bearing arrangement

The floating bearing arrangement is an economical solution where close axial guidance of the shaft is not required, *Figure 13*. The construction is similar to that of the adjusted bearing arrangement.

In the floating bearing arrangement, however, the shaft can be displaced in relation to the housing to the extent of the axial clearance  $s$ . The value  $s$  is defined as a function of the required guidance accuracy such that the bearings are not axially clamped even under unfavourable thermal conditions.

## Suitable bearings

Suitable bearing types for the floating bearing arrangement include deep groove ball bearings, self-aligning ball bearings and spherical roller bearings.

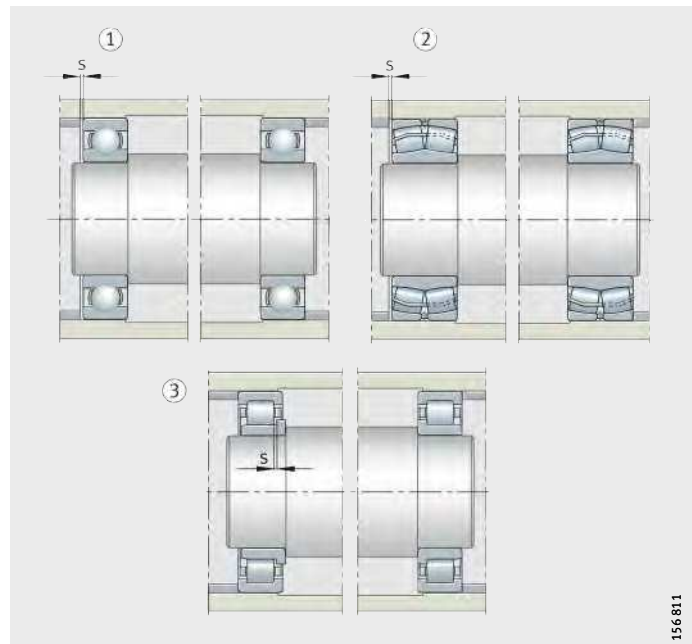
In each of the bearings one ring, usually an outer ring, has a fit that allows displacement.

In floating bearing arrangements and cylindrical roller bearings with cage NJ, the length compensation takes place within the bearings. The inner and outer rings can have tight fits, *Figure 13* ③.

Tapered roller bearings and angular contact ball bearings are not suitable for a floating bearing arrangement, since they must be adjusted in order to run correctly.

- ① Two deep groove ball bearings
- ② Two spherical roller bearings
- ③ Two cylindrical roller bearings NJ  
 $s$  = axial clearance

*Figure 13*  
Floating bearing arrangements



**Fits** Rolling bearings are located on the shaft and in the housing in a radial, axial and tangential direction in accordance with their function. Radial and tangential location is normally achieved by force locking, i. e. by tight fits on the bearing rings. Axial location of the bearings is generally by geometrical locking.

### Criteria for selection of fits

The following must be taken into consideration in the selection of fits:

- The bearing rings must be well supported on their circumference in order to allow full utilisation of the load carrying capacity of the bearing
- The rings must not creep on their mating parts, otherwise the seats will be damaged
- One ring of the non-locating bearing must adapt to changes in the length of the shaft and housing and must therefore be capable of axial displacement
- The bearings must be easy to fit and dismantle.

Good support of the bearing rings on their circumference requires rigid seating. The requirement that rings must not creep on their mating parts also requires rigid seating. If non-separable bearings must be fitted and dismantled, a tight fit can only be achieved for one bearing ring.

In cylindrical roller bearings N, NU and needle roller bearings, both rings can have tight fits, since the length compensation takes place within the bearing and since the rings can be fitted separately.



With tight fits and a temperature differential between the inner and outer ring, the radial internal clearance of the bearing is reduced. This must be taken into consideration when selecting the internal clearance.

If materials other than cast iron or steel are used for the adjacent construction, the modulus of elasticity and the differing coefficients of thermal expansion of the materials must also be taken into consideration to achieve rigid seating.

For aluminium housings, thin-walled housings and hollow shafts, a closer fit should be selected if necessary in order to achieve the same force locking as with cast iron, steel or solid shafts.

Higher loads, especially shocks, require a fit with larger interference and narrower geometrical tolerances.

### Seats for axial bearings

Axial bearings, which support axial loads only, must not be guided radially (with the exception of axial cylindrical roller bearings which have a degree of freedom in the radial direction due to flat raceways).

In the case of groove-shaped raceways this is not present and must be achieved by a loose seat for the stationary washer. A rigid seat is normally selected for the rotating washer.

Where axial bearings also support radial forces, such as in axial spherical roller bearings, fits should be selected in the same way as for radial bearings.

The contact surfaces of the mating parts must be perpendicular to the axis of rotation (axial runout tolerance to IT5 or better), in order to ensure uniform load distribution over all the rolling elements.

# Design of bearing arrangements

## Conditions of rotation

The conditions of rotation indicate the motion of one bearing ring with respect to the load direction and are expressed as either circumferential load or point load as shown in the table.

### Point load

If the ring remains stationary relative to the load direction, there are no forces that displace the ring relative to its seating surface. This type of load is described as point load.

There is no risk that the seating surface will be damaged and a loose fit is possible.





### Circumferential load

If forces are present that displace the ring relative to its seating surface, every point on the raceway is subjected to load over the course of one revolution of the bearing. A load with this characteristic is described as a circumferential load.



As damage to the bearing seating surface can occur, a tight fit should be used.

## Conditions of rotation

Conditions of motion	Example	Schematic	Load case	Fit
Rotating inner ring Stationary outer ring Constant load direction	Shaft with weight load		Circumferential load on inner ring	Inner ring: tight fit necessary Outer ring: loose fit permissible
Stationary inner ring Rotating outer ring Load direction rotates with outer ring	Hub bearing arrangement with significant imbalance		and Point load on outer ring	
Stationary inner ring Rotating outer ring Constant load direction	Passenger car front wheel bearing (hub bearing arrangement)		Point load on inner ring	Inner ring: loose fit permissible Outer ring: tight fit necessary
Rotating inner ring Stationary outer ring Load direction rotates with inner ring	Centrifuge, vibrating screen		and Circumferential load on outer ring	

## Shaft and housing tolerances

The fit is determined by the ISO tolerances for shafts and housings (ISO 286-1:1988) in conjunction with the tolerances  $\Delta_{dmp}$  for the bore and  $\Delta_{Dmp}$  for the outside diameter of the bearings (DIN 620).

### Tolerance zones

The ISO tolerances are defined in the form of tolerance zones. They are determined by their position relative to the zero line (= tolerance position) and their size (= tolerance grade, see ISO 286-1:1988). The tolerance position is indicated by letters (upper case for housings, lower case for shafts). For a schematic representation of the most common rolling bearing fits, see *Figure 14*.

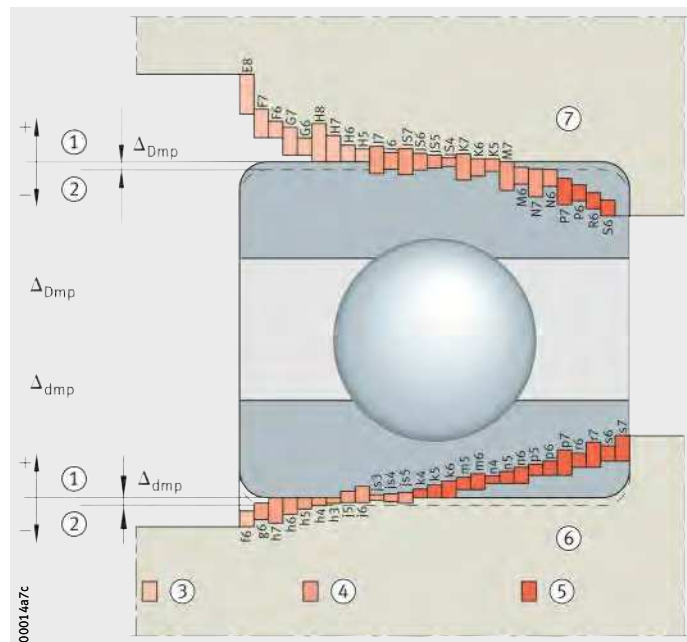
### Reference to tables of shaft and housing tolerances

The tables on pages 150 to 152 contain recommendations for the selection of shaft and housing tolerances that are valid for normal fitting and operating conditions.

Deviations are possible if particular requirements apply, for example in relation to running accuracy, smooth running or operating temperature. Increased running accuracies thus require closer tolerances such as tolerance grade 5 instead of 6. If the inner ring is warmer than the shaft during operation, the seating may loosen to an impermissible extent. A tighter fit must then be selected, for example m6 instead of k6.

In such cases, the question of fits can only be resolved by a compromise. The individual requirements must be weighed against each other and those fulfilled that give the best overall solution.

- ① Zero line
  - ② Nominal diameter
  - ③ Loose fit
  - ④ Transition fit
  - ⑤ Tight fit
  - ⑥ Shaft diameter
  - ⑦ Housing bore
- $\Delta_{Dmp}$  = tolerance for bearing outside diameter  
 $\Delta_{dmp}$  = tolerance for bearing bore



*Figure 14*  
Fits for rolling bearings

# Design of bearing arrangements

## Shaft tolerances for radial bearings with cylindrical bore

Condition of rotation	Bearing type	Shaft diameter mm	Displacement facility Load	Tolerance zone
Point load on inner ring	Ball bearings, roller bearings	All sizes	Inner ring easily displaced	g6 (g5)
			Inner ring not easily displaced, angular contact ball bearings and tapered roller bearings with adjusted inner ring	h6 (j6)
	Needle roller bearings	All sizes	Non-locating bearing	h6 (g6) <sup>1)</sup>
Circumferential load on inner ring or indeterminate load direction	Ball bearings	up to 50	Normal loads <sup>2)</sup>	j6 (j5)
			Low loads <sup>3)</sup>	j6 (j5)
		50 to 100	Normal and high loads <sup>4)</sup>	k6 (k5)
			Low loads <sup>2)</sup>	k6 (m6)
		100 to 200	Normal and high loads <sup>5)</sup>	m6 (m5)
			Low loads	m6 (m5)
		over 200	Normal and high loads	n6 (n5)
			Low loads	j6 (j5)
	Roller bearings	up to 60	Normal and high loads	k6 (k5)
			Low loads	k6 (k5)
		60 to 200	Normal loads	m6 (m5)
			High loads	n6 (n5)
		200 to 500	Normal loads	m6 (n6)
			High loads, shocks	p6
		over 500	Normal loads	n6 (p6)
			High loads	p6
	Needle roller bearings	up to 50	Low loads	k6
			Normal and high loads	m6
		50 to 120	Low loads	m6
			Normal and high loads	n6
		120 to 250	Low loads	n6
Normal and high loads			p6	
250 to 400		Low loads	p6	
		Normal and high loads	r6	
400 to 500		Low loads	r6	
		Normal and high loads	s6	
over 500		Low loads	r6	
		Normal and high loads	s6	

1) For easier fitting.

2)  $C/P > 10$

3)  $C/P > 12$

4)  $C/P < 12$

5)  $C/P < 10$

### Shaft tolerances for axial bearings

Load	Bearing type	Shaft diameter	Operating conditions	Tolerance zone
Axial load	Axial deep groove ball bearings	All sizes	–	j6
	Axial deep groove ball bearings, double direction		–	k6
	Axial cylindrical roller bearings with shaft locating washer		–	h6 (j6)
	Axial cylindrical roller and cage assemblies		–	h8
Combined load	Axial spherical roller bearings	All sizes	Point load on shaft locating washer	j6
		up to 200 mm	Circumferential load on shaft locating washer	j6 (k6)
		over 200 mm		k6 (m6)

# Design of bearing arrangements

## Housing tolerances radial bearings

Condition of rotation	Displacement facility Load	Operating conditions	Tolerance zone
Point load on outer ring	Outer ring easily displaced, housing unsplit	The tolerance grade is determined by the running accuracy required	H7 (H6) <sup>1)</sup>
	Outer ring easily displaced, housing split		H8 (H7)
	Outer ring not easily displaced, housing unsplit	High running accuracy required	H6 (J6)
	Outer ring not easily displaced, angular contact ball bearings and tapered roller bearings with adjusted outer ring, housing split	Normal running accuracy	H7 (J7)
	Outer ring easily displaced	Heat input via shaft	G7 <sup>2)</sup>
Circumferential load on outer ring or indeterminate load direction	Low loads, outer ring cannot be displaced	For high running accuracy requirements: K6, M6, N6 and P6	K7 (K6)
	Normal loads, shocks, outer ring cannot be displaced		M7 (M6)
	High loads, shocks (C/P < 6), outer ring cannot be displaced		N7 (N6)
	High loads, severe shocks, thin-walled housing, outer ring cannot be displaced		P7 (P6)

1) G7 for housings made from flake graphite cast iron GG, if bearing outside diameter  $D > 250$  mm and temperature difference between outer ring and housing  $> 10$  K.

2) F7 for housings made from flake graphite cast iron GG, if bearing outside diameter  $D > 250$  mm and temperature difference between outer ring and housing  $> 10$  K.

## Housing tolerances for axial bearings

Load	Bearing type	Operating conditions	Tolerance zone
Axial load	Axial deep groove ball bearings	Normal running accuracy High running accuracy	E8 H6
	Axial cylindrical roller bearings with housing locating washer	–	H7 (K7)
	Axial cylindrical roller and cage assemblies	–	H10
	Axial spherical roller bearings	Normal loads High loads	E8 G7
Combined loads Point load on housing locating washer	Axial spherical roller bearings	–	H7
Combined loads Circumferential load on housing locating washer	Axial spherical roller bearings	–	K7



## Tables of shaft and housing fits

The numerical values for the fits (page 154 to page 167) are valid for solid steel shafts and cast iron housings. In the table header, below the nominal diameters, are the normal tolerances for the bore or outside diameters of radial bearings (excluding tapered roller bearings). Below these are the deviations for the most important tolerance zones for fitting of rolling bearings.

### Shaft fits

In each cell are five numbers in accordance with the following scheme, for example for shaft  $\varnothing 40j5$ :

#### Example: table entry for shaft fit

Shaft deviation in $\mu\text{m}$		Fit interference or fit clearance in $\mu\text{m}$	
Maximum material value	+6	<b>18</b> <sup>2)</sup>	Interference or fit clearance if the maximum material values are combined
		<b>10</b> <sup>1)2)</sup>	Probable interference or fit clearance
Minimum material value	-5	5 <sup>3)</sup>	Interference or fit clearance if the minimum material values are combined

<sup>1)</sup> The probable interference or fit clearance is the value obtained if the actual dimensions are one third away from the maximum material values.

<sup>2)</sup> Values printed in bold type indicate fit interference.

<sup>3)</sup> Values printed in regular type indicate fit clearance.

Shaft fits: see tables from page 154.

### Housing fits

In each cell are five numbers in accordance with the following scheme, for example for a housing  $\varnothing 100 K6$ :

#### Example: table entry for housing fit

Housing deviation in $\mu\text{m}$		Fit interference or fit clearance in $\mu\text{m}$	
Minimum material value	+4	<b>18</b> <sup>2)</sup>	Interference or fit clearance if the maximum material values are combined
		<b>6</b> <sup>1)2)</sup>	Probable interference or fit clearance
Maximum material value	-18	19 <sup>3)</sup>	Interference or fit clearance if the minimum material values are combined

<sup>1)</sup> The probable interference or fit clearance is the value obtained if the actual dimensions are one third away from the maximum material values.

<sup>2)</sup> Values printed in bold type indicate fit interference.

<sup>3)</sup> Values printed in regular type indicate fit clearance.

Housing fits: see page 163 to page 167.

# Design of bearing arrangements

## Shaft fits

Nominal shaft diameter in mm										
over incl.	<b>3</b> <b>6</b>	<b>6</b> <b>10</b>	<b>10</b> <b>18</b>	<b>18</b> <b>30</b>	<b>30</b> <b>50</b>					
Deviation of bearing bore diameter in $\mu\text{m}$ (normal tolerance)										
$\Delta_{\text{dmp}}$	0 -8	0 -8	0 -8	0 -10	0 -12					
Shaft deviation, fit interference or fit clearance in $\mu\text{m}$										
<b>g5</b>	-4 -9	<b>4</b> <b>0</b> 9	-5 -11	<b>3</b> 2 11	-6 -14	<b>2</b> 3 14	-7 -16	<b>3</b> 3 16	-9 -20	<b>3</b> 5 20
<b>g6</b>	-4 -12	<b>4</b> 1 12	-5 -14	<b>3</b> 3 14	-6 -17	<b>2</b> 4 17	-7 -20	<b>3</b> 5 20	-9 -25	<b>3</b> 6 25
<b>h5</b>	0 -5	<b>8</b> <b>4</b> 5	0 -6	<b>8</b> <b>3</b> 6	0 -8	<b>8</b> <b>3</b> 8	0 -9	<b>10</b> <b>4</b> 9	0 -11	<b>12</b> <b>4</b> 11
<b>h6</b>	0 -8	<b>8</b> <b>3</b> 8	0 -9	<b>8</b> <b>2</b> 9	0 -11	<b>8</b> <b>2</b> 11	0 -13	<b>10</b> <b>2</b> 13	0 -16	<b>12</b> <b>3</b> 16
<b>j5</b>	+3 -2	<b>11</b> <b>7</b> 2	+4 -2	<b>12</b> <b>7</b> 2	+5 -3	<b>13</b> <b>8</b> 3	+5 -4	<b>15</b> <b>9</b> 4	+6 -5	<b>18</b> <b>10</b> 5
<b>j6</b>	+6 -2	<b>14</b> <b>8</b> 2	+7 -2	<b>15</b> <b>9</b> 2	+8 -3	<b>16</b> <b>10</b> 3	+9 -4	<b>19</b> <b>11</b> 4	+11 -5	<b>23</b> <b>14</b> 5
<b>js5</b>	+2,5 -2,5	<b>11</b> <b>6</b> 3	+3 -3	<b>11</b> <b>6</b> 3	+4 -4	<b>12</b> <b>6</b> 4	+4,5 -4,5	<b>15</b> <b>9</b> 5	+5,5 -5,5	<b>18</b> <b>10</b> 6
<b>js6</b>	+4 -4	<b>12</b> <b>7</b> 4	+4,5 -4,5	<b>13</b> <b>7</b> 5	+5,5 -5,5	<b>14</b> <b>8</b> 6	+6,5 -6,5	<b>17</b> <b>9</b> 7	+8 -8	<b>20</b> <b>11</b> 8
<b>k5</b>	+6 +1	<b>14</b> <b>9</b> 1	+7 +1	<b>15</b> <b>10</b> 1	+9 +1	<b>17</b> <b>12</b> 1	+11 +2	<b>21</b> <b>15</b> 2	+13 +2	<b>25</b> <b>17</b> 2
<b>k6</b>	+9 +1	<b>17</b> <b>11</b> 1	+10 +1	<b>18</b> <b>12</b> 1	+12 +1	<b>20</b> <b>14</b> 1	+15 +2	<b>25</b> <b>17</b> 2	+18 +2	<b>30</b> <b>21</b> 2
<b>m5</b>	+9 +4	<b>17</b> <b>13</b> 4	+12 +6	<b>20</b> <b>15</b> 6	+15 +7	<b>23</b> <b>18</b> 7	+17 +8	<b>27</b> <b>21</b> 8	+20 +9	<b>32</b> <b>24</b> 9
<b>m6</b>	+12 +4	<b>20</b> <b>15</b> 4	+15 +6	<b>23</b> <b>17</b> 6	+18 +7	<b>26</b> <b>20</b> 7	+21 +8	<b>31</b> <b>23</b> 8	+25 +9	<b>37</b> <b>27</b> 9

50 65		65 80		80 100		100 120		120 140		140 160		160 180		180 200		200 225		225 250	
0 -15		0 -15		0 -20		0 -20		0 -25		0 -25		0 -25		0 -30		0 -30		0 -30	
-10 -23	5 4 23	-10 -23	5 4 23	-12 -27	8 4 27	-12 -27	8 4 27	-14 -32	11 3 32	-14 -32	11 3 32	-14 -32	11 3 32	-15 -35	15 2 35	-15 -35	15 2 35	-15 -35	15 2 35
-10 -29	5 6 29	-10 -29	5 6 29	-12 -34	8 6 34	-12 -34	8 6 34	-14 -39	11 6 39	-14 -39	11 6 39	-14 -39	11 6 39	-15 -44	15 5 44	-15 -44	15 5 44	-15 -44	15 5 44
0 -13	15 6 13	0 -13	15 6 13	0 -15	20 8 15	0 -15	20 8 15	0 -18	25 11 18	0 -18	25 11 18	0 -18	25 11 18	0 -20	30 13 20	0 -20	30 13 20	0 -20	30 13 20
0 -19	15 4 19	0 -19	15 4 19	0 -22	20 6 22	0 -22	20 6 22	0 -25	25 8 25	0 -25	25 8 25	0 -25	25 8 25	0 -29	30 10 29	0 -29	30 10 29	0 -29	30 10 29
+6 -7	21 12 7	+6 -7	21 12 7	+6 -9	26 14 9	+6 -9	26 14 9	+7 -11	32 18 11	+7 -11	32 18 11	+7 -11	32 18 11	+7 -13	37 20 13	+7 -13	37 20 13	+7 -13	37 20 13
+12 -7	27 16 7	+12 -7	27 16 7	+13 -9	33 19 9	+13 -9	33 19 9	+14 -11	39 22 11	+14 -11	39 22 11	+14 -11	39 22 11	+16 -13	46 26 13	+16 -13	46 26 13	+16 -13	46 26 13
+6,5 -6,5	22 13 7	+6,5 -6,5	22 13 7	+7,5 -7,5	28 16 8	+7,5 -7,5	28 16 8	+9 -9	34 20 9	+9 -9	34 20 9	+9 -9	34 20 9	+10 -10	40 23 10	+10 -10	40 23 10	+10 -10	40 23 10
+9,5 -9,5	25 13 10	+9,5 -9,5	25 13 10	+11 -11	31 17 11	+11 -11	31 17 11	+12,5 -12,5	38 21 13	+12,5 -12,5	38 21 13	+12,5 -12,5	38 21 13	+14,5 -14,5	45 25 15	+14,5 -14,5	45 25 15	+14,5 -14,5	45 25 15
+15 +2	30 21 2	+15 +2	30 21 2	+18 +3	38 26 3	+18 +3	38 26 3	+21 +3	46 32 3	+21 +3	46 32 3	+21 +3	46 32 3	+24 +4	54 37 4	+24 +4	54 37 4	+24 +4	54 37 4
+21 +2	36 25 2	+21 +2	36 25 2	+25 +3	45 31 3	+25 +3	45 31 3	+28 +3	53 36 3	+28 +3	53 36 3	+28 +3	53 36 3	+33 +4	63 43 4	+33 +4	63 43 4	+33 +4	63 43 4
+24 +11	39 30 11	+24 +11	39 30 11	+28 +13	48 36 13	+28 +13	48 36 13	+33 +15	58 44 15	+33 +15	58 44 15	+33 +15	58 44 15	+37 +17	67 50 17	+37 +17	67 50 17	+37 +17	67 50 17
+30 +11	45 34 11	+30 +11	45 34 11	+35 +13	55 42 13	+35 +13	55 42 13	+40 +15	65 48 15	+40 +15	65 48 15	+40 +15	65 48 15	+46 +17	76 56 17	+46 +17	76 56 17	+46 +17	76 56 17

# Design of bearing arrangements

Shaft fits  
continued

Nominal shaft diameter in mm								
over	250		280		315		355	
incl.	280		315		355		400	
Deviation of bearing bore diameter in $\mu\text{m}$ (normal tolerance)								
$\Delta_{\text{dmp}}$	0		0		0		0	
	-35		-35		-40		-40	
Shaft deviation, fit interference or fit clearance in $\mu\text{m}$								
<b>g5</b>	-17 -40	<b>18</b> 1 40	-17 -40	<b>18</b> 1 40	-18 -43	<b>22</b> <b>0</b> 43	-18 -43	<b>22</b> <b>0</b> 43
<b>g6</b>	-17 -49	<b>18</b> 4 49	-17 -49	<b>18</b> 4 49	-18 -54	<b>22</b> 3 54	-18 -54	<b>22</b> 3 54
<b>h5</b>	0 -23	<b>35</b> <b>16</b> 23	0 -23	<b>35</b> <b>16</b> 23	0 -25	<b>40</b> <b>18</b> 25	0 -25	<b>40</b> <b>18</b> 25
<b>h6</b>	0 -32	<b>35</b> <b>13</b> 32	0 -32	<b>35</b> <b>13</b> 32	0 -36	<b>40</b> <b>15</b> 36	0 -36	<b>40</b> <b>15</b> 36
<b>j5</b>	+7 -16	<b>42</b> <b>23</b> 16	+7 -16	<b>42</b> <b>23</b> 16	+7 -18	<b>47</b> <b>25</b> 18	+7 -18	<b>47</b> <b>25</b> 18
<b>j6</b>	+16 -16	<b>51</b> <b>29</b> 16	+16 -16	<b>51</b> <b>29</b> 16	+18 -18	<b>58</b> <b>33</b> 18	+18 -18	<b>58</b> <b>33</b> 18
<b>js5</b>	+11,5 -11,5	<b>47</b> <b>27</b> 12	+11,5 -11,5	<b>47</b> <b>27</b> 12	+12,5 -12,5	<b>53</b> <b>32</b> 13	+12,5 -12,5	<b>53</b> <b>32</b> 13
<b>js6</b>	+16 -16	<b>51</b> <b>29</b> 16	+16 -16	<b>51</b> <b>29</b> 16	+18 -18	<b>58</b> <b>33</b> 18	+18 -18	<b>58</b> <b>33</b> 18
<b>k5</b>	+27 +4	<b>62</b> <b>43</b> 4	+27 +4	<b>62</b> <b>43</b> 4	+29 +4	<b>69</b> <b>47</b> 4	+29 +4	<b>69</b> <b>47</b> 4
<b>k6</b>	+36 +4	<b>71</b> <b>49</b> 4	+36 +4	<b>71</b> <b>49</b> 4	+40 +4	<b>80</b> <b>55</b> 4	+40 +4	<b>80</b> <b>55</b> 4
<b>m5</b>	+43 +20	<b>78</b> <b>59</b> 20	+43 +20	<b>78</b> <b>59</b> 20	+46 +21	<b>86</b> <b>64</b> 21	+46 +21	<b>86</b> <b>64</b> 21
<b>m6</b>	+52 +20	<b>87</b> <b>65</b> 20	+52 +20	<b>87</b> <b>65</b> 20	+57 +21	<b>97</b> <b>72</b> 21	+57 +21	<b>97</b> <b>72</b> 21

<b>400 450</b>		<b>450 500</b>		<b>500 560</b>		<b>560 630</b>		<b>630 710</b>		<b>710 800</b>		<b>800 900</b>	
0 -45		0 -45		0 -50		0 -50		0 -75		0 -75		0 -100	
-20 -47	<b>25</b> <b>1</b> 47	-20 -47	<b>25</b> <b>1</b> 47	-22 -51	<b>28</b> <b>1</b> 51	-22 -51	<b>28</b> <b>1</b> 51	-24 -56	<b>51</b> <b>15</b> 56	-24 -56	<b>51</b> <b>15</b> 56	-26 -62	<b>74</b> <b>29</b> 62
-20 -60	<b>25</b> <b>3</b> 60	-20 -60	<b>25</b> <b>3</b> 60	-22 -66	<b>28</b> <b>4</b> 66	-22 -66	<b>28</b> <b>4</b> 66	-24 -74	<b>51</b> <b>9</b> 74	-24 -74	<b>51</b> <b>9</b> 74	-26 -82	<b>74</b> <b>24</b> 82
0 -27	<b>45</b> <b>21</b> 27	0 -27	<b>45</b> <b>21</b> 27	0 -29	<b>50</b> <b>23</b> 29	0 -29	<b>50</b> <b>23</b> 29	0 -32	<b>75</b> <b>39</b> 32	0 -32	<b>75</b> <b>39</b> 32	0 -36	<b>100</b> <b>55</b> 36
0 -40	<b>45</b> <b>17</b> 40	0 -40	<b>45</b> <b>17</b> 40	0 -44	<b>50</b> <b>18</b> 44	0 -44	<b>50</b> <b>18</b> 44	0 -50	<b>75</b> <b>33</b> 50	0 -50	<b>75</b> <b>33</b> 50	0 -56	<b>100</b> <b>48</b> 56
+7 -20	<b>52</b> <b>28</b> 20	+7 -20	<b>52</b> <b>28</b> 20	-	-	-	-	-	-	-	-	-	-
+20 -20	<b>65</b> <b>37</b> 20	+20 -20	<b>65</b> <b>37</b> 20	+22 -22	<b>72</b> <b>40</b> 22	+22 -22	<b>72</b> <b>40</b> 22	+25 -25	<b>100</b> <b>58</b> 25	+25 -25	<b>100</b> <b>58</b> 25	+28 -28	<b>128</b> <b>76</b> 28
+13,5 -13,5	<b>59</b> <b>35</b> 14	+13,5 -13,5	<b>59</b> <b>35</b> 14	+14,5 -14,5	<b>65</b> <b>38</b> 15	+14,5 -14,5	<b>65</b> <b>38</b> 15	+16 -16	<b>91</b> <b>55</b> 16	+16 -16	<b>91</b> <b>55</b> 16	+18 -18	<b>118</b> <b>73</b> 18
+20 -20	<b>65</b> <b>37</b> 20	+20 -20	<b>65</b> <b>37</b> 20	+22 -22	<b>72</b> <b>40</b> 22	+22 -22	<b>72</b> <b>40</b> 22	+25 -25	<b>100</b> <b>58</b> 25	+25 -25	<b>100</b> <b>58</b> 25	+28 -28	<b>128</b> <b>76</b> 28
+32 +5	<b>77</b> <b>53</b> 5	+32 +5	<b>77</b> <b>53</b> 5	+29 0	<b>79</b> <b>53</b> 0	+29 0	<b>79</b> <b>53</b> 0	+32 0	<b>107</b> <b>71</b> 0	+32 0	<b>107</b> <b>71</b> 0	+36 0	<b>136</b> <b>91</b> 0
+45 +5	<b>90</b> <b>62</b> 5	+45 +5	<b>90</b> <b>62</b> 5	+44 0	<b>94</b> <b>62</b> 0	+44 0	<b>94</b> <b>62</b> 0	+50 0	<b>125</b> <b>83</b> 0	+50 0	<b>125</b> <b>83</b> 0	+56 0	<b>156</b> <b>104</b> 0
+50 +23	<b>95</b> <b>71</b> 23	+50 +23	<b>95</b> <b>71</b> 23	+55 +26	<b>105</b> <b>78</b> 26	+55 +26	<b>105</b> <b>78</b> 26	+62 +30	<b>137</b> <b>101</b> 30	+62 +30	<b>137</b> <b>101</b> 30	+70 +34	<b>170</b> <b>125</b> 34
+63 +23	<b>108</b> <b>80</b> 23	+63 +23	<b>108</b> <b>80</b> 23	+70 +26	<b>120</b> <b>88</b> 26	+70 +26	<b>120</b> <b>88</b> 26	+80 +30	<b>155</b> <b>113</b> 30	+80 +30	<b>155</b> <b>113</b> 30	+90 +34	<b>190</b> <b>138</b> 34

# Design of bearing arrangements

## Shaft fits

Nominal shaft diameter in mm												
over incl.	<b>3</b> <b>6</b>	<b>6</b> <b>10</b>	<b>10</b> <b>18</b>	<b>18</b> <b>30</b>	<b>30</b> <b>50</b>	<b>50</b> <b>65</b>						
Deviation of bearing bore diameter in $\mu\text{m}$ (normal tolerance)												
$\Delta_{\text{dmp}}$	0 -8	0 -8	0 -8	0 -10	0 -12	0 -15						
Shaft deviation, fit interference or fit clearance in $\mu\text{m}$												
<b>n5</b>	+13	<b>21</b>	+16	<b>24</b>	+20	<b>28</b>	+24	<b>34</b>	+28	<b>40</b>	+33	<b>48</b>
	+8	<b>17</b> <b>8</b>	+10	<b>19</b> <b>10</b>	+12	<b>23</b> <b>12</b>	+15	<b>28</b> <b>15</b>	+17	<b>32</b> <b>17</b>	+20	<b>39</b> <b>20</b>
<b>n6</b>	+16	<b>24</b>	+19	<b>27</b>	+23	<b>31</b>	+28	<b>38</b>	+33	<b>45</b>	+39	<b>54</b>
	+8	<b>19</b> <b>8</b>	+10	<b>21</b> <b>10</b>	+12	<b>25</b> <b>12</b>	+15	<b>30</b> <b>15</b>	+17	<b>36</b> <b>17</b>	+20	<b>43</b> <b>20</b>
<b>p6</b>	+20	<b>28</b>	+24	<b>32</b>	+29	<b>37</b>	+35	<b>45</b>	+42	<b>54</b>	+51	<b>66</b>
	+12	<b>23</b> <b>12</b>	+15	<b>26</b> <b>15</b>	+18	<b>31</b> <b>18</b>	+22	<b>37</b> <b>22</b>	+26	<b>45</b> <b>26</b>	+32	<b>55</b> <b>32</b>
<b>p7</b>	+24	<b>32</b>	+30	<b>38</b>	+36	<b>44</b>	+43	<b>53</b>	+51	<b>63</b>	+62	<b>77</b>
	+12	<b>25</b> <b>12</b>	+15	<b>30</b> <b>15</b>	+18	<b>35</b> <b>18</b>	+22	<b>43</b> <b>22</b>	+26	<b>51</b> <b>26</b>	+32	<b>62</b> <b>32</b>
<b>r6</b>	+23	<b>31</b>	+28	<b>36</b>	+34	<b>42</b>	+41	<b>51</b>	+50	<b>62</b>	+60	<b>75</b>
	+15	<b>25</b> <b>15</b>	+19	<b>30</b> <b>19</b>	+23	<b>35</b> <b>23</b>	+28	<b>44</b> <b>28</b>	+34	<b>53</b> <b>34</b>	+41	<b>64</b> <b>41</b>
<b>r7</b>	+27	<b>35</b>	+34	<b>42</b>	+41	<b>49</b>	+49	<b>59</b>	+59	<b>71</b>	+71	<b>86</b>
	+15	<b>28</b> <b>15</b>	+19	<b>34</b> <b>19</b>	+23	<b>40</b> <b>23</b>	+28	<b>49</b> <b>28</b>	+34	<b>59</b> <b>34</b>	+41	<b>71</b> <b>41</b>
Shaft tolerances for adapter sleeves and withdrawal sleeves												
<b>h7</b> / $\frac{\text{IT5}}{2}$	0 -12	<i>2,5</i>	0 -15	<i>3</i>	0 -18	<i>4</i>	0 -21	<i>4,5</i>	0 -25	<i>5,5</i>	0 -30	<i>6,5</i>
<b>h8</b> / $\frac{\text{IT5}}{2}$	0 -18	<i>2,5</i>	0 -22	<i>3</i>	0 -27	<i>4</i>	0 -33	<i>4,5</i>	0 -39	<i>5,5</i>	0 -46	<i>6,5</i>
<b>h9</b> / $\frac{\text{IT6}}{2}$	0 -30	<i>4</i>	0 -36	<i>4,5</i>	0 -43	<i>5,5</i>	0 -52	<i>6,5</i>	0 -62	<i>8</i>	0 -74	<i>9,5</i>

The values *printed in italics* indicate guide values for the cylindricity tolerance  $t_1$  (DIN ISO 1101).

	<b>65</b>	<b>80</b>	<b>100</b>	<b>120</b>	<b>140</b>	<b>160</b>	<b>180</b>	<b>200</b>	<b>225</b>	<b>225</b>								
	<b>80</b>	<b>100</b>	<b>120</b>	<b>140</b>	<b>160</b>	<b>180</b>	<b>200</b>	<b>225</b>	<b>225</b>	<b>250</b>								
	0	0	0	0	0	0	0	0	0	0								
	-15	-20	-20	-25	-25	-25	-30	-30	-30	-30								
+33	<b>48</b>	+38	<b>58</b>	+38	<b>58</b>	+45	<b>70</b>	+45	<b>70</b>	+45	<b>70</b>	+51	<b>81</b>	+51	<b>81</b>	+51	<b>81</b>	
+20	<b>39</b>	+23	<b>46</b>	+23	<b>46</b>	+27	<b>56</b>	+27	<b>56</b>	+27	<b>56</b>	+31	<b>64</b>	+31	<b>64</b>	+31	<b>64</b>	
	<b>20</b>		<b>23</b>		<b>23</b>		<b>27</b>		<b>27</b>		<b>27</b>		<b>31</b>		<b>31</b>		<b>31</b>	
+39	<b>54</b>	+45	<b>65</b>	+45	<b>65</b>	+52	<b>77</b>	+52	<b>77</b>	+52	<b>77</b>	+60	<b>90</b>	+60	<b>90</b>	+60	<b>90</b>	
+20	<b>43</b>	+23	<b>51</b>	+23	<b>51</b>	+27	<b>60</b>	+27	<b>60</b>	+27	<b>60</b>	+31	<b>70</b>	+31	<b>70</b>	+31	<b>70</b>	
	<b>20</b>		<b>23</b>		<b>23</b>		<b>27</b>		<b>27</b>		<b>27</b>		<b>31</b>		<b>31</b>		<b>31</b>	
+51	<b>66</b>	+59	<b>79</b>	+59	<b>79</b>	+68	<b>93</b>	+68	<b>93</b>	+68	<b>93</b>	+79	<b>109</b>	+79	<b>109</b>	+79	<b>109</b>	
+32	<b>55</b>	+37	<b>65</b>	+37	<b>65</b>	+43	<b>76</b>	+43	<b>76</b>	+43	<b>76</b>	+50	<b>89</b>	+50	<b>89</b>	+50	<b>89</b>	
	<b>32</b>		<b>37</b>		<b>37</b>		<b>43</b>		<b>43</b>		<b>43</b>		<b>50</b>		<b>50</b>		<b>50</b>	
+62	<b>77</b>	+72	<b>92</b>	+72	<b>92</b>	+83	<b>108</b>	+83	<b>108</b>	+83	<b>108</b>	+96	<b>126</b>	+96	<b>126</b>	+96	<b>126</b>	
+32	<b>62</b>	+37	<b>73</b>	+37	<b>73</b>	+43	<b>87</b>	+43	<b>87</b>	+43	<b>87</b>	+50	<b>101</b>	+50	<b>101</b>	+50	<b>101</b>	
	<b>32</b>		<b>37</b>		<b>37</b>		<b>43</b>		<b>43</b>		<b>43</b>		<b>50</b>		<b>50</b>		<b>50</b>	
+62	<b>77</b>	+73	<b>93</b>	+76	<b>96</b>	+88	<b>113</b>	+90	<b>115</b>	+93	<b>118</b>	+106	<b>136</b>	+109	<b>139</b>	+113	<b>143</b>	
+43	<b>66</b>	+51	<b>79</b>	+54	<b>82</b>	+63	<b>97</b>	+65	<b>99</b>	+68	<b>102</b>	+77	<b>116</b>	+80	<b>119</b>	+84	<b>123</b>	
	<b>43</b>		<b>51</b>		<b>54</b>		<b>63</b>		<b>65</b>		<b>68</b>		<b>77</b>		<b>80</b>		<b>84</b>	
+73	<b>88</b>	+86	<b>106</b>	+89	<b>109</b>	+103	<b>128</b>	+105	<b>130</b>	+108	<b>133</b>	+123	<b>153</b>	+126	<b>156</b>	+130	<b>160</b>	
+43	<b>73</b>	+51	<b>87</b>	+54	<b>90</b>	+63	<b>107</b>	+65	<b>109</b>	+68	<b>112</b>	+77	<b>128</b>	+80	<b>131</b>	+84	<b>135</b>	
	<b>43</b>		<b>51</b>		<b>54</b>		<b>63</b>		<b>65</b>		<b>68</b>		<b>77</b>		<b>80</b>		<b>84</b>	
0	6,5	0	7,5	0	7,5	0	9	0	9	0	9	0	10	0	10	0	10	
-30		-35		-35		-40		-40		-40		-46		-46		-46		10
0	6,5	0	7,5	0	7,5	0	9	0	9	0	9	0	10	0	10	0	10	
-46		-54		-54		-63		-63		-63		-72		-72		-72		10
0	9,5	0	11	0	11	0	12,5	0	12,5	0	12,5	0	14,5	0	14,5	0	14,5	
-74		-87		-87		-100		-100		-100		-115		-115		-115		14,5

# Design of bearing arrangements

Shaft fits  
continued

Nominal shaft diameter in mm										
over	250		280		315		355		400	
incl.	280		315		355		400		450	
Deviation of bearing bore diameter in $\mu\text{m}$ (normal tolerance)										
$\Delta_{\text{dm}}$	0		0		0		0		0	
p	-35		-35		-40		-40		-45	
Shaft deviation, fit interference or fit clearance in $\mu\text{m}$										
n5	+57	<b>92</b>	+57	<b>92</b>	+62	<b>102</b>	+62	<b>102</b>	+67	<b>112</b>
		<b>73</b>		<b>73</b>		<b>80</b>		<b>80</b>		<b>88</b>
	+34	<b>34</b>	+34	<b>34</b>	+37	<b>37</b>	+37	<b>37</b>	+40	<b>40</b>
n6	+66	<b>101</b>	+66	<b>101</b>	+73	<b>113</b>	+73	<b>113</b>	+80	<b>125</b>
		<b>79</b>		<b>79</b>		<b>88</b>		<b>88</b>		<b>97</b>
	+34	<b>34</b>	+34	<b>34</b>	+37	<b>37</b>	+37	<b>37</b>	+40	<b>40</b>
p6	+88	<b>123</b>	+88	<b>123</b>	+98	<b>138</b>	+98	<b>138</b>	+108	<b>153</b>
		<b>101</b>		<b>101</b>		<b>113</b>		<b>113</b>		<b>125</b>
	+56	<b>56</b>	+56	<b>56</b>	+62	<b>62</b>	+62	<b>62</b>	+68	<b>68</b>
p7	+108	<b>143</b>	+108	<b>143</b>	+119	<b>159</b>	+119	<b>159</b>	+131	<b>176</b>
		<b>114</b>		<b>114</b>		<b>127</b>		<b>127</b>		<b>139</b>
	+56	<b>56</b>	+56	<b>56</b>	+62	<b>62</b>	+62	<b>62</b>	+68	<b>68</b>
r6	+126	<b>161</b>	+130	<b>165</b>	+144	<b>184</b>	+150	<b>190</b>	+166	<b>211</b>
		<b>138</b>		<b>142</b>		<b>159</b>		<b>165</b>		<b>183</b>
	+94	<b>94</b>	+98	<b>98</b>	+108	<b>108</b>	+114	<b>114</b>	+126	<b>126</b>
r7	+146	<b>181</b>	+150	<b>185</b>	+165	<b>205</b>	+171	<b>211</b>	+189	<b>234</b>
		<b>152</b>		<b>156</b>		<b>173</b>		<b>179</b>		<b>198</b>
	+94	<b>94</b>	+98	<b>98</b>	+108	<b>108</b>	+114	<b>114</b>	+126	<b>126</b>
Shaft tolerances for adapter sleeves and withdrawal sleeves										
h7/ $\frac{IT5}{2}$	0	<i>11,5</i>	0	<i>11,5</i>	0	<i>12,5</i>	0	<i>12,5</i>	0	<i>13,5</i>
	-52		-52		-57		-57		-63	
h8/ $\frac{IT5}{2}$	0	<i>11,5</i>	0	<i>11,5</i>	0	<i>12,5</i>	0	<i>12,5</i>	0	<i>13,5</i>
	-81		-81		-89		-89		-97	
h9/ $\frac{IT6}{2}$	0	<i>16</i>	0	<i>16</i>	0	<i>18</i>	0	<i>18</i>	0	<i>20</i>
	-130		-130		-140		-140		-155	

The values *printed in italics* indicate guide values for the cylindricity tolerance  $t_1$  (DIN ISO 1101).



450		500		560		630		710		800	
500		560		630		710		800		900	
0		0		0		0		0		0	
-45		-50		-50		-75		-75		-100	
+67	<b>112</b>	+73	<b>123</b>	+73	<b>123</b>	+82	<b>157</b>	+82	<b>157</b>	+92	<b>192</b>
+40	<b>88</b>	+44	<b>96</b>	+44	<b>96</b>	+50	<b>121</b>	+50	<b>121</b>	+56	<b>147</b>
	<b>40</b>		<b>44</b>		<b>44</b>		<b>50</b>		<b>50</b>		<b>56</b>
+80	<b>125</b>	+88	<b>138</b>	+88	<b>138</b>	+100	<b>175</b>	+100	<b>175</b>	+112	<b>212</b>
+40	<b>97</b>	+44	<b>106</b>	+44	<b>106</b>	+50	<b>133</b>	+50	<b>133</b>	+56	<b>160</b>
	<b>40</b>		<b>44</b>		<b>44</b>		<b>50</b>		<b>50</b>		<b>56</b>
+108	<b>153</b>	+122	<b>172</b>	+122	<b>172</b>	+138	<b>213</b>	+138	<b>213</b>	+156	<b>256</b>
+68	<b>125</b>	+78	<b>140</b>	+78	<b>140</b>	+88	<b>171</b>	+88	<b>171</b>	+100	<b>204</b>
	<b>68</b>		<b>78</b>		<b>78</b>		<b>88</b>		<b>88</b>		<b>100</b>
+131	<b>176</b>	+148	<b>198</b>	+148	<b>198</b>	+168	<b>243</b>	+168	<b>243</b>	+190	<b>290</b>
+68	<b>139</b>	+78	<b>158</b>	+78	<b>158</b>	+88	<b>199</b>	+88	<b>199</b>	+100	<b>227</b>
	<b>68</b>		<b>78</b>		<b>78</b>		<b>88</b>		<b>88</b>		<b>100</b>
+172	<b>217</b>	+194	<b>244</b>	+199	<b>249</b>	+225	<b>300</b>	+235	<b>310</b>	+266	<b>366</b>
+132	<b>189</b>	+150	<b>212</b>	+155	<b>217</b>	+175	<b>258</b>	+185	<b>268</b>	+210	<b>314</b>
	<b>132</b>		<b>150</b>		<b>155</b>		<b>175</b>		<b>185</b>		<b>210</b>
+195	<b>240</b>	+220	<b>270</b>	+225	<b>275</b>	+255	<b>330</b>	+265	<b>340</b>	+300	<b>400</b>
+132	<b>204</b>	+150	<b>230</b>	+155	<b>235</b>	+175	<b>278</b>	+185	<b>288</b>	+210	<b>337</b>
	<b>132</b>		<b>150</b>		<b>155</b>		<b>175</b>		<b>185</b>		<b>210</b>
0	13,5	0	14,5	0	14,5	0	16	0	16	0	18
-63		-70		-70		-80		-80		-90	
0	13,5	0	14,5	0	14,5	0	16	0	16	0	18
-97		-110		-110		-125		-125		-140	
0	20	0	22	0	22	0	25	0	25	0	28
-155		-175		-175		-200		-200		-230	



# Design of bearing arrangements

## Housing fits

Nominal housing bore diameter in mm										
over incl.	<b>6</b>		<b>10</b>		<b>18</b>		<b>30</b>		<b>50</b>	
	<b>10</b>		<b>18</b>		<b>30</b>		<b>50</b>		<b>80</b>	
Deviation of bearing outside diameter in $\mu\text{m}$ (normal tolerance)										
$\Delta_{\text{Dmp}}$	0		0		0		0		0	
	-8		-8		-9		-11		-13	
Housing deviation, fit interference or fit clearance in $\mu\text{m}$										
<b>E8</b>	+47	25	+59	32	+73	40	+89	50	+106	60
	+25	35	+32	44	+40	54	+50	67	+60	79
		55		67		82		100		119
<b>F7</b>	+28	13	+34	16	+41	20	+50	25	+60	30
	+13	21	+16	25	+20	30	+25	37	+30	44
		36		42		50		61		73
<b>G6</b>	+14	5	+17	6	+20	7	+25	9	+29	10
	+5	11	+6	12	+7	14	+9	18	+10	21
		22		25		29		36		42
<b>G7</b>	+20	5	+24	6	+28	7	+34	9	+40	10
	+5	13	+6	15	+7	17	+9	21	+10	24
		28		32		37		45		53
<b>H6</b>	+9	0	+11	0	+13	0	+16	0	+19	0
	0	6	0	6	0	7	0	9	0	11
		17		19		22		27		32
<b>H7</b>	+15	0	+18	0	+21	0	+25	0	+30	0
	0	8	0	9	0	10	0	12	0	14
		23		26		30		36		43
<b>H8</b>	+22	0	+27	0	+33	0	+39	0	+46	0
	0	10	0	12	0	14	0	17	0	20
		30		35		42		50		59
<b>J6</b>	+5	4	+6	5	+8	5	+10	6	+13	6
	-4	2	-5	1	-5	2	-6	3	-6	5
		13		14		17		21		26
<b>J7</b>	+8	7	+10	8	+12	9	+14	11	+18	12
	-7	1	-8	1	-9	1	-11	1	-12	2
		16		18		21		25		31
<b>JS6</b>	+4,5	4,5	+5,5	5,5	+6,5	6,5	+8	8	+9,5	9,5
	-4,5	2	-5,5	1	-6,5	0	-8	1	-9,5	0
		12,5		13,5		15,5		19		22,5
<b>JS7</b>	+7,5	7,5	+9	9	+10,5	10,5	+12,5	12,5	+15	15
	-7,5	1	-9	0	-10,5	1	-12,5	1	-15	1
		15,5		17		19,5		23,5		28
<b>K6</b>	+2	7	+2	9	+2	11	+3	13	+4	15
	-7	1	-9	3	-11	4	-13	4	-15	4
		10		10		11		14		17
<b>K7</b>	+5	10	+6	12	+6	15	+7	18	+9	21
	-10	2	-12	3	-15	5	-18	6	-21	7
		13		14		15		18		22

# Design of bearing arrangements

## Housing fits

Nominal housing bore diameter in mm								
over incl.	<b>80</b> <b>120</b>		<b>120</b> <b>150</b>		<b>150</b> <b>180</b>		<b>180</b> <b>250</b>	
Deviation of bearing outside diameter in $\mu\text{m}$ (normal tolerance)								
$\Delta_{\text{Dmp}}$	0 -15		0 -18		0 -25		0 -30	
Housing deviation, fit interference or fit clearance in $\mu\text{m}$								
<b>E8</b>	+126 +72	72 85 141	+148 +85	85 112 166	+148 +85	85 114 173	+172 +100	100 134 202
<b>F7</b>	+71 +36	36 53 86	+83 +43	43 62 101	+83 +43	43 64 108	+96 +50	50 75 126
<b>G6</b>	+34 +12	12 24 49	+39 +14	14 28 57	+39 +14	14 31 64	+44 +15	15 35 74
<b>G7</b>	+47 +12	12 29 62	+54 +14	14 33 72	+54 +14	14 36 79	+61 +15	15 40 91
<b>H6</b>	+22 0	<b>0</b> 12 37	+25 0	<b>0</b> 14 43	+25 0	<b>0</b> 17 50	+29 0	<b>0</b> 20 59
<b>H7</b>	+35 0	<b>0</b> 17 50	+40 0	<b>0</b> 19 58	+40 0	<b>0</b> 22 65	+46 0	<b>0</b> 25 76
<b>H8</b>	+54 0	<b>0</b> 23 69	+63 0	<b>0</b> 27 81	+63 0	<b>0</b> 29 88	+72 0	<b>0</b> 34 102
<b>J6</b>	+16 -6	<b>6</b> 6 31	+18 -7	<b>7</b> 7 36	+18 -7	<b>7</b> 10 43	+22 -7	<b>7</b> 13 52
<b>J7</b>	+22 -13	<b>13</b> 4 37	+26 -14	<b>14</b> 5 44	+26 -14	<b>14</b> 8 51	+30 -16	<b>16</b> 9 60
<b>JS6</b>	+11 -11	<b>11</b> 1 26	+12,5 -12,5	<b>12,5</b> 1 30,5	+12,5 -12,5	<b>12,5</b> 3 37,5	+14,5 -14,5	<b>14,5</b> 5 44,5
<b>JS7</b>	+17,5 -17,5	<b>17,5</b> 1 32,5	+20 -20	<b>20</b> 1 38	+20 -20	<b>20</b> 1 45	+23 -23	<b>23</b> 2 53
<b>K6</b>	+4 -18	<b>18</b> <b>6</b> 19	+4 -21	<b>21</b> <b>7</b> 22	+4 -21	<b>21</b> <b>4</b> 29	+5 -24	<b>24</b> <b>4</b> 35
<b>K7</b>	+10 -25	<b>25</b> <b>8</b> 25	+12 -28	<b>28</b> <b>9</b> 30	+12 -28	<b>28</b> <b>6</b> 37	+13 -33	<b>33</b> <b>8</b> 43

<b>250</b>		<b>315</b>		<b>400</b>		<b>500</b>		<b>630</b>		<b>800</b>		<b>1000</b>	
<b>315</b>		<b>400</b>		<b>500</b>		<b>630</b>		<b>800</b>		<b>1000</b>		<b>1250</b>	
0		0		0		0		0		0		0	
-35		-40		-45		-50		-75		-100		-125	
+191	110	+214	125	+232	135	+255	145	+285	160	+310	170	+360	195
+110	149	+125	168	+135	182	+145	199	+160	227	+170	250	+195	292
	226		254		277		305		360		410		485
+108	56	+119	62	+131	68	+146	76	+160	80	+176	86	+203	98
+56	85	+62	94	+68	104	+76	116	+80	132	+86	149	+98	175
	143		159		176		196		235		276		328
+49	17	+54	18	+60	20	+66	22	+74	24	+82	26	+94	28
+17	39	+18	43	+20	48	+22	54	+24	66	+26	78	+28	93
	84		94		105		116		149		182		219
+69	17	+75	18	+83	20	+92	22	+104	24	+116	26	+133	28
+17	46	+18	50	+20	56	+22	62	+24	76	+26	89	+28	105
	104		115		128		142		179		216		258
+32	0	+36	0	+40	0	+44	0	+50	0	+56	0	+66	0
	22		25		28		32		42		52		64
	67		76		85		94		125		156		191
+52	0	+57	0	+63	0	+70	0	+80	0	+90	0	+105	0
	29		32		36		40		52		63		77
	87		97		108		120		155		190		230
+81	0	+89	0	+97	0	+110	0	+125	0	+140	0	+165	0
	39		43		47		54		67		80		97
	116		129		142		160		200		240		290
+25	7	+29	7	+33	7	-	-	-	-	-	-	-	-
-7	15	-7	18	-7	21								
	60		69		78								
+36	16	+39	18	+43	20	-	-	-	-	-	-	-	-
-16	13	-18	14	-20	16								
	71		79		88								
+16	16	+18	18	+20	20	+22	22	+25	25	+28	28	+33	33
-16	7	-18	6	-20	8	-22	10	-25	17	-28	24	-33	31
	51		58		65		72		100		128		158
+26	26	+28,5	28,5	+31,5	31,5	+35	35	+40	40	+45	45	+52	52
-26	3	-28,5	3	-31,5	4	-35	5	-40	12	-45	18	-52	24
	61		68,5		76,5		85		115		145		177
+5	27	+7	29	+8	32	0	44	0	50	0	56	0	66
-27	5	-29	4	-32	4	-44	12	-50	8	-56	4	-66	2
	40		47		53		50		75		100		125
+16	36	+17	40	+18	45	0	70	0	80	0	90	0	105
-36	7	-40	8	-45	9	-70	30	-80	28	-90	27	-105	28
	51		57		63		50		75		100		125

# Design of bearing arrangements

## Housing fits

Nominal housing bore diameter in mm												
over	<b>6</b>	<b>10</b>	<b>18</b>	<b>30</b>	<b>50</b>	<b>80</b>						
incl.	<b>10</b>	<b>18</b>	<b>30</b>	<b>50</b>	<b>80</b>	<b>120</b>						
Deviation of bearing outside diameter in $\mu\text{m}$ (normal tolerance)												
$\Delta_{\text{Dmp}}$	0	0	0	0	0	0	0	0	0	0		
	-8	-8	-9	-11	-13	-15						
Housing deviation, fit interference or fit clearance in $\mu\text{m}$												
<b>M6</b>	-3 -12	<b>12</b> <b>6</b> 5	-4 -15	<b>15</b> <b>9</b> 4	-4 -17	<b>17</b> <b>10</b> 5	-4 -20	<b>20</b> <b>11</b> 7	-5 -24	<b>24</b> <b>13</b> 8	-6 -28	<b>28</b> <b>16</b> 9
<b>M7</b>	0 -15	<b>15</b> <b>7</b> 8	0 -18	<b>18</b> <b>9</b> 8	0 -21	<b>21</b> <b>11</b> 9	0 -25	<b>25</b> <b>13</b> 11	0 -30	<b>30</b> <b>16</b> 13	0 -35	<b>35</b> <b>18</b> 15
<b>N6</b>	-7 -16	<b>16</b> <b>10</b> 1	-9 -20	<b>20</b> <b>14</b> 1	-11 -24	<b>24</b> <b>17</b> 2	-12 -28	<b>28</b> <b>19</b> 1	-14 -33	<b>33</b> <b>22</b> 1	-16 -38	<b>38</b> <b>26</b> 1
<b>N7</b>	-4 -19	<b>19</b> <b>11</b> 4	-5 -23	<b>23</b> <b>14</b> 3	-7 -28	<b>28</b> <b>18</b> 2	-8 -33	<b>33</b> <b>21</b> 3	-9 -39	<b>39</b> <b>25</b> 4	-10 -45	<b>45</b> <b>28</b> 5
<b>P6</b>	-12 -21	<b>21</b> <b>15</b> 4	-15 -26	<b>26</b> <b>20</b> 7	-18 -31	<b>31</b> <b>24</b> 9	-21 -37	<b>37</b> <b>28</b> 10	-26 -45	<b>45</b> <b>34</b> 13	-30 -52	<b>52</b> <b>40</b> 15
<b>P7</b>	-9 -24	<b>24</b> <b>16</b> 1	-11 -29	<b>29</b> <b>20</b> 3	-14 -35	<b>35</b> <b>25</b> 5	-17 -42	<b>42</b> <b>30</b> 6	-21 -51	<b>51</b> <b>37</b> 8	-24 -59	<b>59</b> <b>42</b> 9

120 150		150 180		180 250		250 315		315 400		400 500		500 630		630 800		800 1000	
0 -18		0 -25		0 -30		0 -35		0 -40		0 -45		0 -50		0 -75		0 -100	
-8 -33	<b>33</b> <b>19</b> 10	-8 -33	<b>33</b> <b>16</b> 17	-8 -37	<b>37</b> <b>17</b> 22	-9 -41	<b>41</b> <b>19</b> 26	-10 -46	<b>46</b> <b>21</b> 30	-10 -50	<b>50</b> <b>22</b> 35	-26 -70	<b>70</b> <b>38</b> 24	-30 -80	<b>80</b> <b>38</b> 45	-34 -90	<b>90</b> <b>38</b> 66
0 -40	<b>40</b> <b>21</b> 18	0 -40	<b>40</b> <b>18</b> 25	0 -46	<b>46</b> <b>21</b> 30	0 -52	<b>52</b> <b>23</b> 35	0 -57	<b>57</b> <b>25</b> 40	0 -63	<b>63</b> <b>27</b> 45	-26 -96	<b>96</b> <b>56</b> 24	-30 -110	<b>110</b> <b>58</b> 45	-34 -124	<b>124</b> <b>61</b> 66
-20 -45	<b>45</b> <b>31</b> 2	-20 -45	<b>45</b> <b>28</b> 5	-22 -51	<b>51</b> <b>31</b> 8	-25 -57	<b>57</b> <b>35</b> 10	-26 -62	<b>62</b> <b>37</b> 14	-27 -67	<b>67</b> <b>39</b> 18	-44 -88	<b>88</b> <b>56</b> 6	-50 -100	<b>100</b> <b>58</b> 25	-56 -112	<b>112</b> <b>60</b> 44
-12 -52	<b>52</b> <b>33</b> 6	-12 -52	<b>52</b> <b>30</b> 13	-14 -60	<b>60</b> <b>35</b> 16	-14 -66	<b>66</b> <b>37</b> 21	-16 -73	<b>73</b> <b>41</b> 24	-17 -80	<b>80</b> <b>44</b> 28	-44 -114	<b>114</b> <b>74</b> 6	-50 -130	<b>130</b> <b>78</b> 25	-56 -146	<b>146</b> <b>83</b> 44
-36 -61	<b>61</b> <b>47</b> 18	-36 -61	<b>61</b> <b>44</b> 11	-41 -70	<b>70</b> <b>50</b> 11	-47 -79	<b>79</b> <b>57</b> 12	-51 -87	<b>87</b> <b>62</b> 11	-55 -95	<b>95</b> <b>67</b> 10	-78 -122	<b>122</b> <b>90</b> 28	-88 -138	<b>138</b> <b>96</b> 13	-100 -156	<b>156</b> <b>104</b> 0
-28 -68	<b>68</b> <b>49</b> 10	-28 -68	<b>68</b> <b>46</b> 3	-33 -79	<b>79</b> <b>54</b> 3	-36 -88	<b>88</b> <b>59</b> 1	-41 -98	<b>98</b> <b>66</b> 1	-45 -108	<b>108</b> <b>72</b> 0	-78 -148	<b>148</b> <b>108</b> 28	-88 -168	<b>168</b> <b>126</b> 13	-100 -190	<b>190</b> <b>127</b> 0

### Housing fits

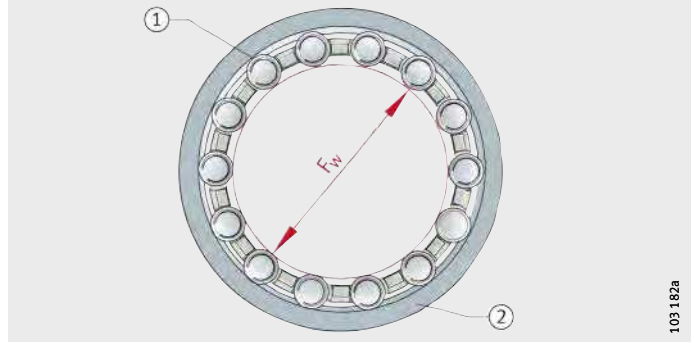
Nominal housing bore diameter in mm		
over	<b>1000</b>	
incl.	<b>1250</b>	
Deviation of bearing outside diameter in $\mu\text{m}$ (normal tolerance)		
$\Delta_{\text{Dmp}}$	0	
	-125	
Housing deviation, fit interference or fit clearance in $\mu\text{m}$		
<b>M6</b>	-40 -106	<b>106</b> <b>45</b> 85
<b>M7</b>	-40 -145	<b>145</b> <b>68</b> 85
<b>N6</b>	-66 -132	<b>132</b> <b>67</b> 59
<b>N7</b>	-66 -171	<b>171</b> <b>94</b> 59
<b>P6</b>	-120 -186	<b>186</b> <b>121</b> 5
<b>P7</b>	-120 -225	<b>225</b> <b>148</b> 5

# Design of bearing arrangements

## Enveloping circle

For bearings without an inner ring, the enveloping circle  $F_w$  is used. This is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway, *Figure 15*. The enveloping circle for unfitted bearings is in the tolerance zone F6 (except for drawn cup needle roller bearings). Deviations for F6 and F8, see table.

- ① Needle roller
  - ② Outer raceway
- $F_w$  = enveloping circle diameter



*Figure 15*  
Enveloping circle

## Deviations for the enveloping circle diameter

Enveloping circle diameter $F_w$ mm		Tolerance zone F6		Tolerance zone F8	
		Tolerance for enveloping circle diameter $F_w$		Tolerance for enveloping circle diameter $F_w$	
over	incl.	Upper deviation $\mu\text{m}$	Lower deviation $\mu\text{m}$	Upper deviation $\mu\text{m}$	Lower deviation $\mu\text{m}$
3	6	+18	+10	+28	+10
6	10	+22	+13	+35	+13
10	18	+27	+16	+43	+16
18	30	+33	+20	+53	+20
30	50	+41	+25	+64	+25
50	80	+49	+30	+76	+30
80	120	+58	+36	+90	+36
120	180	+68	+43	+106	+43
180	250	+79	+50	+122	+50
250	315	+88	+56	+137	+56
315	400	+98	+62	+151	+62
400	500	+108	+68	+165	+68

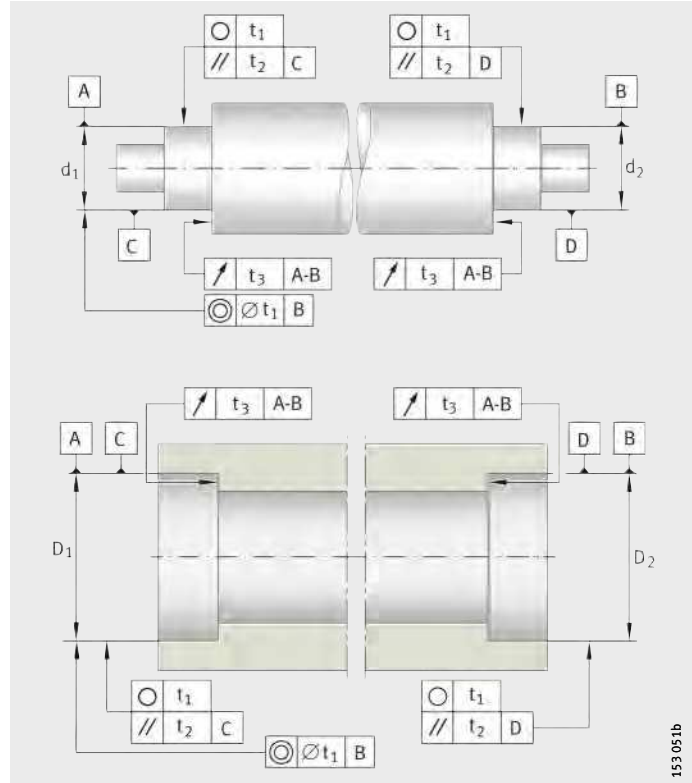


## Geometrical tolerances of bearing seating surfaces

In order to achieve the required fit, the bearing seats and fit surfaces of the shaft and housing bore must conform to certain tolerances, *Figure 16* and table, page 170.

$t_1$  = roundness  
 $t_2$  = parallelism  
 $t_3$  = axial runout of abutment shoulders

*Figure 16*  
 Geometrical tolerances



## Accuracy of bearing seating surfaces

The degree of accuracy for the bearing seat tolerances on the shaft and in the housing is given in the tables, page 170, and the ISO fundamental tolerances (ISO 286-1:1988).

### Second bearing seat

The tolerances for a second bearing seat on the shaft ( $d_2$ ) or in the housing ( $D_2$ ) (expressed in terms of coaxiality to DIN ISO 1101) must be based on the angular adjustment facility of the specific bearing. Misalignments due to elastic deformation of the shaft and housing must be taken into consideration.

### Housings

In split housings, the joints must be free from burrs.

The accuracy of the bearing seats is determined as a function of the accuracy of the bearing selected.

# Design of bearing arrangements

## Geometrical tolerances of bearing seating surfaces

Bearing tolerance class	Bearing seating surface	Diameter tolerance	Roundness tolerance	Parallelism tolerance	Abutment shoulder runout tolerance
			$t_1$	$t_2$	$t_3$
PN P6X	Shaft	IT6 (IT5)	Circumferential load IT4/2	IT4	IT4
			Point load IT5/2	IT5	
	Housing	IT7 (IT6)	Circumferential load IT5/2	IT5	IT5
			Point load IT6/2	IT6	
P5	Shaft	IT5	Circumferential load IT2/2	IT2	IT2
			Point load IT3/2	IT3	
	Housing	IT6	Circumferential load IT3/2	IT3	IT3
			Point load IT4/2	IT4	
P4 P4S SP	Shaft	IT4	Circumferential load IT1/2	IT1	IT1
			Point load IT2/2	IT2	
	Housing	IT5	Circumferential load IT2/2	IT2	IT2
			Point load IT3/2	IT3	
UP	Shaft	IT3	Circumferential load IT0/2	IT0	IT0
			Point load IT1/2	IT1	
	Housing	IT4	Circumferential load IT1/2	IT1	IT1
			Point load IT2/2	IT2	

ISO fundamental tolerances (IT grades) to ISO 286-1:1988: see table, page 172.

### Roughness of bearing seats

The roughness of the bearing seats must be matched to the tolerance class of the bearings. The mean roughness value  $R_a$  must not be too high, in order to maintain the interference loss within limits.

Shafts should be ground and bores should be precision turned.

Guide values: see table.

The bore and shaft tolerances and permissible roughness values are also given in the design and safety guidelines in the product sections. The guide values for roughness correspond to DIN 5 425-1.

### Guide values for roughness of bearing seating surfaces

Diameter of bearing seat d (D) mm		Recommended mean roughness value $R_a$ and roughness classes for ground bearing seats Diameter tolerance corresponding to <sup>2)</sup> $\mu\text{m}$			
over	incl.	IT7	IT6	IT5	IT4
–	80	1,6 (N7)	0,8 (N6)	0,4 (N5)	0,2 (N4)
80	500	1,6 (N7)	1,6 (N7)	0,8 (N6)	0,4 (N5)
500	1 250	3,2 (N8) <sup>1)</sup>	1,6 (N7)	1,6 (N7)	0,8 (N6)

<sup>1)</sup> When fitting using the hydraulic method  $R_a = 1,6 \mu\text{m}$  should not be exceeded.

<sup>2)</sup> The values in brackets are roughness classes to DIN ISO 1302.

# Design of bearing arrangements

## Values for IT grades

The table shows numerical values for the ISO fundamental tolerances (IT grades) to ISO 286-1:1988.

### IT grades and values

Nominal dimension in mm						
over	1	3	6	10	18	30
incl.	3	6	10	18	30	50
Values in $\mu\text{m}$						
<b>IT0</b>	0,5	0,6	0,6	0,8	1	1
<b>IT1</b>	0,8	1	1	1,2	1,5	1,5
<b>IT2</b>	1,2	1,5	1,5	2	2,5	2,5
<b>IT3</b>	2	2,5	2,5	3	4	4
<b>IT4</b>	3	4	4	5	6	7
<b>IT5</b>	4	5	6	8	9	11
<b>IT6</b>	6	8	9	11	13	16
<b>IT7</b>	10	12	15	18	21	25
<b>IT8</b>	14	18	22	27	33	39
<b>IT9</b>	25	30	36	43	52	62
<b>IT10</b>	40	48	58	70	84	100
<b>IT11</b>	60	75	90	110	130	160
<b>IT12</b>	100	120	150	180	210	250

<b>50</b>	<b>80</b>	<b>120</b>	<b>180</b>	<b>250</b>	<b>315</b>	<b>400</b>	<b>500</b>	<b>630</b>	<b>800</b>	<b>1 000</b>
<b>80</b>	<b>120</b>	<b>180</b>	<b>250</b>	<b>315</b>	<b>400</b>	<b>500</b>	<b>630</b>	<b>800</b>	<b>1 000</b>	<b>1 250</b>
1,2	1,5	2	3	4	5	6	-	-	-	-
2	2,5	3,5	4,5	6	7	8	-	-	-	-
3	4	5	7	8	9	10	-	-	-	-
5	6	8	10	12	13	15	-	-	-	-
8	10	12	14	16	18	20	-	-	-	-
13	15	18	20	23	25	27	29	32	36	42
19	22	25	29	32	36	40	44	50	56	66
30	35	40	46	52	57	63	70	80	90	105
46	54	63	72	81	89	97	110	125	140	165
74	87	100	115	130	140	155	175	200	230	260
120	140	160	185	210	230	250	280	320	360	420
190	220	250	290	320	360	400	440	500	560	660
300	350	400	460	520	570	630	700	800	900	1 050

# Mecanizado y ejecución de los apoyos

## Pistas de rodadura para rodamientos sin anillos



En rodamientos sin anillos interior y/o exterior, los elementos rodantes se apoyan directamente sobre el eje o en el agujero del alojamiento.

¡Construir el eje y el agujero del alojamiento como pistas de rodadura de rodamientos!

¡Las pistas de rodadura deben estar siempre libres de ondulaciones y mecanizarse con precisión (rectificar y pulir)!

¡Para una rugosidad media  $R_a > 0,2 \mu\text{m}$  la capacidad de carga de los rodamientos no se puede aprovechar completamente!

¡Tener en cuenta las indicaciones adicionales respecto a la ejecución del eje en los capítulos de producto!

¡Las tolerancias de los diámetros del eje y del alojamiento determinan el juego del rodamiento!

## Materiales para las pistas de rodadura Aceros de gran dureza másica

Como materiales para las pistas de rodadura, en caso de rodaduras directas, son adecuados los aceros de gran dureza másica, según ISO 683-17 (como 100Cr6). Estos aceros pueden ser templados también solamente en la capa superficial.

### Aceros de cementación

También pueden templarse superficialmente los aceros de cementación ISO 683-17 (como 17MnCr5, 16CrNiMo6) o EN 10 084 (como 16MnCr5).

### Temple a la llama o por inducción

Para el temple a la llama o por inducción, se emplean los aceros según ISO 683-17 (como Cf54, 43CrMo4) o DIN 17 212 (como Cf53).

### Dureza superficial y profundidad de temple

Los valores son válidos para pistas de rodadura, arandelas de tope y resaltes en el eje. En la utilización de aceros de cementación y de temple a la llama o por inducción, debe garantizarse una dureza superficial de 670 HV + 170 HV y una profundidad de cementación CHD o SHD suficiente.

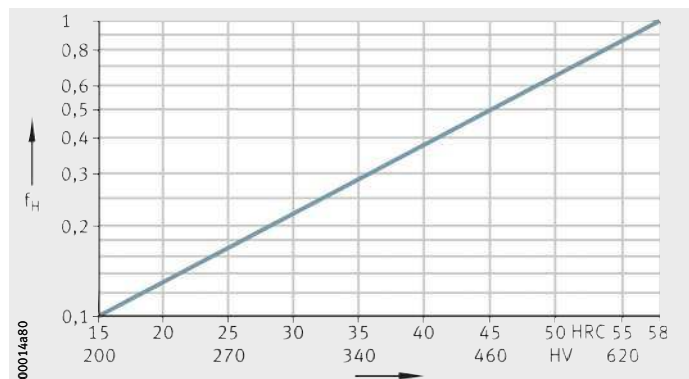
Según DIN 50 190 la profundidad de temple es la profundidad de la zona superficial templada, que todavía presenta una dureza de 550 HV. Se mide en la superficie rectificada y acabada y debe ser conforme a los valores indicados, pero en todo caso  $\geq 0,3 \text{ mm}$ .



¡Si las pistas de rodadura son más blandas que 650 HV (58 HRC), la rodadura no alcanza su plena capacidad de carga! ¡En este caso, las capacidades de carga dinámica  $C_r$  y estática  $C_{0r}$  se deben reducir por el factor  $f_H$ , figura 17!

$f_H$  = factor para tener en cuenta la dureza de la pista de rodadura  
HRC, HV = dureza superficial

Figura 17  
Factores para tener en cuenta la dureza de la pista de rodadura



**Hardness curves**

The hardness curves are shown schematically, see *Figure 18* and *Figure 19*. The required hardness curve is derived from the strain on the material.

The formulae are based on hardness curves achieved with normal specialist heat treatment.

Case hardening:

$$CHD \geq 0,078 \cdot D_w$$

Flame or induction hardening:

$$SHD \geq 140 \cdot D_w / R_{p0,2}$$

CHD mm  
Case hardening depth

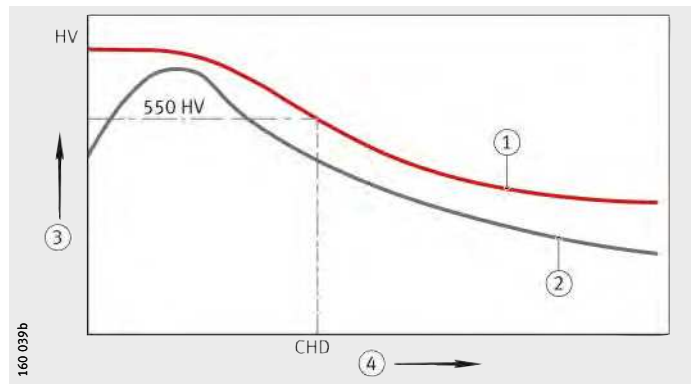
SHD mm  
Surface hardening depth

$D_w$  mm  
Rolling element diameter

$R_{p0,2}$  N/mm<sup>2</sup>  
Proof stress.

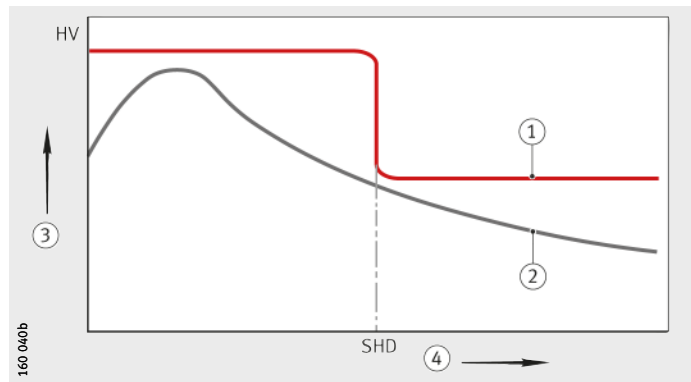
- ① Case hardening
  - ② Required hardness
  - ③ Hardness
  - ④ Distance from surface
- CHD = case hardening depth with hardness 550 HV

*Figure 18*  
Case hardening depth CHD and hardness curve



- ① Flame or induction hardening
  - ② Required hardness
  - ③ Hardness
  - ④ Distance from surface
- SHD = surface hardening depth

*Figure 19*  
Surface hardening depth SHD and hardness curve



# Design of bearing arrangements

## Axial location of bearings

Axial location of the bearing rings is matched to the specific bearing arrangement (locating bearing, non-locating bearing, adjusted and floating arrangements of bearings).

Examples: see *Figure 20*, page 177 to *Figure 30*, page 180.

## Design guidelines



The bearing rings must be located by force locking or geometrical locking in order to prevent lateral movement. The bearing rings must only be in contact with the shaft or housing shoulder, but not with the fillet.

Every radius of the mating part must be smaller than the smallest chamfer dimension  $r$  or  $r_1$  of the bearing.

The radius should have rounding to DIN 5 418 or an undercut to DIN 509.

The shoulders on the mating parts must be large enough to provide a sufficiently wide contact surface even with the largest chamfer dimension of the bearing (DIN 5 418).

The bearing tables give the maximum values for the radius  $r_a$  or  $r_{a1}$  and the diameter of the abutment shoulders ( $D_a$  or  $d_a$ ).

Any special characteristics of the individual bearing types, e.g. for needle roller bearings, cylindrical roller bearings, tapered roller bearings and axial bearings, are indicated in the product sections.

### Locating bearings

Locating bearings can support axial forces. The retaining element must be matched to these axial forces. Shoulders on the shaft and housing, snap rings, housing cover, shaft covers, nuts and spacer rings are suitable.

### Non-locating bearings

Non-locating bearings only need to support slight axial forces occurring in thermal expansion. The means of axial location only needs to prevent creep of the rings. A tight fit is often sufficient.

### Self-retaining bearings

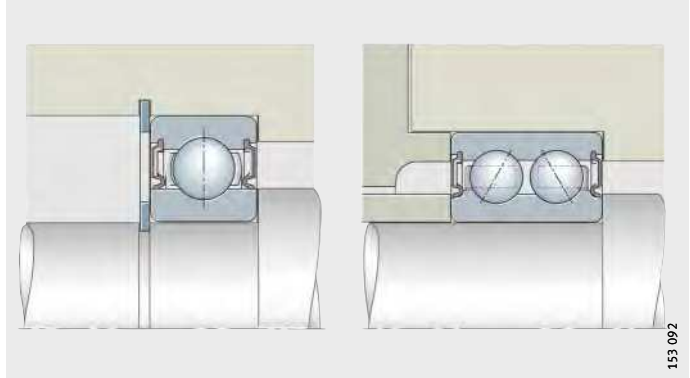
In non-separable bearings, one bearing ring requires a tight fit, the other ring is retained by the rolling elements.



**Deep groove ball bearings,  
double row angular contact  
ball bearings**

Support on both sides,  
inner and outer sides

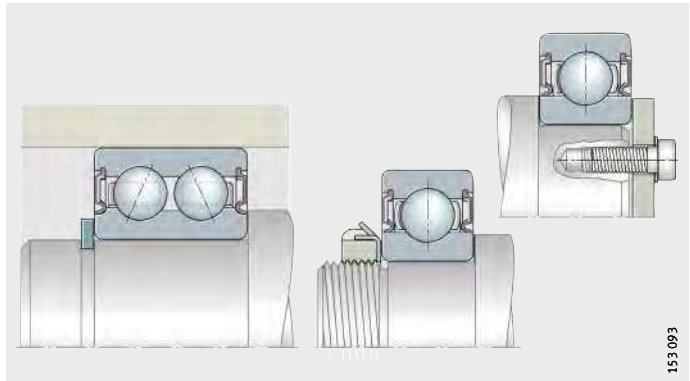
*Figure 20*  
Locating bearings



153 092

Support on both sides,  
inner side

*Figure 21*  
Non-locating bearings



153 093

**Cylindrical roller bearings**

The bearing rings must be supported on both the inner and outer sides, *Figure 22 to Figure 24*, page 178.

The ribs of axially loaded cylindrical roller bearings must be supported up to dimension  $d_1$  and  $D_1$ .

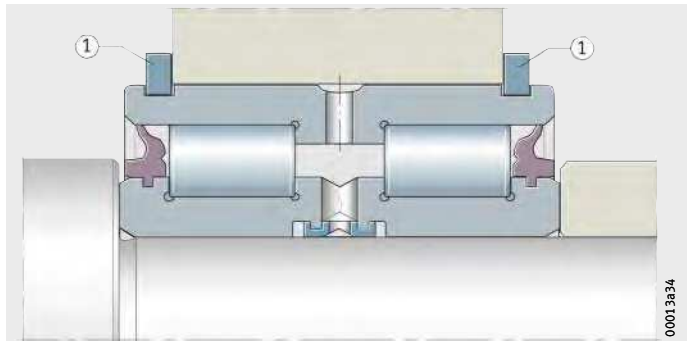
Dimensions  $d_1$ ,  $D_1$ : see dimension tables.

For semi-locating bearings, the bearing rib only requires support on one side, on the rib supporting the axial load.

Outer ring axially located by retaining rings

① Retaining rings

*Figure 22*  
Locating bearing



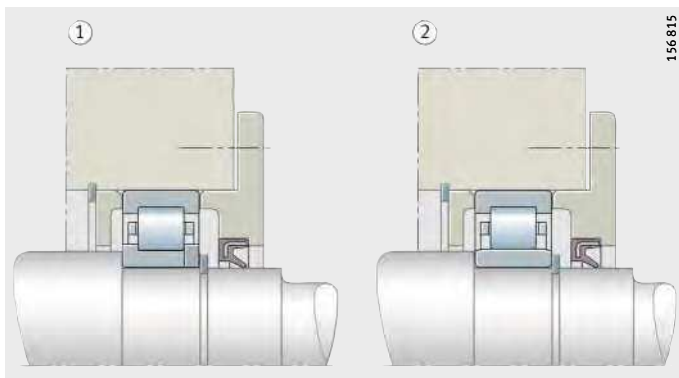
00013a34

# Design of bearing arrangements

Axial location by geometrical locking

- ① Locating bearing
- ② Non-locating bearing

*Figure 23*  
Locating and non-locating bearings



The inner ring rib prevents axial creep to one side

*Figure 24*  
Non-locating bearing

## Needle roller and cage assemblies



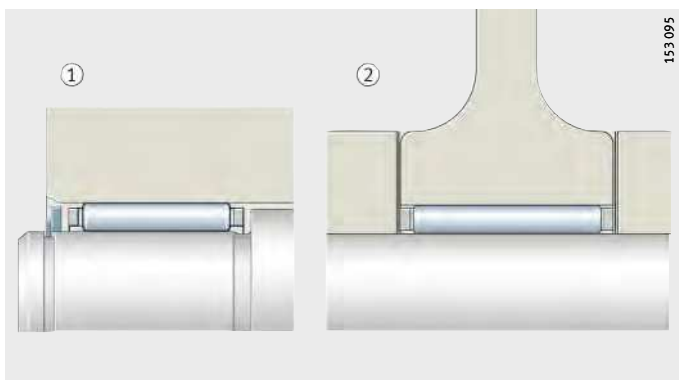
The axial running surfaces should be precision machined ( $R_a2$ ) and wear resistant.

A washer should be fitted to provide a smooth running surface for retaining rings and snap rings, *Figure 25*.

Sufficient interference must be ensured between the snap ring and washer.

- ① Axial location by snap ring and washer
- ② Axial location by adjacent construction

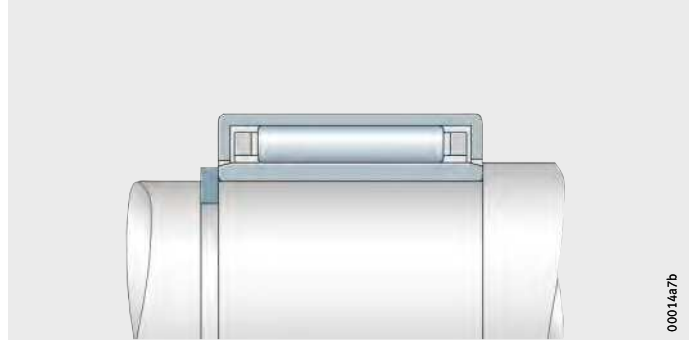
*Figure 25*  
Non-locating bearings



**Drawn cup needle roller bearings,  
needle roller bearings without ribs,  
needle roller bearings  
without inner ring**

Location is achieved by a snap ring and abutment shoulder, *Figure 26* and *Figure 27*. Sufficient interference must be ensured between the snap ring and the end face of the inner ring.

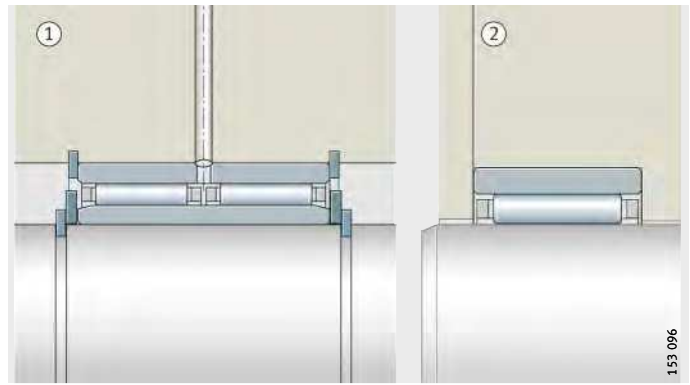
Drawn cup needle roller bearing  
Axial location by snap ring  
and shaft shoulder



00014a7b

*Figure 26*  
Non-locating bearing

Needle roller bearing  
① Axial location by snap rings  
② Axial location by abutment shoulder



153 096

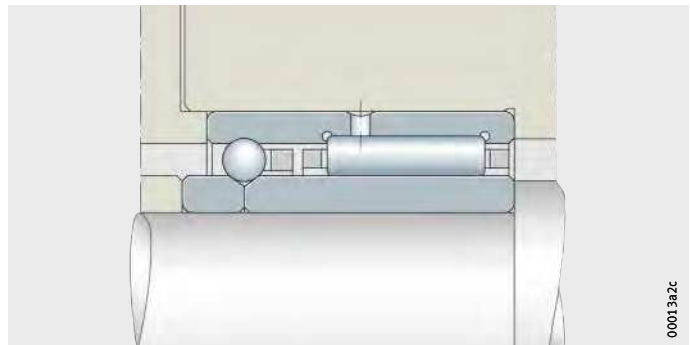
*Figure 27*  
Axial location of  
needle roller bearings

**Combined needle roller bearings**



Axial support of bearing rings on both sides is particularly important for locating bearings and bearings with split inner ring or split outer ring, *Figure 28*.

Needle roller/angular contact ball bearing  
Axial support of bearing rings on both sides



00013a2c

*Figure 28*  
Locating bearing

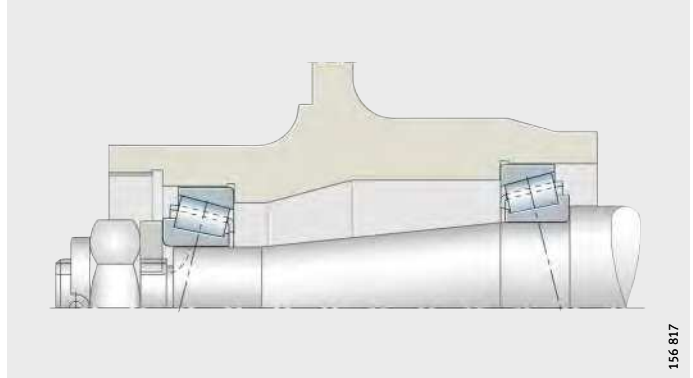
# Design of bearing arrangements

## Adjusted and floating bearing arrangements

Since bearings in adjusted and floating arrangements support axial forces in one direction only, the bearing rings only need to be supported on one side. Counterguidance is performed by a second, symmetrically arranged bearing, *Figure 29* and *Figure 30*. Shaft nuts, ring nuts, covers or spacer washers are suitable as adjustment elements.

In floating bearing arrangements, lateral movement of the rings is prevented by shaft or housing shoulders, covers, snap rings, *Figure 30*.

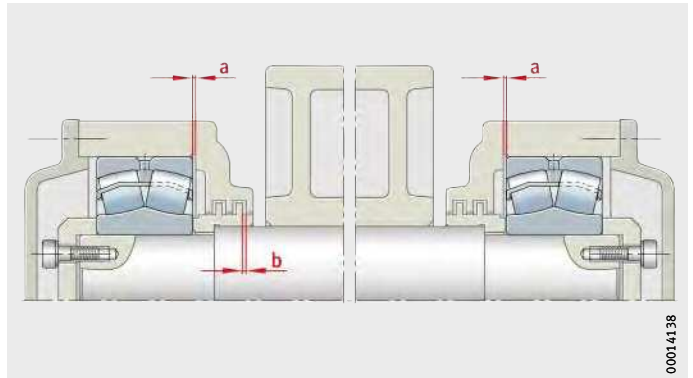
Axial location



*Figure 29*  
Adjusted bearing arrangement

Axial location

$a$  = guidance clearance;  
 $a < b$  ( $b$  = axial labyrinth gap)



*Figure 30*  
Floating bearing arrangement

**Seals** The sealing arrangement has a considerable influence on the operating life of a bearing arrangement. It is intended to retain the lubricant in the bearing and prevent the ingress of contaminants into the bearing.

Contaminants may have various effects:

- a large number of very small, abrasive particles causes wear in the bearing. The increase in clearance or noise bring the operating life of the bearing to an end
- large, overrolled hard particles reduce the fatigue life since pittings occur at the indentation points under high bearing loads.

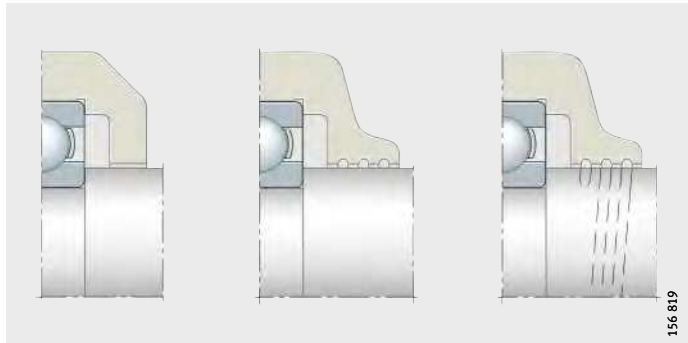
A basic distinction is made between contact and non-contact seals in the adjacent construction and in the bearing.

### Non-contact seals in the adjacent construction

With non-contact seals, only lubricant friction occurs in the lubricant gap. The seals do not undergo wear and remain capable of operation for a long period. Since they generate no heat, non-contact seals are also suitable for very high speeds.

### Gap seals

A simple design, although adequate in many cases, is a narrow seal gap between the shaft and housing, *Figure 31*.



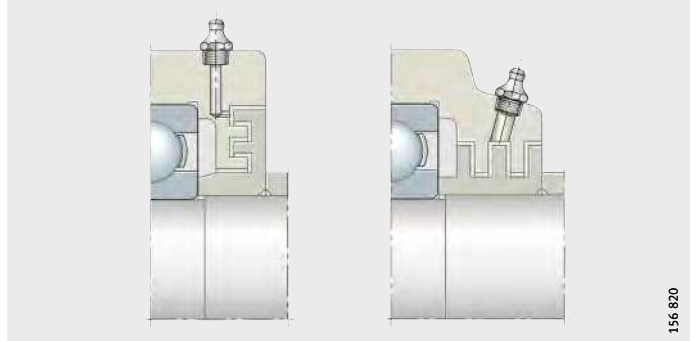
*Figure 31*  
Simple gap seals

# Design of bearing arrangements

## Labyrinth seals

A considerably greater sealing effect than with gap seals is achieved by labyrinths incorporating gaps filled with grease, *Figure 32*.

In contaminated environments, grease should be pressed from the interior into the seal gap at short intervals.

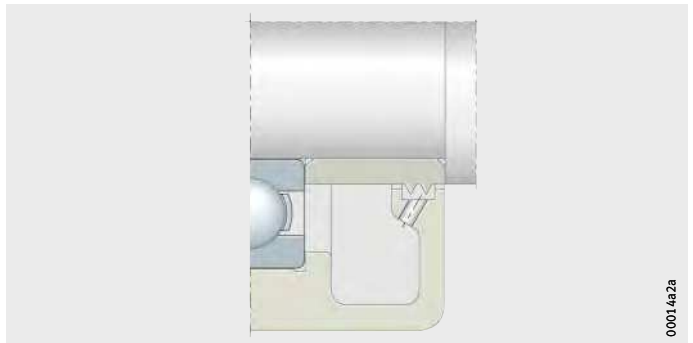


*Figure 32*  
Labyrinth seals

## Splash ring

Where oil lubrication is used with a horizontal shaft, splash rings are suitable for preventing the escape of oil, *Figure 33*.

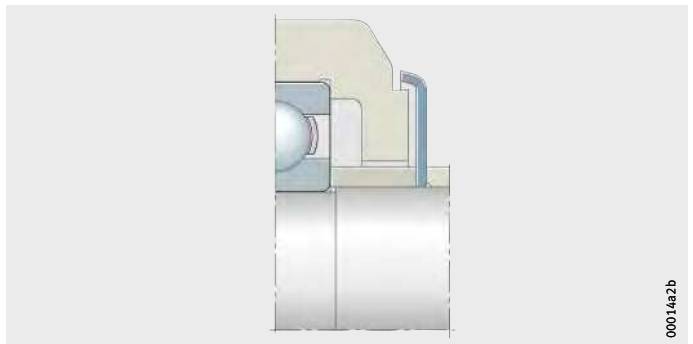
The oil outlet hole on the underside of the seal location must be sufficiently large that it cannot be clogged by contamination.



*Figure 33*  
Splash ring

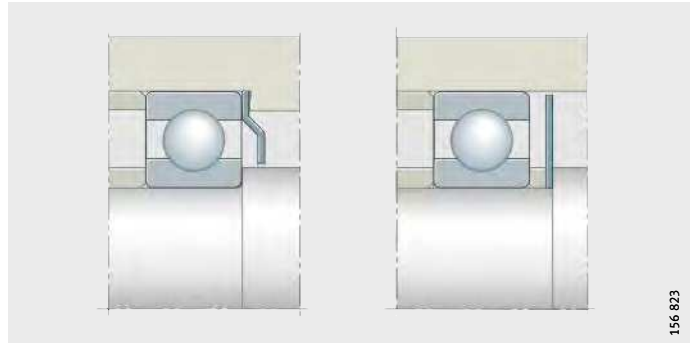
## Flinger shields

Co-rotating flinger shields have the effect of shielding the seal gap from heavy contamination, *Figure 34*.



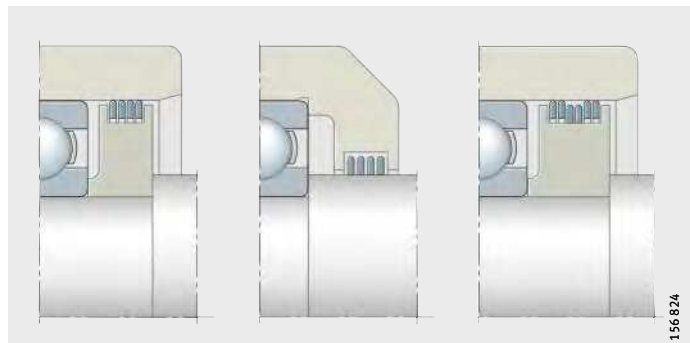
*Figure 34*  
Flinger shield

**Baffle plates** Stationary (rigid) baffle plates ensure that grease remains in the area around the bearing, *Figure 35*. The grease collar that forms at the seal gap protects the bearing against contamination.



*Figure 35*  
Rigid baffle plates

**Lamellar rings** Lamellar rings made from steel and radially sprung either outwards or inwards require little mounting space, *Figure 36*. They give protection against loss of grease and ingress of contamination and are also used as an outer seal against spray water.



*Figure 36*  
Lamellar rings

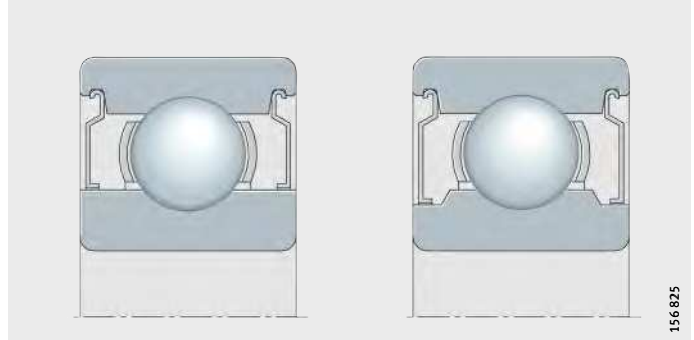
# Design of bearing arrangements

## Non-contact seals in the bearing

### Sealing shields in the bearing

Sealing shields are compact sealing elements fitted on one or both sides of the bearing, *Figure 37*.

Bearings with sealing shields on both sides are supplied with a grease filling.

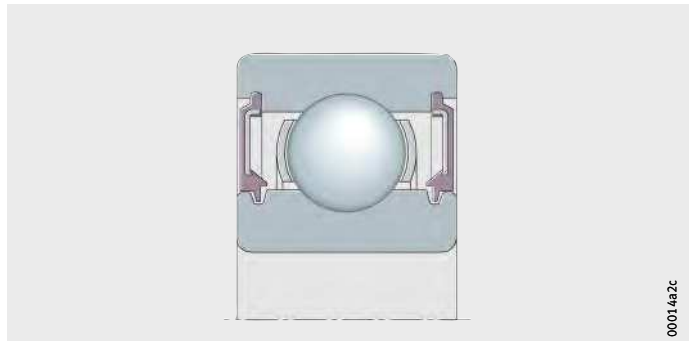


*Figure 37*  
Sealing shields

### BRS seals

The friction in this case is as low as that in bearings with sealing shields. They have the advantage over these, however, that the outer elastic rim gives good sealing when fitted in the slot in the outer ring. This is important with a rotating outer ring since the base oil is separated from the soap suspension by centrifugal force and would escape through the unsealed metallic seat in the outer ring if sealing shields were fitted.

Bearings with BRS seals are supplied by agreement only, *Figure 38*.



*Figure 38*  
BRS seals



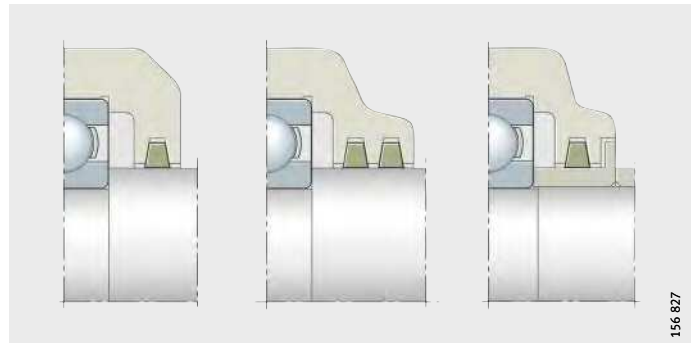
## Contact seals in the adjacent construction

Contact seals are normally in contact with the running surface under radial contact force. The contact force should be kept small to avoid an excessive increase in frictional torque and temperature.

The frictional torque and temperature as well as the wear of the seal are also affected by the lubrication condition at the running surface, its roughness and the sliding speed.

### With grease lubrication

Felt rings and felt strips are sealing elements that have proved very effective with grease lubrication, *Figure 39*. They are impregnated with oil before fitting and give particularly good sealing against dust. In unfavourable environmental conditions, two felt rings are arranged adjacent to each other. Felt rings and annular slots are standardised according to DIN 5 419.

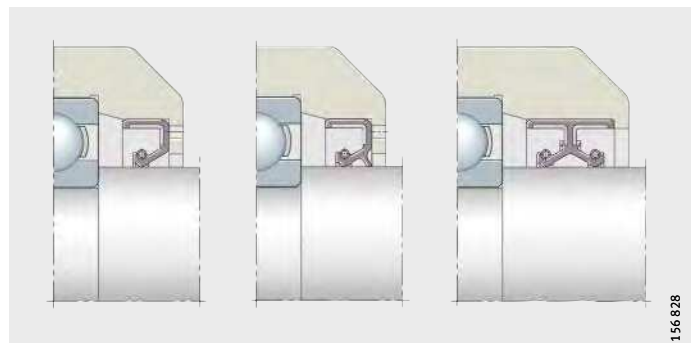


*Figure 39*  
Felt rings or felt strips

### With oil lubrication

If oil lubrication is used, sealing is primarily carried out with rotary shaft seals to DIN 3 760 and DIN 3 761, *Figure 40*. The seal collar with one lip is pressed against the shaft running surface by a spring.

If the principal objective is to prevent escape of lubricant, the lip is arranged on the inner side of the bearing arrangement. A sealing ring with an additional protective lip also prevents the ingress of contamination. Seal lips made from nitrile butadiene rubber (NBR) are suitable with oil lubrication for circumferential speeds up to 12 m/s.



*Figure 40*  
Rotary shaft seals

## Design of bearing arrangements

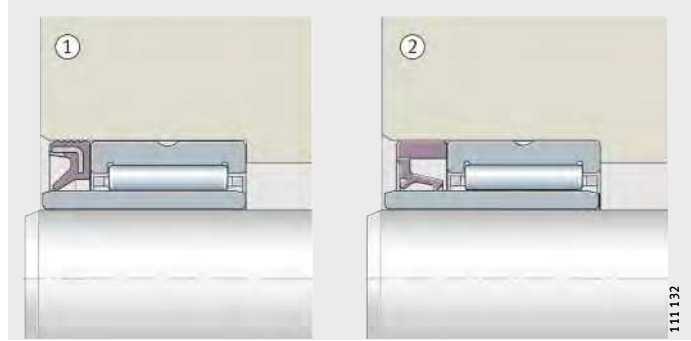
### INA sealing rings for needle roller bearings

These compact sealing rings are matched to INA needle roller bearings and are suitable for circumferential speeds at the running surface of up to 10 m/s, *Figure 41*.

INA inner rings are recommended as sealing ring raceways.

- ① INA sealing ring G
- ② INA sealing ring SD

*Figure 41*  
INA sealing rings for needle roller bearings



### Lip seal with axial sealing action

The V ring is a lip seal with axial sealing action, *Figure 42*.

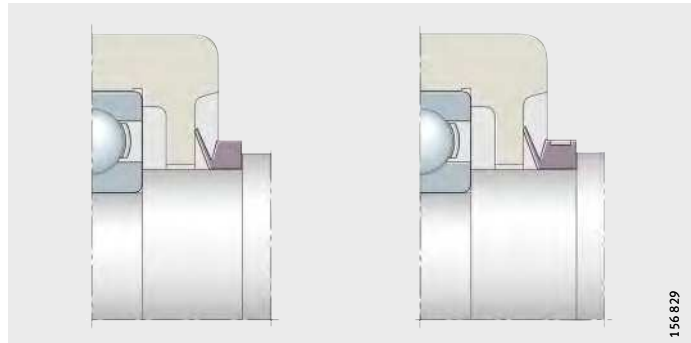
During fitting, this single piece rubber ring is pushed under tension along the shaft until its lip is in axial contact with the housing wall. The seal lip acts simultaneously as a flinger shield.

Axial lip seals are unaffected by radial misalignment and slight skewing of the shaft.

Rotating V rings are suitable with grease lubrication for circumferential speeds up to 12 m/s, stationary V rings up to 20 m/s. For circumferential speeds over 8 m/s, the V ring must be axially abutted and, from 12 m/s, it must be radially clamped in addition.

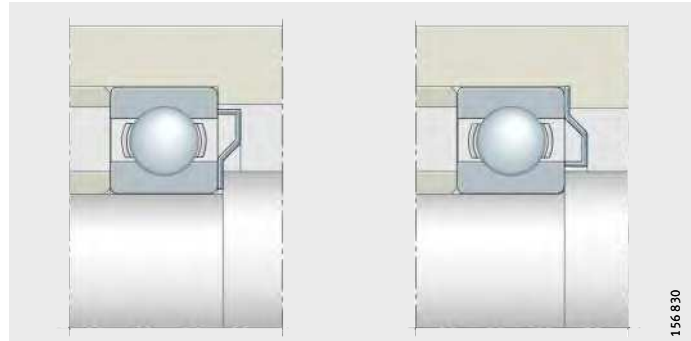
V rings are frequently used as outer seals in order to keep contamination away from a rotary shaft seal.

*Figure 42*  
V ring



### Axial spring seals

When using grease lubrication, effective sealing can also be achieved by means of axial spring seals, *Figure 43*. The thin sheet metal washers are clamped to the end face of the inner ring or outer ring and are axially sprung against the other bearing ring.



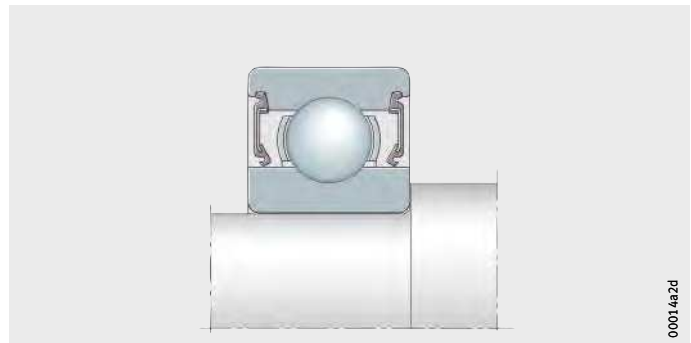
*Figure 43*  
Spring seals

### Contact seals in the bearing Sealing washers

Bearings fitted with one or two sealing washers allow simple designs, *Figure 44*. The washers are suitable for giving protection against dust, contamination, damp atmospheres and slight pressure differentials.

Sealing washers are used, for example, in maintenance-free bearings with grease filling.

The sealing washer design RSR made from acrylonitrile butadiene rubber (NBR), normally used in deep groove ball bearings, is located under slight radial contact pressure against a cylindrically ground inner ring rib.



Sealing washers 2RSR

*Figure 44*  
Sealing washers on both sides

# Fitting and dismantling

## Handling

Rolling bearings, rolling bearing parts and Arcanol rolling bearing greases are high quality goods and thus require careful handling.

## Storage of rolling bearings

The performance capability of modern rolling bearings lies at the boundaries of what is technically feasible. The materials, dimensional and geometrical tolerances, surface quality and lubrication have been optimised for maximum levels of function, which means that even slight deviations in functional areas, such as those caused by corrosion, can impair the performance capacity.

In order to realise the full performance capability of rolling bearings, it is essential to match the anti-corrosion protection, packaging, storage and handling to each other.

The anti-corrosion protection and packaging are a constituent part of the bearing and are thus optimised so that they preserve all characteristics of the product at the same time as far as possible. In addition to protecting the surface against corrosion, this includes emergency running lubrication, friction, lubricant compatibility, noise behaviour, resistance to ageing and compatibility with rolling bearing components (cage and seal material).

## Storage conditions for rolling bearings



As a basic prerequisite, parts must be stored in a closed storage area which cannot be affected by any aggressive media, such as exhaust gases from vehicles or gases, mist or aerosols of acids, lyes or salts. Direct sunlight should be avoided since, apart from the harmful effects of UV radiation, it can lead to wide temperature fluctuations in the packaging. The temperature should be constant and air humidity should be as low as possible. Jumps in temperature and increased humidity lead to condensation.

The following conditions must be fulfilled:

- frost-free storage, i. e. at a temperature  $> +5\text{ °C}$   
(to prevent formation of white frost, a limit of  $+2\text{ °C}$  is permissible for a maximum of 12 hours per day)
- maximum temperature  $+40\text{ °C}$   
(to prevent excessive drainage of anti-corrosion oils)
- relative humidity  $< 65\%$   
(if changes in temperature occur, a limit of  $70\text{ °C}$  is permissible up to 12 hours per day).

The temperature and humidity must be continuously monitored. This can be carried out using a datalogger. The measurements must be taken at intervals of no more than 2 hours.

At least 2 measurement points must be selected: the highest point and the lowest point in the vicinity of an external wall at which the goods can be stored.

**Storage periods for rolling bearings**

Rolling bearings should not be stored for longer than 3 years. This applies both to open and to greased bearings with sealing shields or washers. In particular, specifically greased rolling bearings should not be stored for too long, since the chemical-physical behaviour of greases may change during storage. Even if the minimum performance capacity remains, the safety reserves of the grease may have diminished.

In general, rolling bearings can be used even after their permissible storage period has been exceeded if the storage conditions during storage and transport were observed. If the conditions are not fulfilled, shorter storage periods must be anticipated. If the periods are exceeded, it is recommended that the bearing should be checked for corrosion, the condition of the anti-corrosion oil and the condition of the grease before it is used.

**Storage of Arcanol rolling bearing greases**

The information on storage of rolling bearings applies correspondingly to Arcanol rolling bearing greases. The precondition is that the Arcanol rolling bearing grease is stored in closed, completely filled original containers.

**Storage periods for Arcanol rolling bearing greases**

Rolling bearing greases are mixtures of oil, thickener and additives. Such mixtures of liquid and solid substances do not have unlimited stability. During storage, their chemical-physical characteristics may change and they should therefore be used up as soon as possible.

If the storage conditions are observed, Arcanol greases can be stored without loss of performance for 3 years. As in the case of rolling bearings, the permissible storage period should not be seen as a rigid limit.

If stored as prescribed, most greases can be used after 3 years, if allowance is made for small changes. If there is any doubt when using older greases, the random sample checking of chemical-physical characteristics is recommended in order to determine any changes in the grease. It is therefore not possible to state storage periods for containers that have been opened. If containers are to be stored after opening, the grease surface should always be brushed flat, the container should be sealed airtight and it should be stored such that the empty space is upwards. High temperatures should be avoided in all cases.

# Fitting and dismantling

## Unpacking of rolling bearings

Perspiration leads to corrosion. Hands should be kept clean and dry and protective gloves worn if necessary. Bearings should only be removed from their original packaging immediately before assembly. If bearings are removed from multi-item packaging with dry preservation, the package must be closed again immediately, since the protective vapour phase is only effective in closed packaging. Bearings should be oiled or greased immediately after unpacking.

## Compatibility, miscibility

The anti-corrosion agents in bearings with an oil-based preservative are compatible and miscible with oils and greases having a mineral oil base. Compatibility should be checked if synthetic lubricants or thickeners other than lithium or lithium complex soaps are used. If there is an incompatibility, the anti-corrosion oil should be washed out before greasing, especially in the case of lubricants with a PTFE/alkoxyfluoroether base and thickeners based on polycarbamide. Bearings should be washed out if the lubricant is changed or the bearings are contaminated. If in doubt, please contact the relevant lubricant manufacturer.

## Cleaning of rolling bearings

The following are suitable for degreasing and washing of rolling bearings:

- aqueous neutral, acidic or alkaline cleaning agents. Check the compatibility of alkaline agents with aluminium components before cleaning
- organic cleaning agents such as paraffin oil free from water and acid, petroleum ether (not petrol), spirit, dewatering fluids, freon 12 substitutes, cleaning agents containing chlorinated hydrocarbons.

Cleaning should be carried out using brushes, paint brushes or lint-free cloths. In the case of resinous oil or grease residues, precleaning by mechanical means followed by treatment with an aqueous, strongly alkaline cleaning agent is recommended.



Legal regulations relating to handling, environmental protection and health and safety at work must be observed. The specifications of the cleaning agent manufacturer must be observed.

Paraffin oil, petroleum ether, spirit and dewatering fluids are flammable, alkaline agents are corrosive. The use of chlorinated hydrocarbons is associated with the risk of fire, explosion and decomposition as well as with health hazards. These hazards and appropriate protective measures are described comprehensively in Code of Practice ZH1/425 of the Hauptverband der gewerblichen Berufsgenossenschaften (German Federation of Institutions for Statutory Accident Insurance and Prevention).

Rolling bearings must be dried and preservative applied immediately after cleaning (risk of corrosion).

**Fitting** Comprehensive information on fitting and dismantling is given in the publications WL 80 100, Mounting of Rolling Bearings and IS 1, Mounting and Maintenance of Rolling Bearings.

For more extensive work, a fitting manual should be available that precisely describes all relevant work. The manual should also contain details on means of transport, fitting equipment, measurement tools, type and quantity of lubricant and a precise description of the fitting procedure.

### Guidelines for fitting



The following guidelines must always be taken into account:

- The assembly area must be kept clean and free from dust.
- Protect bearings from dust, contaminants and moisture. Contaminants have a detrimental influence on the running and operating life of rolling bearings.
- Before fitting, familiarise yourself with the design by means of the final assembly drawing.
- Before fitting, check whether the bearing presented for fitting corresponds to the data in the drawing.
- Check the housing bore and shaft seat for dimensional and geometrical accuracy and cleanliness.
- Check that the shaft and housing bore have a lead chamfer of 10° to 15°.
- Wipe away any anti-corrosion agent from the seating and contact surfaces, wash anti-corrosion agent out of tapered bores.
- Lubricate the seats of the bearing rings lightly with oil or solid lubricant.
- Do not cool the bearings excessively. Moisture due to condensation can lead to corrosion in the bearings and bearing seats.
- After fitting, provide the rolling bearings with lubricant.
- Check the correct functioning of the bearing arrangement.

# Fitting and dismantling

## Fitting of rolling bearings with cylindrical seats



Avoid applying direct blows to the bearing rings with a hammer.

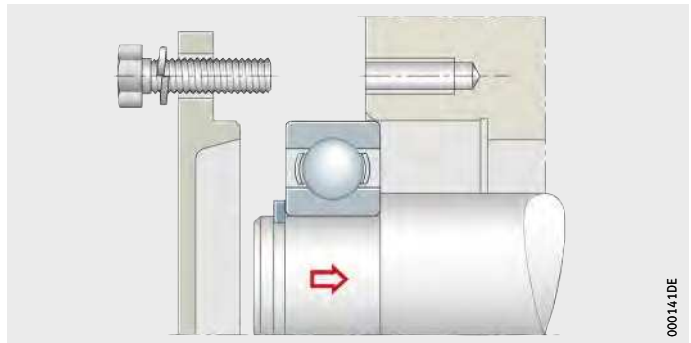
### Non-separable bearings

In non-separable bearings, apply the fitting forces to the ring with a tight fit, which should also be fitted first, *Figure 1*.

If the inner ring of a non-separable bearing will have a tight fit, press the bearing onto the shaft first, *Figure 1*. The bearing together with the shaft is then pushed into the housing (fit clearance).

Tight fit of the inner ring, fitting of this ring first

*Figure 1*  
Non-separable bearing

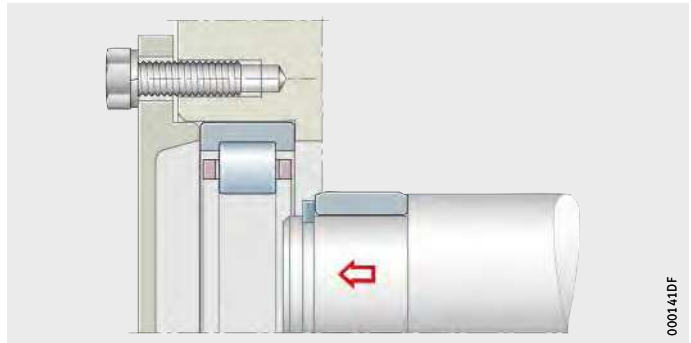


### Separable bearings

In separable bearings fitting is easier; both rings can be fitted individually, *Figure 2*. Rotating the ring while fitting to give a screwdriver effect will help to avoid scraping marks.

Tight fit of the inner ring, individual fitting of rings

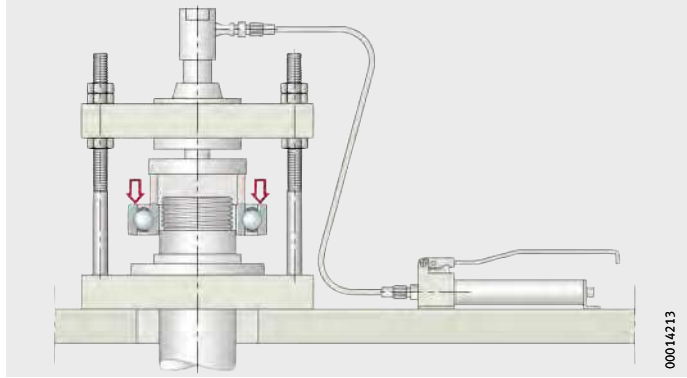
*Figure 2*  
Separable bearing





### Cold fitting of bearings by pressing

Bearings up to  $d = 80$  mm can be pressed onto the shaft while cold for normal tight fits, *Figure 3*. Mechanical or hydraulic presses can be used for this purpose.

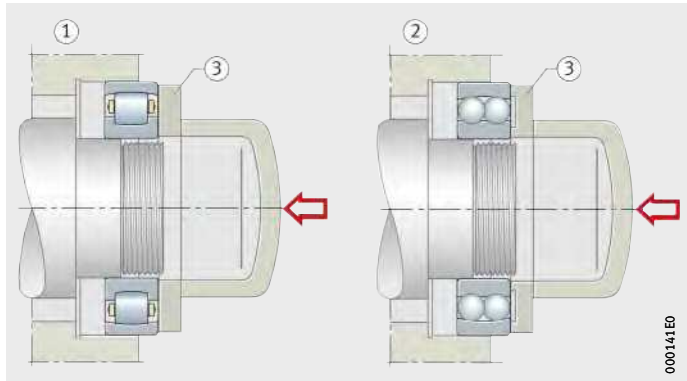


*Figure 3*  
Fitting using hydraulic press

If a press is not available, the bearings can be fitted by means of a hammer and a mounting sleeve.

In bearings with an angular adjustment facility, tilting of the outer ring is prevented by a mounting disc that is in contact with both bearing rings, *Figure 4*. In bearings with axially protruding cages or balls (e.g. some self-aligning ball bearings), the disc must have a turned recess, *Figure 4* ②.

- ① Without turned recess, for barrel roller bearings
- ② With turned recess, for some self-aligning ball bearings
- ③ Mounting disc



*Figure 4*  
Fitting with mounting disc

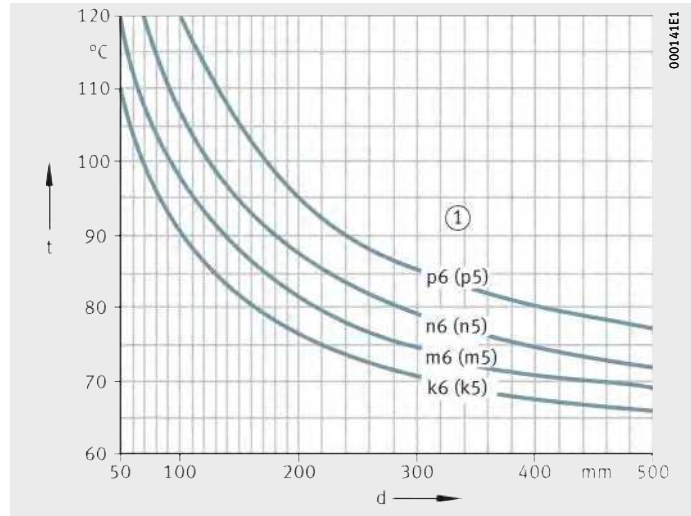
# Fitting and dismantling

## Heating of bearings

Bearings with a cylindrical bore should be heated before fitting if a tight fit on the shaft is intended and excessive effort is required for pressing by mechanical means. The temperature required for fitting is shown in *Figure 5*. The data are valid for maximum fit interference, a room temperature of +20 °C and a temperature safety margin of 30 K.

① Shaft tolerance  
 t = heating temperature  
 d = bearing bore diameter

*Figure 5*  
 Heating temperature



### Induction heating devices

Induction heating devices are characterised by rapid, safe and clean operation. The devices are used mainly in volume fitting work.

### Heating plate

Individual bearings can be heated on an electric heating plate. A thermostatic controller must be always be used.

### Heating cabinet

Thermostatically controlled hot air or heating cabinets are safe and clean. This method is mainly used for small and medium sized bearings. The heating times are relatively long.

### Oil bath

With the exception of sealed, greased bearings and high precision bearings, rolling bearings of all sizes and types can be heated in an oil bath. A thermostatic controller is advisable (temperature +80 °C to +100 °C). In order that the bearings are heated uniformly, they should be laid on a grid or suspended in the oil bath.



With this method, please note the risk of accidents, environmental pollution by oil vapour, flammability of hot oil and risk of bearing contamination.

## Fitting of rolling bearings with tapered bore

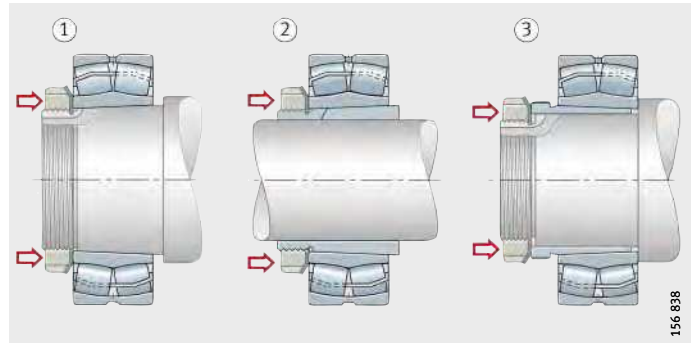
Bearings with a tapered bore are mounted either directly on the tapered shaft seat or by means of an adapter sleeve or withdrawal sleeve on a cylindrical shaft, *Figure 6* ①, ②, ③.

Small bearings (up to approx.  $d = 80$  mm) must be driven onto the tapered shaft seat or adapter sleeve using a locknut.

The tight fit is achieved by pressing the inner ring on in an axial direction. The nut is tightened using, for example, a hook wrench. Small withdrawal sleeves can also be pressed into the gap between the shaft and inner ring bore using a locknut.

- ① Fitting using a locknut
- ② Fitting on an adapter sleeve using the adapter sleeve nut
- ③ Fitting on a withdrawal sleeve using a locknut

*Figure 6*  
Mounting of rolling bearings with a tapered bore



## Reduction in radial internal clearance

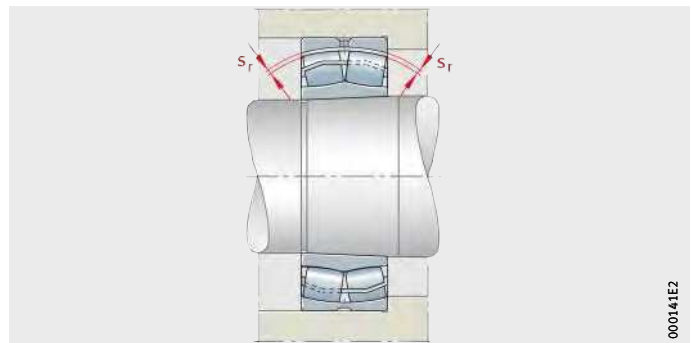
The reduction in radial internal clearance as a result of inner ring expansion is used as a means of checking the tight fit. In spherical roller bearings, the radial internal clearance ( $s_r$ ) must be measured simultaneously over both rows of rollers, *Figure 7*. Alternatively, the axial displacement is measured.

Values for reduction in radial internal clearance and displacement in spherical roller bearings, see Spherical roller bearings, page 572.

For the measurement of radial internal clearance, aids such as feeler gauges FEELER-GAUGE-100 and FEELER-GAUGE-300 are suitable.

Spherical roller bearing  
 $s_r$  = radial internal clearance

*Figure 7*  
Radial internal clearance



# Fitting and dismantling

## Fitting using pressure screws or hydraulic tool

Even in the case of medium sized bearings, the forces required to tighten nuts are considerable. In such cases, fitting can be made easier by using locknuts with pressure screws, *Figure 8 ①*. This method is not suitable for spherical roller bearings of E1 design.

For the fitting of large bearings, a hydraulic device should be used to drive up the product or press in the sleeve, *Figure 8 ②*. Hydraulic nuts are available for all common threaded sleeves and shafts.

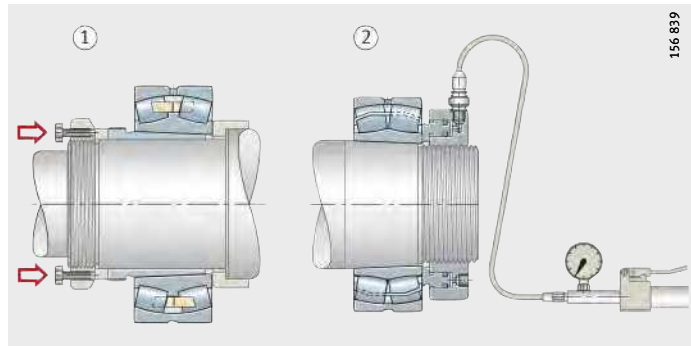
## Hydraulic method

The hydraulic method gives considerable assistance in the fitting and particularly in the dismantling of bearings of approx.  $d = 160$  mm and above.

For fitting, an oil with a viscosity of  $75 \text{ mm}^2/\text{s}$  at  $+20^\circ\text{C}$  (nominal viscosity  $32 \text{ mm}^2/\text{s}$  at  $+40^\circ\text{C}$ ) is recommended.

- ① Fitting on withdrawal sleeve using locknut and pressure screws
- ② Fitting on tapered shaft using hydraulic nut

*Figure 8*  
Mounting of rolling bearings with a tapered bore



## Guidelines for dismantling

Information on fitting and dismantling is given in the publications WL 80 100, Mounting of Rolling Bearings and IS 1, Mounting and Maintenance of Rolling Bearings.

Dismantling should be taken into consideration in the original design of the bearing position. If bearing rings are to be mounted with a tight fit, slots should be provided in the shaft or housing bore, for example, to allow removal of the rings.



If the bearing is to be reused, the following guidelines should be taken into consideration:

- do not use a concentrated or “hard” flame
- direct blows on the bearing rings should be avoided
- fitting forces must never be directed through the rolling elements
- carefully clean the bearings after dismantling.

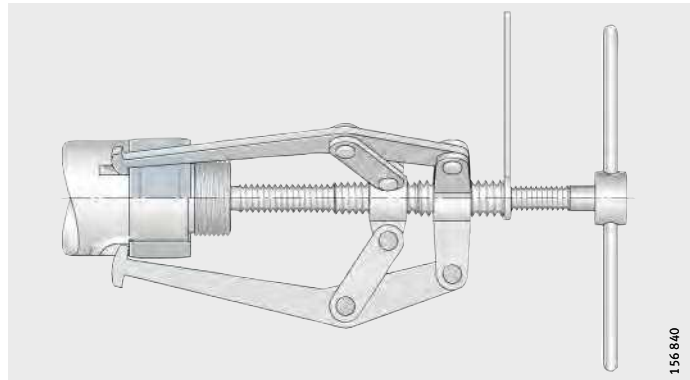
## Dismantling of rolling bearings on cylindrical seats

### Removal of small bearings

If the bearings and adjacent parts are to be reused, the removal tool should be applied to the ring fitted with a tight fit. In non-separable bearings, the ring fitted with a drive fit is dismantled and the ring with a tight fit is then removed.

For the removal of small bearings, mechanical withdrawal devices, *Figure 9* or hydraulic presses are suitable. Dismantling is made easier if there are slots on the shaft or housing so that the withdrawal tool can be applied to the bearing ring with a tight fit.

Special devices are available for cases where withdrawal slots are not present.



*Figure 9*  
Withdrawal device with three adjustable arms

### Removal of inner rings using an induction heating device

Induction heating devices are used to remove the shrink-fitted inner rings of cylindrical roller bearings, *Figure 10*.

Heating is achieved quickly and the rings are loosened easily without the transfer of substantial heat to the shaft.



*Figure 10*  
Induction heating device

# Fitting and dismantling

## Heating rings

Heating rings made from light metal with radial slots can be used to dismantle the inner rings of cylindrical roller bearings that have no ribs or only one rigid rib, *Figure 11*. The rings are heated on an electric heating plate to between +200 °C and +300 °C, pushed over the bearing ring to be removed and clamped in place using the grips. Once the press fit on the shaft has been eliminated, both rings are removed together.



The bearing ring must be separated from the heating ring immediately after removal in order to prevent overheating.

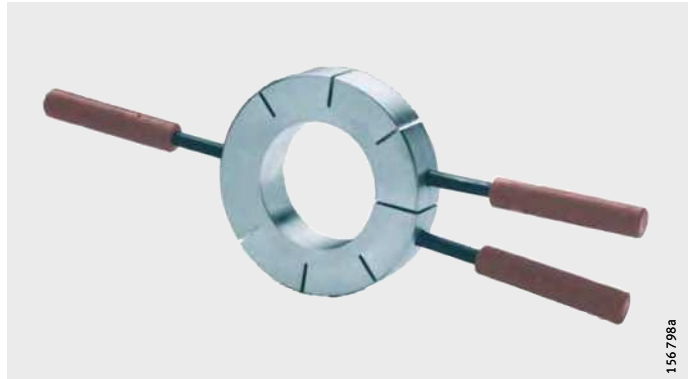


Figure 11  
Heating ring

## Dismantling of rolling bearings with tapered bore Mechanical dismantling

Where bearings are mounted directly on a tapered shaft seat or on an adapter sleeve, the locking effect of the shaft or adapter sleeve nut must be loosened first. The nut is then unscrewed by the amount of the drive-up distance. The inner ring is then driven off the sleeve or shaft, for example using a metal drift or impact block, *Figure 12* ①, ②. An impact block avoids the risk of slipping.

Bearings located using withdrawal sleeves are dismantled using a withdrawal nut, *Figure 12* ③.

- ① Metal drift
- ② Impact block
- ③ Withdrawal nut

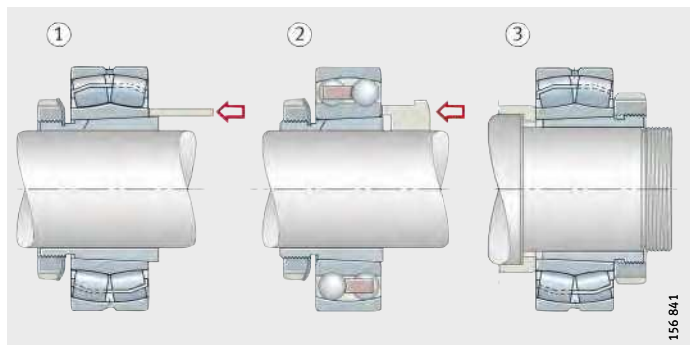


Figure 12  
Dismantling of bearings

Large bearings located using a withdrawal sleeve require considerable force. In this case, locknuts with additional pressure screws can be used, *Figure 13* ①. A disc must be inserted between the inner ring and the pressure screws.

### Hydraulic dismantling

An easier and more economical method is the dismantling of withdrawal sleeves using hydraulic nuts, *Figure 13* ②. The protruding withdrawal sleeve is supported by a heavy-section ring.

The dismantling of large bearings can be made easier by using the hydraulic method, *Figure 13* ③ and *Figure 14*. Oil is pressed between the fit surfaces. The adjacent parts can then be moved in relation to each other by applying only slight force and without the risk of surface damage.

Tapered shafts must be provided with appropriate oil slots and feed holes. Oil injectors are sufficient to generate the pressure. The arrangement of oil ducts in the hydraulic method for dismantling of a spherical roller bearing from a tapered shaft seat is shown in *Figure 14*.

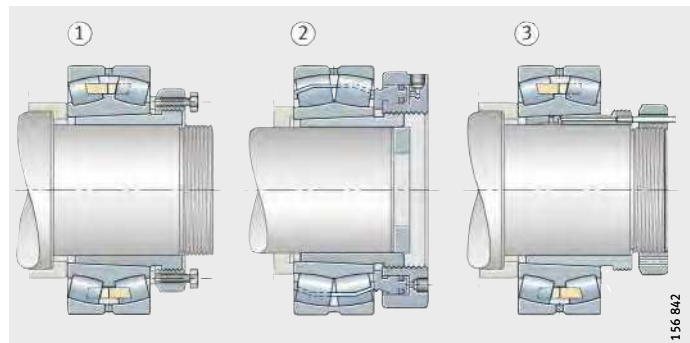


The withdrawal sleeve becomes loose abruptly. Leave the nut on the shaft.

Large adapter and withdrawal sleeves already have the appropriate slots and holes. In this case, a pump must be used to generate the oil pressure required.

- Dismantling of a withdrawal sleeve:  
 ① Using a nut and pressure screws  
 ② Using a hydraulic nut

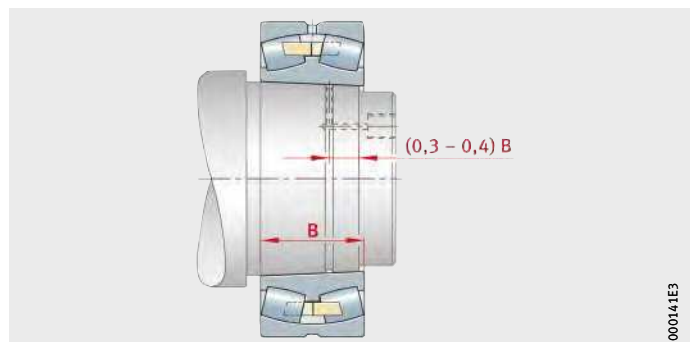
- Dismantling of a spherical roller bearing from the withdrawal sleeve:  
 ③ Using the hydraulic method



*Figure 13*

Dismantling of a withdrawal sleeve and spherical roller bearing

B = bearing width



*Figure 14*

Oil ducts for dismantling a spherical roller bearing

## Fitting and dismantling

### Suitable oils

For dismantling, the oils used should have a viscosity of approx. 150 mm<sup>2</sup>/s at +20 °C (nominal viscosity 46 mm<sup>2</sup>/s at +40 °C). Fretting corrosion can be dissolved by rust-dissolving additives in the oil.

### Disposal of bearings after dismantling

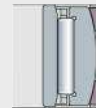
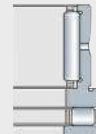
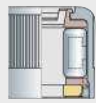
If the bearings are not to be reused after dismantling, the products should be separated into their constituent parts. Grease, seals and plastic parts should be disposed of in accordance with the relevant waste product guidelines. Bearing rings and rolling elements should be sent for recycling.







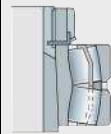
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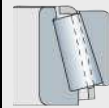
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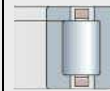
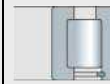
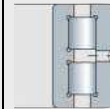
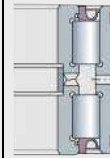
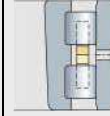
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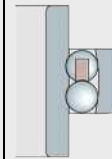
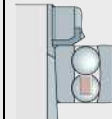
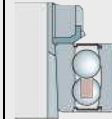
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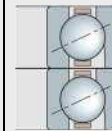
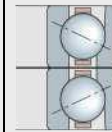
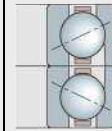
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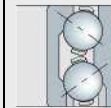
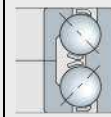
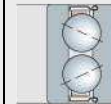
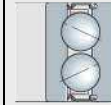
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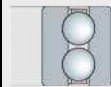
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### Deep groove ball bearings



191 548

### Angular contact ball bearings



191 587

### Spindle bearings



191 588

### Four point contact bearings



191 552

### Self-aligning ball bearings



191 554

### Cylindrical roller bearings



191 589

### Tapered roller bearings



191 590

### Barrel roller bearings



191 591

### Spherical roller bearings



191 592

### Needle roller and cage assemblies



191 566

### Drawn cup needle roller bearings



191 568

### Machined needle roller bearings Inner rings



191 593

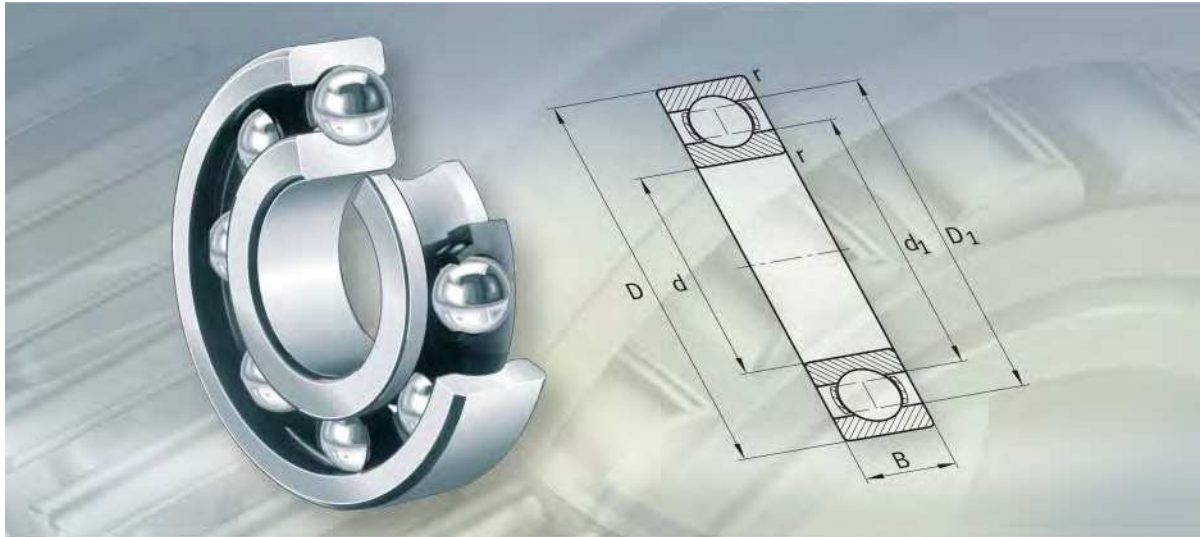
### Drawn cup roller clutches



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### Sealing rings

**FAG**



## Deep groove ball bearings

Single row  
Double row



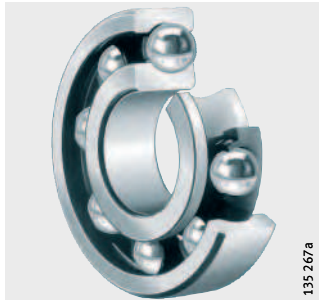
# Deep groove ball bearings

	Page
<b>Product overview</b>	Deep groove ball bearings ..... 206
<b>Features</b>	Radial and axial load capacity..... 207
	Single row deep groove ball bearings ..... 207
	Double row deep groove ball bearings ..... 208
	Operating temperature ..... 209
	Cages..... 209
	Suffixes..... 210
<b>Design and safety guidelines</b>	Equivalent dynamic bearing load ..... 211
	Equivalent static bearing load..... 213
	Axial load carrying capacity..... 214
	Minimum radial load ..... 214
	Design of bearing arrangements ..... 214
<b>Accuracy</b>	..... 214
	Radial internal clearance of bearings with cylindrical bore..... 215
<b>Dimension tables</b>	Deep groove ball bearings, single row, open or sealed..... 216
	Deep groove ball bearings, single row, open ..... 250
	Deep groove ball bearings, double row ..... 254

# Product overview Deep groove ball bearings

## Single row

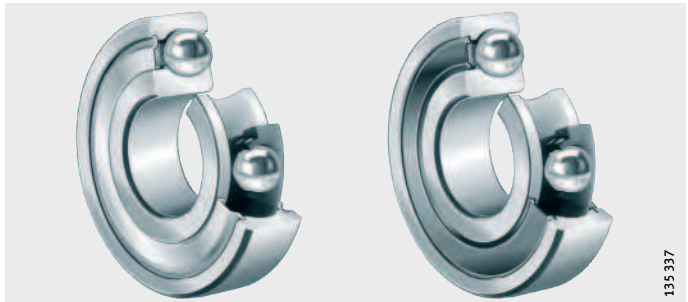
160, 60, 62, 63, 64,  
618, 619



135 267a

## Gap seals Lip seals

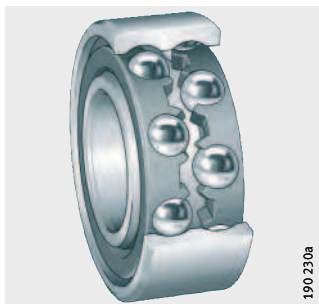
60..-2Z, 62..-2Z, 63..-2Z, 618..-2Z, 619..-2Z,  
60..-2RSR, 62(622)..-2RSR, 63(623)..-2RSR, 618(619)..-2RSR



135 337

## Double row

42..-B, 43..-B



190 230a



# Deep groove ball bearings

## Features

Deep groove ball bearings are versatile, self-retaining bearings with solid outer rings, inner rings and ball and cage assemblies.

These products, which are of simple design, robust in operation and easy to maintain, are available in single and double row designs and in open and sealed variants. Due to the manufacturing processes used, open bearings can have turned recesses in the outer ring for seals or shields. Due to their low frictional torque, deep groove ball bearings are suitable for high speeds.

## Radial and axial load capacity

Due to the raceway geometry and the balls used as rolling elements, deep groove ball bearings can support axial loads in both directions as well as radial loads, see Axial load carrying capacity, page 214.

## Compensation of angular misalignments

The angular adjustment facility of single row deep groove ball bearings is limited, so the bearing positions must be well aligned. Misalignments can lead to unfavourable ball running and induce additional loads in the bearing that shorten the operating life. In order to keep these loads at a low level, only small adjustment angles are permissible (dependent on the load) for single row deep groove ball bearings, see section Axial load carrying capacity, page 214.



Due to their internal construction, double row deep groove ball bearings do not have an angular adjustment facility. When using these bearings, therefore, misalignments are not permissible.

## Load and adjustment angle for single row deep groove ball bearings

Series	Adjustment angle	
	Low loads	High loads
62, 622, 63, 623, 64	5' to 10'	8' to 16'
618, 619, 160, 60	2' to 6'	5' to 10'

## Single row deep groove ball bearings

Single row deep groove ball bearings are the most frequently used type of rolling bearing. They are produced in numerous sizes and designs and are particularly economical.

## Sealing

Open bearings are suitable for high to very high speeds.

Deep groove ball bearings with the suffix 2Z have gap seals on both sides and are suitable for high speeds.

Bearings with the suffix 2RSR have lip seals on both sides made from nitrile butadiene rubber NBR and are suitable for moderate speeds.

By agreement, we can supply bearings with non-contact BRS seals on both sides (suffix 2BRS). These bearings have favourable frictional behaviour equivalent to that of bearings with Z seals.

If the inner ring is stationary and the outer ring rotates, the lubricant loss is less than that in bearings with Z seals.

# Deep groove ball bearings

**Lubrication** Open bearings can be lubricated with grease or oil. Deep groove ball bearings with gap or lip seals on both sides are greased with a high quality grease and are lubricated for life.

**Anti-corrosion protection** For applications requiring high levels of anti-corrosion protection, we offer corrosion-resistant deep groove ball bearings in sealed and open designs. The range is described in detail in TPI 64, Corrosion-resistant products.

**Matched single row deep groove ball bearings** By agreement, deep groove ball bearings of series 160, 60, 62, 63, 64 and 618 are available in various arrangements as matched pairs of bearings, *Figure 1*.

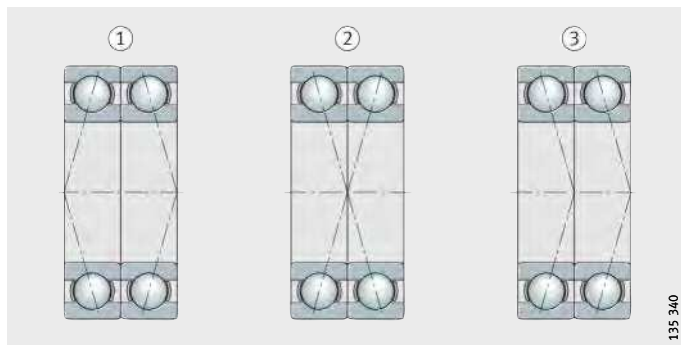
Sets in an O arrangement (suffix DB) can support axial loads in both directions as well as tilting moments.

Sets in an X arrangement (suffix DF) can support axial loads in both directions but are not suitable for tilting moments.

For high axial loads from one direction, pairs of bearings in a tandem arrangement are suitable (suffix DT).

- ① O arrangement, DB
- ② X arrangement, DF
- ③ Tandem arrangement, DT

*Figure 1*  
Matched sets



**Double row deep groove ball bearings** Double row deep groove ball bearings correspond in their structure and function to a pair of single row deep groove ball bearings. They are designed for high to very high speeds and are used where the load carrying capacity of single row deep groove ball bearings is not sufficient.

Double row deep groove ball bearings are wider than single row deep groove ball bearings of the same bore and outside diameter but have a significantly higher load carrying capacity.

**Sealing** Double row deep groove ball bearings are not sealed.

**Lubrication** The bearings are open and are greased using a high quality grease.





## Operating temperature

Open deep groove ball bearings can be used up to an operating temperature of +120 °C. For applications at temperatures above +120 °C, please contact us. Bearings with a diameter D of more than 240 mm are dimensionally stable up to +200 °C.

Deep groove ball bearings with lip seals can be used at operating temperatures from –30 °C to +110 °C, limited by the grease and sealing ring material.

Bearings with gap seals can be used from –30 °C to +120 °C.



Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C.

## Cages

Single row deep groove ball bearings without a cage suffix have a sheet steel cage.

Deep groove ball bearings with ball-guided solid brass cages are indicated by the suffix M.

The suffix Y indicates bearings with a sheet brass cage.

Double row deep groove ball bearings have cages made from glass fibre reinforced polyamide (suffix TVH).



Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures. The oil change intervals must be observed.

## Cage and bore code

Series	Sheet steel cage	Sheet brass cage	Solid brass cage	Cage made from glass fibre reinforced polyamide
	Bore code			
42	–	–	–	All
43	–	–	–	All
60	up to 30, 34	–	32, from 36	–
62	up to 30	–	from 32	–
63	up to 24	–	from 26	–
64	up to 14	–	from 15	–
160	up to 52	–	from 56	–
618	up to 08, 26, 30 to 56	09 to 24, 28	from 60	–
619	up to 16	–	–	–
622	up to 10	–	–	–
623	up to 10	–	–	–

# Deep groove ball bearings

**Suffixes** Suffixes for available designs: see table.

**Available designs**

Suffix	Description	Design
B	Modified internal construction	Standard
M	Solid brass cage, ball-guided	
DB	Two deep groove ball bearings in O arrangement, matched clearance-free	Special design, available by agreement
DF	Two deep groove ball bearings in X arrangement, matched clearance-free	
DT	Two deep groove ball bearings in tandem arrangement, matched clearance-free	
2RSR	Lip seals on both sides	Standard
RSR	Lip seal on one side	Special design, available by agreement
BRS	Labyrinth seal	
TVH	Cage made from glass fibre reinforced polyamide	
Y	Sheet brass cage	
2Z	Gap seals on both sides	
Z	Gap seal on one side	



**Design and  
safety guidelines**  
**Equivalent  
dynamic bearing load**

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = X \cdot F_r + Y \cdot F_a$

P N  
Equivalent dynamic bearing load for combined load  
F<sub>a</sub> N  
Axial dynamic bearing load  
F<sub>r</sub> N  
Radial dynamic bearing load  
e, X, Y –  
Factors: see table Factors e, X and Y.

The values according to the table Factors e, X and Y, are valid for normal fits:

- Shaft machined to j5 or k5, housing machined to J6.

**Factors e, X and Y**

$\frac{f_0 \cdot F_a}{C_{0r}}$	Factor for radial internal clearance								
	CN			C3			C4		
	e	X	Y	e	X	Y	e	X	Y
0,3	0,22	0,56	2	0,32	0,46	1,7	0,4	0,44	1,4
0,5	0,24	0,56	1,8	0,35	0,46	1,56	0,43	0,44	1,31
0,9	0,28	0,56	1,58	0,39	0,46	1,41	0,45	0,44	1,23
1,6	0,32	0,56	1,4	0,43	0,46	1,27	0,48	0,44	1,16
3	0,36	0,56	1,2	0,48	0,46	1,14	0,52	0,44	1,08
6	0,43	0,56	1	0,54	0,46	1	0,56	0,44	1

C<sub>0r</sub> N  
Basic static load rating according to dimension tables  
f<sub>0</sub> –  
Factor: see table Factor f<sub>0</sub> for deep groove ball bearings, page 212  
F<sub>a</sub> N  
Axial dynamic bearing load.

# Deep groove ball bearings

Factor  $f_0$  for  
deep groove ball bearings

Bore code	Factor $f_0$										
	618	619	160	60	62	622	63	623	64	42	43
3	-	-	-	-	12,9	-	-	-	-	-	-
4	-	-	-	-	12,2	-	12,4	-	-	-	-
5	-	-	-	-	13,2	-	12,2	-	-	-	-
6	-	-	-	-	13	-	-	-	-	-	-
7	-	-	-	13	12,4	-	-	-	-	-	-
8	-	-	-	12,4	13	-	-	-	-	-	-
9	-	-	-	13	12,4	-	-	-	-	-	-
00	14,8	14	-	12,4	12,1	12,1	11,3	-	-	12,1	-
01	15,3	14,5	-	13	12,3	12,2	11,1	-	-	12,7	-
02	15,8	14,3	13,9	13,9	13,1	13,1	12,1	12,1	-	13,4	12,8
03	16,1	14,7	14,3	14,3	13,1	13,1	12,3	12,2	12,4	13,1	13,1
04	15,8	14,5	14,9	13,9	13,1	13,1	12,4	12,1	13	13,8	13,1
05	16,3	15,2	15,4	14,5	13,8	13,8	12,4	12,4	13,1	14,3	13,2
06	16,5	15,6	15,2	14,8	13,8	13,8	13	13	12,2	14,3	13,8
07	16,3	15,5	15,6	14,8	13,8	13,8	13,1	13,1	12,1	14,5	13,1
08	16,1	15,4	16	15,3	14	14	13	13	12,2	14,9	13,2
09	16,2	15,7	15,9	15,4	14,3	14,1	13	13	12,1	15,3	13,9
10	16,1	16	16,1	15,6	14,3	14,3	13	13	13,1	15,5	13,8
11	16,2	16	16,1	15,4	14,3	-	12,9	-	13,2	15,5	13,8
12	16,3	16,1	16,3	15,5	14,3	-	13,1	-	13,2	15,4	13,8
13	16,2	16,3	16,4	15,7	14,3	-	13,2	-	13,2	15,3	-
14	16,1	16,1	16,2	15,5	14,4	-	13,2	-	13,3	15,5	-
15	16	16,2	16,4	15,7	14,7	-	13,2	-	13,3	15,7	-
16	15,9	16,4	16,4	15,6	14,6	-	13,2	-	12,3	15,7	-
17	16,2	-	16,4	15,7	14,7	-	13,1	-	12,3	15,7	-
18	16,1	-	16,3	15,6	14,5	-	13,9	-	12,2	15,5	-
19	16	-	16,5	15,7	14,4	-	13,9	-	-	-	-
20	16	-	16,5	15,9	14,4	-	13,8	-	-	-	-
21	15,9	-	16,3	15,8	14,3	-	13,8	-	-	-	-
22	16,1	-	16,3	15,6	14,3	-	13,8	-	-	-	-
24	16	-	16,5	15,9	14,8	-	13,5	-	-	-	-
26	16,1	-	16,4	15,8	14,5	-	13,6	-	-	-	-
28	16	-	16,5	16	14,8	-	13,6	-	-	-	-
30	16,1	-	16,4	16	15,2	-	13,7	-	-	-	-
32	16	-	16,5	16	15,2	-	13,9	-	-	-	-
34	16,1	-	16,4	15,7	15,3	-	13,9	-	-	-	-
36	16	-	16,3	15,6	15,3	-	13,9	-	-	-	-
38	16	-	16,4	15,8	15	-	14	-	-	-	-
40	16	-	16,3	15,6	15,3	-	14,1	-	-	-	-
44	15,9	-	16,3	15,6	15,2	-	14,1	-	-	-	-
48	15,9	-	16,5	15,8	15,2	-	14,2	-	-	-	-
52	15,9	-	16,4	15,7	15,2	-	-	-	-	-	-



continued  
Factor  $f_0$  for  
deep groove ball bearings

Bore code	Factor $f_0$										
	618	619	160	60	62	622	63	623	64	42	43
56	16	-	16,5	15,9	15,3	-	-	-	-	-	-
60	16	-	16,4	15,7	-	-	-	-	-	-	-
64	15,9	-	16,5	15,9	-	-	-	-	-	-	-
68	15,9	-	16,3	15,8	-	-	-	-	-	-	-
72	15,8	-	16,4	15,9	-	-	-	-	-	-	-
76	16	-	16,5	-	-	-	-	-	-	-	-
80	15,9	-	-	-	-	-	-	-	-	-	-
84	15,9	-	-	-	-	-	-	-	-	-	-
88	15,8	-	-	-	-	-	-	-	-	-	-
92	16	-	-	-	-	-	-	-	-	-	-
96	16	-	-	-	-	-	-	-	-	-	-
/500	15,9	-	-	-	-	-	-	-	-	-	-
/530	15,9	-	-	-	-	-	-	-	-	-	-
/560	15,8	-	-	-	-	-	-	-	-	-	-
...											
/850											

### Equivalent static bearing load

For bearings under static loading, the following applies:

Load ratio	Equivalent static load
$\frac{F_{0a}}{F_{0r}} \leq 0,8$	$P_0 = F_{0r}$
$\frac{F_{0a}}{F_{0r}} > 0,8$	$P_0 = 0,6 \cdot F_{0r} + 0,5 \cdot F_{0a}$

$P_0$  N  
Equivalent static bearing load for combined load  
 $F_{0a}$  N  
Axial static bearing load  
 $F_{0r}$  N  
Radial static bearing load.

# Deep groove ball bearings

## Axial load carrying capacity



Deep groove ball bearings are also suitable for axial loads.

If the bearing is subjected to high loads and high speeds, a reduced life as well as increased friction and bearing temperature must be taken into consideration.

## Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of  $P/C_r > 0,01$  is necessary for ball bearings with cage.

## Design of bearing arrangements Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

## Mounting dimensions

The dimension tables give the maximum dimension of the radius  $r_a$  and the diameters of the abutment shoulders  $D_a$  and  $d_a$ .

## Accuracy

The main dimensions of single row deep groove ball bearings correspond to DIN 625-1, the main dimensions of double row deep groove ball bearings to DIN 625-3.

The dimensional and running tolerances correspond to tolerance class PN to DIN 620.

The width tolerance of matched bearings is different from this standard, see table.

## Width tolerance of bearing rings in matched bearings

Bore diameter d mm		Width deviation $\Delta_{Bs}$ $\mu\text{m}$	
over	incl.	min.	max.
–	18	0	–250
18	50	0	–300
50	80	0	–450
80	120	0	–550
120	180	0	–750
180	250	0	–950
250	315	0	–1050
315	400	0	–1350
400	500	0	–1650



## Radial internal clearance of bearings with cylindrical bore

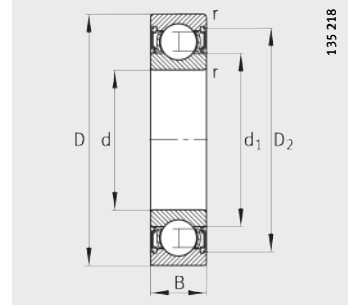
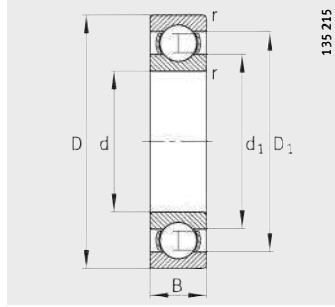
The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

### Radial internal clearance

Bore d mm		Radial internal clearance							
		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
1,5	6	0	7	2	13	8	23	–	–
6	10	0	7	2	13	8	23	14	29
10	18	0	9	3	18	11	25	18	33
18	24	0	10	5	20	13	28	20	36
24	30	1	11	5	20	13	28	23	41
30	40	1	11	6	20	15	33	28	46
40	50	1	11	6	23	18	36	30	51
50	65	1	15	8	28	23	43	38	61
65	80	1	15	10	30	25	51	46	71
80	100	1	18	12	36	30	58	53	84
100	120	2	20	15	41	36	66	61	97
120	140	2	23	18	48	41	81	71	114
140	160	2	23	18	53	46	91	81	130
160	180	2	25	20	61	53	102	91	147
180	200	2	30	25	71	63	117	107	163
200	225	2	35	25	85	75	140	125	195
225	250	2	40	30	95	85	160	145	225
250	280	2	45	35	105	90	170	155	245
280	315	2	55	40	115	100	190	175	270
315	355	3	60	45	125	110	210	195	300
355	400	3	70	55	145	130	240	225	340
400	450	3	80	60	170	150	270	250	380
450	500	3	90	70	190	170	300	280	420
500	560	10	100	80	210	190	330	310	470
560	630	10	110	90	230	210	360	340	520
630	710	20	130	110	260	240	400	380	570
710	800	20	140	120	290	270	450	430	630
800	900	20	160	140	320	300	500	480	700

# Deep groove ball bearings

Single row  
Open or sealed

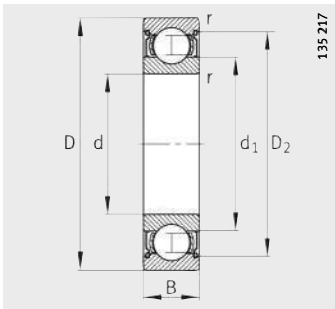


Seal 2RSR

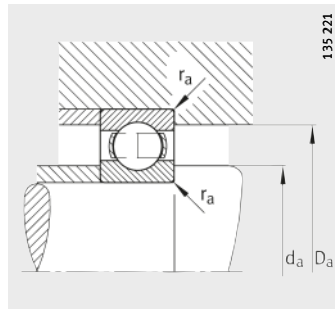
**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>
					min.	≈	≈	≈
623	0,001	3	10	4	0,15	7,7	–	5
623-2RSR	0,001	3	10	4	0,15	–	8,2	5
623-2Z	0,001	3	10	4	0,15	–	8,2	5
624	0,003	4	13	5	0,2	10,5	–	7
624-2RSR	0,003	4	13	5	0,2	–	11,2	7
624-2Z	0,004	4	13	5	0,2	–	11,2	7
634	0,006	4	16	5	0,3	12,5	–	8,5
634-2RSR	0,006	4	16	5	0,3	–	13,2	8,5
634-2Z	0,006	4	16	5	0,3	–	13,2	8,5
625	0,005	5	16	5	0,3	12,5	–	8,5
625-2RSR	0,005	5	16	5	0,3	–	13,2	8,5
625-2Z	0,005	5	16	5	0,3	–	13,2	8,5
635	0,008	5	19	6	0,3	15,5	–	10,8
635-2RSR	0,008	5	19	6	0,3	–	16,7	10,8
635-2Z	0,008	5	19	6	0,3	–	16,7	10,8
626	0,008	6	19	6	0,3	15,5	–	10,6
626-2RSR	0,008	6	19	6	0,3	–	16,7	10,6
626-2Z	0,008	6	19	6	0,3	–	16,7	10,6
607	0,007	7	19	6	0,3	15,5	–	10,6
607-2RSR	0,007	7	19	6	0,3	–	16,7	10,6
607-2Z	0,008	7	19	6	0,3	–	16,7	10,6
627	0,011	7	22	7	0,3	18	–	12,4
627-2RSR	0,011	7	22	7	0,3	–	19,1	12,4
627-2Z	0,012	7	22	7	0,3	–	19,1	12,4
608	0,01	8	22	7	0,3	18	–	12,4
608-2RSR	0,01	8	22	7	0,3	–	19,1	12,4
608-2Z	0,011	8	22	7	0,3	–	19,1	12,4
609	0,015	9	24	7	0,3	19,6	–	14
609-2RSR	0,016	9	24	7	0,3	–	20,5	14
609-2Z	0,016	9	24	7	0,3	–	20,5	14
629	0,02	9	26	8	0,3	21,4	–	14,7
629-2RSR	0,021	9	26	8	0,3	–	22,5	14,7
629-2Z	0,021	9	26	8	0,3	–	22,5	14,7

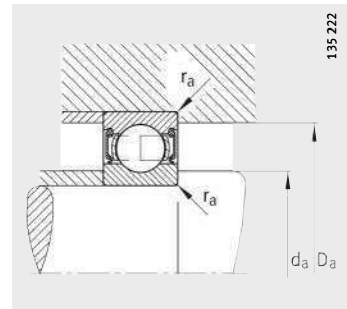




Seal 2Z



Mounting dimensions  
Open design

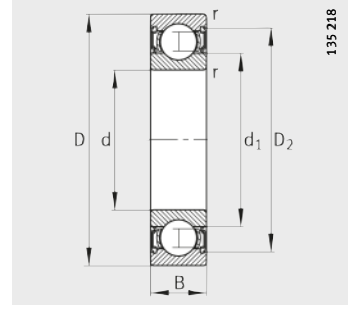
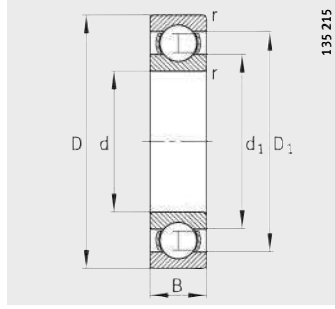


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{0r}$	$C_{ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
4,4	8,6	0,15	640	220	10,6	53 000	57 000
4,4	8,6	0,15	640	220	10,6	32 000	–
4,4	8,6	0,15	640	220	10,6	45 000	57 000
5,8	11,2	0,2	1 290	490	24,6	45 000	46 500
5,8	11,2	0,2	1 290	490	24,6	26 000	–
5,8	11,2	0,2	1 290	490	24,6	38 000	46 500
6,4	13,6	0,3	1 730	670	35,5	43 000	35 000
6,4	13,6	0,3	1 730	670	35,5	24 000	–
6,4	13,6	0,3	1 730	670	35,5	36 000	35 000
7,4	13,6	0,3	1 320	440	22,4	43 000	36 500
7,4	13,6	0,3	1 320	440	22,4	24 000	–
7,4	13,6	0,3	1 320	440	22,4	36 000	36 500
7,4	16,6	0,3	2 600	1 100	53	40 000	31 500
7,4	16,6	0,3	2 600	1 100	53	22 000	–
7,4	16,6	0,3	2 600	1 100	53	32 000	31 500
8,4	16,6	0,3	2 600	1 100	53	38 000	32 500
8,4	16,6	0,3	2 600	1 100	53	22 000	–
8,4	16,6	0,3	2 600	1 100	53	32 000	32 500
9	17	0,3	2 600	1 100	53	38 000	34 500
9	17	0,3	2 600	1 100	53	22 000	–
9	17	0,3	2 600	1 100	53	32 000	35 500
9,4	19,6	0,3	3 250	1 370	72	36 000	30 000
9,4	19,6	0,3	3 250	1 370	72	20 000	–
9,4	19,6	0,3	3 250	1 370	72	30 000	30 000
10	20	0,3	3 250	1 370	72	36 000	31 500
10	20	0,3	3 250	1 370	72	20 000	–
10	20	0,3	3 250	1 370	72	30 000	32 500
11	22	0,3	3 650	1 630	89	36 000	28 500
11	22	0,3	3 650	1 630	89	20 000	–
11	22	0,3	3 650	1 630	89	30 000	29 000
11,4	23,6	0,3	4 550	1 960	93	34 000	25 500
11,4	23,6	0,3	4 550	1 960	93	19 000	–
11,4	23,6	0,3	4 550	1 960	93	28 000	25 500

# Deep groove ball bearings

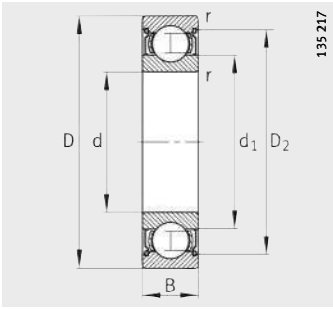
Single row  
Open or sealed



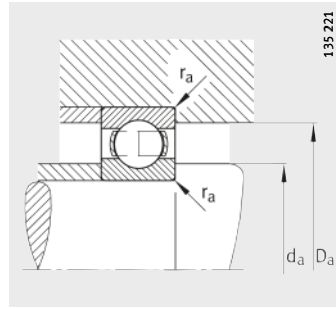
Seal 2RSR

Dimension table (continued) · Dimensions in mm

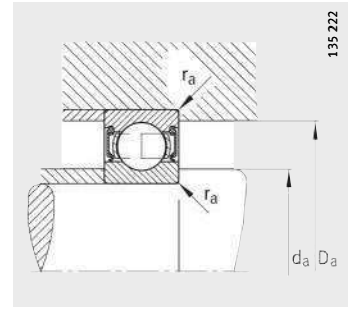
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈
<b>61800</b>	0,006	<b>10</b>	19	5	0,3	16,3	–	13
<b>61800-2RSR</b>	0,006	<b>10</b>	19	5	0,3	–	17	13
<b>61800-2Z</b>	0,006	<b>10</b>	19	5	0,3	–	17	13
<b>61900</b>	0,01	<b>10</b>	22	6	0,3	18,2	–	13,8
<b>61900-2RSR</b>	0,01	<b>10</b>	22	6	0,3	–	19,1	13,8
<b>61900-2Z</b>	0,01	<b>10</b>	22	6	0,3	–	19,1	13,8
<b>6000</b>	0,019	<b>10</b>	26	8	0,3	21,4	–	14,7
<b>6000-2RSR</b>	0,02	<b>10</b>	26	8	0,3	–	22,5	14,7
<b>6000-2Z</b>	0,02	<b>10</b>	26	8	0,3	–	22,5	14,7
<b>6200</b>	0,031	<b>10</b>	30	9	0,6	24	–	16,7
<b>6200-2RSR</b>	0,032	<b>10</b>	30	9	0,6	–	25	16,7
<b>6200-2Z</b>	0,032	<b>10</b>	30	9	0,6	–	25	16,7
<b>62200-2RSR</b>	0,048	<b>10</b>	30	14	0,6	–	25	16,7
<b>6300</b>	0,055	<b>10</b>	35	11	0,6	27	–	18,1
<b>6300-2RSR</b>	0,057	<b>10</b>	35	11	0,6	–	28,6	18,1
<b>6300-2Z</b>	0,057	<b>10</b>	35	11	0,6	–	28,6	18,1
<b>61801</b>	0,006	<b>12</b>	21	5	0,3	18,3	–	15
<b>61801-2RSR</b>	0,006	<b>12</b>	21	5	0,3	–	19	15
<b>61801-2Z</b>	0,006	<b>12</b>	21	5	0,3	–	19	15
<b>61901</b>	0,012	<b>12</b>	24	6	0,3	20,2	–	15,8
<b>61901-2RSR</b>	0,012	<b>12</b>	24	6	0,3	–	21,1	15,8
<b>61901-2Z</b>	0,012	<b>12</b>	24	6	0,3	–	21,1	15,8
<b>6001</b>	0,02	<b>12</b>	28	8	0,3	23,5	–	16,7
<b>6001-2RSR</b>	0,022	<b>12</b>	28	8	0,3	–	24,5	16,7
<b>6001-2Z</b>	0,02	<b>12</b>	28	8	0,3	–	24,5	16,7
<b>6201</b>	0,037	<b>12</b>	32	10	0,6	25,8	–	18,3
<b>6201-2RSR</b>	0,039	<b>12</b>	32	10	0,6	–	27,4	18,3
<b>6201-2Z</b>	0,039	<b>12</b>	32	10	0,6	–	27,4	18,3
<b>62201-2RSR</b>	0,051	<b>12</b>	32	14	0,6	–	27,4	18,3
<b>6301</b>	0,062	<b>12</b>	37	12	1	29,6	–	19,5
<b>6301-2RSR</b>	0,064	<b>12</b>	37	12	1	–	31,4	19,5
<b>6301-2Z</b>	0,064	<b>12</b>	37	12	1	–	31,4	19,5



Seal 2Z



Mounting dimensions  
Open design

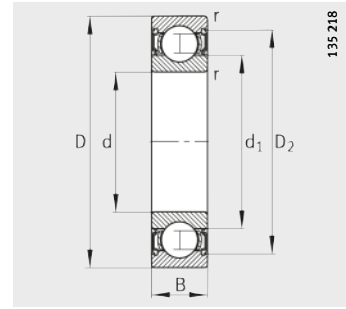
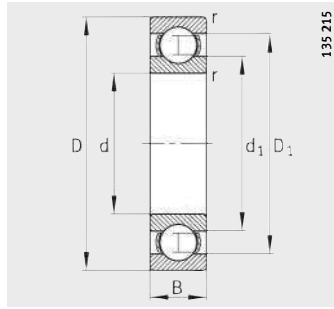


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{Or}$	$C_{Ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
12	17	0,3	1 450	590	29,5	43 000	27 500
12	17	0,3	1 450	590	29,5	18 000	–
12	17	0,3	1 450	590	29,5	36 000	27 500
12	20	0,3	2 200	840	42,5	40 000	27 000
12	20	0,3	2 200	840	42,5	17 300	–
12	20	0,3	2 200	840	42,5	34 000	27 000
12	24	0,3	4 550	1 960	93	34 000	28 500
12	24	0,3	4 550	1 960	93	19 000	–
12	24	0,3	4 550	1 960	93	28 000	28 500
14,2	25,8	0,6	6 000	2 600	171	32 000	23 400
14,2	25,8	0,6	6 000	2 600	171	17 000	–
14,2	25,8	0,6	6 000	2 600	171	26 000	23 400
14,2	25,8	0,6	6 000	2 600	158	17 000	–
14,2	30,8	0,6	8 150	3 450	230	56 000	21 100
14,2	30,8	0,6	8 150	3 450	230	15 000	–
14,2	30,8	0,6	8 150	3 450	230	22 000	21 100
14	19	0,3	1 520	670	33,5	38 000	23 600
14	19	0,3	1 520	670	33,5	18 000	–
14	19	0,3	1 520	670	33,5	32 000	23 600
14	22	0,3	2 360	980	49,5	36 000	23 500
14	22	0,3	2 360	980	49,5	18 000	–
14	22	0,3	2 360	980	49,5	30 000	23 500
14	26	0,3	5 100	2 360	130	32 000	25 000
14	26	0,3	5 100	2 360	130	18 000	–
14	26	0,3	5 100	2 360	130	26 000	25 000
16,2	27,8	0,6	6 950	3 100	198	30 000	22 200
16,2	27,8	0,6	6 950	3 100	198	16 000	–
16,2	27,8	0,6	6 950	3 100	198	24 000	22 200
16,2	27,8	0,6	6 950	3 100	198	16 000	–
17,6	31,4	1	9 650	4 150	280	53 000	20 000
17,6	31,4	1	9 650	4 150	280	13 000	–
17,6	31,4	1	9 650	4 150	280	20 000	20 000

# Deep groove ball bearings

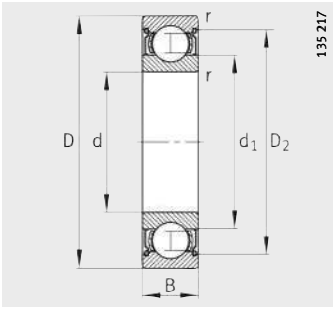
Single row  
Open or sealed



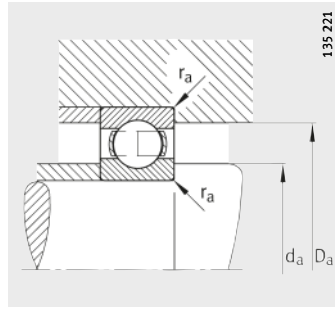
Seal 2RSR

**Dimension table** (continued) · Dimensions in mm

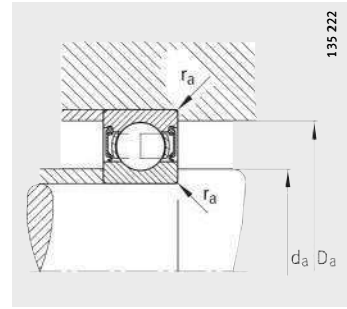
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈
<b>61802</b>	0,008	<b>15</b>	24	5	0,3	21,1	–	18
<b>61802-2RSR</b>	0,008	<b>15</b>	24	5	0,3	–	22	18
<b>61802-2Z</b>	0,008	<b>15</b>	24	5	0,3	–	22	18
<b>61902</b>	0,017	<b>15</b>	28	7	0,3	24,3	–	18,8
<b>61902-2RSR</b>	0,017	<b>15</b>	28	7	0,3	–	25,5	18,8
<b>61902-2Z</b>	0,017	<b>15</b>	28	7	0,3	–	25,5	18,8
<b>16002</b>	0,027	<b>15</b>	32	8	0,3	26,9	–	20,5
<b>6002</b>	0,031	<b>15</b>	32	9	0,3	26,9	–	20,5
<b>6002-2RSR</b>	0,033	<b>15</b>	32	9	0,3	–	28,4	20,5
<b>6002-2Z</b>	0,033	<b>15</b>	32	9	0,3	–	28,4	20,5
<b>6202</b>	0,043	<b>15</b>	35	11	0,6	29,3	–	21,1
<b>6202-2RSR</b>	0,045	<b>15</b>	35	11	0,6	–	30,9	21,1
<b>6202-2Z</b>	0,045	<b>15</b>	35	11	0,6	–	30,9	21,1
<b>62202-2RSR</b>	0,057	<b>15</b>	35	14	0,6	–	30,9	21,1
<b>6302</b>	0,088	<b>15</b>	42	13	1	33,5	–	23,6
<b>6302-2RSR</b>	0,09	<b>15</b>	42	13	1	–	35	23,6
<b>6302-2Z</b>	0,09	<b>15</b>	42	13	1	–	35	23,6
<b>62302-2RSR</b>	0,114	<b>15</b>	42	17	1	–	35	23,6



Seal 2Z



Mounting dimensions  
Open design

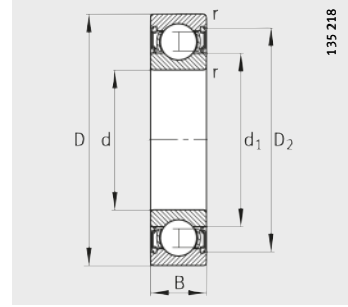
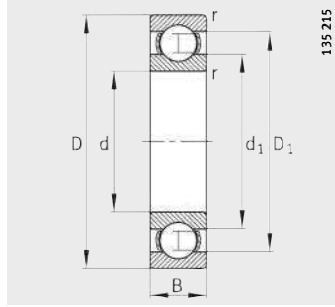


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load $C_{Ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N			
17	22	0,3	1650	800	40,5	34 000	19 300
17	22	0,3	1650	800	40,5	16 000	–
17	22	0,3	1650	800	40,5	28 000	19 300
17	26	0,3	4350	2 260	125	30 000	20 600
17	26	0,3	4350	2 260	125	15 000	–
17	26	0,3	4350	2 260	125	24 000	20 600
17	30	0,3	5600	2 850	144	30 000	20 000
17	30	0,3	5600	2 850	134	30 000	22 000
17	30	0,3	5600	2 850	134	16 000	–
17	30	0,3	5600	2 850	134	24 000	22 000
19,2	30,8	0,6	7800	3 750	220	26 000	20 200
19,2	30,8	0,6	7800	3 750	220	14 000	–
19,2	30,8	0,6	7800	3 750	220	20 000	20 200
19,2	30,8	0,6	7800	3 750	220	14 000	–
20,6	36,4	1	11 400	5 400	350	43 000	17 500
20,6	36,4	1	11 400	5 400	350	12 000	–
20,6	36,4	1	11 400	5 400	350	18 000	17 500
20,6	36,4	1	11 400	5 400	350	12 000	–

# Deep groove ball bearings

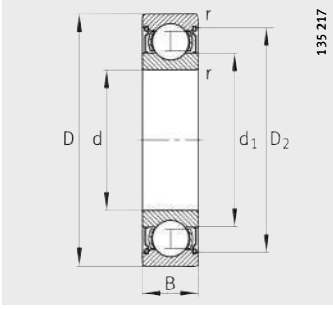
Single row  
Open or sealed



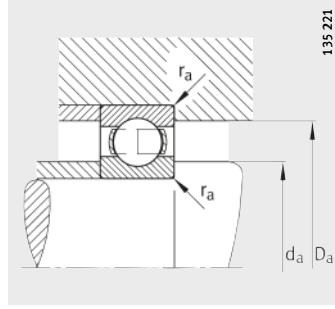
Seal 2RSR

Dimension table (continued) · Dimensions in mm

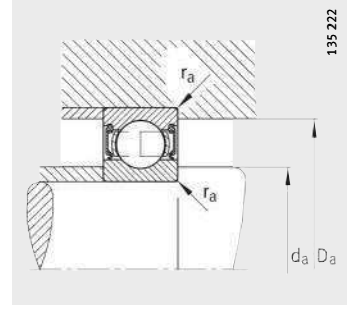
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>
					min.	≈	≈	≈
<b>61803</b>	0,008	17	26	5	0,3	23	–	20
<b>61803-2RSR</b>	0,008	17	26	5	0,3	–	24	20
<b>61803-2Z</b>	0,008	17	26	5	0,3	–	24	20
<b>61903</b>	0,017	17	30	7	0,3	26,3	–	20,8
<b>61903-2RSR</b>	0,019	17	30	7	0,3	–	27,5	20,8
<b>61903-2Z</b>	0,019	17	30	7	0,3	–	27,5	20,8
<b>16003</b>	0,03	17	35	8	0,3	29,5	–	22,7
<b>6003</b>	0,038	17	35	10	0,3	29,5	–	22,7
<b>6003-2RSR</b>	0,04	17	35	10	0,3	–	30,8	22,7
<b>6003-2Z</b>	0,04	17	35	10	0,3	–	30,8	22,7
<b>6203</b>	0,065	17	40	12	0,6	33,1	–	24
<b>6203-2RSR</b>	0,067	17	40	12	0,6	–	34,4	24
<b>6203-2Z</b>	0,067	17	40	12	0,6	–	34,4	24
<b>62203-2RSR</b>	0,087	17	40	16	0,6	–	34,4	24
<b>6303</b>	0,114	17	47	14	1	37,9	–	26,2
<b>6303-2RSR</b>	0,118	17	47	14	1	–	39,3	26,2
<b>6303-2Z</b>	0,117	17	47	14	1	–	39,3	26,2
<b>62303-2RSR</b>	0,154	17	47	19	1	–	39,3	26,2
<b>6403</b>	0,269	17	62	17	1,1	50,2	–	36,4



Seal 2Z



Mounting dimensions  
Open design

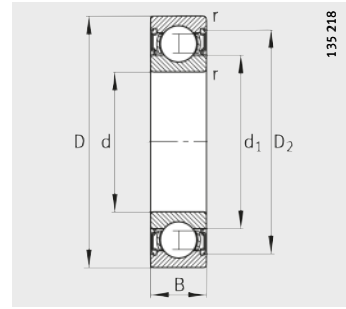
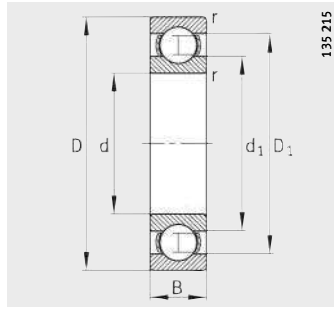


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{Or}$	$C_{Ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
19	24	0,3	1 770	930	47	30 000	17 200
19	24	0,3	1 770	930	47	15 000	–
19	24	0,3	1 770	930	47	24 000	17 200
19	28	0,3	4 600	2 550	135	28 000	18 500
19	28	0,3	4 600	2 550	135	14 000	–
19	28	0,3	4 600	2 550	135	22 000	18 500
19	33	0,3	6 000	3 250	157	28 000	17 700
19	33	0,3	6 000	3 250	157	28 000	21 000
19	33	0,3	6 000	3 250	157	14 000	–
19	33	0,3	6 000	3 250	157	22 000	21 000
21,2	35,8	0,6	9 500	4 750	275	22 000	18 100
21,2	35,8	0,6	9 500	4 750	275	12 000	–
21,2	35,8	0,6	9 500	4 750	275	18 000	18 100
21,2	35,8	0,6	9 500	4 750	280	12 000	–
22,6	41,4	1	13 400	6 550	425	30 000	15 900
22,6	41,4	1	13 400	6 550	425	11 000	–
22,6	41,4	1	13 400	6 550	425	16 000	15 900
22,6	41,4	1	13 400	6 550	425	11 000	–
26	53	1	22 400	11 400	750	28 000	13 700

# Deep groove ball bearings

Single row  
Open or sealed

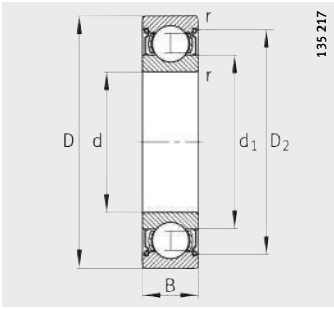


Seal 2RSR

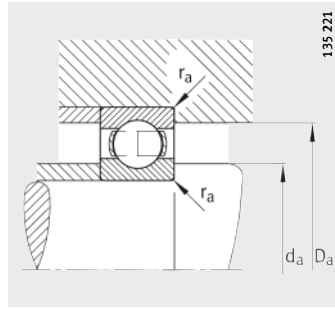
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>
					min.	≈	≈	≈
<b>61804</b>	0,018	<b>20</b>	32	7	0,3	28,1	–	24
<b>61804-2RSR</b>	0,018	<b>20</b>	32	7	0,3	–	29,2	24
<b>61804-2Z</b>	0,018	<b>20</b>	32	7	0,3	–	29,2	24
<b>61904</b>	0,037	<b>20</b>	37	9	0,3	31,8	–	25,2
<b>61904-2RSR</b>	0,037	<b>20</b>	37	9	0,3	–	33,2	25,2
<b>61904-2Z</b>	0,037	<b>20</b>	37	9	0,3	–	33,2	25,2
<b>16004</b>	0,05	<b>20</b>	42	8	0,3	34,7	–	27,2
<b>6004</b>	0,069	<b>20</b>	42	12	0,6	35,5	–	26,6
<b>6004-2RSR</b>	0,071	<b>20</b>	42	12	0,6	–	37,4	26,6
<b>6004-2Z</b>	0,071	<b>20</b>	42	12	0,6	–	37,4	26,6
<b>6204</b>	0,106	<b>20</b>	47	14	1	38,4	–	28,8
<b>6204-2RSR</b>	0,11	<b>20</b>	47	14	1	–	41	28,8
<b>6204-2Z</b>	0,11	<b>20</b>	47	14	1	–	41	28,8
<b>62204-2RSR</b>	0,139	<b>20</b>	47	18	1	–	41	28,8
<b>6304</b>	0,151	<b>20</b>	52	15	1,1	41,9	–	30,3
<b>6304-2RSR</b>	0,155	<b>20</b>	52	15	1,1	–	44,4	30,3
<b>6304-2Z</b>	0,155	<b>20</b>	52	15	1,1	–	44,4	30,3
<b>62304-2RSR</b>	0,209	<b>20</b>	52	21	1,1	–	44,4	30,3
<b>6404</b>	0,414	<b>20</b>	72	19	1,1	59,6	–	44,6

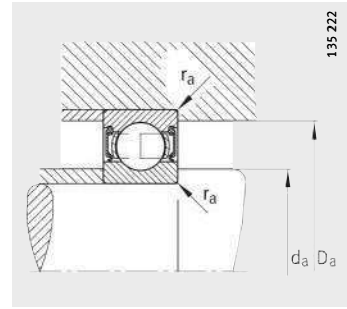




Seal 2Z



Mounting dimensions  
Open design

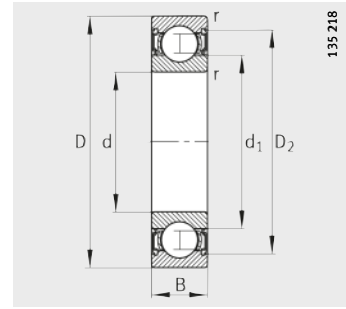
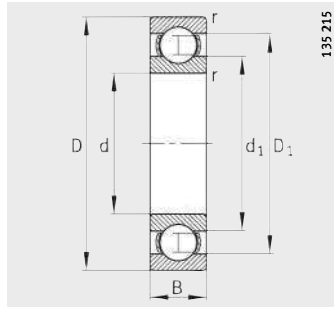


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{0r}$	$C_{Ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
22	30	0,3	3 900	2 320	117	24 000	16 600
22	30	0,3	3 900	2 320	117	11 500	–
22	30	0,3	3 900	2 320	117	19 000	16 600
22	35	0,3	6 300	3 700	191	22 000	17 000
22	35	0,3	6 300	3 700	191	11 500	–
22	35	0,3	6 300	3 700	191	18 000	17 000
22	40	0,3	6 950	4 050	202	22 000	14 300
23,2	38,8	0,6	9 300	5 000	285	20 000	18 900
23,2	38,8	0,6	9 300	5 000	285	12 000	–
23,2	38,8	0,6	9 300	5 000	285	17 000	18 900
25,6	41,4	1	12 700	6 550	440	18 000	16 300
25,6	41,4	1	12 700	6 550	440	10 000	–
25,6	41,4	1	12 700	6 550	440	15 000	16 300
25,6	41,4	1	12 700	6 550	385	10 000	–
27	45	1	16 000	7 800	530	34 000	14 400
27	45	1	16 000	7 800	530	9 500	–
27	45	1	16 000	7 800	530	14 000	14 400
27	45	1	16 000	7 800	495	9 500	–
27	65	1	29 000	16 300	1 020	24 000	12 100

# Deep groove ball bearings

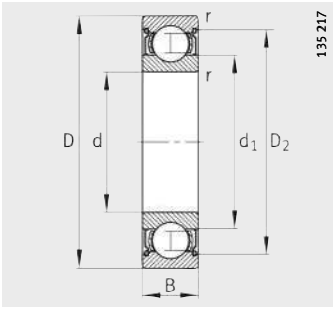
Single row  
Open or sealed



Seal 2RSR

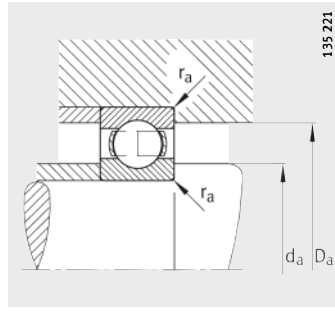
**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>
					min.	≈	≈	≈
<b>61805</b>	0,023	<b>25</b>	37	7	0,3	33,1	–	29
<b>61805-2RSR</b>	0,023	<b>25</b>	37	7	0,3	–	34,2	29
<b>61805-2Z</b>	0,023	<b>25</b>	37	7	0,3	–	34,2	29
<b>61905</b>	0,042	<b>25</b>	42	9	0,3	36,8	–	30,2
<b>61905-2RSR</b>	0,043	<b>25</b>	42	9	0,3	–	38,4	30,2
<b>61905-2Z</b>	0,043	<b>25</b>	42	9	0,3	–	38,4	30,2
<b>16005</b>	0,055	<b>25</b>	47	8	0,3	39,7	–	32,2
<b>6005</b>	0,081	<b>25</b>	47	12	0,6	40,2	–	32
<b>6005-2RSR</b>	0,085	<b>25</b>	47	12	0,6	–	42,5	32
<b>6005-2Z</b>	0,083	<b>25</b>	47	12	0,6	–	42,5	32
<b>6205</b>	0,129	<b>25</b>	52	15	1	43,6	–	33,5
<b>6205-2RSR</b>	0,133	<b>25</b>	52	15	1	–	45,4	33,5
<b>6205-2Z</b>	0,133	<b>25</b>	52	15	1	–	45,4	33,5
<b>62205-2RSR</b>	0,157	<b>25</b>	52	18	1	–	45,4	33,5
<b>6305</b>	0,234	<b>25</b>	62	17	1,1	50,2	–	36,4
<b>6305-2RSR</b>	0,242	<b>25</b>	62	17	1,1	–	52,5	36,4
<b>6305-2Z</b>	0,24	<b>25</b>	62	17	1,1	–	52,5	36,4
<b>62305-2RSR</b>	0,272	<b>25</b>	62	24	1,1	–	52,5	36,4
<b>6405</b>	0,549	<b>25</b>	80	21	1,5	65,5	–	49,3



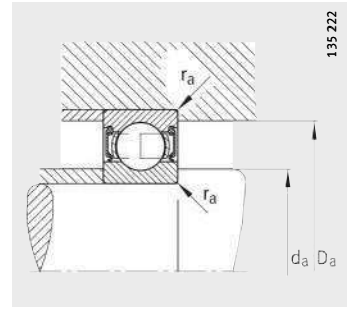
135 217

Seal 2Z



135 221

Mounting dimensions  
Open design



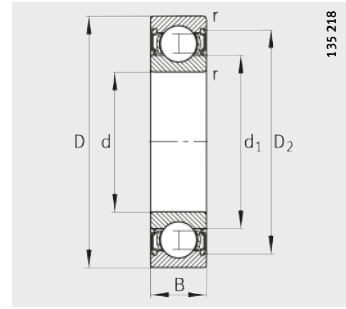
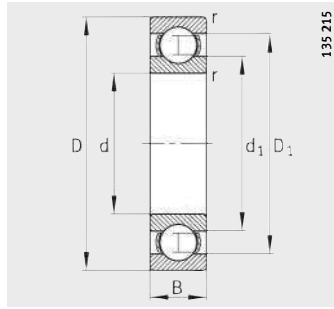
135 222

Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{0r}$	$C_{ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
27	35	0,3	4 150	2 600	132	20 000	13 500
27	35	0,3	4 150	2 600	132	9 800	–
27	35	0,3	4 150	2 600	132	17 000	13 500
27	40	0,3	6 900	4 350	219	19 000	14 000
27	40	0,3	6 900	4 350	219	9 800	–
27	40	0,3	6 900	4 350	219	16 000	14 000
27	45	0,3	7 200	4 650	215	19 000	12 000
28,2	43,8	0,6	10 000	5 850	305	36 000	15 800
28,2	43,8	0,6	10 000	5 850	305	10 000	–
28,2	43,8	0,6	10 000	5 850	305	15 000	15 800
30,6	46,4	1	14 000	7 800	510	17 000	14 400
30,6	46,4	1	14 000	7 800	510	9 000	–
30,6	46,4	1	14 000	7 800	510	14 000	14 400
30,6	46,4	1	14 000	7 800	415	9 000	–
32	55	1	22 400	11 400	750	28 000	12 300
32	55	1	22 400	11 400	750	7 500	–
32	55	1	22 400	11 400	750	11 000	12 300
32	55	1	22 400	11 400	750	7 500	–
36	71	1,5	33 500	19 000	1 250	20 000	11 000

# Deep groove ball bearings

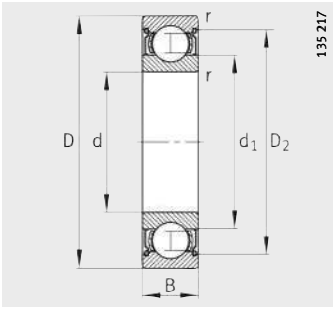
Single row  
Open or sealed



Seal 2RSR

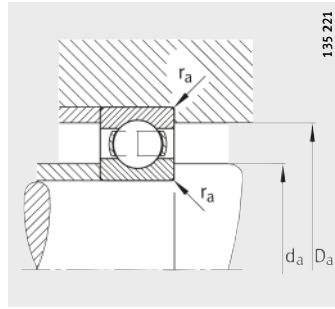
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈
<b>61806</b>	0,027	<b>30</b>	42	7	0,3	38,1	–	34
<b>61806-2RSR</b>	0,027	<b>30</b>	42	7	0,3	–	39,2	34
<b>61806-2Z</b>	0,027	<b>30</b>	42	7	0,3	–	39,2	34
<b>61906</b>	0,048	<b>30</b>	47	9	0,3	41,9	–	35,2
<b>61906-2RSR</b>	0,051	<b>30</b>	47	9	0,3	–	43,5	35,2
<b>61906-2Z</b>	0,051	<b>30</b>	47	9	0,3	–	43,5	35,2
<b>16006</b>	0,082	<b>30</b>	55	9	0,3	47,5	–	37,7
<b>6006</b>	0,122	<b>30</b>	55	13	1	47,2	–	38,3
<b>6006-2RSR</b>	0,126	<b>30</b>	55	13	1	–	49,2	38,3
<b>6006-2Z</b>	0,126	<b>30</b>	55	13	1	–	49,2	38,3
<b>6206</b>	0,195	<b>30</b>	62	16	1	52,1	–	40
<b>6206-2RSR</b>	0,201	<b>30</b>	62	16	1	–	54,9	40
<b>6206-2Z</b>	0,201	<b>30</b>	62	16	1	–	54,9	40
<b>62206-2RSR</b>	0,245	<b>30</b>	62	20	1	–	54,9	40
<b>6306</b>	0,355	<b>30</b>	72	19	1,1	59,6	–	44,6
<b>6306-2RSR</b>	0,365	<b>30</b>	72	19	1,1	–	61,6	44,6
<b>6306-2Z</b>	0,363	<b>30</b>	72	19	1,1	–	61,6	44,6
<b>62306-2RSR</b>	0,499	<b>30</b>	72	27	1,1	–	61,6	44,6
<b>6406</b>	0,74	<b>30</b>	90	23	1,5	74,6	–	55,6



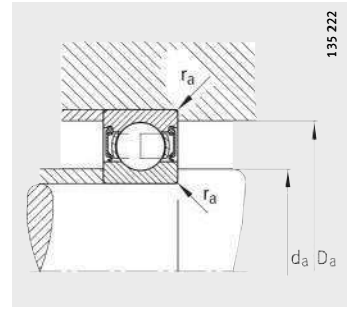
135 217

Seal 2Z



135 221

Mounting dimensions  
Open design



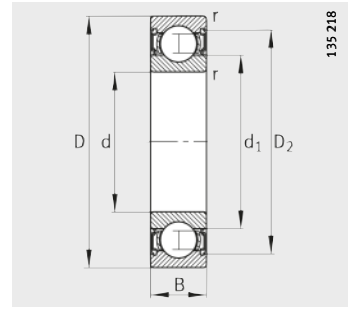
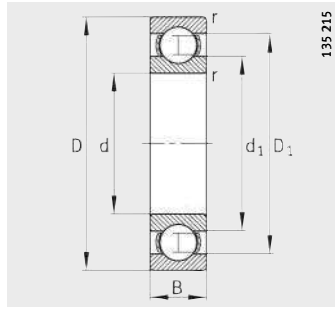
135 222

Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{0r}$	$C_{ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
32	40	0,3	4 300	2 900	249	18 000	11 300
32	40	0,3	4 300	2 900	249	8 400	–
32	40	0,3	4 300	2 900	249	15 000	11 300
32	45	0,3	7 000	4 600	231	17 000	11 900
32	45	0,3	7 000	4 600	231	8 100	–
32	45	0,3	7 000	4 600	231	14 000	11 900
32	53	0,3	11 200	7 350	365	16 000	10 400
34,6	50,4	1	12 700	8 000	390	32 000	13 600
34,6	50,4	1	12 700	8 000	390	8 500	–
34,6	50,4	1	12 700	8 000	390	13 000	13 600
35,6	56,4	1	19 300	11 200	680	14 000	12 000
35,6	56,4	1	19 300	11 200	680	7 500	–
35,6	56,4	1	19 300	11 200	680	11 000	12 000
35,6	56,4	1	19 300	11 200	680	7 500	–
37	65	1	29 000	16 300	1 020	24 000	10 800
37	65	1	29 000	16 300	1 020	6 300	–
37	65	1	29 000	16 300	1 020	9 500	10 800
37	65	1	29 000	16 300	1 020	6 300	–
39	81	1,5	42 500	25 000	1 640	18 000	10 000

# Deep groove ball bearings

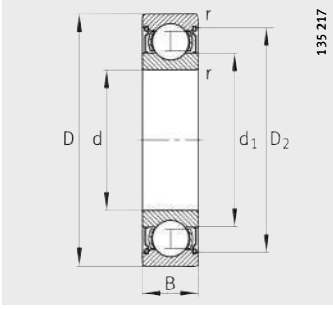
Single row  
Open or sealed



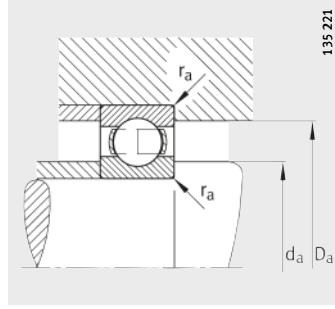
Seal 2RSR

**Dimension table** (continued) · Dimensions in mm

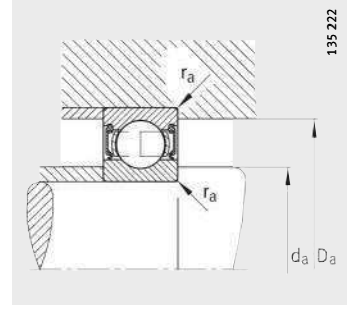
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>
					min.	≈	≈	≈
<b>61807</b>	0,03	<b>35</b>	47	7	0,3	43,1	–	39
<b>61807-2RSR</b>	0,03	<b>35</b>	47	7	0,3	–	44,3	39
<b>61807-2Z</b>	0,03	<b>35</b>	47	7	0,3	–	44,3	39
<b>61907</b>	0,076	<b>35</b>	55	10	0,6	49	–	41,1
<b>61907-2RSR</b>	0,076	<b>35</b>	55	10	0,6	–	50,6	41,1
<b>61907-2Z</b>	0,076	<b>35</b>	55	10	0,6	–	50,6	41,1
<b>16007</b>	0,105	<b>35</b>	62	9	0,3	53,5	–	43,7
<b>6007</b>	0,157	<b>35</b>	62	14	1	53,3	–	43,2
<b>6007-2RSR</b>	0,163	<b>35</b>	62	14	1	–	55,4	43,2
<b>6007-2Z</b>	0,163	<b>35</b>	62	14	1	–	55,4	43,2
<b>6207</b>	0,291	<b>35</b>	72	17	1,1	60,7	–	47,2
<b>6207-2RSR</b>	0,301	<b>35</b>	72	17	1,1	–	63,3	47,2
<b>6207-2Z</b>	0,299	<b>35</b>	72	17	1,1	–	63,3	47,2
<b>62207-2RSR</b>	0,393	<b>35</b>	72	23	1,1	–	63,3	47,2
<b>6307</b>	0,471	<b>35</b>	80	21	1,5	65,5	–	49,3
<b>6307-2RSR</b>	0,483	<b>35</b>	80	21	1,5	–	67,6	49,3
<b>6307-2Z</b>	0,481	<b>35</b>	80	21	1,5	–	67,6	49,3
<b>62307-2RSR</b>	0,687	<b>35</b>	80	31	1,5	–	67,6	49,3
<b>6407</b>	0,971	<b>35</b>	100	25	1,5	83,3	–	62



Seal 2Z



Mounting dimensions  
Open design

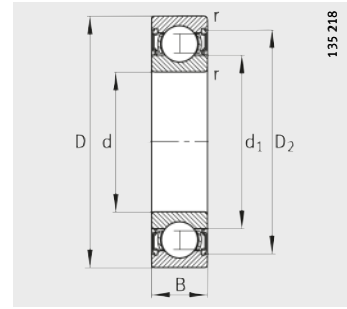
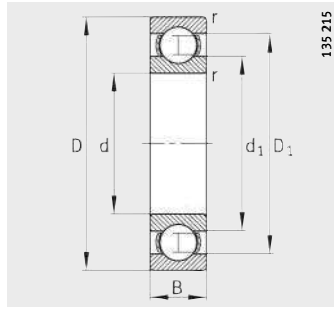


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{0r}$	$C_{Ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
37	45	0,3	4 450	3 200	285	16 000	9 600
37	45	0,3	4 450	3 200	285	7 300	–
37	45	0,3	4 450	3 200	285	13 000	9 600
38,2	51,8	0,6	9 500	6 800	325	14 000	10 500
38,2	51,8	0,6	9 500	6 800	325	6 900	–
38,2	51,8	0,6	9 500	6 800	325	11 500	10 500
37	60	0,3	12 200	8 800	415	14 000	8 900
39,6	57,4	1	16 000	10 200	550	28 000	12 100
39,6	57,4	1	16 000	10 200	550	7 500	–
39,6	57,4	1	16 000	10 200	550	11 000	12 100
42	65	1	25 500	15 300	920	24 000	10 300
42	65	1	25 500	15 300	920	6 300	–
42	65	1	25 500	15 300	920	9 500	10 300
42	65	1	25 500	15 300	920	6 300	–
44	71	1,5	33 500	19 000	1 250	20 000	9 900
44	71	1,5	33 500	19 000	1 250	5 600	–
44	71	1,5	33 500	19 000	1 250	8 500	9 900
44	71	1,5	33 500	19 000	1 250	5 600	–
46	89	1,5	53 000	31 500	2 180	16 000	8 900

# Deep groove ball bearings

Single row  
Open or sealed

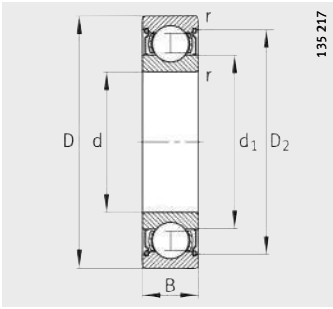


Seal 2RSR

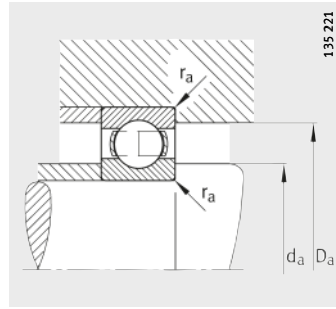
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>
					min.	≈	≈	≈
<b>61808</b>	0,032	<b>40</b>	52	7	0,3	48,2	–	44
<b>61808-2RSR</b>	0,032	<b>40</b>	52	7	0,3	–	49,5	44
<b>61808-2Z</b>	0,032	<b>40</b>	52	7	0,3	–	49,5	44
<b>61908</b>	0,11	<b>40</b>	62	12	0,6	55,3	–	46,6
<b>61908-2RSR</b>	0,11	<b>40</b>	62	12	0,6	–	56,6	46,6
<b>61908-2Z</b>	0,11	<b>40</b>	62	12	0,6	–	56,6	46,6
<b>16008</b>	0,12	<b>40</b>	68	9	0,3	59,3	–	49,4
<b>6008</b>	0,194	<b>40</b>	68	15	1	59,1	–	49,3
<b>6008-2RSR</b>	0,202	<b>40</b>	68	15	1	–	61,6	49,3
<b>6008-2Z</b>	0,2	<b>40</b>	68	15	1	–	61,6	49,3
<b>6208</b>	0,372	<b>40</b>	80	18	1,1	67,5	–	53
<b>6208-2RSR</b>	0,384	<b>40</b>	80	18	1,1	–	70,4	53
<b>6208-2Z</b>	0,382	<b>40</b>	80	18	1,1	–	70,4	53
<b>62208-2RSR</b>	0,478	<b>40</b>	80	23	1,1	–	70,4	53
<b>6308</b>	0,64	<b>40</b>	90	23	1,5	74,6	–	55,6
<b>6308-2RSR</b>	0,654	<b>40</b>	90	23	1,5	–	76,5	55,6
<b>6308-2Z</b>	0,654	<b>40</b>	90	23	1,5	–	76,5	55,6
<b>62308-2RSR</b>	0,903	<b>40</b>	90	33	1,5	–	76,5	55,6
<b>6408</b>	0,805	<b>40</b>	110	27	2	91,6	–	68

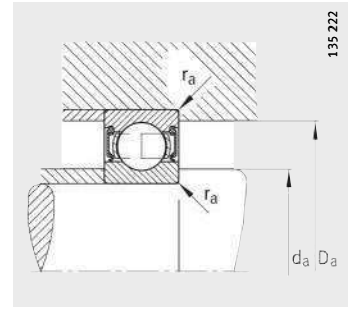




Seal 2Z



Mounting dimensions  
Open design

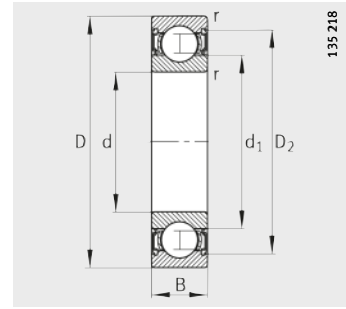
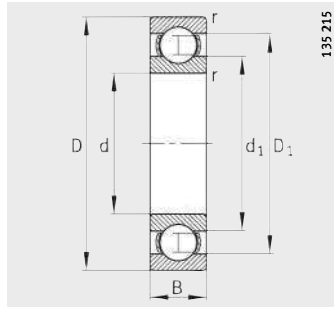


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N			
42	50	0,3	4 600	3 500	320	14 000	8 400
42	50	0,3	4 600	3 500	320	6 500	–
42	50	0,3	4 600	3 500	320	11 000	8 400
43,2	58,8	0,6	13 700	10 000	540	12 000	10 000
43,2	58,8	0,6	13 700	10 000	540	6 100	–
43,2	58,8	0,6	13 700	10 000	540	10 000	10 000
42	66	0,3	13 200	10 200	465	13 000	7 800
44,6	63,4	1	16 600	11 600	580	26 000	11 100
44,6	63,4	1	16 600	11 600	580	6 700	–
44,6	63,4	1	16 600	11 600	580	10 000	11 100
47	73	1	29 000	18 000	1 050	20 000	9 300
47	73	1	29 000	18 000	1 050	5 600	–
47	73	1	29 000	18 000	1 050	8 500	9 300
47	73	1	29 000	18 000	1 050	5 600	–
49	81	1,5	42 500	25 000	1 640	18 000	9 000
49	81	1,5	42 500	25 000	1 640	5 000	–
49	81	1,5	42 500	25 000	1 640	7 500	9 000
49	81	1,5	42 500	25 000	1 640	5 000	–
53	97	2	62 000	38 000	2 500	14 000	8 200

# Deep groove ball bearings

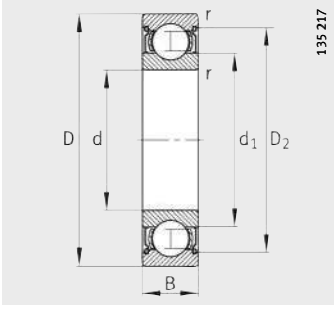
Single row  
Open or sealed



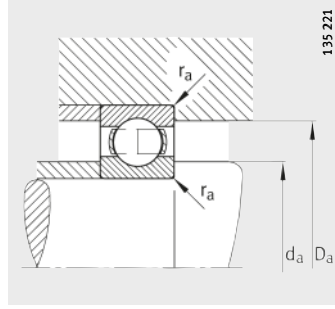
Seal 2RSR

**Dimension table** (continued) · Dimensions in mm

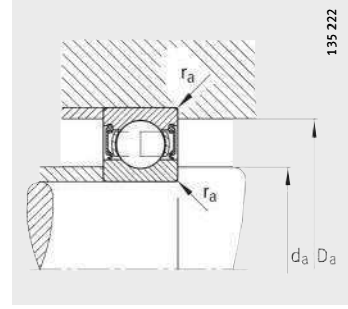
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>
					min.	≈	≈	≈
<b>61809-Y</b>	0,039	<b>45</b>	58	7	0,3	54,1	–	49,1
<b>61809-2RSR-Y</b>	0,039	<b>45</b>	58	7	0,3	–	55,4	49,1
<b>61809-2Z-Y</b>	0,039	<b>45</b>	58	7	0,3	–	55,4	49,1
<b>61909</b>	0,13	<b>45</b>	68	12	0,6	60,8	–	52,1
<b>61909-2RSR</b>	0,13	<b>45</b>	68	12	0,6	–	62,1	52,1
<b>61909-2Z</b>	0,13	<b>45</b>	68	12	0,6	–	62,1	52,1
<b>16009</b>	0,167	<b>45</b>	75	10	0,6	65,6	–	55
<b>6009</b>	0,247	<b>45</b>	75	16	1	65,5	–	54,2
<b>6009-2RSR</b>	0,257	<b>45</b>	75	16	1	–	68	54,2
<b>6009-2Z</b>	0,253	<b>45</b>	75	16	1	–	68	54,2
<b>6209</b>	0,429	<b>45</b>	85	19	1,1	71,8	–	57,2
<b>6209-2RSR</b>	0,441	<b>45</b>	85	19	1,1	–	74,6	57,2
<b>6209-2Z</b>	0,441	<b>45</b>	85	19	1,1	–	74,6	57,2
<b>62209-2RSR</b>	0,522	<b>45</b>	85	23	1,1	–	74,6	57,2
<b>6309</b>	0,849	<b>45</b>	100	25	1,5	83,3	–	62,3
<b>6309-2RSR</b>	0,867	<b>45</b>	100	25	1,5	–	85,6	62
<b>6309-2Z</b>	0,869	<b>45</b>	100	25	1,5	–	85,6	62
<b>62309-2RSR</b>	1,2	<b>45</b>	100	36	1,5	–	85,6	62
<b>6409</b>	1,98	<b>45</b>	120	29	2	100,9	–	75,5



Seal 2Z



Mounting dimensions  
Open design

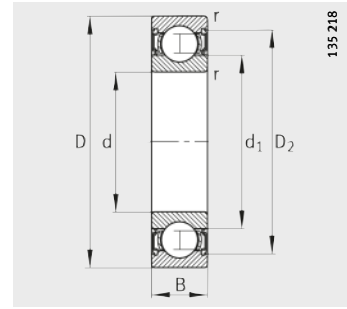
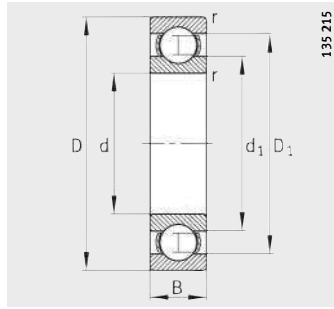


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{Or}$	$C_{Ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
47	56	0,3	6 400	5 600	285	14 000	9 000
47	56	0,3	6 400	5 600	285	7 500	–
47	56	0,3	6 400	5 600	285	11 000	9 000
48,2	64,8	0,6	14 000	10 800	570	26 000	8 900
48,2	64,8	0,6	14 000	10 800	570	6 700	–
48,2	64,8	0,6	14 000	10 800	570	10 000	8 900
48,2	71,8	0,6	15 600	12 200	580	22 000	7 300
49,6	70,4	1	20 000	14 300	730	22 000	10 200
49,6	70,4	1	20 000	14 300	730	6 000	–
49,6	70,4	1	20 000	14 300	730	9 000	10 200
52	78	1	31 000	20 400	1 150	19 000	8 700
52	78	1	31 000	20 400	1 150	5 300	–
52	78	1	31 000	20 400	1 150	8 000	8 700
52	78	1	31 000	20 400	1 150	5 300	–
54	91	1,5	53 000	31 500	2 180	16 000	8 300
54	91	1,5	53 000	31 500	2 180	4 500	–
54	91	1,5	53 000	31 500	2 180	6 700	8 300
54	91	1,5	53 000	31 500	2 180	4 500	–
58	107	2	76 500	47 500	3 050	13 000	7 600

# Deep groove ball bearings

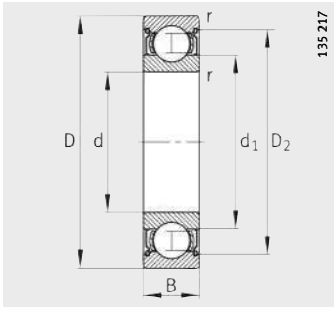
Single row  
Open or sealed



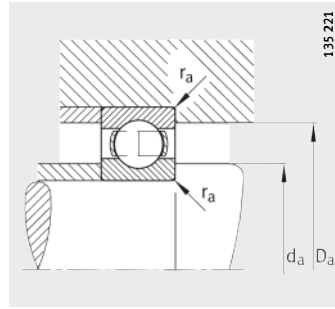
Seal 2RSR

Dimension table (continued) · Dimensions in mm

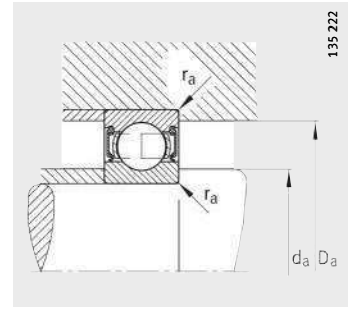
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈
61810-Y	0,052	50	65	7	0,3	60,5	–	55,1
61810-2RSR-Y	0,052	50	65	7	0,3	–	61,8	55,1
61810-2Z-Y	0,052	50	65	7	0,3	–	61,8	55,1
61910	0,13	50	72	12	0,6	65,5	–	56,6
61910-2RSR	0,13	50	72	12	0,6	–	68,6	56,6
16010	0,181	50	80	10	0,6	70,6	–	60,1
6010	0,272	50	80	16	1	70,1	–	59,8
6010-2RSR	0,283	50	80	16	1	–	72,9	59,8
6010-2Z	0,282	50	80	16	1	–	72,9	59,8
6210	0,466	50	90	20	1,1	77,9	–	62
6210-2RSR	0,48	50	90	20	1,1	–	80	62
6210-2Z	0,478	50	90	20	1,1	–	80	62
62210-2RSR	0,543	50	90	23	1,1	–	80	62
6310	1,1	50	110	27	2	91,6	–	68,3
6310-2RSR	1,12	50	110	27	2	–	95,1	68
6310-2Z	1,12	50	110	27	2	–	95,1	68
62310-2RSR	1,55	50	110	40	2	–	95,1	68,3
6410	1,96	50	130	31	2,1	108,4	–	81,6
61811-Y	0,084	55	72	9	0,3	66,5	–	60,6
61811-2RSR-Y	0,084	55	72	9	0,3	–	68,6	60,6
61811-2Z-Y	0,084	55	72	9	0,3	–	68,6	60,6
61911	0,18	55	80	13	1	72,3	–	62,6
61911-2RSR	0,18	55	80	13	1	–	74,2	62,6
16011	0,266	55	90	11	0,6	78	–	67,1
6011	0,397	55	90	18	1,1	78,9	–	66,2
6011-2RSR	0,41	55	90	18	1,1	–	81,5	66,2
6011-2Z	0,409	55	90	18	1,1	–	81,5	66,2
6211	0,618	55	100	21	1,5	86,1	–	68,9
6211-2RSR	0,632	55	100	21	1,5	–	88,2	68,7
6211-2Z	0,632	55	100	21	1,5	–	88,2	68,7
6311	1,39	55	120	29	2	100,9	–	75,5
6311-2RSR	1,43	55	120	29	2	–	104,3	75,2
6311-2Z	1,43	55	120	29	2	–	104,3	75,2
6411	1,38	55	140	33	2,1	117,5	–	88,6



Seal 2Z



Mounting dimensions  
Open design

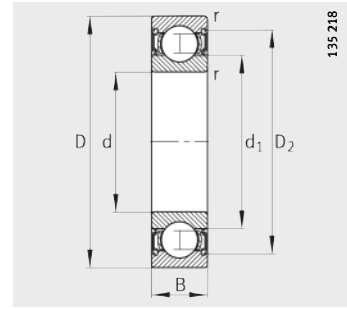
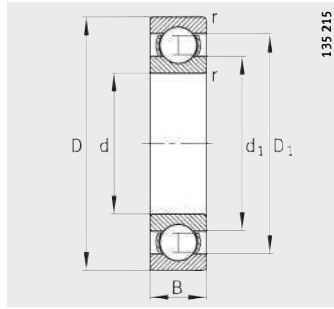


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{Or}$	$C_{Ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
52	63	0,3	6 800	6 300	265	13 000	8 000
52	63	0,3	6 800	6 300	265	6 700	–
52	63	0,3	6 800	6 300	265	9 300	8 000
53,2	68,8	0,6	14 600	11 800	600	22 000	8 100
53,2	68,8	0,6	14 600	11 800	600	6 000	–
53,2	76,8	0,6	16 000	13 200	610	20 000	6 700
54,6	75,4	1	20 800	15 600	770	20 000	9 300
54,6	75,4	1	20 800	15 600	770	5 600	–
54,6	75,4	1	20 800	15 600	770	8 500	9 300
57	83	1	36 500	24 000	1 420	18 000	8 200
57	83	1	36 500	24 000	1 420	4 800	–
57	83	1	36 500	24 000	1 420	7 500	8 200
57	83	1	36 500	24 000	1 420	4 800	–
61	99	2	62 000	38 000	2 600	14 000	7 700
61	99	2	62 000	38 000	2 600	4 000	–
61	99	2	62 000	38 000	2 600	6 000	7 700
61	99	2	62 000	38 000	2 600	4 000	–
64	116	2,1	81 500	52 000	3 400	12 000	7 200
57	70	0,3	9 000	8 500	375	11 000	8 000
57	70	0,3	9 000	8 500	375	6 000	–
57	70	0,3	9 000	8 500	375	9 000	8 000
59,6	75,4	1	16 600	14 000	700	19 000	7 500
59,6	75,4	1	16 600	14 000	700	5 600	–
58,2	86,8	0,6	19 300	16 300	780	18 000	6 200
61	84	1	28 500	21 200	1 120	18 000	8 700
61	84	1	28 500	21 200	1 120	5 000	–
61	84	1	28 500	21 200	1 120	7 500	8 300
64	91	1,5	43 000	29 000	1 720	16 000	7 500
64	91	1,5	43 000	29 000	1 720	4 300	–
64	91	1,5	43 000	29 000	1 720	6 700	7 500
66	109	2	76 500	47 500	3 050	13 000	7 100
66	109	2	76 500	47 500	3 050	3 600	–
66	109	2	76 500	47 500	3 050	5 300	7 100
69	126	2,1	93 000	60 000	3 950	11 000	6 700

# Deep groove ball bearings

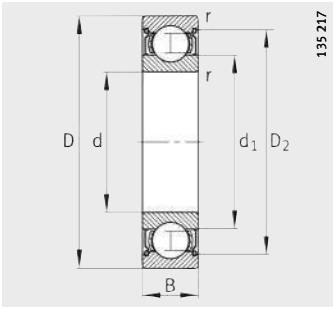
Single row  
Open or sealed



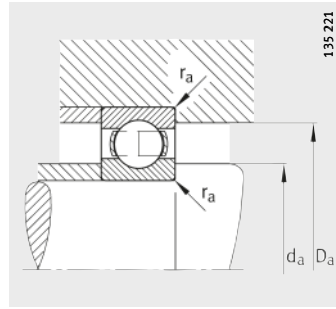
Seal 2RSR

Dimension table (continued) · Dimensions in mm

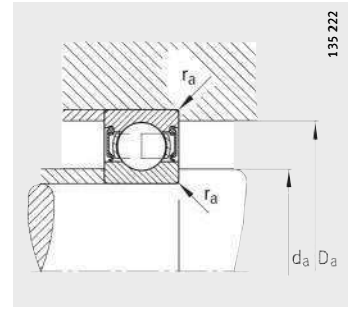
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈
61812-Y	0,105	60	78	10	0,3	72,6	–	65,6
61812-2RSR-Y	0,105	60	78	10	0,3	–	74,5	65,6
61812-2Z-Y	0,105	60	78	10	0,3	–	74,5	65,6
61912	0,19	60	85	13	1	77,3	–	67,6
61912-2RSR	0,19	60	85	13	1	–	79,2	67,6
16012	0,283	60	95	11	0,6	82,9	–	72,1
6012	0,419	60	95	18	1,1	83,9	–	71,3
6012-2RSR	0,432	60	95	18	1,1	–	86	71,3
6012-2Z	0,431	60	95	18	1,1	–	86	71,3
6212	0,791	60	110	22	1,5	95,6	–	76,1
6212-2RSR	0,809	60	110	22	1,5	–	97,7	75,8
6212-2Z	0,807	60	110	22	1,5	–	97,7	75,8
6312	1,75	60	130	31	2,1	108,4	–	81,6
6312-2RSR	1,79	60	130	31	2,1	–	113,1	81,3
6312-2Z	1,79	60	130	31	2,1	–	113,1	81,3
6412	2,83	60	150	35	2,1	126,3	–	95,1
61813-Y	0,13	65	85	10	0,6	78,6	–	71,6
61813-2RSR-Y	0,13	65	85	10	0,6	–	80,5	71,6
61813-2Z-Y	0,13	65	85	10	0,6	–	80,5	71,6
61913	0,2	65	90	13	1	82,3	–	72,6
16013	0,302	65	100	11	0,6	87,9	–	77,1
6013	0,448	65	100	18	1,1	88,8	–	76,2
6013-2RSR	0,463	65	100	18	1,1	–	91,5	76,2
6013-2Z	0,464	65	100	18	1,1	–	91,5	76,2
6213	1	65	120	23	1,5	103,1	–	82,3
6213-2RSR	1,03	65	120	23	1,5	–	106,3	82
6213-2Z	1,03	65	120	23	1,5	–	106,3	82
6313	2,14	65	140	33	2,1	117,5	–	88,6
6313-2RSR	2,18	65	140	33	2,1	–	122,2	88,3
6313-2Z	2,18	65	140	33	2,1	–	122,2	88,3
6413	3,49	65	160	37	2,1	133,2	–	101,7



Seal 2Z



Mounting dimensions  
Open design

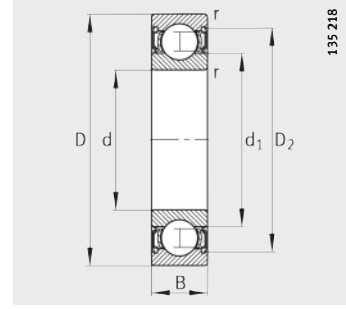
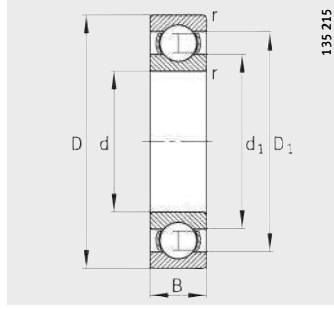


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{Or}$	$C_{Ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
62	76	0,3	11 800	11 000	485	9 500	8 000
62	76	0,3	11 800	11 000	485	5 600	–
62	76	0,3	11 800	11 000	485	8 000	8 000
64,6	80,4	1	16 300	14 300	700	18 000	6 900
64,6	80,4	1	16 300	14 300	700	5 000	–
63,2	91,8	0,6	20 000	17 600	820	17 000	5 700
66	89	1	29 000	23 200	1 190	17 000	8 000
66	89	1	29 000	23 200	1 190	4 500	–
66	89	1	29 000	23 200	1 190	7 000	8 000
69	101	1,5	52 000	36 000	2 240	14 000	6 800
69	101	1,5	52 000	36 000	2 240	4 000	–
69	101	1,5	52 000	36 000	2 240	6 000	6 800
72	118	2,1	81 500	52 000	3 400	12 000	6 700
72	118	2,1	81 500	52 000	3 400	3 400	–
72	118	2,1	81 500	52 000	3 400	5 000	6 700
74	136	2,1	104 000	68 000	4 450	10 000	6 400
68,2	81,8	0,6	12 200	12 000	520	9 000	7 000
68,2	81,8	0,6	12 200	12 000	520	5 000	–
68,2	81,8	0,6	12 200	12 000	520	7 500	7 000
69,6	85,4	1	20 000	17 600	860	17 000	6 400
68,2	96,8	0,6	21 200	19 600	910	16 000	5 300
71	94	1	30 500	25 000	1 270	15 000	7 500
71	94	1	30 500	25 000	1 270	4 300	–
71	94	1	30 500	25 000	1 270	6 300	7 500
74	111	1,5	60 000	41 500	2 550	13 000	6 300
74	111	1,5	60 000	41 500	2 550	3 600	–
74	111	1,5	60 000	41 500	2 550	5 300	6 300
77	128	2,1	93 000	60 000	3 950	11 000	6 400
77	128	2,1	93 000	60 000	3 950	3 000	–
77	128	2,1	93 000	60 000	3 950	4 500	6 400
79	146	2,1	114 000	76 500	4 650	9 500	6 100

# Deep groove ball bearings

Single row  
Open or sealed

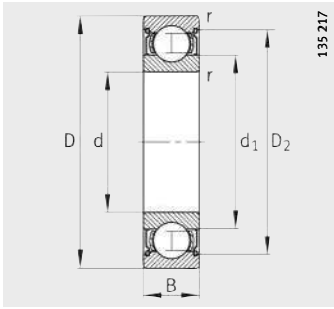


Seal 2RSR

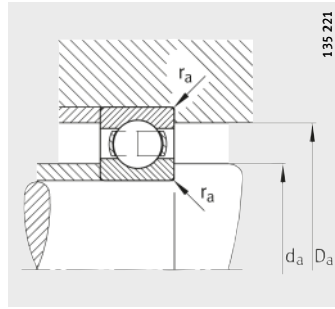
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈
<b>61814-Y</b>	0,14	<b>70</b>	90	10	0,6	83,6	–	76,6
<b>61814-2RSR-Y</b>	0,14	<b>70</b>	90	10	0,6	–	85,5	76,6
<b>61814-2Z-Y</b>	0,14	<b>70</b>	90	10	0,6	–	85,5	76,6
<b>61914</b>	0,34	<b>70</b>	100	16	1	90,9	–	79,1
<b>61914-2RSR</b>	0,34	<b>70</b>	100	16	1	–	92,8	79,1
<b>16014</b>	0,438	<b>70</b>	110	13	0,6	96,2	–	83,7
<b>6014</b>	0,622	<b>70</b>	110	20	1,1	97,3	–	82,8
<b>6014-2Z</b>	0,642	<b>70</b>	110	20	1,1	–	100	82,8
<b>6214</b>	1,09	<b>70</b>	125	24	1,5	108	–	87,1
<b>6214-2RSR</b>	1,11	<b>70</b>	125	24	1,5	–	110,7	86,8
<b>6214-2Z</b>	1,11	<b>70</b>	125	24	1,5	–	110,7	86,8
<b>6314</b>	2,55	<b>70</b>	150	35	2,1	126,3	–	95,1
<b>6314-2RSR</b>	2,6	<b>70</b>	150	35	2,1	–	130,2	94,8
<b>6314-2Z</b>	2,6	<b>70</b>	150	35	2,1	–	130,2	94,8
<b>6414</b>	5,06	<b>70</b>	180	42	3	151,6	–	114,4
<b>61815-Y</b>	0,15	<b>75</b>	95	10	0,6	88,7	–	81,6
<b>61815-2RSR-Y</b>	0,15	<b>75</b>	95	10	0,6	–	90,5	81,6
<b>61815-2Z-Y</b>	0,15	<b>75</b>	95	10	0,6	–	90,5	81,6
<b>61915</b>	0,356	<b>75</b>	105	16	1	96,2	–	84,1
<b>61915-2RSR</b>	0,356	<b>75</b>	105	16	1	–	98,2	84,1
<b>16015</b>	0,463	<b>75</b>	115	13	0,6	101,2	–	88,7
<b>6015</b>	0,654	<b>75</b>	115	20	1,1	102,6	–	88,1
<b>6015-2RSR</b>	0,678	<b>75</b>	115	20	1,1	–	105,3	88,1
<b>6015-2Z</b>	0,676	<b>75</b>	115	20	1,1	–	105,3	88,1
<b>6215</b>	1,19	<b>75</b>	130	25	1,5	112,8	–	92,5
<b>6215-2RSR</b>	1,22	<b>75</b>	130	25	1,5	–	115,5	92,1
<b>6215-2Z</b>	1,21	<b>75</b>	130	25	1,5	–	115,5	92,1
<b>6315</b>	3,18	<b>75</b>	160	37	2,1	133,2	–	101,8
<b>6315-2RSR</b>	3,18	<b>75</b>	160	37	2,1	–	137,2	101,8
<b>6315-2Z</b>	3,23	<b>75</b>	160	37	2,1	–	137,2	101,4
<b>6415-M</b>	7	<b>75</b>	190	45	3	151,6	–	114,4

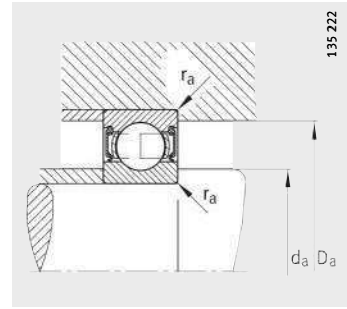




Seal 2Z



Mounting dimensions  
Open design

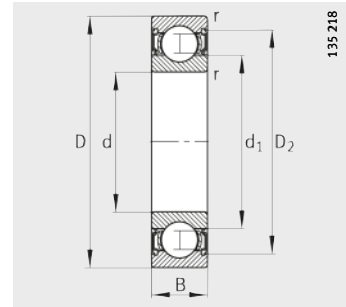
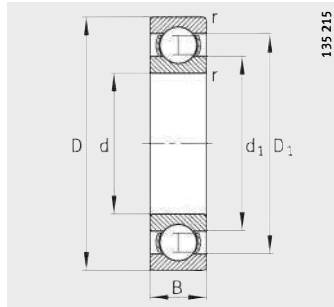


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{Or}$	$C_{Ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
73,2	86,8	0,6	12 500	12 500	540	8 500	6 700
73,2	86,8	0,6	12 500	12 500	540	4 800	–
73,2	86,8	0,6	12 500	12 500	540	7 000	6 700
74,6	95,4	1	27 000	23 200	1 160	15 000	6 400
74,6	95,4	1	27 000	23 200	1 160	4 300	–
73,2	106,8	0,6	28 000	25 000	1 230	14 000	5 300
76	104	1	38 000	31 000	1 850	14 000	7 200
76	104	1	38 000	31 000	1 850	6 000	7 200
79	116	1,5	62 000	44 000	2 900	12 000	6 100
79	116	1,5	62 000	44 000	2 900	3 400	–
79	116	1,5	62 000	44 000	2 900	5 000	6 100
82	138	2,1	104 000	68 000	4 450	10 000	6 100
82	138	2,1	104 000	68 000	4 450	2 800	–
82	138	2,1	104 000	68 000	4 450	4 300	6 100
86	164	2,5	132 000	96 500	5 800	8 500	5 700
78,2	91,8	0,6	12 900	13 400	690	8 000	6 000
78,2	91,8	0,6	12 900	13 400	690	4 500	–
78,2	91,8	0,6	12 900	13 400	690	6 700	6 000
79,6	100,4	1	24 500	22 400	1 100	14 000	6 700
79,6	100,4	1	24 500	22 400	1 100	4 000	–
78,2	111,8	0,6	28 500	27 000	1 290	13 000	4 900
81	109	1	39 000	33 500	1 960	13 000	6 700
81	109	1	39 000	33 500	1 960	3 800	–
81	109	1	39 000	33 500	1 960	5 600	6 700
84	121	1,5	65 500	49 000	3 350	11 000	5 900
84	121	1,5	65 500	49 000	3 350	3 200	–
84	121	1,5	65 500	49 000	3 350	4 800	5 900
87	148	2,1	114 000	76 500	4 650	9 500	5 800
87	148	2,1	114 000	76 500	4 650	2 600	–
87	148	2,1	114 000	76 500	4 650	4 000	5 800
91	174	2,5	132 000	96 500	5 800	8 500	5 600

# Deep groove ball bearings

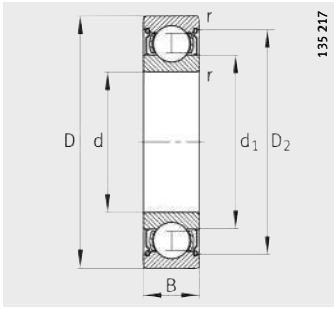
Single row  
Open or sealed



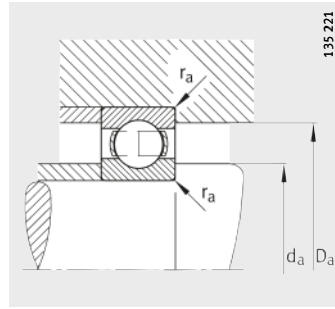
Seal 2RSR

Dimension table (continued) · Dimensions in mm

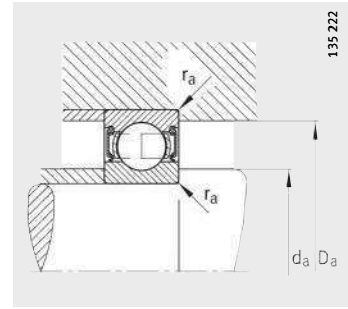
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈
<b>61816-Y</b>	0,155	<b>80</b>	100	10	0,6	93,7	–	86,6
<b>61816-2RSR-Y</b>	0,155	<b>80</b>	100	10	0,6	–	95,5	86,6
<b>61816-2Z-Y</b>	0,155	<b>80</b>	100	10	0,6	–	95,5	86,6
<b>61916</b>	0,379	<b>80</b>	110	16	1	100,8	–	89,1
<b>16016</b>	0,609	<b>80</b>	125	14	0,6	110,7	–	96,9
<b>6016</b>	0,845	<b>80</b>	125	22	1,1	111	–	94
<b>6016-2Z</b>	0,893	<b>80</b>	125	22	1,1	–	113,7	93,7
<b>6216</b>	1,46	<b>80</b>	140	26	2	121,3	–	98,8
<b>6216-2Z</b>	1,49	<b>80</b>	140	26	2	–	124,5	98,5
<b>6316</b>	3,75	<b>80</b>	170	39	2,1	141,8	–	108,6
<b>6316-2RSR</b>	3,75	<b>80</b>	170	39	2,1	–	145,5	108,6
<b>6316-2Z</b>	3,82	<b>80</b>	170	39	2,1	–	145,5	108,2
<b>6416-M</b>	8,29	<b>80</b>	200	48	3	162,1	–	117,9
<b>61817-Y</b>	0,27	<b>85</b>	110	13	1	101,7	–	93,2
<b>61817-2RSR-Y</b>	0,27	<b>85</b>	110	13	1	–	104,2	93,2
<b>61817-2Z-Y</b>	0,27	<b>85</b>	110	13	1	–	104,2	93,2
<b>16017</b>	0,666	<b>85</b>	130	14	0,6	113,8	–	101,6
<b>6017</b>	0,917	<b>85</b>	130	22	1,1	116	–	99,6
<b>6017-2RSR</b>	0,917	<b>85</b>	130	22	1,1	–	119,2	99,6
<b>6017-2Z</b>	0,94	<b>85</b>	130	22	1,1	–	119,2	99,2
<b>6217</b>	1,87	<b>85</b>	150	28	2	129,7	–	106,2
<b>6217-2RSR</b>	1,87	<b>85</b>	150	28	2	–	133,8	106,2
<b>6217-2Z</b>	1,91	<b>85</b>	150	28	2	–	133,8	106,2
<b>6317</b>	4,25	<b>85</b>	180	41	3	151,6	–	114,4
<b>6317-2RSR</b>	4,25	<b>85</b>	180	41	3	–	154,9	114,4
<b>6317-2Z</b>	4,33	<b>85</b>	180	41	3	–	154,9	114
<b>6417-M</b>	9,6	<b>85</b>	210	52	4	173	–	123,4



Seal 2Z



Mounting dimensions  
Open design

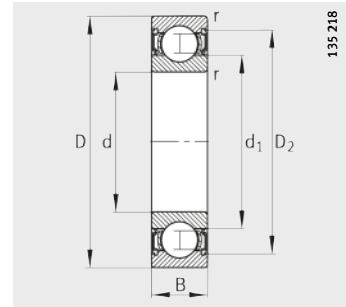
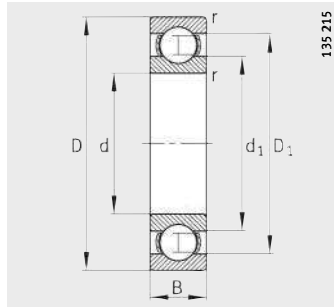


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{Or}$	$C_{Ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
83,2	96,8	0,6	12 900	13 700	600	7 500	5 600
83,2	96,8	0,6	12 900	13 700	600	4 300	–
83,2	96,8	0,6	12 900	13 700	600	6 300	5 600
84,6	105,4	1	25 000	24 000	1 160	13 000	6 300
83,2	121,8	0,6	32 000	31 000	1 510	13 000	4 700
86	119	1	47 500	40 000	2 340	12 000	6 500
86	119	1	47 500	40 000	2 340	5 000	6 500
91	129	2	72 000	54 000	3 450	11 000	5 500
91	129	2	72 000	54 000	3 450	4 500	5 500
92	158	2,1	122 000	86 500	5 200	9 000	5 500
92	158	2,1	122 000	86 500	5 200	2 600	–
92	158	2,1	122 000	86 500	5 200	3 800	5 500
96	184	2,5	163 000	125 000	6 900	7 500	5 400
89,6	105,4	1	19 300	20 000	960	6 700	6 000
89,6	105,4	1	19 300	20 000	960	3 800	–
89,6	105,4	1	19 300	20 000	960	5 600	6 000
88,2	126,8	0,6	34 000	33 500	1 570	12 000	4 400
91	124	1	49 000	43 000	2 430	11 000	6 100
91	124	1	49 000	43 000	2 430	3 200	–
91	124	1	49 000	43 000	2 430	4 800	6 100
96	139	2	83 000	64 000	4 050	10 000	5 300
96	139	2	83 000	64 000	4 050	2 800	–
96	139	2	83 000	64 000	4 050	4 300	5 300
99	166	2,5	132 000	96 500	5 800	8 000	5 300
99	166	2,5	132 000	96 500	5 800	2 400	–
99	166	2,5	132 000	96 500	5 800	3 400	5 300
105	190	3	173 000	137 000	7 500	7 000	5 300

# Deep groove ball bearings

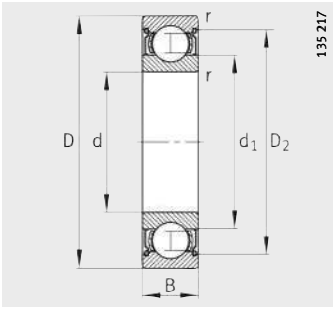
Single row  
Open or sealed



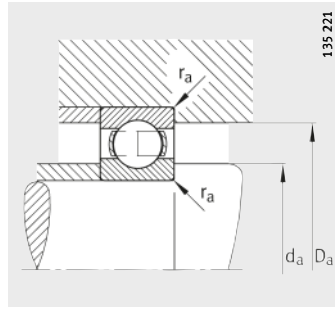
Seal 2RSR

Dimension table (continued) · Dimensions in mm

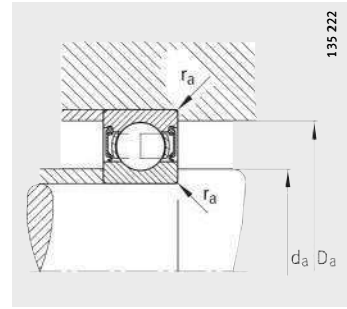
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈
<b>61818-Y</b>	0,28	<b>90</b>	115	13	1	106,7	–	98,2
<b>61818-2RSR-Y</b>	0,28	<b>90</b>	115	13	1	–	109,2	98,2
<b>61818-2Z-Y</b>	0,28	<b>90</b>	115	13	1	–	109,2	98,2
<b>16018</b>	0,866	<b>90</b>	140	16	1	122,7	–	107,6
<b>6018</b>	1,21	<b>90</b>	140	24	1,5	123,7	–	106,6
<b>6018-2RSR</b>	1,21	<b>90</b>	140	24	1,5	–	126,8	106,6
<b>6018-2Z</b>	1,23	<b>90</b>	140	24	1,5	–	126,8	106,2
<b>6218</b>	2,21	<b>90</b>	160	30	2	139,4	–	112,3
<b>6218-2RSR</b>	2,21	<b>90</b>	160	30	2	–	143,4	112,3
<b>6218-2Z</b>	2,26	<b>90</b>	160	30	2	–	143,4	112,3
<b>6318</b>	5,43	<b>90</b>	190	43	3	157,1	–	123,8
<b>6318-2RSR</b>	5,43	<b>90</b>	190	43	3	–	160,7	123,8
<b>6318-2Z</b>	5,53	<b>90</b>	190	43	3	–	160,7	123,3
<b>6418-M</b>	11,7	<b>90</b>	225	54	4	184	–	132,2
<b>61819-Y</b>	0,295	<b>95</b>	120	13	1	112	–	103,2
<b>61819-2RSR-Y</b>	0,295	<b>95</b>	120	13	1	–	114,2	103,2
<b>61819-2Z-Y</b>	0,295	<b>95</b>	120	13	1	–	114,2	103,2
<b>16019</b>	0,922	<b>95</b>	145	16	1	128,3	–	113,8
<b>6019</b>	1,27	<b>95</b>	145	24	1,5	129	–	111
<b>6019-2RSR</b>	1,27	<b>95</b>	145	24	1,5	–	131,8	111
<b>6219</b>	2,73	<b>95</b>	170	32	2,1	146,6	–	118,3
<b>6219-2RSR</b>	2,73	<b>95</b>	170	32	2,1	–	150,9	118,3
<b>6219-2Z</b>	2,79	<b>95</b>	170	32	2,1	–	150,9	118,3
<b>6319</b>	6,23	<b>95</b>	200	45	3	166,9	–	129,1
<b>6319-2Z</b>	7,14	<b>95</b>	200	45	3	–	170,4	128,7



Seal 2Z



Mounting dimensions  
Open design

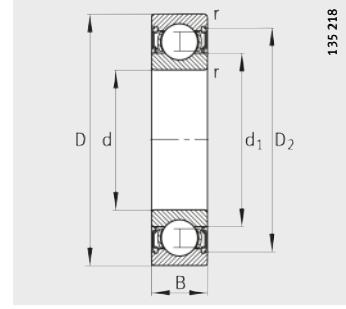
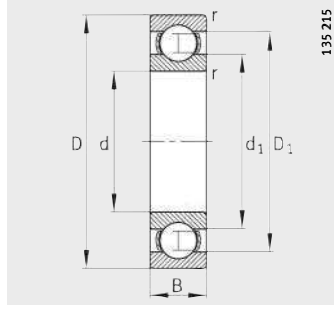


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{or}$	$C_{ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
94,6	110,4	1	19 600	20 400	990	6 300	5 600
94,6	110,4	1	19 600	20 400	990	3 600	–
94,6	110,4	1	19 600	20 400	990	5 300	5 600
94,6	135,4	1	41 500	39 000	1 870	11 000	4 400
97	133	1,5	58 500	50 000	2 650	11 000	6 000
97	133	1,5	58 500	50 000	2 650	3 000	–
97	133	1,5	58 500	50 000	2 650	4 500	6 000
101	149	2	96 500	72 000	4 200	9 000	5 100
101	149	2	96 500	72 000	4 200	2 600	–
101	149	2	96 500	72 000	4 200	3 800	5 100
104	176	2,5	134 000	102 000	5 800	8 000	5 100
104	176	2,5	134 000	102 000	5 800	2 200	–
104	176	2,5	134 000	102 000	5 800	3 400	5 100
110	205	3	196 000	163 000	8 900	6 700	4 900
99,6	115,4	1	20 000	21 200	1 100	6 300	5 300
99,6	115,4	1	20 000	21 200	1 100	3 400	–
99,6	115,4	1	20 000	21 200	1 100	5 300	5 300
99,6	140,4	1	40 000	40 500	1 990	11 000	4 200
102	138	1,5	60 000	54 000	2 800	10 000	5 800
102	138	1,5	60 000	54 000	2 800	2 800	–
107	158	2,1	108 000	81 500	4 700	8 500	4 950
107	158	2,1	108 000	81 500	4 700	2 400	–
107	158	2,1	108 000	81 500	4 700	3 600	4 950
109	186	2,5	146 000	114 000	6 400	7 500	4 950
109	186	2,5	146 000	114 000	6 400	3 200	4 950

# Deep groove ball bearings

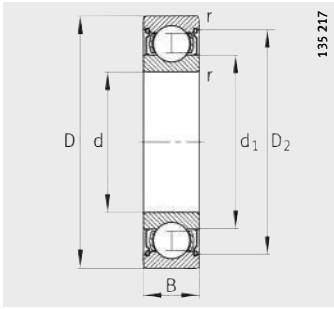
Single row  
Open or sealed



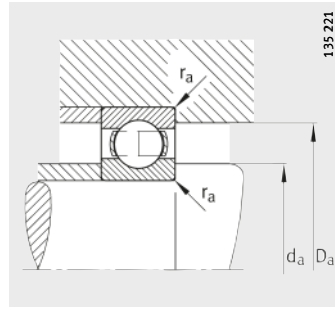
Seal 2RSR

Dimension table (continued) · Dimensions in mm

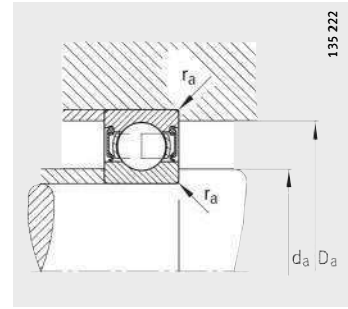
Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈
<b>61820-Y</b>	0,31	<b>100</b>	125	13	1	116,7	–	108,2
<b>61820-2RSR-Y</b>	0,31	<b>100</b>	125	13	1	–	119,2	108,2
<b>61820-2Z-Y</b>	0,31	<b>100</b>	125	13	1	–	119,2	108,2
<b>16020</b>	0,956	<b>100</b>	150	16	1	132,7	–	117,6
<b>6020</b>	1,32	<b>100</b>	150	24	1,5	134	–	116,6
<b>6020-2RSR</b>	1,32	<b>100</b>	150	24	1,5	–	137,3	116,6
<b>6020-2Z</b>	1,35	<b>100</b>	150	24	1,5	–	137,3	116,2
<b>6220</b>	3,3	<b>100</b>	180	34	2,1	154,8	–	124,7
<b>6220-2RSR</b>	3,3	<b>100</b>	180	34	2,1	–	158,9	124,7
<b>6220-2Z</b>	3,36	<b>100</b>	180	34	2,1	–	158,9	124,7
<b>6320</b>	7,67	<b>100</b>	215	47	3	179	–	138,6
<b>6320-2Z</b>	7,78	<b>100</b>	215	47	3	–	184,6	138,1
<b>61821-Y</b>	0,33	<b>105</b>	130	13	1	121,7	–	113,2
<b>61821-2RSR-Y</b>	0,33	<b>105</b>	130	13	1	–	124,2	113,2
<b>61821-2Z-Y</b>	0,33	<b>105</b>	130	13	1	–	124,2	113,2
<b>16021</b>	1,24	<b>105</b>	160	18	1	141,2	–	124,2
<b>6021</b>	1,67	<b>105</b>	160	26	2	142,4	–	122,1
<b>6021-2Z</b>	1,7	<b>105</b>	160	26	2	–	145,3	121,7
<b>6221</b>	3,88	<b>105</b>	190	36	2,1	163,2	–	131,9
<b>6221-2Z</b>	3,99	<b>105</b>	190	36	2,1	–	168,1	131,5
<b>6321</b>	8,7	<b>105</b>	225	49	3	187	–	144,5
<b>61822-Y</b>	0,5	<b>110</b>	140	16	1	130,3	–	119,7
<b>61822-2RSR-Y</b>	0,5	<b>110</b>	140	16	1	–	133,3	119,7
<b>61822-2Z-Y</b>	0,5	<b>110</b>	140	16	1	–	133,3	119,7
<b>16022</b>	1,52	<b>110</b>	170	19	1	149,5	–	130,7
<b>6022</b>	2,06	<b>110</b>	170	28	2	150,9	–	129,2
<b>6022-2RSR</b>	2,06	<b>110</b>	170	28	2	–	155	129,2
<b>6022-2Z</b>	2,11	<b>110</b>	170	28	2	–	155	128,7
<b>6222</b>	4,64	<b>110</b>	200	38	2,1	171,6	–	138,5
<b>6222-2Z</b>	4,8	<b>110</b>	200	38	2,1	–	177,2	138
<b>6322</b>	10,3	<b>110</b>	240	50	3	197,4	–	153,4
<b>6322-2RSR</b>	10,3	<b>110</b>	240	50	3	–	203,1	153,4
<b>6322-2Z</b>	10,5	<b>110</b>	240	50	3	–	203,1	152,9



Seal 2Z



Mounting dimensions  
Open design

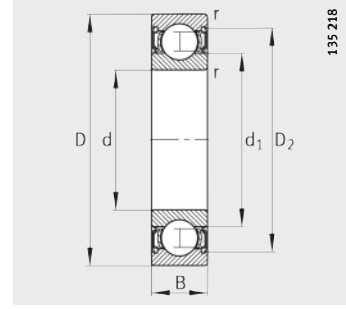
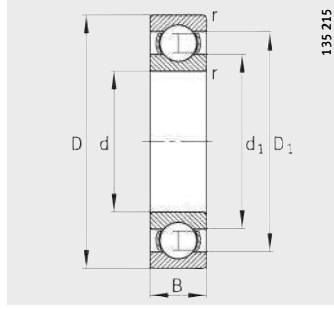


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{Or}$	$C_{Ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
104,6	120,4	1	20 000	22 000	1 010	6 000	5 000
104,6	120,4	1	20 000	22 000	1 010	3 400	–
104,6	120,4	1	20 000	22 000	1 010	5 000	5 000
104,6	145,4	1	44 000	44 000	1 990	10 000	4 000
107	143	1,5	60 000	54 000	2 700	9 500	5 400
107	143	1,5	60 000	54 000	2 700	2 800	–
107	143	1,5	60 000	54 000	2 700	4 000	5 400
112	168	2,1	122 000	93 000	5 400	8 000	4 800
112	168	2,1	122 000	93 000	5 400	2 400	–
112	168	2,1	122 000	93 000	5 400	3 400	4 800
114	201	2,5	163 000	134 000	7 400	7 000	4 650
114	201	2,5	163 000	134 000	7 400	3 000	4 650
109,6	125,4	1	20 800	23 600	1 060	5 600	4 800
109,6	125,4	1	20 800	23 600	1 060	3 200	–
109,6	125,4	1	20 800	23 600	1 060	4 800	4 800
109,6	155,4	1	54 000	54 000	2 390	9 500	3 950
113,8	151,2	2	71 000	64 000	3 100	9 000	5 300
113,8	151,2	2	71 000	64 000	3 100	3 800	5 300
117	178	2,1	132 000	104 000	5 700	7 500	4 650
117	178	2,1	132 000	104 000	5 700	3 200	4 650
119	211	2,5	173 000	146 000	7 500	6 700	4 500
114,6	135,4	1	28 000	30 500	1 320	5 000	5 000
114,6	135,4	1	28 000	30 500	1 320	3 000	–
114,6	135,4	1	28 000	30 500	1 320	4 300	5 000
114,6	165,4	1	57 000	57 000	2 800	9 000	3 850
118,8	161,2	2	80 000	71 000	3 450	8 500	5 200
118,8	161,2	2	80 000	71 000	3 450	2 400	–
118,8	161,2	2	80 000	71 000	3 450	3 600	5 200
122	188	2,1	143 000	116 000	6 300	7 000	4 550
122	188	2,1	143 000	116 000	6 300	3 000	4 550
124	226	2,5	190 000	166 000	8 600	6 300	4 150
124	226	2,5	190 000	166 000	8 600	1 800	–
124	226	2,5	190 000	166 000	8 600	2 600	4 150

# Deep groove ball bearings

Single row  
Open or sealed

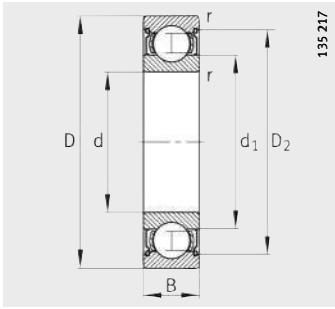


Seal 2RSR

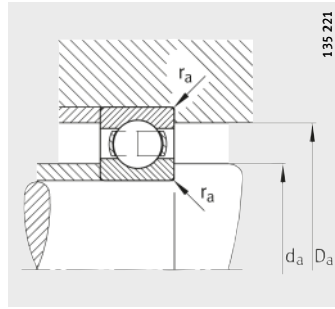
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈
61824-Y	0,55	120	150	16	1	140,6	–	129,7
61824-2Z-Y	0,55	120	150	16	1	–	143,3	129,7
16024	1,62	120	180	19	1	159,5	–	140,7
6024	2,18	120	180	28	2	161,2	–	139,9
6024-2RSR	2,18	120	180	28	2	–	165,4	139,9
6024-2Z	2,23	120	180	28	2	–	165,4	139,4
6224	5,62	120	215	40	2,1	184,9	–	151,6
6224-2Z	5,62	120	215	40	2,1	–	190,5	151,6
6324	12,8	120	260	55	3	214,9	–	165,1
61826	0,803	130	165	18	1,1	153,8	–	141,3
16026	2,41	130	200	22	1,1	176,7	–	154,7
6026	3,42	130	200	33	2	177,9	–	153,3
6026-2RSR	3,42	130	200	33	2	–	182,1	153,3
6026-2Z	3,4	130	200	33	2	–	182,1	152,9
6226	6,24	130	230	40	3	198,6	–	161,4
6226-2Z	6,24	130	230	40	3	–	203,5	161,4
6326-M	18,3	130	280	58	4	231,2	–	178,9
61828-Y	0,86	140	175	18	1,1	163,7	–	151,3
16028	2,55	140	210	22	1,1	186,6	–	164,8
6028	3,57	140	210	33	2	187,5	–	162,3
6028-2Z	3,65	140	210	33	2	–	191,3	161,9
6228	8,07	140	250	42	3	213,7	–	175,9
6328-M	22,3	140	300	62	4	248,7	–	191,3
61830	1,16	150	190	20	1,1	177,9	–	162,7
16030	3,17	150	225	24	1,1	199,6	–	176
6030	4,32	150	225	35	2,1	201,4	–	174,4
6230	10,3	150	270	45	3	229,1	–	191,6
6330-M	26,5	150	320	65	4	266,1	–	205,6
61832	1,26	160	200	20	1,1	187,3	–	172,7
16032	3,8	160	240	25	1,5	212,4	–	187,3
6032-M	6,16	160	240	38	2,1	214,6	–	186,2
6032-2RSR	6,16	160	240	38	2,1	–	219,7	186,2
6232-M	14,7	160	290	48	3	244,8	–	205
6332-M	31,8	160	340	68	4	280,9	–	219,7

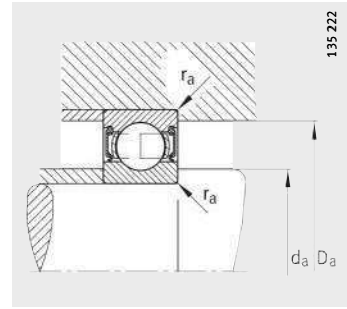




Seal 2Z



Mounting dimensions  
Open design

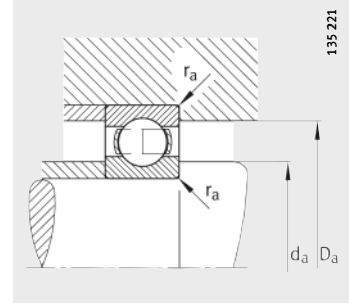
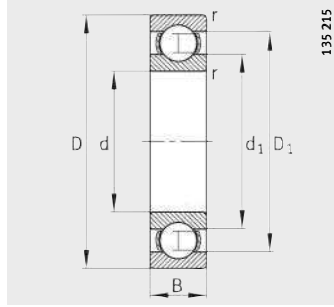


Mounting dimensions  
Sealed design

Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{Or}$	$C_{Ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
124,6	145,4	1	29 000	32 500	1 370	4 800	4 500
124,6	145,4	1	29 000	32 500	1 370	4 000	4 500
124,6	175,4	1	61 000	64 000	3 000	8 000	3 550
128,8	171,2	2	83 000	78 000	3 550	8 000	4 750
128,8	171,2	2	83 000	78 000	3 550	2 200	–
128,8	171,2	2	83 000	78 000	3 550	3 400	4 750
132	203	2,1	146 000	122 000	6 200	6 700	4 300
132	203	2,1	146 000	122 000	6 200	2 800	4 300
134	246	2,5	212 000	190 000	9 000	6 000	3 850
136	159	1	38 000	43 000	1 690	8 500	4 500
136	194	1	78 000	81 500	3 650	7 500	3 450
138,8	191,2	2	106 000	100 000	4 850	7 000	4 650
138,8	191,2	2	106 000	100 000	4 850	2 000	–
138,8	191,2	2	106 000	100 000	4 850	3 000	4 650
144	216	2,5	166 000	146 000	7 500	6 300	3 900
144	216	2,5	166 000	146 000	7 500	2 600	3 900
147	263	3	228 000	216 000	9 800	5 600	3 500
146	169	1	39 000	46 500	1 750	4 000	4 000
146	204	1	80 000	86 500	3 700	7 000	3 200
148,8	201,2	2	108 000	108 000	4 950	6 700	4 350
148,8	201,2	2	108 000	108 000	4 950	2 800	4 350
154	236	2,5	176 000	166 000	8 100	6 000	3 600
157	283	3	255 000	245 000	11 100	5 300	3 250
156	184	1	51 000	60 000	2 420	7 500	4 000
156	219	1	91 500	98 000	3 650	6 700	3 100
160,2	214,8	2,1	122 000	125 000	5 400	6 300	3 850
164	256	2,5	176 000	170 000	7 800	5 600	3 350
167	303	3	280 000	290 000	13 100	4 800	3 000
166	194	1	52 000	62 000	2 430	7 000	3 800
167	233	1,5	102 000	114 000	4 600	6 300	2 950
170,2	229,8	2,1	134 000	137 000	5 800	6 300	3 750
170,2	229,8	2,1	134 000	137 000	5 800	1 700	–
174	276	2,5	200 000	204 000	8 900	5 600	3 100
177	323	3	300 000	325 000	14 000	4 300	2 800

# Deep groove ball bearings

Single row  
Open



Mounting dimensions

Dimension table (continued) · Dimensions in mm

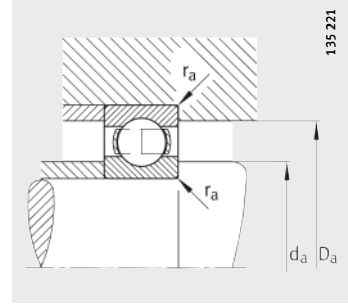
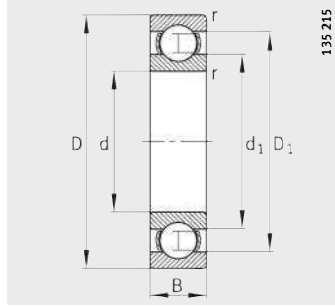
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D <sub>1</sub> ≈	d <sub>1</sub> ≈
61834	1,64	170	215	22	1,1	200,8	184,9
16034	5,15	170	260	28	1,5	228,6	202,3
6034	7,13	170	260	42	2,1	231,2	199,4
6234-M	18,3	170	310	52	4	260,7	219,1
6334-M	37,3	170	360	72	4	298	232,6
61836	1,77	180	225	22	1,1	211,4	194,4
16036	6,92	180	280	31	2	238,8	211,9
6036-M	10,6	180	280	46	2,1	249,3	211,8
6236-M	19	180	320	52	4	272	228,7
6336-M	43	180	380	75	4	317	245,2
61838	2,24	190	240	24	1,5	223,8	206,1
16038	7,04	190	290	31	2	255,1	225,8
6038-M	11,3	190	290	46	2,1	257,9	222,6
6238-M	22,6	190	340	55	4	291,5	239,9
6338-M	50,4	190	400	78	5	330,5	260,2
61840	2,31	200	250	24	1,5	234,4	216,2
16040	9	200	310	34	2	276,4	244,5
6040-M	14,4	200	310	51	2,1	276,3	234,8
6240-M	27	200	360	58	4	306,5	254,9
6340-M	56,6	200	420	80	5	345,9	274,7
61844	2,6	220	270	24	1,5	254,4	236,1
16044	11,8	220	340	37	2,1	298,1	262,8
6044-M	18,8	220	340	56	3	303,1	258,1
6244-M	37,9	220	400	65	4	337,6	282,2
6344-M	73,7	220	460	88	5	383	299,4
61848	3,93	240	300	28	2	280,7	260
16048	12,7	240	360	37	2,1	317,4	283,1
6048-M	20,5	240	360	56	3	321,9	278,8
6248-M	51,3	240	440	72	4	369,6	309,9
6348-M	96,4	240	500	95	5	411,3	328,7
61852	4,23	260	320	28	2	300,7	279,6
16052	19,1	260	400	44	3	351,2	310
6052-M	29,8	260	400	65	4	357	304,6
6252-M	68,4	260	480	80	5	402,4	337,3



Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{or}$ N			
176	209	1	61 000	73 500	2 850	6 700	3 600
177	253	1,5	122 000	137 000	5 400	6 000	2 850
180,2	249,8	2,1	170 000	173 000	7 400	5 600	3 550
187	293	3	212 000	224 000	9 400	5 300	2 950
187	343	3	325 000	365 000	14 700	4 000	2 600
186	219	1	62 000	76 500	2 850	6 300	3 400
188,8	271,2	2	132 000	146 000	5 200	5 600	2 800
190,2	269,8	2,1	190 000	200 000	8 200	5 600	3 300
197	303	3	224 000	245 000	10 300	4 800	2 750
197	363	3	355 000	405 000	16 300	3 800	2 440
197	233	1,5	69 500	85 000	3 300	6 000	3 200
198,8	281,2	2	150 000	166 000	6 300	5 300	2 650
200,2	279,8	2,1	196 000	212 000	8 500	5 300	3 150
207	323	3	255 000	280 000	11 600	4 300	2 600
210	380	4	375 000	440 000	17 500	3 600	2 300
207	243	1,5	69 500	88 000	3 350	6 000	3 000
208,8	301,2	2	176 000	204 000	7 300	4 800	2 550
210,2	299,8	2,1	216 000	245 000	9 600	4 800	3 000
217	343	3	270 000	310 000	12 400	4 000	2 430
220	400	4	380 000	465 000	18 000	3 400	2 170
227	263	1,5	73 500	96 500	3 550	5 600	2 600
230,2	329,8	2,1	200 000	240 000	8 400	4 300	2 310
232,4	327,6	2,5	245 000	290 000	11 100	4 000	2 700
237	383	3	300 000	355 000	13 500	3 600	2 200
240	440	4	440 000	560 000	20 000	3 200	1 960
248,8	291,2	2	91 500	120 000	4 200	4 800	2 400
250,2	349,8	2,1	204 000	255 000	8 500	3 800	2 100
252,4	347,6	2,5	255 000	315 000	11 400	3 800	2 450
257	423	3	360 000	475 000	16 700	3 400	1 980
260	480	4	465 000	620 000	21 800	3 000	1 800
268,8	311,2	2	96 500	132 000	4 550	4 300	2 200
272,4	387,6	2,5	236 000	310 000	9 900	3 600	1 960
274,6	385,4	3	300 000	390 000	13 300	3 400	2 260
280	460	4	405 000	560 000	19 200	3 000	1 820

# Deep groove ball bearings

Single row  
Open



Mounting dimensions

Dimension table (continued) · Dimensions in mm

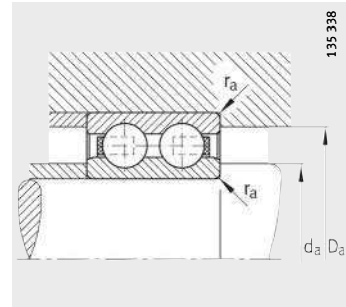
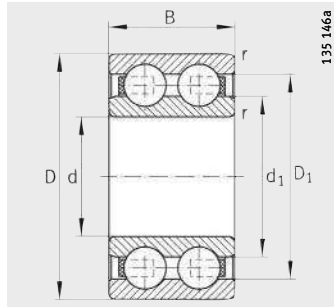
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D <sub>1</sub> ≈	d <sub>1</sub> ≈
<b>61856</b>	6,34	<b>280</b>	350	33	2	328,1	302,7
<b>16056-M</b>	23,2	<b>280</b>	420	44	3	370,6	329,9
<b>6056-M</b>	31,7	<b>280</b>	420	65	4	377,5	324,1
<b>6256-M</b>	72,9	<b>280</b>	500	80	5	423	356,7
<b>61860-M</b>	8,97	<b>300</b>	380	38	2,1	354,7	326,2
<b>16060-M</b>	32,6	<b>300</b>	460	50	4	404	357,3
<b>6060-M</b>	44,5	<b>300</b>	460	74	4	410,8	350,8
<b>61864-M</b>	11,3	<b>320</b>	400	38	2,1	373,8	347
<b>16064-M</b>	34,9	<b>320</b>	480	50	4	423,1	377,7
<b>6064-M</b>	47,4	<b>320</b>	480	74	4	430,8	370,9
<b>61868-M</b>	12	<b>340</b>	420	38	2,1	394,2	366,7
<b>16068-M</b>	47,5	<b>340</b>	520	57	4	457,1	403,6
<b>6068-M</b>	63,2	<b>340</b>	520	82	5	469,6	402,3
<b>61872-M</b>	12,8	<b>360</b>	440	38	2,1	413	387,7
<b>16072-M</b>	49,4	<b>360</b>	540	57	4	478,1	423,5
<b>6072-M</b>	66,2	<b>360</b>	540	82	5	489	423,7
<b>61876-M</b>	20,6	<b>380</b>	480	46	2,1	445,9	414,1
<b>16076-M</b>	51,7	<b>380</b>	560	57	4	498	443,5
<b>61880-M</b>	21,5	<b>400</b>	500	46	2,1	467,3	433,7
<b>61884-M</b>	22,8	<b>420</b>	520	46	2,1	485,8	454,3
<b>61888-M</b>	23,8	<b>440</b>	540	46	2,1	505,9	474,2
<b>61892-M</b>	35,8	<b>460</b>	580	56	3	540,9	500,2
<b>61896-M</b>	37,3	<b>480</b>	600	56	3	560,9	520,3
<b>618/500-M</b>	38,7	<b>500</b>	620	56	3	580,9	540,4
<b>618/530-M</b>	41,3	<b>530</b>	650	56	3	610,8	570,4
<b>618/560-M</b>	35,1	<b>560</b>	680	56	3	640,7	600,4
<b>618/600-M</b>	54,2	<b>600</b>	730	60	3	687,8	643,6
<b>618/630-M</b>	75,9	<b>630</b>	780	69	4	730,5	681,1
<b>618/670-M</b>	80,4	<b>670</b>	820	69	4	770,3	721,1
<b>618/710-M</b>	96	<b>710</b>	870	74	4	818,9	762,7
<b>618/750-M</b>	114	<b>750</b>	920	78	5	864,9	806,7
<b>618/800-M</b>	136	<b>800</b>	980	82	5	921,8	860
<b>618/850-M</b>	144	<b>850</b>	1 030	82	5	971,9	910



Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{Or}$	$C_{ur}$	$n_G$	$n_B$
min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
288,8	341,2	2	129 000	176 000	5 800	3 800	2 000
292,4	407,6	2,5	240 000	325 000	10 100	3 400	1 800
294,6	405,4	3	320 000	440 000	14 400	3 400	2 060
291	489	4	425 000	600 000	20 300	3 000	1 690
310,2	369,8	2,1	153 000	204 000	6 300	3 600	2 000
314,6	445,4	3	300 000	430 000	12 700	3 200	1 670
314,6	445,4	3	365 000	510 000	16 700	3 000	1 930
330,2	389,8	2,1	156 000	220 000	6 500	3 400	1 710
334,6	465,4	3	305 000	455 000	13 000	3 000	1 550
334,6	465,4	3	380 000	560 000	17 400	3 000	1 790
350,2	409,8	2,1	156 000	220 000	6 600	3 200	1 590
354,6	505,4	3	355 000	550 000	17 800	2 800	1 460
358	502	4	440 000	695 000	20 800	2 800	1 660
370,2	429,8	2,1	160 000	236 000	6 900	3 200	1 480
374,6	525,4	3	365 000	585 000	15 700	2 800	1 370
378	522	4	455 000	735 000	21 500	2 600	1 560
390,2	469,8	2,1	220 000	320 000	8 900	3 000	1 430
394,6	545,4	3	375 000	620 000	16 100	2 600	1 290
410,2	489,8	2,1	220 000	335 000	8 800	2 800	1 300
430,2	509,8	2,1	224 000	345 000	9 200	2 800	1 260
450,2	529,8	2,1	228 000	355 000	9 400	2 600	1 190
472,4	567,6	2,5	290 000	480 000	12 000	2 400	1 170
492,4	587,6	2,5	290 000	500 000	12 100	2 200	1 110
512,4	607,6	2,5	300 000	510 000	12 300	2 000	1 060
542,4	637,6	2,5	305 000	550 000	12 800	2 000	980
572,4	667,6	2,5	310 000	560 000	12 800	1 900	930
612,4	717,6	2,5	355 000	670 000	15 000	1 800	850
644,6	765,4	3	400 000	780 000	17 500	1 600	830
684,6	805,4	3	405 000	815 000	17 700	1 500	760
724,6	855,4	3	465 000	980 000	20 000	1 400	720
768	902	4	510 000	1 120 000	22 600	1 300	680
818	962	4	550 000	1 270 000	23 800	1 300	630
868	1 012	4	560 000	1 290 000	23 900	1 200	580

# Deep groove ball bearings

Double row



Mounting dimensions

Dimension table - Dimensions in mm

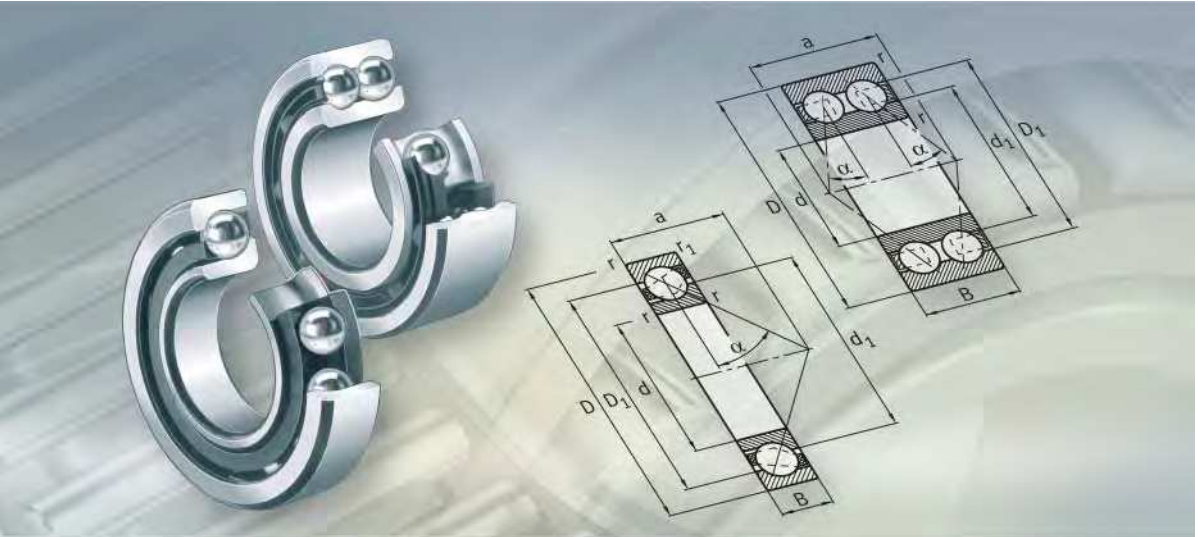
Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D <sub>1</sub> ≈	d <sub>1</sub> ≈
4200-B-TVH	0,054	10	30	14	0,6	23,9	16,6
4201-B-TVH	0,057	12	32	14	0,6	25,9	18,6
4202-B-TVH	0,065	15	35	14	0,6	28,9	21,6
4302-B-TVH	0,116	15	42	17	1	33,5	24,2
4203-B-TVH	0,098	17	40	16	0,6	33,2	24
4303-B-TVH	0,16	17	47	19	1	39,1	28,7
4204-B-TVH	0,143	20	47	18	1	39,5	30,2
4304-B-TVH	0,211	20	52	21	1,1	43,1	31,5
4205-B-TVH	0,166	25	52	18	1	44	34,7
4305-B-TVH	0,336	25	62	24	1,1	51,7	38,4
4206-B-TVH	0,467	30	62	20	1	52,5	41,3
4306-B-TVH	0,51	30	72	27	1,1	61,1	46,6
4207-B-TVH	0,407	35	72	23	1,1	60,1	47,7
4307-B-TVH	0,758	35	80	31	1,5	66,9	49,2
4208-B-TVH	0,545	40	80	23	1,1	66,6	54,2
4308-B-TVH	1,03	40	90	33	1,5	75,5	55,7
4209-B-TVH	0,592	45	85	23	1,1	71,6	59,2
4309-B-TVH	1,23	45	100	36	1,5	86,8	66,7
4210-B-TVH	0,587	50	90	23	1,1	77,6	65,2
4310-B-TVH	1,62	50	110	40	2	96,2	73,6
4211-B-TVH	0,86	55	100	25	1,5	84,7	71,4
4311-B-TVH	2,06	55	120	43	2	105,3	80,4
4212-B-TVH	1,09	60	110	28	1,5	95,3	79,8
4312-B-TVH	2,51	60	130	46	2,1	113,8	87,7
4213-B-TVH	1,6	65	120	31	1,5	101,9	84,2
4214-B-TVH	1,7	70	125	31	1,5	109,4	91,7
4215-B-TVH	1,72	75	130	31	1,5	115,4	97,7
4216-B-TVH	2,14	80	140	33	2	124	105,2
4217-B-TVH	2,7	85	150	36	2	132,8	112,7
4218-B-TVH	3,7	90	160	40	2	140,2	117,6



Mounting dimensions			Basic load ratings		Fatigue limit load	Limiting speed
d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>
min.	max.	max.	N	N	N	min <sup>-1</sup>
14,2	25,8	0,6	9 150	5 200	315	24 000
16,2	27,8	0,6	9 300	5 500	330	20 000
19,2	30,8	0,6	10 400	6 700	370	18 000
20,6	36,4	1	14 600	9 150	550	17 000
21,2	35,8	0,6	14 600	9 500	550	17 000
22,6	41,4	1	19 600	13 200	770	15 000
25,6	41,4	1	18 000	12 700	690	14 000
27	45	1	23 200	16 000	940	13 000
30,6	46,4	1	19 300	14 600	740	12 000
32	55	1	31 500	22 400	1 330	10 000
35,6	56,4	1	26 000	20 800	1 170	9 500
37	65	1	40 000	30 500	1 840	8 500
42	65	1	32 000	26 000	1 460	8 500
44	71	1,5	51 000	38 000	2 260	8 000
47	73	1	34 000	30 000	1 570	7 500
49	81	1,5	63 000	48 000	2 900	7 000
52	78	1	36 000	33 500	1 690	7 000
54	91	1,5	72 000	60 000	3 600	6 000
57	83	1	37 500	36 500	1 810	6 300
61	99	2	90 000	75 000	4 450	5 300
64	91	1,5	36 500	43 000	2 260	5 600
66	109	2	104 000	90 000	5 400	5 000
69	101	1,5	57 000	58 500	2 850	5 000
72	118	2,1	120 000	106 000	6 200	4 500
74	111	1,5	67 000	67 000	3 350	4 800
79	116	1,5	69 500	73 500	3 600	4 500
84	121	1,5	73 500	80 000	3 750	4 300
91	129	2	80 000	90 000	4 350	4 000
96	139	2	93 000	106 000	5 100	3 800
101	149	2	112 000	122 000	5 900	3 600







## Angular contact ball bearings

Single row  
Double row

# Angular contact ball bearings

<b>X-life</b> <b>Single row angular contact ball bearings</b>	..... 260
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In single row angular contact ball bearings, the raceways are arranged such that the forces are transmitted from one raceway to the other at a specific contact angle (oblique to the radial plane).

The axial load carrying capacity increases with the contact angle. Due to the large contact angle, single row angular contact ball bearings are more suitable than deep groove ball bearings for supporting large axial forces acting in one direction.

Single row angular contact ball bearings can support radial loads and unilateral axial loads. They are adjusted against a second bearing that provides counter guidance.

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<b>Double row angular contact ball bearings</b>	..... 280
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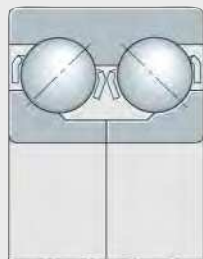
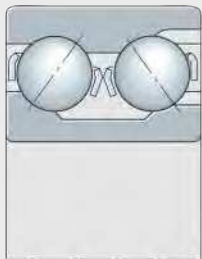
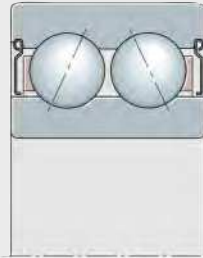
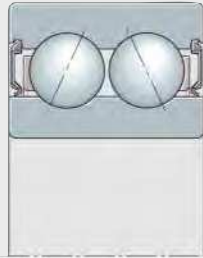
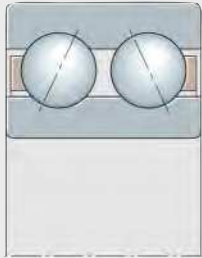
Double row angular contact ball bearings are similar in design to a pair of single row angular contact ball bearings in an O arrangement. In this case, the apexes of the cones formed by the ball contact lines point outwards.

Double row bearings can support high radial forces as well as axial forces in both directions and are particularly suitable for rigid axial guidance arrangements.

Depending on the series, the bearings are designed with or without filling slots.

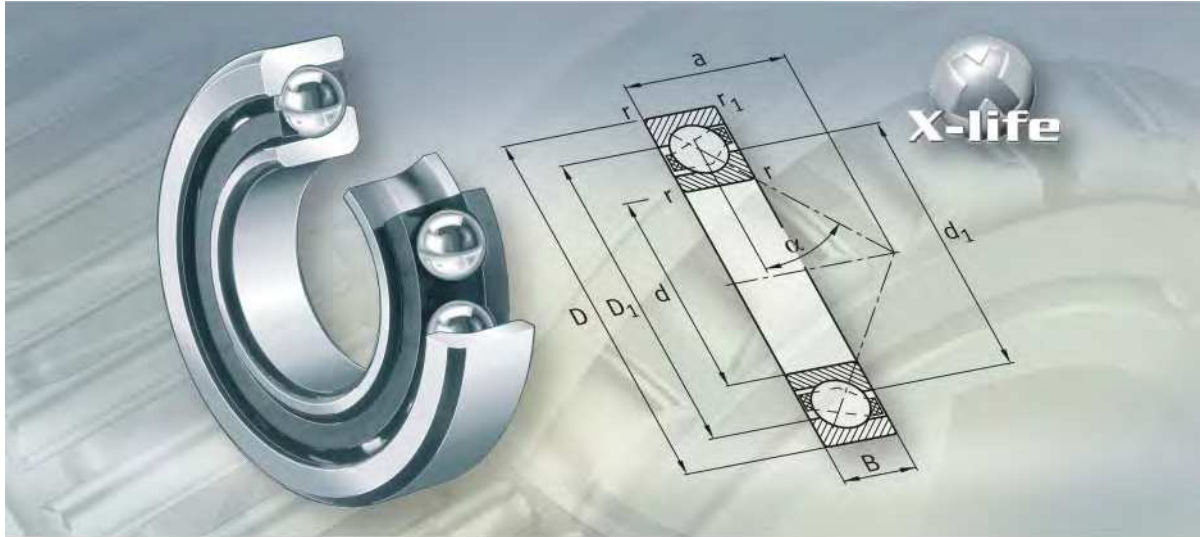


135 320



135 321

**FAG**



**Single row angular contact ball bearings**

# Single row angular contact ball bearings

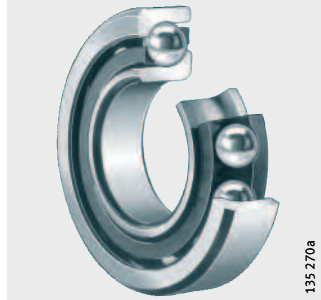


	Page
<b>Product overview</b>	Single row angular contact ball bearings ..... 262
<b>Features</b>	X-life ..... 263
	Radial and axial load capacity..... 263
	Operating temperature ..... 264
	Cages..... 264
	Suffixes..... 265
<b>Design and safety guidelines</b>	Calculation of axial force ..... 266
	Equivalent dynamic bearing load ..... 267
	Equivalent static bearing load..... 268
	Basic dynamic and static load ratings for bearing pairs ..... 268
	Minimum radial load ..... 268
	Speeds..... 268
	Design of bearing arrangements ..... 269
<b>Accuracy</b>	Tolerances for universal designs and for matched bearings ..... 269
	Axial internal clearance and preload ..... 270
<b>Dimension tables</b>	Angular contact ball bearings, single row, open or sealed..... 272
	Angular contact ball bearings, single row, open..... 276

## Product overview    Single row angular contact ball bearings

### Single row

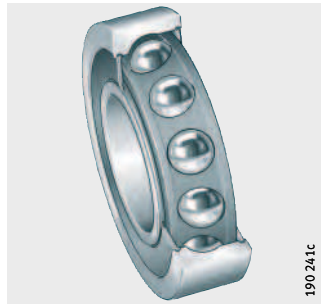
718..-B, 70..-B, 72..-B,  
73..-B



135 270a

### Lip seals

70..-B-2RS, 72..-B-2RS,  
73..-B-2RS



190 241c

# Single row angular contact ball bearings



**Features** Single row angular contact ball bearings are self-retaining units with solid inner and outer rings and ball and cage assemblies with polyamide, sheet metal or brass cages. The raceways of the inner and outer rings are offset from each other along the bearing axis. The bearings are available in open and sealed designs. Their angular adjustment facility is very limited.

**X-life** Many sizes of angular contact ball bearings are classified as X-life products. These bearings are indicated in the dimension tables. Bearings of X-life quality have an improved raceway geometry and optimised surfaces. This gives a significant increase in the fatigue limit load of the bearings. When calculating the expanded adjusted rating life, values up to 50% higher are achieved. In certain applications, this means that a smaller bearing arrangement can be designed.

**Radial and axial load capacity** Single row angular contact ball bearings can support axial forces in one direction and high radial forces. They must be axially adjusted against a second bearing fitted in a mirror image arrangement. The axial load carrying capacity is dependent on the contact angle; i.e. the larger the angle, the higher the load to which the bearing can be subjected. Due to the contact angle of 40°, these bearings can support high axial loads.

**Universal design** Single row angular contact ball bearings of universal design have the suffix UA, UL or UO and are intended for fitting in pairs in an X, O or tandem arrangement or fitting in groups. These bearings can be fitted in any arrangement required. For tandem arrangements, pay attention to the guidelines in the section Design of bearing arrangements, page 269. The suffix UA indicates small axial internal clearance, the suffix UL indicates slight preload and the suffix UO indicates freedom from clearance in an X or O arrangement. When ordering bearings, the total quantity of bearings must be stated, not the number of bearing pairs or bearing groups.

**Matched bearings** Sets without an intermediate ring are available in an O arrangement (DB), X arrangement (DF) or tandem arrangement (DT). When ordering bearings, the number of sets must be stated, not the number of single bearings.

**Sealing** Bearings with the suffix 2RS have lip seals on both sides. Contact RS seals are suitable for giving protection against dust, contamination and damp atmospheres.

**Lubrication** Bearings with lip seals on both sides are greased with a high quality grease and are lubricated for life. Open bearings and bearings with seals on one side are not greased. They can be lubricated with grease or oil.

# Single row angular contact ball bearings

## Operating temperature

Open angular contact ball bearings can be used at operating temperatures from  $-30\text{ °C}$  to  $+150\text{ °C}$ .

Bearings with a diameter  $D > 240\text{ mm}$  are dimensionally stable up to  $+200\text{ °C}$ .



Angular contact ball bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to  $+120\text{ °C}$ , restricted by the cage material.

Sealed bearings are suitable for operating temperatures from  $-30\text{ °C}$  to  $+110\text{ °C}$ , restricted by the lubricant and the seal material.

## Cages

Angular contact ball bearings with solid cages made from glass fibre reinforced polyamide have the suffix TVP or TVH.

Solid brass cages have the suffix MP.

The bearings are also available with universally applicable sheet steel window cages (suffix JP).



Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

## Cage and bore code

Series	Solid window cage made from polyamide <sup>1)</sup>	Solid window cage made from brass <sup>1)</sup>	Sheet steel cage <sup>1)</sup>
	Bore code		
718..-B	06 to 16	–	–
70..-B	All	–	–
72..-B	up to 20, 22 to 26	21, from 28	up to 22
73..-B	up to 20, 22 to 26	21, from 28	up to 22

<sup>1)</sup> Other cage designs are available by agreement.

With such cages, suitability for high speeds and high temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.





## Suffixes Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
B	Modified internal construction	Standard
JP	Sheet steel cage	
MP	Solid brass cage	
DB	Two angular contact ball bearings in O arrangement, matched clearance-free	Special design, available by agreement
DF	Two angular contact ball bearings in X arrangement, matched clearance-free	
DT	Two angular contact ball bearings in tandem arrangement, matched	
TVH TVP	Solid cage made from glass fibre reinforced polyamide	Standard
UA	Universal design for fitting in pairs, bearing pair has small axial internal clearance in O and X arrangement	
UL	Universal design for fitting in pairs, bearing pair has slight preload in O and X arrangement	
UO	Universal design for fitting in pairs, bearing pair is clearance-free in O and X arrangement	
P5	Bearing in tolerance class P5	Special design, available by agreement
2RS	Contact seals on both sides	Standard

# Single row angular contact ball bearings

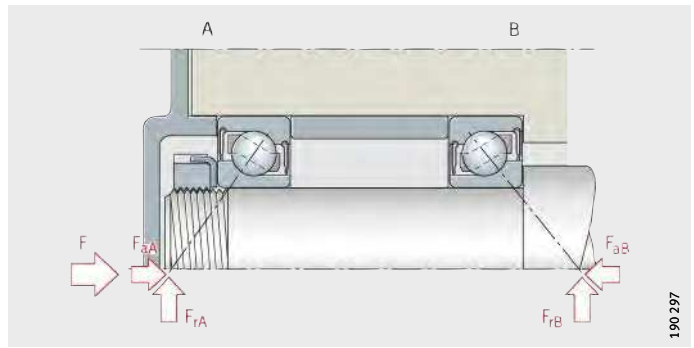
## Design and safety guidelines Calculation of axial force

Under radial load, an internal axial force is induced in the bearing that must be supported by a second bearing and taken into consideration when calculating the equivalent bearing load. Depending on the bearing arrangement (O or X arrangement), the axial force must first be determined for bearings adjusted clearance-free without preload, see Load ratio and axial bearing load, page 267 and *Figure 1, Figure 2*.

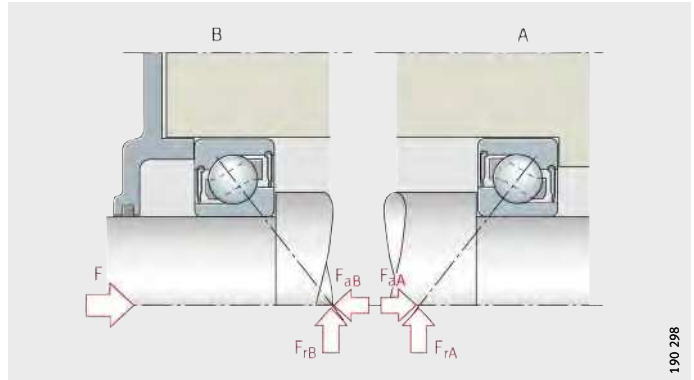
The following preconditions apply:

- The radial forces act at the central contact points and are positive
- Bearing A is subjected to a radial load  $F_{rA}$ , bearing B to  $F_{rB}$
- $F$  is an external axial force acting on bearing A.

*Figure 1*  
Bearings in O arrangement



*Figure 2*  
Bearings in X arrangement





## Load ratio and axial bearing load

Load ratio <sup>3)</sup>		Axial force $F_a$ <sup>1)3)</sup>	
Radial bearing load	External axial force	Bearing A	Bearing B
$\frac{F_{rA}}{Y_A} \leq \frac{F_{rB}}{Y_B}$	$F \geq 0$	$F_a = F + 0,5 \cdot \frac{F_{rB}}{Y_B}$	2)
$\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$	$F > 0,5 \cdot \left( \frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B} \right)$	$F_a = F + 0,5 \cdot \frac{F_{rB}}{Y_B}$	2)
	$F \leq 0,5 \cdot \left( \frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B} \right)$	2)	$F_a = 0,5 \cdot \frac{F_{rA}}{Y_A} - F$

- 1) Axial force  $F_a$ , to be used in calculation of the equivalent dynamic bearing load.
- 2) If no formula is given, the axial force is not taken into consideration.
- 3) For bearings of series 718..-B, 70..-B, 72..-B and 73..-B, the axial load component factor for  $Y = 0,57$  is used in the formulae.

## Equivalent dynamic bearing load

Contact angle  $40^\circ$

For bearings under dynamic loading, the following applies:

Bearing arrangement	Load ratio	Equivalent dynamic bearing load
Single bearing <sup>1)</sup>	$\frac{F_a}{F_r} \leq 1,14$	$P = F_r$
	$\frac{F_a}{F_r} > 1,14$	$P = 0,35 \cdot F_r + 0,57 \cdot F_a$
Bearing pair in O or X arrangement	$\frac{F_a}{F_r} \leq 1,14$	$P = F_r + 0,55 \cdot F_a$
	$\frac{F_a}{F_r} > 1,14$	$P = 0,57 \cdot F_r + 0,93 \cdot F_a$

- 1) Calculation of axial force for single bearings, see table Load ratio and axial bearing load.

$P$  N  
 Equivalent dynamic bearing load for combined load  
 $F_a$  N  
 Axial dynamic bearing load  
 $F_r$  N  
 Radial dynamic bearing load.

# Single row angular contact ball bearings

## Equivalent static bearing load

Contact angle 40°

For bearings under static loading, the following applies:

Bearing arrangement	Load ratio	Equivalent static load
Single bearing	$\frac{F_{0a}}{F_{0r}} \leq 1,9$	$P_0 = F_{0r}$
	$\frac{F_{0a}}{F_{0r}} > 1,9$	$P_0 = 0,5 \cdot F_{0r} + 0,26 \cdot F_{0a}$
Bearing pair in O or X arrangement	–	$P_0 = F_{0r} + 0,52 \cdot F_{0a}$

$P_0$  N  
Equivalent static bearing load for combined load

$F_{0a}$  N  
Axial static bearing load

$F_{0r}$  N  
Radial static bearing load.

## Basic dynamic and static load ratings for bearing pairs

If two bearings of the same size and design are fitted immediately adjacent to each other in an O or X arrangement, the basic dynamic load rating  $C_r$  and basic static load rating  $C_{0r}$  of the bearing pair are as follows:

- $C_r = 1,625 \cdot C_{r \text{ single bearing}}$
- $C_{0r} = 2 \cdot C_{0r \text{ single bearing}}$

## Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of  $P/C_r > 0,01$  is necessary for ball bearings with cage.

## Speeds

For greased and sealed bearings, the speeds are lower than in the case of unsealed bearings.



The limiting speeds  $n_G$  given in the dimension tables must not be exceeded.

## Bearings in universal design

Bearings with the suffix UA, UL or UO can be used in an X, O or tandem arrangement. The operating speed of the bearing pair is then approximately 20% below the calculated permissible operating speed of the single bearing.

The limiting speed  $n_G$  is possible if the less favourable thermal balance of the bearing pair is taken into consideration.



**Design of bearing arrangements**  
**Shaft and housing tolerances**

Recommended shaft tolerances for radial bearings with cylindrical bore, see tables, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

**Mounting dimensions**

The bearing tables give the maximum dimension of the radii  $r_a$  and  $r_{a1}$  and the diameters of the abutment shoulders  $D_a$ ,  $D_b$  and  $d_a$ .

**Fitting in tandem arrangement**



If single row angular contact bearings are fitted in a tandem arrangement, it must be ensured that the end faces of the outer rings in contact with each other have sufficient overlap. If in doubt, please contact the Schaeffler engineering service.

**Accuracy**

The main dimensions of the bearings conform to DIN 628-1.

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

**Tolerances for universal designs and for matched bearings**

Angular contact ball bearings of the universal designs UA, UL or UO are available not only in the normal tolerance (no tolerance suffix) but also by agreement in the tolerance class P5 (suffix P5-UL or P5-UA).

The following exceptions apply: bore tolerances for bearings of all tolerance classes uniformly to P5 (no special suffix), width tolerances for universal bearings and matched bearings, see table.

**Tolerance for ring width**

Bore d mm		Width deviation			
		$\Delta_{Bs}$ $\mu\text{m}$		P5	
over	incl.	min.	max.	min.	max.
–	50	0	–250	0	–250
50	80	0	–380	0	–250
80	120	0	–380	0	–380
120	180	0	–500	0	–380
180	315	0	–500	0	–500

# Single row angular contact ball bearings

## Axial internal clearance and preload

Axial internal clearance or preload of series 70...-B, 72...-B and 73...-B of universal design, in pairs in an X or O arrangement, see table.

The axial internal clearance or freedom from clearance do not apply to fitted bearing pairs. If rigid fits are used, this leads to reduced axial internal clearance or increased preload of the bearing pair.

## Axial internal clearance and preload

Bore code	Axial internal clearance or preload of bearing pair Nominal dimension $\mu\text{m}$						Preload $F_{V \max}$ N		
	UA	UO	UL			UL			
	70B, 72B, 73B	70B	72B	73B		70B	72B	73B	
	Tolerance classes						Tolerance class		
	PN, P6, P5	P5	P5	P5		P5	P5	P5	
00	22	0	-	-3	-	-	38	-	
01	24	0	-	-4	-5	-	53	82	
02	24	0	-	-4	-5	-	62	99	
03	24	0	-	-4	-6	-	77	123	
04	28	0	-4	-5	-6	103	103	146	
05	34	0	-4	-4	-6	115	112	200	
06	34	0	-5	-5	-7	141	157	250	
07	40	0	-5	-6	-7	172	208	300	
08	40	0	-5	-6	-8	200	246	385	
09	44	0	-	-6	-9	-	277	462	
10	44	0	-	-6	-10	-	288	535	
11	46	0	-	-7	-10	-	358	600	
12	46	0	-	-7	-10	-	431	692	
13	46	0	-	-8	-11	-	492	785	
14	50	0	-	-8	-11	-	535	877	
15	50	0	-	-8	-12	-	523	977	
16	50	0	-	-8	-12	-	615	1077	
17	54	0	-	-8	-13	-	692	1154	
18	54	0	-	-9	-13	-	815	1231	
19	54	0	-	-10	-14	-	892	1331	
20	54	0	-	-11	-14	-	992	1485	
21	58	0	-	-11	-14	-	1 100	1 538	
22	58	0	-	-12	-15	-	1 177	1 723	
24	58	0	-	-12	-16	-	1 277	1 923	
26	60	0	-	-12	-17	-	1 431	2 115	
28	60	0	-	-12	-17	-	1 508	2 308	
30	60	0	-	-13	-18	-	1 723	2 500	
32	60	0	-	-13	-18	-	1 815	2 769	
34	70	0	-	-14	-19	-	2 038	3 115	



**Tolerances for axial internal clearance or preload**

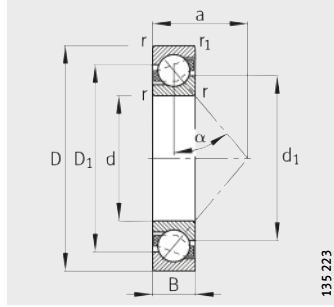
Tolerances for axial internal clearance or preload of pairs of angular contact ball bearings of universal design in X or O arrangement before fitting.

**Tolerances**

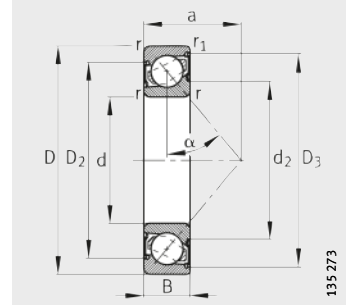
Bore code	Series 70B, 72B		Series 73B	
	Tolerance classes in $\mu\text{m}$			
	PN, P6	P5	PN, P6	P5
00 to 09	+8	+6	+8	+6
10 to 11	+8	+6	+12	+10
12 to 34	+12	+10	+12	+10

# Angular contact ball bearings

Single row  
Open or sealed



70...-B, 72...-B, 73...-B  
 $\alpha = 40^\circ$

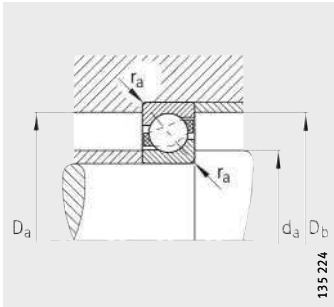


70...-B-2RS, 72...-B-2RS,  
73...-B-2RS  
Seal 2RS

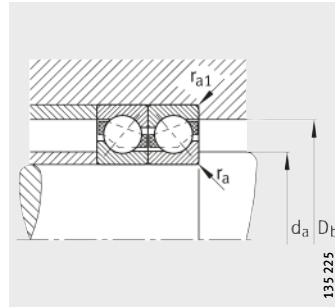
**Dimension table** - Dimensions in mm

Designation	X-life	Mass m ≈kg	Dimensions								
			d	D	B	r	r <sub>1</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	d <sub>1</sub>
						min.	min.	≈	≈	≈	≈
7200-B-JP	XL	0,033	10	30	9	0,6	0,3	22,1	-	-	18
7200-B-TVP	XL	0,032	10	30	9	0,6	0,3	22,1	-	-	18
7200-B-2RS-TVP	XL	0,032	10	30	9	0,6	0,3	-	23,3	25,6	-
7201-B-JP	XL	0,038	12	32	10	0,6	0,3	24,6	-	-	19,5
7201-B-TVP	XL	0,035	12	32	10	0,6	0,3	24,6	-	-	19,5
7201-B-2RS-TVP	XL	0,037	12	32	10	0,6	0,3	-	25,9	28,8	-
7301-B-JP	XL	0,066	12	37	12	1	0,6	27,2	-	-	22,1
7301-B-TVP	XL	0,06	12	37	12	1	0,6	27,2	-	-	22,1
7202-B-JP	XL	0,047	15	35	11	0,6	0,3	27,6	-	-	22,5
7202-B-TVP	XL	0,044	15	35	11	0,6	0,3	27,6	-	-	22,5
7202-B-2RS-TVP	XL	0,044	15	35	11	0,6	0,3	-	29,2	32,1	-
7302-B-JP	XL	0,088	15	42	13	1	0,6	31,8	-	-	25,5
7302-B-TVP	XL	0,082	15	42	13	1	0,6	31,8	-	-	25,5
7302-B-2RS-TVP	XL	0,082	15	42	13	1	0,6	-	33,3	38,1	-
7203-B-JP	XL	0,069	17	40	12	0,6	0,3	31,2	-	-	26,2
7203-B-TVP	XL	0,065	17	40	12	0,6	0,3	31,2	-	-	26,2
7203-B-2RS-TVP	XL	0,065	17	40	12	0,6	0,3	-	33,1	36,3	-
7303-B-JP	XL	0,117	17	47	14	1	0,6	35,8	-	-	28,5
7303-B-TVP	XL	0,109	17	47	14	1	0,6	35,8	-	-	28,5
7303-B-2RS-TVP	XL	0,109	17	47	14	1	0,6	-	37,2	42,6	-
7004-B-TVP	XL	0,06	20	42	12	0,6	0,3	34,7	-	-	29,1
7004-B-2RS-TVP	XL	0,061	20	42	12	0,6	0,3	-	37,1	39,8	-
7204-B-JP	XL	0,111	20	47	14	1	0,6	36,6	-	-	30,4
7204-B-TVP	XL	0,104	20	47	14	1	0,6	36,6	-	-	30,4
7204-B-2RS-TVP	XL	0,104	20	47	14	1	0,6	-	39,1	43	-
7304-B-JP	XL	0,152	20	52	15	1,1	0,6	39,9	-	-	32,4
7304-B-TVP	XL	0,143	20	52	15	1,1	0,6	39,9	-	-	32,4
7304-B-2RS-TVP	XL	0,143	20	52	15	1,1	0,6	-	41,4	47,1	-
7005-B-TVP	XL	0,071	25	47	12	0,6	0,3	39,7	-	-	34,1
7005-B-2RS-TVP	XL	0,071	25	47	12	0,6	0,3	-	41,5	44,8	-
7205-B-JP	XL	0,135	25	52	15	1	0,6	41,6	-	-	35,4
7205-B-TVP	XL	0,127	25	52	15	1	0,6	41,6	-	-	35,4
7205-B-2RS-TVP	XL	0,127	25	52	15	1	0,6	-	44,1	48	-
7305-B-JP	XL	0,242	25	62	17	1,1	0,6	48,1	-	-	39,3
7305-B-TVP	XL	0,223	25	62	17	1,1	0,6	48,1	-	-	39,3
7305-B-2RS-TVP	XL	0,231	25	62	17	1,1	0,6	-	50,4	57,1	-





Mounting dimensions

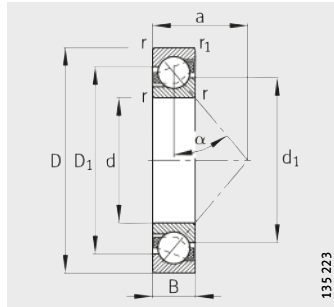


Mounting dimensions

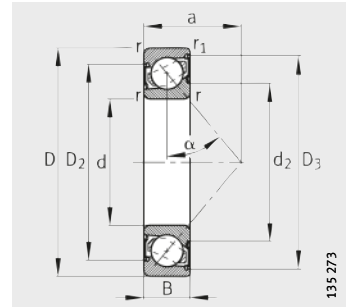
		Mounting dimensions					Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_2$ $\approx$	a $\approx$	$d_a$ min.	$D_a$ max.	$D_b$ max.	$r_a$ max.	$r_{a1}$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N			
-	13	14,2	25,8	27,6	0,6	0,3	5 300	2 600	174	32 000	22 600
-	13	14,2	25,8	27,6	0,6	0,3	5 300	2 600	174	32 000	22 600
15,5	13	14,2	25,8	27,6	0,6	0,3	5 300	2 600	174	15 000	-
-	14	16,2	27,8	29,6	0,6	0,3	7 400	3 550	241	28 000	21 100
-	14	16,2	27,8	29,6	0,6	0,3	7 400	3 550	241	28 000	21 100
17	14	16,2	27,8	29,6	0,6	0,3	7 400	3 550	241	14 000	-
-	16	17,6	31,4	32,8	1	0,6	11 400	5 300	355	24 000	16 300
-	16	17,6	31,4	32,8	1	0,6	11 400	5 300	355	24 000	16 300
-	16	19,2	30,8	32,6	0,6	0,3	8 400	4 450	300	24 000	19 100
-	16	19,2	30,8	32,6	0,6	0,3	8 400	4 450	300	24 000	19 100
19,7	16	19,2	30,8	32,6	0,6	0,3	8 400	4 450	300	12 000	-
-	18	20,6	36,4	37,8	1	0,6	14 200	7 200	485	20 000	14 200
-	18	20,6	36,4	37,8	1	0,6	14 200	7 200	485	20 000	14 200
22,9	18	20,6	36,4	37,8	1	0,6	14 200	7 200	485	11 000	-
-	18	21,2	35,8	37,6	0,6	0,6	10 500	5 700	380	20 000	17 100
-	18	21,2	35,8	37,6	0,6	0,6	10 500	5 700	380	20 000	17 100
22,9	18	21,2	35,8	37,6	0,6	0,6	10 500	5 700	380	11 000	-
-	20	22,6	41,4	42,8	1	0,6	17 600	9 000	610	18 000	12 800
-	20	22,6	41,4	42,8	1	0,6	17 600	9 000	610	18 000	12 800
26,1	20	22,6	41,4	42,8	1	0,6	17 600	9 000	610	9 500	-
-	12	23,2	38,8	40	0,6	0,3	13 400	7 000	470	18 000	14 600
25,9	12	23,2	38,8	40	0,6	0,3	13 400	7 000	470	9 500	-
-	21	25,6	41,4	42,8	1	0,6	14 000	7 800	520	18 000	15 400
-	21	25,6	41,4	42,8	1	0,6	14 000	7 800	520	18 000	15 400
26,8	21	25,6	41,4	42,8	1	0,6	14 000	7 800	520	9 000	-
-	23	27	45	47,8	1	0,6	20 400	11 100	750	17 000	11 500
-	23	27	45	47,8	1	0,6	20 400	11 100	750	17 000	11 500
30	23	27	45	47,8	1	0,6	20 400	11 100	750	8 500	-
-	21	28,2	43,8	45	0,6	0,3	14 900	8 600	580	16 000	12 200
30,9	21	28,2	43,8	45	0,6	0,3	14 900	8 600	580	8 000	-
-	24	30,6	46,4	47,8	1	0,6	15 300	9 000	600	16 000	13 700
-	24	30,6	46,4	47,8	1	0,6	15 300	9 000	600	16 000	13 700
31,8	24	30,6	46,4	47,8	1	0,6	15 300	9 000	600	8 000	-
-	27	32	55	57,8	1	0,6	28 000	15 800	1 070	14 000	9 800
-	27	32	55	57,8	1	0,6	28 000	15 800	1 070	14 000	9 800
35,8	27	32	55	57,8	1	0,6	28 000	15 800	1 070	7 000	-

# Angular contact ball bearings

Single row  
Open or sealed



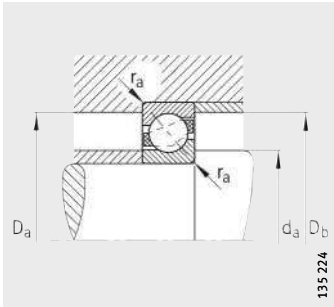
718...-B, 70...-B, 72...-B, 73...-B  
 $\alpha = 40^\circ$



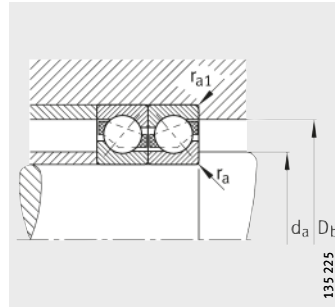
70...-B-2RS, 72...-B-2RS,  
73...-B-2RS  
Seal 2RS

**Dimension table** (continued) · Dimensions in mm

Designation	X-life	Mass m ≈kg	Dimensions								
			d	D	B	r	r <sub>1</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	d <sub>1</sub>
						min.	min.	≈	≈	≈	≈
71806-B-TVH	–	0,025	30	42	7	0,3	0,2	37,3	–	–	34,7
7006-B-TVP	XL	0,109	30	55	13	1	0,6	46,9	–	–	40,7
7006-B-2RS-TVP	XL	0,109	30	55	13	1	0,6	–	48,8	53,6	–
7206-B-JP	XL	0,202	30	62	16	1	0,6	49,8	–	–	42,8
7206-B-TVP	XL	0,196	30	62	16	1	0,6	49,8	–	–	42,8
7206-B-2RS-TVP	XL	0,203	30	62	16	1	0,6	–	51,9	57	–
7306-B-JP	XL	0,362	30	72	19	1,1	0,6	56	–	–	46,5
7306-B-TVP	XL	0,341	30	72	19	1,1	0,6	56	–	–	46,5
7306-B-2RS-TVP	XL	0,341	30	72	19	1,1	0,6	–	58,6	65,9	–
71807-B-TVH	–	0,027	35	47	7	0,3	0,2	42,3	–	–	39,7
7007-B-TVP	XL	0,14	35	62	14	1	0,6	53,2	–	–	46,5
7007-B-2RS-TVP	XL	0,14	35	62	14	1	0,6	–	55	60,4	–
7207-B-JP	XL	0,3	35	72	17	1,1	0,6	57,9	–	–	49,5
7207-B-TVP	XL	0,282	35	72	17	1,1	0,6	57,9	–	–	49,5
7207-B-2RS-TVP	XL	0,282	35	72	17	1,1	0,6	–	60,2	66,5	–
7307-B-JP	XL	0,475	35	80	21	1,5	1	63,1	–	–	52,7
7307-B-TVP	XL	0,447	35	80	21	1,5	1	63,1	–	–	52,7
7307-B-2RS-TVP	XL	0,447	35	80	21	1,5	1	–	64,7	73,5	–
71808-B-TVH	–	0,029	40	52	7	0,3	0,2	47,3	–	–	44,7
7008-B-TVP	XL	0,17	40	68	15	1	0,6	58,6	–	–	51,3
7008-B-2RS-TVP	XL	0,17	40	68	15	1	0,6	–	60,5	66,3	–
7208-B-JP	XL	0,387	40	80	18	1,1	0,6	64,7	–	–	55,7
7208-B-TVP	XL	0,367	40	80	18	1,1	0,6	64,7	–	–	55,7
7208-B-2RS-TVP	XL	0,367	40	80	18	1,1	0,6	–	67	73,8	–
7308-B-JP	XL	0,646	40	90	23	1,5	1	71,7	–	–	59,2
7308-B-TVP	XL	0,61	40	90	23	1,5	1	71,7	–	–	59,2
7308-B-2RS-TVP	XL	0,61	40	90	23	1,5	1	–	73,9	83,3	–
71809-B-TVH	–	0,033	45	58	7	0,3	0,2	52,8	–	–	50,2
7209-B-JP	XL	0,428	45	85	19	1,1	0,6	70	–	–	60,5
7209-B-TVP	XL	0,405	45	85	19	1,1	0,6	70	–	–	60,5
7309-B-JP	XL	0,878	45	100	25	1,5	1	79,8	–	–	66,7
7309-B-TVP	XL	0,813	45	100	25	1,5	1	79,8	–	–	66,7



Mounting dimensions

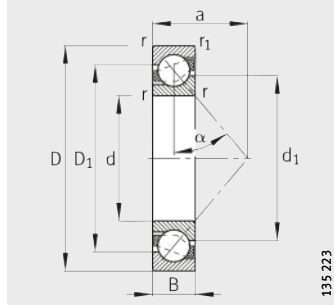


Mounting dimensions

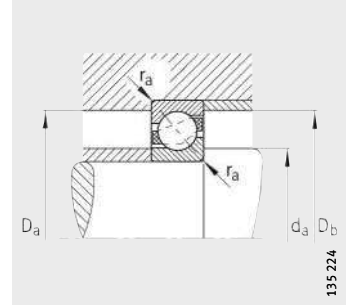
		Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
d <sub>2</sub>	a	d <sub>a</sub>	D <sub>a</sub>	D <sub>b</sub>	r <sub>a</sub>	r <sub>a1</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
≈	≈	min.	max.	max.	max.	max.	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
–	18,6	32	40	40,6	0,3	0,2	5 600	4 550	295	17 000	–
–	24	34,6	50,4	51,8	1	0,6	18 400	11 500	770	14 000	10 400
38,2	24	34,6	50,4	51,8	1	0,6	18 400	11 500	770	6 700	–
–	27	35,6	56,4	57,8	1	0,6	21 700	14 100	950	13 000	11 200
–	27	35,6	56,4	57,8	1	0,6	21 700	14 100	950	13 000	11 200
39,8	27	35,6	56,4	57,8	1	0,6	21 700	14 100	950	6 300	–
–	31	37	65	67,8	1	0,6	35 500	22 100	1 490	11 000	8 600
–	31	37	65	67,8	1	0,6	35 500	22 100	1 490	11 000	8 600
42,8	31	37	65	67,8	1	0,6	35 500	22 100	1 490	6 000	–
–	20,7	37	45	45,6	0,3	0,2	6 000	5 300	350	15 000	–
–	27	39,6	57,4	58,8	1	0,6	22 400	14 800	1 000	12 000	9 200
44	27	39,6	57,4	58,8	1	0,6	22 400	14 800	1 000	6 000	–
–	31	42	65	67,8	1	0,6	28 000	19 000	1 280	11 000	9 600
–	31	42	65	67,8	1	0,6	28 000	19 000	1 280	11 000	9 600
45,8	31	42	65	67,8	1	0,6	28 000	19 000	1 280	5 600	–
–	35	44	71	74,4	1,5	1	43 000	27 500	1 860	9 500	7 900
–	35	44	71	74,4	1,5	1	43 000	27 500	1 860	9 500	7 900
49,2	35	44	71	74,4	1,5	1	43 000	27 500	1 860	5 000	–
–	22,8	42	50	50,6	0,3	0,2	6 300	5 850	395	13 000	–
–	30	44,6	63,4	64,8	1	0,6	26 000	17 400	1 180	10 000	–
48,8	30	44,6	63,4	64,8	1	0,6	26 000	17 400	1 180	5 300	–
–	34	47	73	75,8	1	0,6	34 000	23 500	1 580	9 500	8 600
–	34	47	73	75,8	1	0,6	34 000	23 500	1 580	9 500	8 600
52	34	47	73	75,8	1	0,6	34 000	23 500	1 580	5 000	–
–	39	49	81	84,4	1,5	1	53 000	34 500	2 320	8 500	7 100
–	39	49	81	84,4	1,5	1	53 000	34 500	2 320	8 500	7 100
55,6	39	49	81	84,4	1,5	1	53 000	34 500	2 320	4 500	–
–	25,1	47	56	56,6	0,3	0,2	6 550	6 550	450	13 000	–
–	37	52	78	80,8	1	0,6	37 500	27 000	1 810	8 500	8 000
–	37	52	78	80,8	1	0,6	37 500	27 000	1 810	8 500	8 000
–	43	54	91	94,4	1,5	1	65 000	43 000	2 900	7 500	6 500
–	43	54	91	94,4	1,5	1	65 000	43 000	2 900	7 500	6 500

# Angular contact ball bearings

Single row  
Open



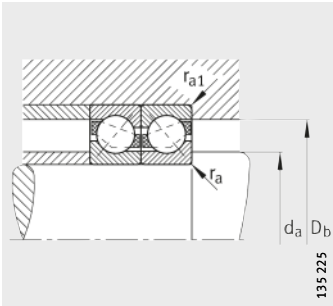
718...-B, 72...-B, 73...-B  
 $\alpha = 40^\circ$



Mounting dimensions

Dimension table (continued) · Dimensions in mm

Designation	X-life	Mass m ≈kg	Dimensions							
			d	D	B	r	r <sub>1</sub>	D <sub>1</sub>	d <sub>1</sub>	a
						min.	min.	≈	≈	≈
71810-B-TVH	–	0,043	50	65	7	0,3	0,2	59,3	56,7	27,8
7210-B-JP	XL	0,493	50	90	20	1,1	0,6	74,8	66,2	39
7210-B-TVP	XL	0,458	50	90	20	1,1	0,6	74,8	66,2	39
7310-B-JP	XL	1,13	50	110	27	2	1	87,6	73,1	47
7310-B-TVP	XL	1,05	50	110	27	2	1	87,6	73,1	47
71811-B-TVH	–	0,058	55	72	9	0,3	0,2	65,3	61,7	31,1
7211-B-JP	XL	0,645	55	100	21	1,5	1	83	72,6	43
7211-B-TVP	XL	0,604	55	100	21	1,5	1	83	72,6	43
7311-B-JP	XL	1,46	55	120	29	2	1	95,3	80,3	51
7311-B-TVP	XL	1,38	55	120	29	2	1	95,3	80,3	51
71812-B-TVH	–	0,07	60	78	10	0,3	0,2	70,8	67,2	33,9
7212-B-JP	XL	0,847	60	110	22	1,5	1	91,1	79,5	47
7212-B-TVP	XL	0,78	60	110	22	1,5	1	91,1	79,5	47
7312-B-JP	XL	1,74	60	130	31	2,1	1,1	103,4	87,3	55
7312-B-TVP	XL	1,72	60	130	31	2,1	1,1	103,4	87,3	55
71813-B-TVH	–	0,085	65	85	10	0,6	0,3	77	73	36,5
7213-B-JP	XL	1,08	65	120	23	1,5	1	98,9	86	51
7213-B-TVP	XL	1	65	120	23	1,5	1	98,9	86	51
7313-B-JP	XL	2,22	65	140	33	2,1	1,1	112	95	60
7313-B-TVP	XL	2,12	65	140	33	2,1	1,1	112	95	60
71814-B-TVH	–	0,091	70	90	10	0,6	0,3	82	78	38,5
7214-B-JP	XL	1,17	70	125	24	1,5	1	104,7	91	53
7214-B-TVP	XL	1,08	70	125	24	1,5	1	104,7	91	53
7314-B-JP	XL	2,76	70	150	35	2,1	1,1	120,1	101,9	64
7314-B-TVP	XL	2,58	70	150	35	2,1	1,1	120,1	101,9	64
71815-B-TVH	–	0,096	75	95	10	0,6	0,3	87	83	40,6
7215-B-JP	XL	1,25	75	130	25	1,5	1	109,2	96,5	56
7215-B-TVP	XL	1,16	75	130	25	1,5	1	109,2	96,5	56
7315-B-JP	XL	3,29	75	160	37	2,1	1,1	128,5	108,8	68
7315-B-TVP	XL	3,1	75	160	37	2,1	1,1	128,5	108,8	68
71816-B-TVH	–	0,101	80	100	10	0,6	0,3	92	88	42,7
7216-B-JP	XL	1,53	80	140	26	2	1	117,8	102,9	59
7216-B-TVP	XL	1,42	80	140	26	2	1	117,8	102,9	59
7316-B-JP	XL	3,86	80	170	39	2,1	1,1	136,7	115,7	72
7316-B-TVP	XL	3,66	80	170	39	2,1	1,1	136,7	115,7	72

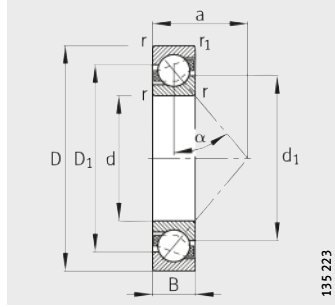


Mounting dimensions

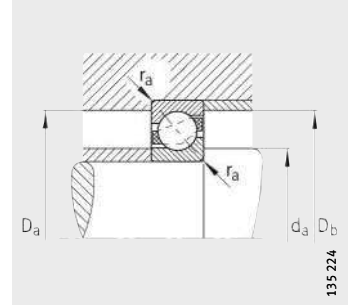
Mounting dimensions					Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$D_b$ max.	$r_a$ max.	$r_{a1}$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N			
52	63	63,6	0,3	0,2	6 950	7 350	520	9 500	–
57	83	85,8	1	0,6	39 000	28 500	1 920	8 000	7 600
57	83	85,8	1	0,6	39 000	28 500	1 920	8 000	7 600
61	99	104,4	2	1	75 000	50 000	3 400	7 000	6 100
61	99	104,4	2	1	75 000	50 000	3 400	7 000	6 100
57	70	70,6	0,3	0,2	11 800	11 800	760	9 000	–
64	91	94,4	1,5	1	49 000	38 500	2 600	7 000	6 800
64	91	94,4	1,5	1	49 000	38 500	2 600	7 000	6 800
66	109	114,4	2	1	86 000	61 000	4 100	6 300	5 600
66	109	114,4	2	1	86 000	61 000	4 100	6 300	5 600
62	76	76,6	0,3	0,2	12 200	12 900	840	8 000	–
69	101	104,4	1,5	1	59 000	45 000	3 050	6 300	6 200
69	101	104,4	1,5	1	59 000	45 000	3 050	6 300	6 200
72	118	123	2,1	1	96 000	69 000	4 650	5 600	5 300
72	118	123	2,1	1	96 000	69 000	4 650	5 600	5 300
68,2	81,8	83	0,6	0,3	15 300	16 000	970	7 500	–
74	111	114,4	1,5	1	67 000	55 000	3 700	6 000	5 700
74	111	114,4	1,5	1	67 000	55 000	3 700	6 000	5 700
77	128	133	2,1	1	110 000	82 000	5 400	5 300	5 000
77	128	133	2,1	1	110 000	82 000	5 400	5 300	5 000
73,2	86,8	88	0,6	0,3	16 000	17 300	1 070	7 000	–
79	116	119,4	1,5	1	74 000	62 000	4 200	5 600	5 400
79	116	119,4	1,5	1	74 000	62 000	4 200	5 600	5 400
82	138	143	2,1	1	126 000	93 000	6 000	5 000	4 750
82	138	143	2,1	1	126 000	93 000	6 000	5 000	4 750
78,2	91,8	93	0,6	0,3	16 300	18 000	1 140	6 300	–
84	121	124,4	1,5	1	73 000	62 000	4 100	5 300	5 300
84	121	124,4	1,5	1	73 000	62 000	4 100	5 300	5 300
87	148	153	2,1	1	140 000	107 000	6 700	4 500	4 500
87	148	153	2,1	1	140 000	107 000	6 700	4 500	4 500
83,2	96,8	98	0,6	0,3	16 600	19 000	1 200	6 000	–
91	129	134,4	2	1	85 000	72 000	4 650	5 000	4 950
91	129	134,4	2	1	85 000	72 000	4 650	5 000	4 950
92	158	163	2,1	1	155 000	124 000	7 500	4 300	4 250
92	158	163	2,1	1	155 000	124 000	7 500	4 300	4 250

# Angular contact ball bearings

Single row  
Open



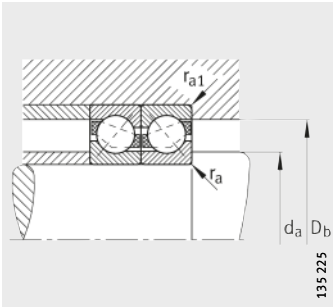
72...-B, 73...-B  
 $\alpha = 40^\circ$



Mounting dimensions

Dimension table (continued) · Dimensions in mm

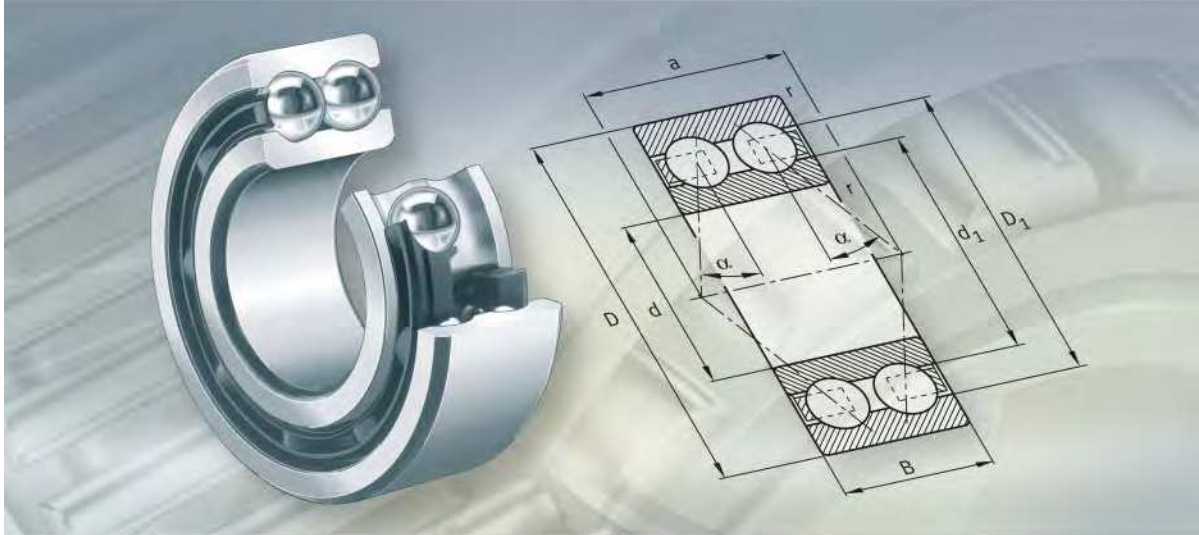
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r	r <sub>1</sub>	D <sub>1</sub>	d <sub>1</sub>	a
7217-B-JP	XL	1,94	<b>85</b>	150	28	2	1	125	110,6	63
7217-B-TVP	XL	1,82	<b>85</b>	150	28	2	1	125	110,6	63
7317-B-JP	XL	4,4	<b>85</b>	180	41	3	1,1	144	122	76
7317-B-TVP	XL	4,26	<b>85</b>	180	41	3	1,1	144	122	76
7218-B-JP	XL	2,38	<b>90</b>	160	30	2	1	133,4	117,5	67
7218-B-TVP	XL	2,21	<b>90</b>	160	30	2	1	133,4	117,5	67
7318-B-JP	XL	5,14	<b>90</b>	190	43	3	1,1	153	129,7	80
7318-B-TVP	XL	5	<b>90</b>	190	43	3	1,1	153	129,7	80
7219-B-JP	XL	2,64	<b>95</b>	170	32	2,1	1,1	142	124,9	72
7219-B-TVP	XL	2,64	<b>95</b>	170	32	2,1	1,1	142	124,9	72
7319-B-JP	XL	5,93	<b>95</b>	200	45	3	1,1	160,1	136,7	84
7319-B-TVP	XL	5,78	<b>95</b>	200	45	3	1,1	160,1	136,7	84
7220-B-JP	XL	3,45	<b>100</b>	180	34	2,1	1,1	149,6	131,9	76
7220-B-TVP	XL	3,17	<b>100</b>	180	34	2,1	1,1	149,6	131,9	76
7320-B-JP	XL	7,38	<b>100</b>	215	47	3	1,1	172,3	145,8	90
7320-B-TVP	XL	7,16	<b>100</b>	215	47	3	1,1	172,3	145,8	90
7221-B-MP	XL	4,18	<b>105</b>	190	36	2,1	1,1	157,7	138,2	80
7321-B-MP	XL	9	<b>105</b>	225	49	3	1,1	179,6	153,5	94
7222-B-JP	XL	4,7	<b>110</b>	200	38	2,1	1,1	165,7	144,9	84
7222-B-TVP	XL	4,44	<b>110</b>	200	38	2,1	1,1	165,7	144,9	84
7322-B-JP	XL	9,97	<b>110</b>	240	50	3	1,1	191,5	161,9	98
7322-B-TVP	XL	9,74	<b>110</b>	240	50	3	1,1	191,5	161,9	98
7224-B-TVP	XL	5,31	<b>120</b>	215	40	2,1	1,1	179,5	157,2	90
7324-B-TVP	XL	12,5	<b>120</b>	260	55	3	1,1	207,7	175,9	107
7226-B-TVP	XL	6,12	<b>130</b>	230	40	3	1,1	191,8	169,2	96
7326-B-TVP	XL	15,1	<b>130</b>	280	58	4	1,5	222,5	188,5	115
7228-B-MP	XL	8,55	<b>140</b>	250	42	3	1,1	207,5	183,5	103
7328-B-MP	–	20,5	<b>140</b>	300	62	4	1,5	240,2	203,9	123
7230-B-MP	XL	10,9	<b>150</b>	270	45	3	1,1	223,5	197,5	111
7330-B-MP	–	24,8	<b>150</b>	320	65	4	1,5	256,5	217,8	131
7232-B-MP	–	13,5	<b>160</b>	290	48	3	1,1	238	212	118
7332-B-MP	–	29	<b>160</b>	340	68	4	1,5	272,2	232,4	139
7234-B-MP	–	16,7	<b>170</b>	310	52	4	1,5	256,5	226,9	127
7334-B-MP	–	34,4	<b>170</b>	360	72	4	1,5	291,6	248,4	147



Mounting dimensions

Mounting dimensions					Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$D_b$ max.	$r_a$ max.	$r_{a1}$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N			
96	139	144,4	2	1	97 000	86 000	5 300	4 500	4 750
96	139	144,4	2	1	97 000	86 000	5 300	4 500	4 750
99	166	173	2,5	1	167 000	138 000	8 100	4 000	4 100
99	166	173	2,5	1	167 000	138 000	8 100	4 000	4 100
101	149	154,4	2	1	114 000	98 000	5 900	4 300	4 550
101	149	154,4	2	1	114 000	98 000	5 900	4 300	4 550
104	176	183	2,5	1	180 000	155 000	8 800	3 800	3 900
104	176	183	2,5	1	180 000	155 000	8 800	3 800	3 900
107	158	163	2,1	1	123 000	106 000	6 200	4 000	4 500
107	158	163	2,1	1	123 000	106 000	6 200	4 000	4 450
109	186	193	2,5	1	189 000	167 000	9 300	3 800	3 800
109	186	193	2,5	1	189 000	167 000	9 300	3 800	3 800
112	168	173	2,1	1	148 000	132 000	7 500	3 800	4 200
112	168	173	2,1	1	142 000	124 000	7 100	3 800	4 250
114	201	208	2,5	1	214 000	197 000	10 600	3 600	3 550
114	201	208	2,5	1	214 000	197 000	10 600	3 600	3 550
117	178	183	2,1	1	155 000	142 000	7 900	6 000	4 100
119	211	218	2,5	1	225 000	214 000	11 200	5 300	3 400
122	188	193	2,1	1	167 000	154 000	8 300	3 600	3 950
122	188	193	2,1	1	167 000	154 000	8 300	3 600	3 950
124	226	233	2,5	1	250 000	245 000	12 500	3 400	3 150
124	226	233	2,5	1	250 000	245 000	12 500	3 400	3 150
132	203	208	2,1	1	182 000	178 000	9 300	3 400	3 700
134	246	253	2,5	1	275 000	285 000	13 900	3 200	2 850
144	216	223	2,5	1	200 000	204 000	10 300	3 200	3 350
147	263	271	3	1,5	305 000	325 000	15 400	3 000	2 600
154	236	243	2,5	1	214 000	231 000	11 100	4 800	3 100
157	283	291	3	1,5	300 000	345 000	12 700	4 300	2 400
164	256	263	2,5	1	245 000	275 000	12 800	4 500	2 850
167	303	311	3	1,5	325 000	390 000	14 200	3 800	2 200
174	276	283	2,5	1	236 000	280 000	10 400	4 300	2 650
177	323	331	3	1,5	360 000	450 000	15 100	3 600	2 040
187	293	301	3	1,5	265 000	325 000	11 600	3 800	2 440
187	343	351	3	1,5	405 000	530 000	18 100	3 200	1 840

**FAG**



**Double row angular contact ball bearings**



# Double row angular contact ball bearings

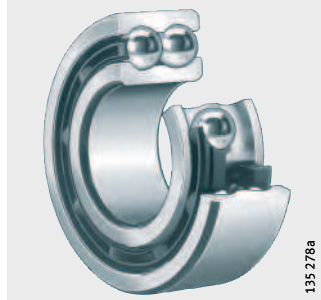


	Page
<b>Product overview</b>	Double row angular contact ball bearings..... 282
<b>Features</b>	Radial and axial load capacity..... 283
	Operating temperature ..... 284
	Cages ..... 284
	Suffixes..... 285
<b>Design and safety guidelines</b>	Equivalent dynamic bearing load ..... 285
	Equivalent static bearing load..... 286
	Minimum radial load ..... 286
	Speed ..... 286
	Design of bearing arrangements ..... 286
<b>Accuracy</b>	Axial internal clearance ..... 287
<b>Dimension tables</b>	Angular contact ball bearings, double row, open or sealed ..... 288
	Angular contact ball bearings, double row, open or sealed, split inner ring ..... 292

# Product overview Double row angular contact ball bearings

## Double row

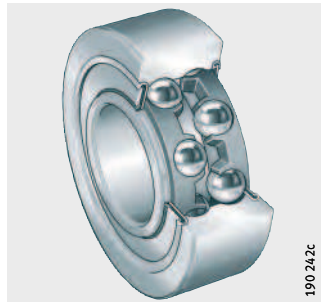
38..-B, 30..-B, 32..-B, 33..-B



135 278a

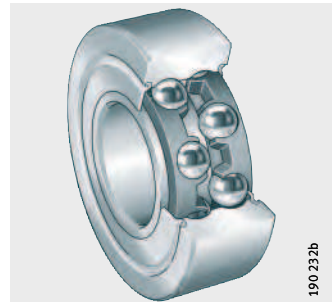
## Lip seals or gap seals

38..-B-2RSR, 30..-B-2RSR,  
32..-B-2RSR, 33..-B-2RSR



190 242c

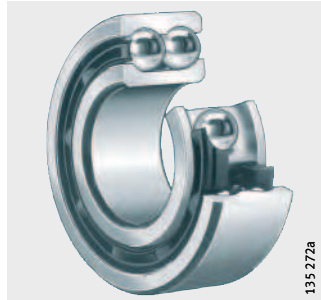
38..-B-2Z, 30..-B-2Z,  
32..-B-2Z, 33..-B-2Z



190 232b

## With filling slot

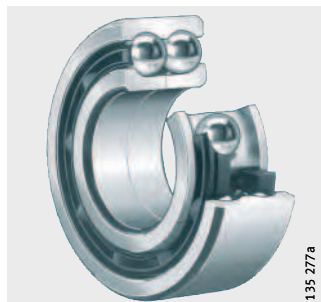
32, 33



135 272a

## Split inner ring

33..-DA



135 277a

# Double row angular contact ball bearings



**Features** Double row angular contact ball bearings are units with solid inner and outer rings and ball and cage assemblies with polyamide, sheet steel or brass cages. Their construction is similar to a pair of single row angular contact ball bearings in an O arrangement but they are narrower to a certain extent. They differ in the size of the contact angle and the design of the bearing rings.

The bearings are available in open and sealed designs. Due to the manufacturing processes used, open bearings can have turned recesses in the outer ring for seals or shields. Sealed bearings are maintenance-free and therefore allow particularly economical bearing arrangements.

The angular adjustment facility of the angular contact ball bearings is very limited.

## Radial and axial load capacity

Double row angular contact ball bearings can support axial forces in both directions and high radial forces. They are particularly suitable for bearing arrangements where rigid axial guidance is required.

The axial load carrying capacity is dependent on the contact angle; i.e. the larger the angle ( $\alpha = 25^\circ, 35^\circ$  and  $45^\circ$ ), the higher the axial load to which the bearing can be subjected.

### Without filling slot

Bearings of series 38..-B, 30..-B, 32..-B and 33..-B are self-retaining and do not have filling slots in the end faces of the bearing rings. They have a contact angle of  $\alpha = 25^\circ$ . Their axial load carrying capacity is the same in both directions. These bearings are highly versatile.

### With filling slot

Angular contact ball bearings of series 32 und 33 are self-retaining and have filling slots on one side. They have a contact angle of  $\alpha = 35^\circ$ .



These series must be fitted such that the main load direction is supported by the raceways without filling slots.

### With split inner ring

Bearings of series 33..-DA have a split inner ring. Due to the contact angle of  $\alpha = 45^\circ$ , they can support very high axial forces in both directions.

The inner ring halves are matched to the particular bearing and must not be interchanged with those of other bearings of the same size.

### Sealing

Series 38..-B, 30..-B, 32..-B and 33..-B with the suffix 2RSR are sealed by lip seals on both sides. Contact seals are suitable for giving protection against dust, contamination and damp atmospheres.

Series with the suffix 2Z have gap seals on both sides.

### Lubrication

Sealed bearings are greased with a high quality grease and are lubricated for life.

# Double row angular contact ball bearings

## Operating temperature

Open bearings are suitable for operating temperatures from  $-30\text{ °C}$  to  $+150\text{ °C}$ .



Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to  $+120\text{ °C}$ , restricted by the cage material.

Bearings with the suffix 2RSR are suitable up to  $+110\text{ °C}$ , restricted by the lubricant and seal material.

## Cages

Bearings without a cage suffix have standard cages made from sheet steel.

Angular contact ball bearings with cages made from glass fibre reinforced polyamide have the suffix TVH.

Bearings with ball-guided solid brass cages are indicated by the suffix M. Solid brass cages guided on the outer ring have the suffix MA.



Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

## Cage and bore code

Series	Polyamide cage <sup>1)</sup>	Solid brass cage <sup>1)</sup>	Sheet steel cage <sup>1)</sup>
	Bore code		
32	–	19, 21, 22	17, 18, 20
33	–	17, 19, 20, 22	14 to 16, 18
30..-B	up to 08	–	–
32..-B	up to 16	–	–
33..-B	up to 13	–	–
38..-B	up to 16	–	–
33..-DA	05	08, 10, 11	06, 09, from 12

<sup>1)</sup> Other cage designs are available by agreement.  
With such cages, suitability for high speeds and high temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.



## Suffixes

Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
B	Modified internal construction, contact angle $\alpha = 25^\circ$ , without filling slot	Standard
C2	Axial internal clearance C2	Special design, available by agreement
C3	Axial internal clearance C3	
DA	Inner ring split	Standard
M	Solid brass cage, ball-guided	
MA	Solid brass cage, guidance on outer ring	
TVH	Solid polyamide snap cage, ball-guided	
2RSR	Lip seals on both sides	
2Z	Gap seals on both sides	

## Design and safety guidelines

### Equivalent dynamic bearing load

Contact angle  $25^\circ$

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq 0,68$	$P = F_r + 0,92 \cdot F_a$
$\frac{F_a}{F_r} > 0,68$	$P = 0,67 \cdot F_r + 1,41 \cdot F_a$

Contact angle  $35^\circ$

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq 0,95$	$P = F_r + 0,66 \cdot F_a$
$\frac{F_a}{F_r} > 0,95$	$P = 0,6 \cdot F_r + 1,07 \cdot F_a$

Contact angle  $45^\circ$

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq 1,33$	$P = F_r + 0,47 \cdot F_a$
$\frac{F_a}{F_r} > 1,33$	$P = 0,54 \cdot F_r + 0,81 \cdot F_a$

### Symbols, units and definitions

P N  
Equivalent dynamic bearing load for combined load  
 $F_a$  N  
Axial dynamic bearing load  
 $F_r$  N  
Radial dynamic bearing load.

# Double row angular contact ball bearings

## Equivalent static bearing load

For bearings under static loading, the following applies:

Contact angle 25°

$$P_0 = F_{0r} + 0,76 \cdot F_{0a}$$

Contact angle 35°

$$P_0 = F_{0r} + 0,58 \cdot F_{0a}$$

Contact angle 45°

$$P_0 = F_{0r} + 0,44 \cdot F_{0a}$$

## Symbols, units and definitions

$P_0$	N
Equivalent static bearing load for combined load	
$F_{0a}$	N
Axial static bearing load	
$F_{0r}$	N
Radial static bearing load.	

## Minimum radial load

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of  $P/C_r > 0,01$  is necessary for ball bearings with cage.

## Speed

The reference speed  $n_B$  can be exceeded up to the limiting speed  $n_G$  if permitted by the operating conditions. If the reference speed in the tables is higher than the limiting speed, the higher value cannot be used.

In bearings with lip seals 2RSR, the speed is limited by the permissible sliding speed of the sealing lips, so only the limiting speed is given in the dimension tables.



The limiting speed  $n_G$  given in the dimension tables must not be exceeded.

## Design of bearing arrangements

### Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

### Mounting dimensions

The dimension tables give the maximum dimension of the radius  $r_a$  and the diameters of the abutment shoulders  $D_a$  and  $d_a$ .



**Accuracy** The main dimensions of the bearings conform to DIN 628-3. The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

**Axial internal clearance** Double row angular contact ball bearings of the basic design have the normal axial internal clearance (CN). Bearings are available by agreement with an axial internal clearance larger (C3) or smaller (C2) than normal.

Bearings with a split inner ring are intended for higher axial loads. In general, they have a tighter fit than unsplit bearings. Their normal internal clearance corresponds to internal clearance group C3 for unsplit bearings.

**Axial internal clearance to DIN 628-3 for bearings with unsplit inner ring**

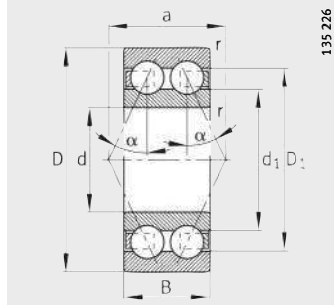
Bore d mm		Axial internal clearance					
		C2 μm		CN μm		C3 μm	
over	incl.	min.	max.	min.	max.	min.	max.
–	10	1	11	5	21	12	28
10	18	1	12	6	23	13	31
18	24	2	14	7	25	16	34
24	30	2	15	8	27	18	37
30	40	2	16	9	29	21	40
40	50	2	18	11	33	23	44
50	65	3	22	13	36	26	48
65	80	3	24	15	40	30	54
80	100	3	26	18	46	35	63
100	120	4	30	22	53	42	73

**Axial internal clearance for bearings with split inner ring**

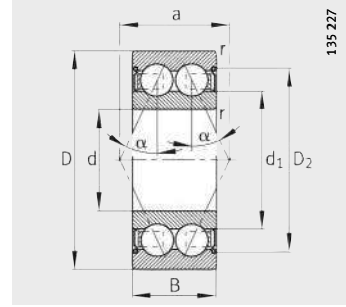
Bore d mm		Axial internal clearance					
		C2 μm		CN μm		C3 μm	
over	incl.	min.	max.	min.	max.	min.	max.
24	30	8	27	16	35	27	46
30	40	9	29	18	38	30	50
40	50	11	33	22	44	36	58
50	65	13	36	25	48	40	63
65	80	15	40	29	54	46	71

# Angular contact ball bearings

Double row  
Open or sealed



30..-B, 38..-B, 32..-B  
 $\alpha = 25^\circ$

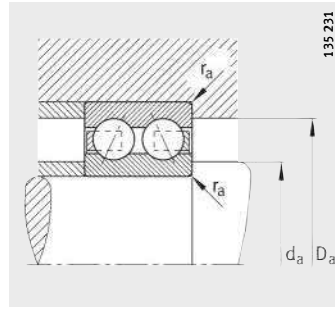
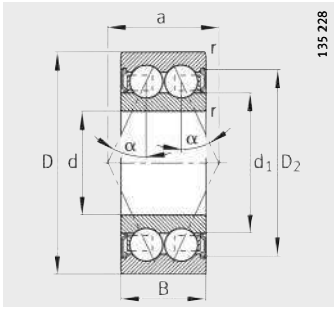


30..-B-2Z, 38..-B-2Z, 32-B-2Z  
 $\alpha = 25^\circ$

**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions							
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>	a
					min.	≈	≈	≈	≈
30/5-B-TVH	0,008	5	14	7	0,2	-	-	7,5	6,3
30/5-B-2Z-TVH	0,008	5	14	7	0,2	-	-	7,5	6,3
30/5-B-2RSR-TVH	0,008	5	14	7	0,2	-	-	7,5	6,3
30/6-B-TVH	0,01	6	17	9	0,3	-	-	8,3	8,8
30/6-B-2Z-TVH	0,01	6	17	9	0,3	-	-	8,3	8,8
30/6-B-2RSR-TVH	0,01	6	17	9	0,3	-	-	8,3	8,8
30/7-B-TVH	0,012	7	19	10	0,3	-	-	9	10
30/7-B-2Z-TVH	0,012	7	19	10	0,3	-	-	9	10
30/7-B-2RSR-TVH	0,012	7	19	10	0,3	-	-	9	10
30/8-B-TVH	0,02	8	22	11	0,3	-	-	10,5	10,7
30/8-B-2Z-TVH	0,02	8	22	11	0,3	-	-	10,5	10,7
30/8-B-2RSR-TVH	0,02	8	22	11	0,3	-	-	10,5	10,7
3800-B-TVH	0,008	10	19	7	0,3	-	-	13	8,1
3800-B-2Z-TVH	0,008	10	19	7	0,3	-	-	13	8,1
3800-B-2RSR-TVH	0,008	10	19	7	0,3	-	-	13	8,1
3000-B-TVH	0,022	10	26	12	0,3	-	-	13,5	12,3
3000-B-2Z-TVH	0,022	10	26	12	0,3	-	-	13,5	12,3
3000-B-2RSR-TVH	0,022	10	26	12	0,3	-	-	13,5	12,3
3200-B-TVH	0,05	10	30	14	0,6	23,9	-	17,9	15
3200-B-2Z-TVH	0,051	10	30	14	0,6	-	25,3	17,9	15
3801-B-TVH	0,008	12	21	7	0,3	-	-	15	8,9
3801-B-2Z-TVH	0,008	12	21	7	0,3	-	-	15	8,9
3801-B-2RSR-TVH	0,008	12	21	7	0,3	-	-	15	8,9
3001-B-TVH	0,025	12	28	12	0,3	-	-	15,5	13
3001-B-2Z-TVH	0,025	12	28	12	0,3	-	-	15,5	13
3001-B-2RSR-TVH	0,025	12	28	12	0,3	-	-	15,5	13
3201-B-TVH	0,051	12	32	15,9	0,6	25,7	-	18,3	17
3201-B-2Z-TVH	0,053	12	32	15,9	0,6	-	28,1	18,3	17





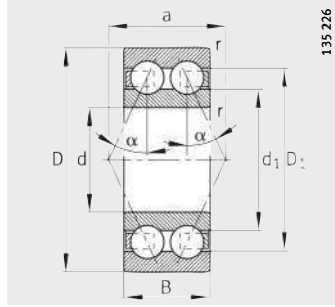
30..-B-2RSR, 32-B-2RSR,  
38..-B-2RSR  
 $\alpha = 25^\circ$

Mounting dimensions

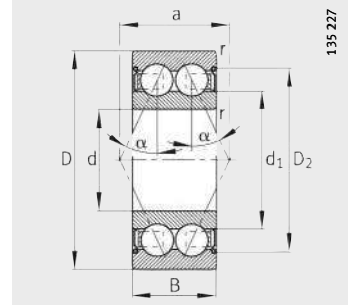
Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N			
6,4	12,6	0,2	1 810	950	48,5	30 000	32 000
6,4	12,6	0,2	1 810	950	48,5	24 000	32 000
6,4	12,6	0,2	1 810	950	48,5	15 000	–
8	15	0,3	3 100	1 420	72	28 000	32 000
8	15	0,3	3 100	1 420	72	22 000	32 000
8	15	0,3	3 100	1 420	72	15 000	–
9	17	0,3	3 650	1 700	86	26 000	31 500
9	17	0,3	3 650	1 700	86	20 000	31 500
9	17	0,3	3 650	1 700	86	15 000	–
10	20	0,3	5 200	2 650	133	26 000	26 000
10	20	0,3	5 200	2 650	133	19 000	26 000
10	20	0,3	5 200	2 650	133	14 000	–
12	17	0,3	2 120	1 400	71	26 000	21 100
12	17	0,3	2 120	1 400	71	18 000	21 100
12	17	0,3	2 120	1 400	71	16 000	–
12	24	0,3	5 700	3 250	164	24 000	22 100
12	24	0,3	5 700	3 250	164	17 000	22 100
12	24	0,3	5 700	3 250	164	14 000	–
14,2	25,8	0,6	7 800	4 550	223	22 000	19 300
14,2	25,8	0,6	7 800	4 550	223	16 000	19 300
14	19	0,3	2 190	1 550	79	24 000	18 100
14	19	0,3	2 190	1 550	79	17 000	18 100
14	19	0,3	2 190	1 550	79	15 000	–
14	26	0,3	6 200	3 750	191	22 000	19 400
14	26	0,3	6 200	3 750	191	16 000	19 400
14	26	0,3	6 200	3 750	191	13 000	–
16,2	27,8	0,6	10 600	5 850	295	20 000	20 000
16,2	27,8	0,6	10 600	5 850	295	15 000	20 000

# Angular contact ball bearings

Double row  
Open or sealed



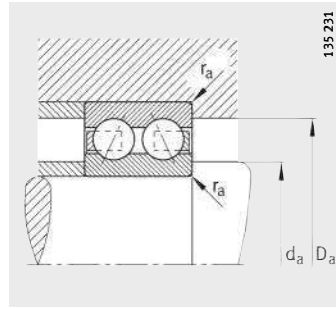
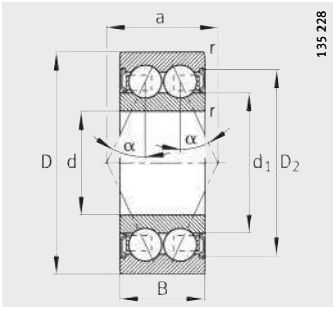
38..-B, 30..-B, 32..-B, 33..-B  
 $\alpha = 25^\circ$



38..-B-2Z, 30..-B-2Z,  
32..-B-2Z, 33..-B-2Z  
 $\alpha = 25^\circ$

**Dimension table (continued)** · Dimensions in mm

Designation	Mass m ≈kg	Dimensions							
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>	a
					min.	≈	≈	≈	≈
3802-B-TVH	0,009	15	24	7	0,3	–	–	18	10,1
3802-B-2Z-TVH	0,009	15	24	7	0,3	–	–	18	10,1
3802-B-2RSR-TVH	0,009	15	24	7	0,3	–	–	18	10,1
3002-B-TVH	0,036	15	32	13	0,3	–	–	20,4	14,8
3002-B-2Z-TVH	0,036	15	32	13	0,3	–	–	20,4	14,8
3002-B-2RSR-TVH	0,036	15	32	13	0,3	–	–	20,4	14,8
3202-B-TVH	0,065	15	35	15,9	0,6	28,8	–	21,1	18
3202-B-2Z-TVH	0,067	15	35	15,9	0,6	–	30,9	21,1	18
3202-B-2RSR-TVH	0,067	15	35	15,9	0,6	–	30,9	21,1	18
3302-B-TVH	0,124	15	42	19	1	34,5	–	25,6	21
3803-B-TVH	0,015	17	26	7	0,3	–	–	20	10,9
3803-B-2Z-TVH	0,015	17	26	7	0,3	–	–	20	10,9
3803-B-2RSR-TVH	0,015	17	26	7	0,3	–	–	20	10,9
3003-B-TVH	0,042	17	35	14	0,3	–	–	21,6	15,5
3003-B-2Z-TVH	0,042	17	35	14	0,3	–	–	21,6	15,5
3003-B-2RSR-TVH	0,042	17	35	14	0,3	–	–	21,6	15,5
3203-B-TVH	0,093	17	40	17,5	0,6	33,1	–	24	20
3203-B-2Z-TVH	0,095	17	40	17,5	0,6	–	35,1	24	20
3203-B-2RSR-TVH	0,095	17	40	17,5	0,6	–	35,1	24	20
3303-B-TVH	0,177	17	47	22,2	1	37,7	–	26,2	24
3804-B-TVH	0,02	20	32	10	0,3	–	–	24,3	14,3
3804-B-2Z-TVH	0,02	20	32	10	0,3	–	–	24,3	14,3
3804-B-2RSR-TVH	0,02	20	32	10	0,3	–	–	24,3	14,3
3004-B-TVH	0,08	20	42	16	0,6	–	–	25,2	19,1
3004-B-2Z-TVH	0,08	20	42	16	0,6	–	–	25,2	19,1
3004-B-2RSR-TVH	0,08	20	42	16	0,6	–	–	25,2	19,1
3204-B-TVH	0,154	20	47	20,6	1	38,7	–	28,9	24
3204-B-2Z-TVH	0,16	20	47	20,6	1	–	41,1	28,9	24
3204-B-2RSR-TVH	0,158	20	47	20,6	1	–	41,1	28,9	24
3304-B-TVH	0,217	20	52	22,2	1,1	42,7	–	31,2	26
3304-B-2Z-TVH	0,222	20	52	22,2	1,1	–	44,3	31,2	26
3304-B-2RSR-TVH	0,221	20	52	22,2	1,1	–	44,3	31,2	26



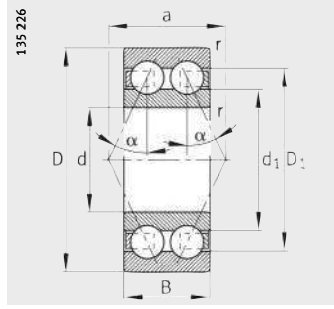
38..-B-2RSR, 30..-B-2RSR,  
32..-B-2RSR, 33..-B-2RSR  
 $\alpha = 25^\circ$

Mounting dimensions

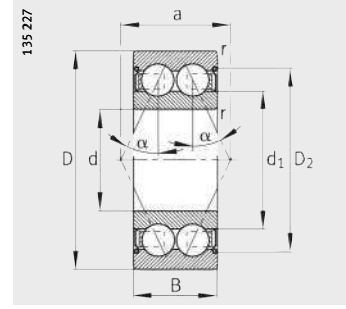
Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N			
17	22	0,3	2 430	1 960	99	22 000	14 800
17	22	0,3	2 430	1 960	99	16 000	14 800
17	22	0,3	2 430	1 960	99	14 000	–
17	30	0,3	8 600	5 400	275	20 000	15 800
17	30	0,3	8 600	5 400	275	15 000	15 800
17	30	0,3	8 600	5 400	275	12 000	–
19,2	30,8	0,6	11 800	7 100	360	19 000	17 100
19,2	30,8	0,6	11 800	7 100	360	14 000	17 100
19,2	30,8	0,6	11 800	7 100	360	12 000	–
20,6	36,4	1	16 300	10 000	460	16 000	11 000
19	24	0,3	2 480	2 080	107	19 000	13 200
19	24	0,3	2 480	2 080	107	14 000	13 200
19	24	0,3	2 480	2 080	107	12 000	–
19	33	0,3	9 200	6 200	315	18 000	15 400
19	33	0,3	9 200	6 200	315	13 000	15 400
19	33	0,3	9 200	6 200	315	11 000	–
21,2	35,8	0,6	14 600	9 000	420	17 000	15 500
21,2	35,8	0,6	14 600	9 000	420	12 000	15 500
21,2	35,8	0,6	14 600	9 000	420	10 000	–
22,6	41,4	1	20 800	12 500	570	15 000	11 500
22	30	0,3	5 800	4 850	245	17 000	11 900
22	30	0,3	5 800	4 850	245	12 000	11 900
22	30	0,3	5 800	4 850	245	10 000	–
23,2	38,8	0,6	14 500	9 600	485	16 000	13 300
23,2	38,8	0,6	14 500	9 600	485	11 000	13 300
23,2	38,8	0,6	14 500	9 600	485	9 000	–
25,6	41,4	1	19 600	12 500	610	15 000	13 600
25,6	41,4	1	19 600	12 500	610	10 000	13 600
25,6	41,4	1	19 600	12 500	610	8 500	–
27	45	1	23 200	15 000	690	13 000	9 500
27	45	1	23 200	15 000	690	9 000	9 500
27	45	1	23 200	15 000	690	8 000	–

# Angular contact ball bearings

Double row  
Open or sealed  
Split inner ring



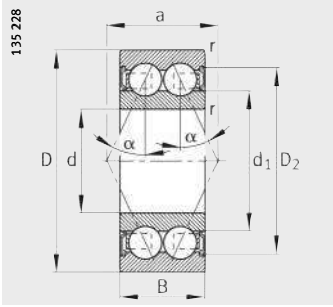
38...-B, 30...-B, 32...-B, 33...-B  
 $\alpha = 25^\circ$



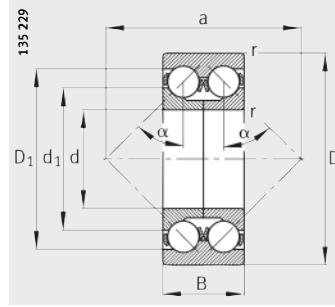
38...-B-2Z, 30...-B-2Z,  
32...-B-2Z, 33...-B-2Z  
 $\alpha = 25^\circ$

**Dimension table (continued)** · Dimensions in mm

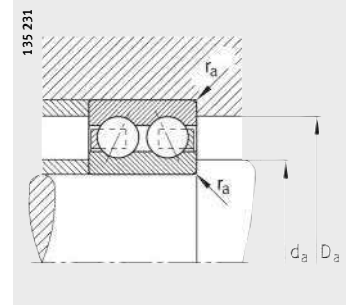
Designation	Mass m ≈kg	Dimensions							
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>	a
					min.	≈	≈	≈	≈
3805-B-TVH	0,025	25	37	10	0,3	–	–	28,3	15,9
3805-B-2Z-TVH	0,025	25	37	10	0,3	–	–	28,3	15,9
3805-B-2RSR-TVH	0,025	25	37	10	0,3	–	–	28,3	15,9
3005-B-TVH	0,1	25	47	16	0,6	–	–	29,8	21,2
3005-B-2Z-TVH	0,1	25	47	16	0,6	–	–	29,8	21,2
3005-B-2RSR-TVH	0,1	25	47	16	0,6	–	–	29,8	21,2
3205-B-TVH	0,178	25	52	20,6	1	43,7	–	33,9	26
3205-B-2Z-TVH	0,182	25	52	20,6	1	–	46,1	33,9	26
3205-B-2RSR-TVH	0,182	25	52	20,6	1	–	46,1	33,9	26
3305-B-TVH	0,353	25	62	25,4	1,1	50	–	37,2	31
3305-B-2Z-TVH	0,359	25	62	25,4	1,1	–	53,1	37,2	31
3305-B-2RSR-TVH	0,359	25	62	25,4	1,1	–	53,1	37,2	31
3305-DA-TVP	0,341	25	62	25,4	1,1	51,8	–	47,5	56
3806-B-TVH	0,03	30	42	10	0,3	–	–	32,8	18,1
3806-B-2Z-TVH	0,03	30	42	10	0,3	–	–	32,8	18,1
3806-B-2RSR-TVH	0,03	30	42	10	0,3	–	–	32,8	18,1
3006-B-TVH	0,16	30	55	19	1	–	–	35,6	24,8
3006-B-2Z-TVH	0,16	30	55	19	1	–	–	35,6	24,8
3006-B-2RSR-TVH	0,16	30	55	19	1	–	–	35,6	24,8
3206-B-TVH	0,289	30	62	23,8	1	52,1	–	40	31
3206-B-2Z-TVH	0,295	30	62	23,8	1	–	55,7	40	31
3206-B-2RSR-TVH	0,296	30	62	23,8	1	–	55,7	40	31
3306-B-TVH	0,548	30	72	30,2	1,1	58,9	–	44	36
3306-B-2Z-TVH	0,558	30	72	30,2	1,1	–	62,5	44	36
3306-B-2RSR-TVH	0,558	30	72	30,2	1,1	–	62,5	44	36
3306-DA	0,657	30	72	30,2	1,1	61,5	–	55,2	67



38..-B-2RSR, 30..-B-2RSR,  
32..-B-2RSR, 33..-B-2RSR  
 $\alpha = 25^\circ$



33..-DA  
Split inner ring  
 $\alpha = 45^\circ$

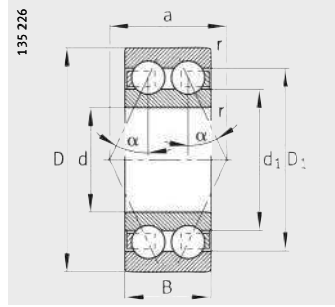


Mounting dimensions

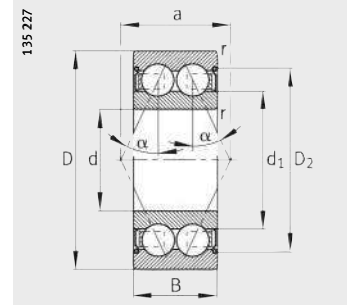
Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N			
27	35	0,3	6 000	5 600	280	14 000	10 300
27	35	0,3	6 000	5 600	280	9 500	10 300
27	35	0,3	6 000	5 600	280	8 500	–
28,2	43,8	0,6	15 500	11 100	560	13 000	11 200
28,2	43,8	0,6	15 500	11 100	560	9 000	11 200
28,2	43,8	0,6	15 500	11 100	560	8 000	–
30,6	46,4	1	21 200	14 600	710	12 000	11 600
30,6	46,4	1	21 200	14 600	710	8 500	11 600
30,6	46,4	1	21 200	14 600	710	7 500	–
32	55	1	30 000	20 000	900	10 000	8 600
32	55	1	30 000	20 000	900	7 500	8 600
32	55	1	30 000	20 000	900	6 700	–
32	55	1	30 000	23 200	1 270	10 000	8 400
32	40	0,3	6 300	6 100	320	11 000	8 700
32	40	0,3	6 300	6 100	320	8 000	8 700
32	40	0,3	6 300	6 100	320	7 000	–
34,6	50,4	1	20 300	15 600	790	10 000	10 200
34,6	50,4	1	20 300	15 600	790	7 500	10 200
34,6	50,4	1	20 300	15 600	790	6 700	–
35,6	56,4	1	30 000	21 200	980	9 500	10 400
35,6	56,4	1	30 000	21 200	980	7 000	10 400
35,6	56,4	1	30 000	21 200	980	6 300	–
37	65	1	41 500	28 500	1 310	8 500	7 800
37	65	1	41 500	28 500	1 310	6 300	7 800
37	65	1	41 500	28 500	1 310	5 600	–
37	65	1	41 500	34 500	2 070	8 500	7 500

# Angular contact ball bearings

Double row  
Open or sealed  
Split inner ring



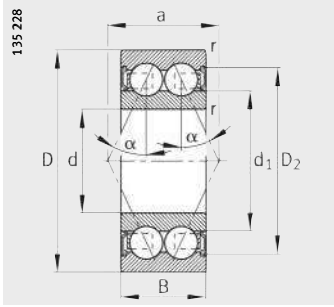
38...-B, 30...-B, 32...-B, 33...-B  
 $\alpha = 25^\circ$



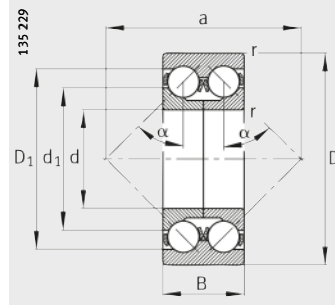
38...-B-2Z, 30...-B-2Z,  
32...-B-2Z, 33...-B-2Z  
 $\alpha = 25^\circ$

**Dimension table (continued)** · Dimensions in mm

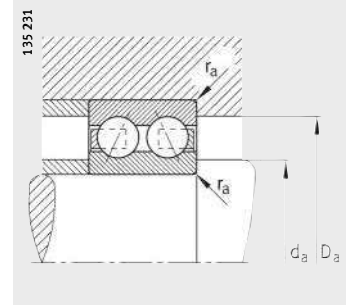
Designation	Mass m ≈kg	Dimensions							
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>	a
					min.	≈	≈	≈	≈
<b>3807-B-TVH</b>	0,035	<b>35</b>	47	10	0,3	–	–	38,5	20
<b>3807-B-2Z-TVH</b>	0,035	<b>35</b>	47	10	0,3	–	–	38,5	20
<b>3807-B-2RSR-TVH</b>	0,035	<b>35</b>	47	10	0,3	–	–	38,5	20
<b>3007-B-TVH</b>	0,2	<b>35</b>	62	20	1	–	–	41,7	27,8
<b>3007-B-2Z-TVH</b>	0,2	<b>35</b>	62	20	1	–	–	41,7	27,8
<b>3007-B-2RSR-TVH</b>	0,2	<b>35</b>	62	20	1	–	–	41,7	27,8
<b>3207-B-TVH</b>	0,446	<b>35</b>	72	27	1,1	60,6	–	47,2	36
<b>3207-B-2Z-TVH</b>	0,454	<b>35</b>	72	27	1,1	–	64,2	47,2	36
<b>3207-B-2RSR-TVH</b>	0,454	<b>35</b>	72	27	1,1	–	64,2	47,2	36
<b>3307-B-TVH</b>	0,657	<b>35</b>	80	34,9	1,5	65,5	–	49,3	41
<b>3307-B-2Z-TVH</b>	0,667	<b>35</b>	80	34,9	1,5	–	68,5	49,3	41
<b>3307-B-2RSR-TVH</b>	0,739	<b>35</b>	80	34,9	1,5	–	68,5	49,3	41
<b>3307-DA</b>	0,889	<b>35</b>	80	34,9	1,5	69,6	–	62	75
<b>3808-B-TVH</b>	0,04	<b>40</b>	52	10	0,3	–	–	43,4	22,4
<b>3808-B-2Z-TVH</b>	0,04	<b>40</b>	52	10	0,3	–	–	43,4	22,4
<b>3808-B-2RSR-TVH</b>	0,04	<b>40</b>	52	10	0,3	–	–	43,4	22,4
<b>3008-B-TVH</b>	0,25	<b>40</b>	68	21	1	–	–	46,7	30,8
<b>3008-B-2Z-TVH</b>	0,25	<b>40</b>	68	21	1	–	–	46,7	30,8
<b>3008-B-2RSR-TVH</b>	0,25	<b>40</b>	68	21	1	–	–	46,7	30,8
<b>3208-B-TVH</b>	0,594	<b>40</b>	80	30,2	1,1	67,9	–	53	41
<b>3208-B-2Z-TVH</b>	0,604	<b>40</b>	80	30,2	1,1	–	71,3	53	41
<b>3208-B-2RSR-TVH</b>	0,605	<b>40</b>	80	30,2	1,1	–	71,3	53	41
<b>3308-B-TVH</b>	0,984	<b>40</b>	90	36,5	1,5	74,6	–	55,6	46
<b>3308-B-2Z-TVH</b>	0,998	<b>40</b>	90	36,5	1,5	–	77,4	55,6	46
<b>3308-B-2RSR-TVH</b>	0,998	<b>40</b>	90	36,5	1,5	–	77,4	55,6	46
<b>3308-DA-MA</b>	1,19	<b>40</b>	90	36,5	1,5	79,4	–	72,5	85



38..-B-2RSR, 30..-B-2RSR,  
32..-B-2RSR, 33..-B-2RSR  
 $\alpha = 25^\circ$



33..-DA  
Split inner ring  
 $\alpha = 45^\circ$

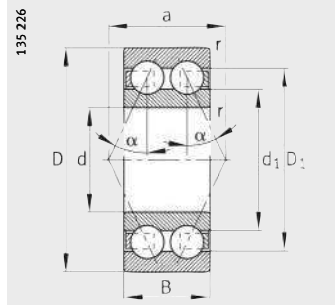


Mounting dimensions

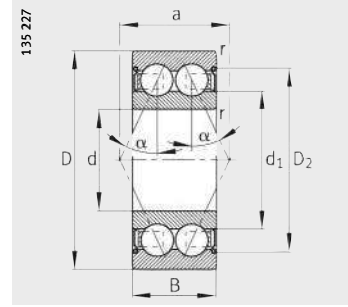
Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N			
37	45	0,3	6 700	7 000	370	9 500	7 400
37	45	0,3	6 700	7 000	370	7 000	7 400
37	45	0,3	6 700	7 000	370	6 000	–
39,6	57,4	1	24 500	19 400	980	9 000	8 800
39,6	57,4	1	24 500	19 400	980	6 700	8 800
39,6	57,4	1	24 500	19 400	980	5 600	–
42	65	1	39 000	28 500	1 370	8 500	9 200
42	65	1	39 000	28 500	1 370	6 300	9 200
42	65	1	39 000	28 500	1 370	5 300	–
44	71	1,5	51 000	34 500	1 650	7 500	7 400
44	71	1,5	51 000	34 500	1 650	5 600	7 400
44	71	1,5	51 000	34 500	1 650	5 000	–
44	71	1,5	50 000	41 500	2 480	7 500	7 100
42	50	0,3	7 000	7 800	425	8 500	6 400
42	50	0,3	7 000	7 800	425	6 300	6 400
42	50	0,3	7 000	7 800	425	5 300	–
44,6	63,4	1	25 500	21 700	1 100	8 000	8 000
44,6	63,4	1	25 500	21 700	1 100	6 000	8 000
44,6	63,4	1	25 500	21 700	1 100	5 000	–
47	73	1	48 000	36 500	1 840	7 500	8 500
47	73	1	48 000	36 500	1 840	5 600	8 500
47	73	1	48 000	36 500	1 840	4 800	–
49	81	1,5	62 000	45 000	2 500	6 700	6 400
49	81	1,5	62 000	45 000	2 500	5 000	6 400
49	81	1,5	62 000	45 000	2 500	4 500	–
49	81	1,5	62 000	53 000	3 150	6 300	6 000

# Angular contact ball bearings

Double row  
Open or sealed  
Split inner ring



38...-B, 32...-B, 33...-B  
 $\alpha = 25^\circ$

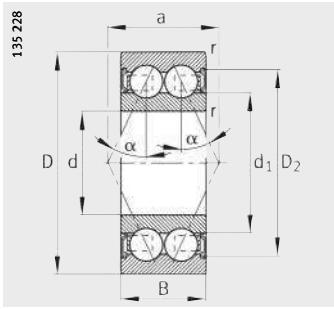


38...-B-2Z, 32...-B-2Z, 33...-B-2Z  
 $\alpha = 25^\circ$

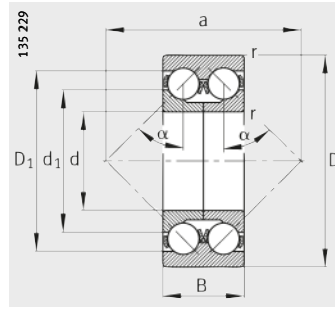
**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions							
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>	a
					min.	≈	≈	≈	≈
3809-B-TVH	0,053	45	58	10	0,3	–	–	48,6	24,2
3809-B-2Z-TVH	0,053	45	58	10	0,3	–	–	48,6	24,2
3809-B-2RSR-TVH	0,053	45	58	10	0,3	–	–	48,6	24,2
3209-B-TVH	0,628	45	85	30,2	1,1	72,9	–	57,2	43
3209-B-2Z-TVH	0,64	45	85	30,2	1,1	–	75,5	57,2	43
3209-B-2RSR-TVH	0,64	45	85	30,2	1,1	–	75,5	57,2	43
3309-B-TVH	1,34	45	100	39,7	1,5	81,5	–	62,3	50
3309-B-2Z-TVH	1,36	45	100	39,7	1,5	–	86,5	62	50
3309-B-2RSR-TVH	1,36	45	100	39,7	1,5	–	86,5	62	50
3309-DA	1,55	45	100	39,7	1,5	86,7	–	78,6	93
3810-B-TVH	0,07	50	65	12	0,3	–	–	55,1	27,1
3810-B-2Z-TVH	0,07	50	65	12	0,3	–	–	55,1	27,1
3810-B-2RSR-TVH	0,07	50	65	12	0,3	–	–	55,1	27,1
3210-B-TVH	0,68	50	90	30,2	1,1	77,9	–	62	45
3210-B-2Z-TVH	0,692	50	90	30,2	1,1	–	80,9	62	45
3210-B-2RSR-TVH	0,693	50	90	30,2	1,1	–	80,9	62	45
3310-B-TVH	1,8	50	110	44,4	2	89,5	–	68,3	55
3310-B-2Z-TVH	1,82	50	110	44,4	2	–	96	64	55
3310-B-2RSR-TVH	1,82	50	110	44,4	2	–	96	64	55
3310-DA-MA	2,24	50	110	44,4	2	96,9	–	87,6	104
3811-B-TVH	0,09	55	72	13	0,3	–	–	61,9	30,7
3811-B-2Z-TVH	0,09	55	72	13	0,3	–	–	61,9	30,7
3811-B-2RSR-TVH	0,09	55	72	13	0,3	–	–	61,9	30,7
3211-B-TVH	0,954	55	100	33,3	1,5	85,3	–	69	50
3211-B-2Z-TVH	0,969	55	100	33,3	1,5	–	89,1	68,7	50
3211-B-2RSR-TVH	0,969	55	100	33,3	1,5	–	89,1	68,7	50
3311-B-TVH	2,32	55	120	49,2	2	98,4	–	75,2	61
3311-B-2Z-TVH	2,36	55	120	49,2	2	–	105,2	75,2	61
3311-B-2RSR-TVH	2,35	55	120	49,2	2	–	105,2	75,2	61
3311-DA-MA	2,85	55	120	49,2	2	105,3	–	94,6	111

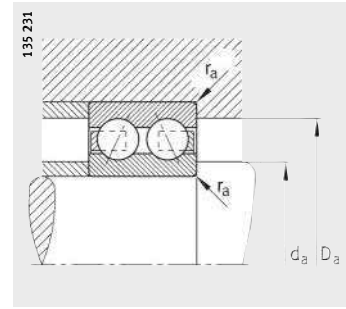




38..-B-2RSR, 32..-B-2RSR,  
33..-B-2RSR  
 $\alpha = 25^\circ$



33..-DA  
Split inner ring  
 $\alpha = 45^\circ$



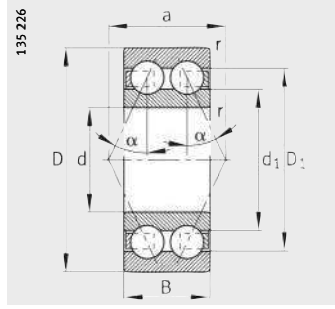
Mounting dimensions



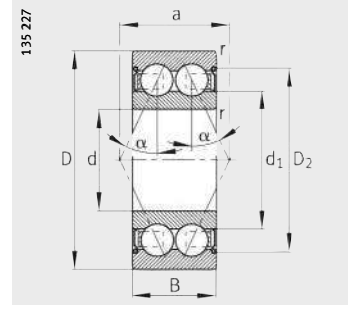
Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N			
47	56	0,3	7 200	8 300	465	7 500	5 700
47	56	0,3	7 200	8 300	465	5 600	5 700
47	56	0,3	7 200	8 300	465	5 000	–
52	78	1	48 000	37 500	1 800	6 700	7 800
52	78	1	48 000	37 500	1 800	5 000	7 800
52	78	1	48 000	37 500	1 800	4 500	–
54	91	1,5	68 000	51 000	2 750	6 000	6 100
54	91	1,5	68 000	51 000	2 750	4 500	6 100
54	91	1,5	68 000	51 000	2 750	4 000	–
54	91	1,5	75 000	64 000	3 400	6 000	5 800
52	63	0,3	8 700	10 400	580	7 000	5 400
52	63	0,3	8 700	10 400	580	5 300	5 400
52	63	0,3	8 700	10 400	580	4 500	–
57	83	1	51 000	42 500	2 120	6 300	7 100
57	83	1	51 000	42 500	2 120	4 800	7 100
57	83	1	51 000	42 500	2 120	4 000	–
61	99	2	81 500	62 000	3 450	5 300	5 800
61	99	2	81 500	62 000	3 450	4 000	5 800
61	99	2	81 500	62 000	3 450	3 600	–
61	99	2	90 000	85 000	5 200	5 300	5 300
57	70	0,3	12 100	15 700	880	6 300	5 100
57	70	0,3	12 100	15 700	880	4 500	5 100
57	70	0,3	12 100	15 700	880	4 300	–
64	91	1,5	58 500	49 000	2 390	5 600	6 800
64	91	1,5	58 500	49 000	2 390	4 300	6 800
64	91	1,5	58 500	49 000	2 390	3 800	–
66	109	2	102 000	78 000	4 250	5 000	5 400
66	109	2	102 000	78 000	4 250	3 800	5 400
66	109	2	102 000	78 000	4 250	3 400	–
66	109	2	110 000	100 000	5 400	5 000	5 200

# Angular contact ball bearings

Double row  
Open or sealed  
Split inner ring



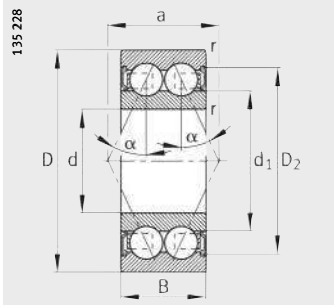
38..-B, 32..-B, 33..-B  
 $\alpha = 25^\circ$



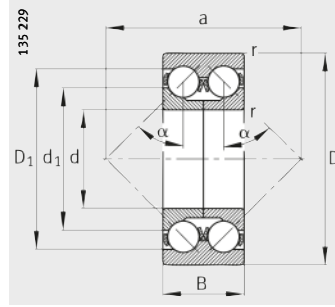
38..-B-2Z, 32..-B-2Z  
 $\alpha = 25^\circ$

**Dimension table (continued)** · Dimensions in mm

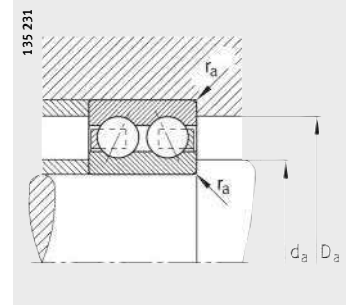
Designation	Mass m ≈kg	Dimensions							
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>	a
					min.	≈	≈	≈	≈
3812-B-TVH	0,14	60	78	14	0,3	–	–	65,9	33,2
3812-B-2Z-TVH	0,14	60	78	14	0,3	–	–	65,9	33,2
3812-B-2RSR-TVH	0,14	60	78	14	0,3	–	–	65,9	33,2
3212-B-TVH	1,27	60	110	36,5	1,5	94,5	–	75,8	55
3212-B-2Z-TVH	1,29	60	110	36,5	1,5	–	98,6	75,8	55
3212-B-2RSR-TVH	1,29	60	110	36,5	1,5	–	98,6	75,8	55
3312-B-TVH	2,92	60	130	54	2,1	108,7	–	81,6	67
3312-B-2RSR-TVH	2,92	60	130	54	2,1	–	113,1	81,6	67
3312-DA	3,39	60	130	54	2,1	115,8	–	101,7	122
3813-B-TVH	0,16	65	85	15	0,6	–	–	71,2	36,2
3813-B-2Z-TVH	0,16	65	85	15	0,6	–	–	71,2	36,2
3813-B-2RSR-TVH	0,16	65	85	15	0,6	–	–	71,2	36,2
3213-B-TVH	1,64	65	120	38,1	1,5	103,9	–	84,8	60
3213-B-2RSR-TVH	1,66	65	120	38,1	1,5	–	107,2	84,5	60
3313-B-TVH	3,63	65	140	58,7	2,1	117,6	–	88,6	71
3313-DA	4,38	65	140	58,7	2,1	124,3	–	110,2	131
3814-B-TVH	0,19	70	90	15	0,6	–	–	76,5	38,5
3814-B-2Z-TVH	0,19	70	90	15	0,6	–	–	76,5	38,5
3814-B-2RSR-TVH	0,19	70	90	15	0,6	–	–	76,5	38,5
3214-B-TVH	1,8	70	125	39,7	1,5	106,3	–	87	62
3214-B-2RSR-TVH	1,83	70	125	39,7	1,5	–	111,6	86,8	62
3314	5,03	70	150	63,5	2,1	131,9	–	98,5	109
3314-DA	5,36	70	150	63,5	2,1	132,4	–	118,2	141
3815-B-TVH	0,21	75	95	15	0,6	–	–	81,2	40,4
3815-B-2Z-TVH	0,21	75	95	15	0,6	–	–	81,2	40,4
3815-B-2RSR-TVH	0,21	75	95	15	0,6	–	–	81,2	40,4
3215-B-TVH	1,91	75	130	41,3	1,5	112,6	–	92,4	65
3215-B-2RSR-TVH	1,94	75	130	41,3	1,5	–	116,4	92,1	65
3315	6,07	75	160	68,3	2,1	141,2	–	105,5	117



38..-B-2RSR, 32..-B-2RSR,  
33..-B-2RSR  
 $\alpha = 25^\circ$



33..-DA  
Split inner ring  
 $\alpha = 45^\circ$

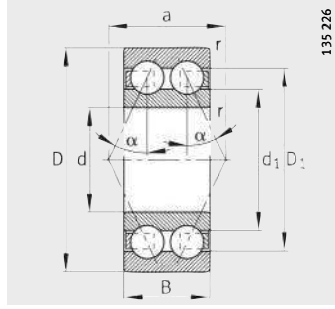


Mounting dimensions

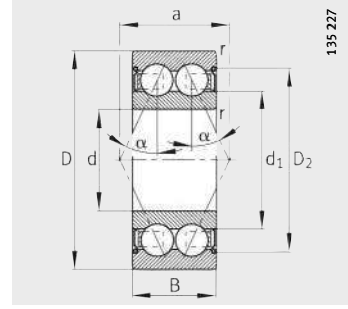
Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N			
62	76	0,3	14 500	17 500	960	5 600	4 700
62	76	0,3	14 500	17 500	960	4 300	4 700
62	76	0,3	14 500	17 500	960	3 800	–
69	101	1,5	72 000	61 000	3 450	5 000	6 200
69	101	1,5	72 000	61 000	3 450	3 800	6 200
69	101	1,5	72 000	61 000	3 450	3 400	–
72	118	2,1	125 000	98 000	5 400	4 500	5 100
72	118	2,1	125 000	98 000	5 400	3 000	–
72	118	2,1	127 000	118 000	6 500	4 500	4 850
68,2	81,8	0,6	17 700	21 400	1 120	5 000	4 500
68,2	81,8	0,6	17 700	21 400	1 120	4 000	4 500
68,2	81,8	0,6	17 700	21 400	1 120	3 600	–
74	111	1,5	80 000	73 500	3 700	4 500	5 600
74	111	1,5	80 000	73 500	3 700	3 000	–
77	128	2,1	143 000	112 000	6 100	4 300	4 850
77	128	2,1	143 000	137 000	7 200	4 300	4 650
73,2	86,8	0,6	19 200	23 800	1 300	5 000	4 100
73,2	86,8	0,6	19 200	23 800	1 300	3 800	4 100
73,2	86,8	0,6	19 200	23 800	1 300	3 400	–
79	116	1,5	83 000	76 500	4 000	4 500	5 600
79	116	1,5	83 000	76 500	4 000	3 400	–
82	138	2,1	143 000	166 000	8 500	4 000	4 500
82	138	2,1	163 000	156 000	8 200	4 000	4 550
78,2	91,8	0,6	19 400	24 400	1 370	4 800	3 950
78,2	91,8	0,6	19 400	24 400	1 370	3 600	3 950
78,2	91,8	0,6	19 400	24 400	1 370	3 200	–
84	121	1,5	91 500	85 000	4 250	4 300	5 300
84	121	1,5	91 500	85 000	4 250	2 800	–
87	148	2,1	163 000	193 000	9 700	3 800	4 350

# Angular contact ball bearings

Double row  
Open or sealed



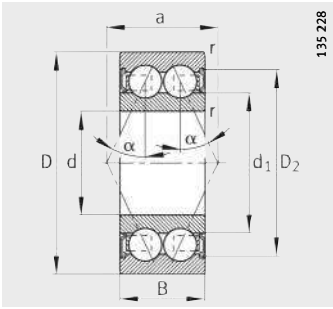
38..-B, 32..-B  
 $\alpha = 25^\circ$



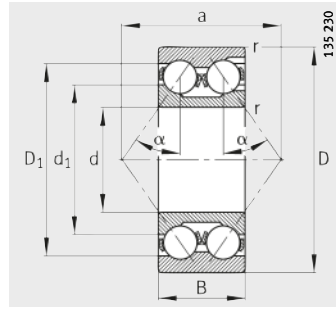
38..-B-2Z, 32..-B-2Z  
 $\alpha = 25^\circ$

**Dimension table** (continued) · Dimensions in mm

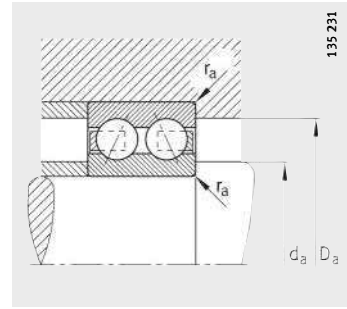
Designation	Mass m ≈kg	Dimensions							
		d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>	a
					min.	≈	≈	≈	≈
<b>3816-B-TVH</b>	0,23	<b>80</b>	100	15	0,6	–	–	85,5	42,2
<b>3816-B-2Z-TVH</b>	0,23	<b>80</b>	100	15	0,6	–	–	85,5	42,2
<b>3816-B-2RSR-TVH</b>	0,23	<b>80</b>	100	15	0,6	–	–	85,5	42,2
<b>3216-B-TVH</b>	2,45	<b>80</b>	140	44,4	2	120,3	–	98,5	69
<b>3216-B-2Z-TVH</b>	2,48	<b>80</b>	140	44,4	2	–	125,4	98,5	69
<b>3316</b>	7,26	<b>80</b>	170	68,3	2,1	149,7	–	111,8	123
<b>3217</b>	3,44	<b>85</b>	150	49,2	2	135,1	–	108,5	106
<b>3317-M</b>	8,78	<b>85</b>	180	73	3	160	–	119,6	131
<b>3218</b>	4,22	<b>90</b>	160	52,4	2	143,7	–	115,6	113
<b>3318</b>	9,23	<b>90</b>	190	73	3	168,2	–	126,1	136
<b>3219-M</b>	5,31	<b>95</b>	170	55,6	2,1	152,8	–	122,2	120
<b>3319-M</b>	11,4	<b>95</b>	200	77,8	3	177,3	–	133	143
<b>3220</b>	6,19	<b>100</b>	180	60,3	2,1	163,7	–	131	127
<b>3320-M</b>	14,6	<b>100</b>	215	82,6	3	188,7	–	142,5	153
<b>3221-M</b>	7,78	<b>105</b>	190	65,1	2,1	172,9	–	138	135
<b>3222-M</b>	9,23	<b>110</b>	200	69,8	2,1	180,1	–	143,3	144
<b>3322-M</b>	20	<b>110</b>	240	92,1	3	209,6	–	161,5	171



38..-B-2RSR  
 $\alpha = 25^\circ$



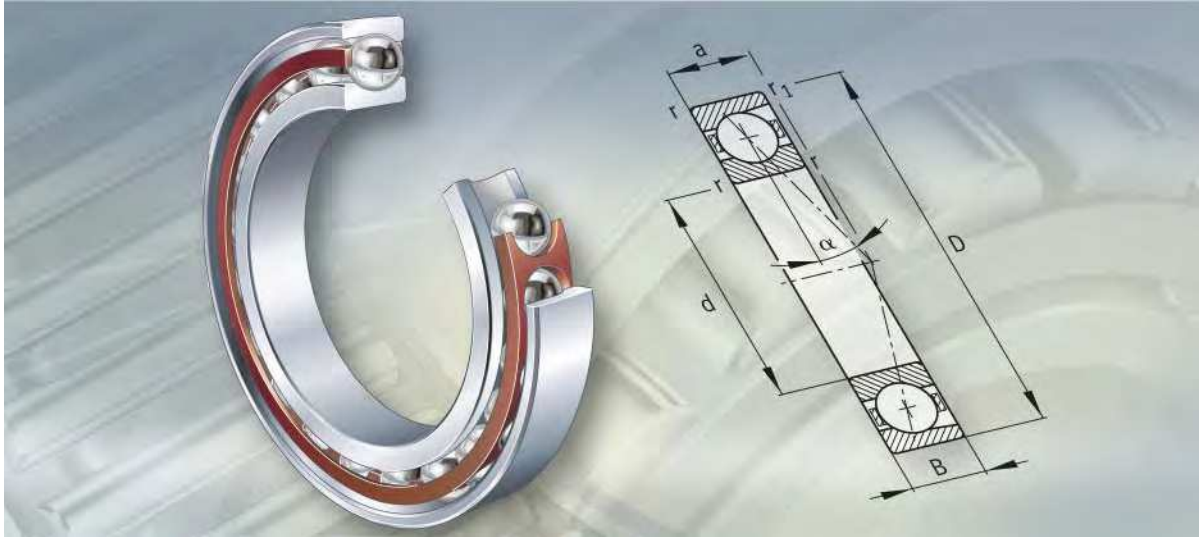
32, 33  
 $\alpha = 35^\circ$



Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{or}$ N			
83,2	96,8	0,6	19 600	25 500	1 420	4 500	3 650
83,2	96,8	0,6	19 600	25 500	1 420	3 400	3 650
83,2	96,8	0,6	19 600	25 500	1 420	3 000	–
91	129	2	98 000	93 000	4 950	4 000	5 200
91	129	2	98 000	93 000	4 950	3 000	5 200
92	158	2,1	176 000	212 000	10 300	3 600	3 950
96	139	2	112 000	150 000	7 200	3 800	4 750
99	166	2,5	190 000	228 000	11 100	3 400	3 750
104	146	2	125 000	170 000	7 800	3 600	4 550
104	176	2,5	216 000	275 000	12 600	3 200	3 400
107	158	2,1	140 000	186 000	8 500	3 400	4 400
109	186	2,5	220 000	285 000	13 100	3 200	3 250
112	168	2,1	160 000	224 000	10 000	3 200	4 200
114	201	2,5	236 000	320 000	13 700	3 000	3 000
117	178	2,1	180 000	245 000	11 100	3 200	4 000
122	188	2,1	204 000	280 000	11 900	3 000	3 800
124	226	2,5	270 000	390 000	16 300	2 600	2 700

**FAG**



**Spindle bearings**

# Spindle bearings

	Page
<b>Product overview</b>	Spindle bearings ..... 304
<b>Features</b>	Radial and axial load capacity..... 305
	Standard spindle bearings..... 305
	High speed spindle bearings..... 305
	Further bearing designs ..... 306
	Universal designs ..... 306
	Operating temperature ..... 307
	Cages..... 307
	Suffixes..... 307
<b>Design and safety guidelines</b>	Operating life ..... 308
	Equivalent static bearing load..... 308
	Static load safety factor ..... 309
	Speeds..... 309
	Universal bearing sets ..... 309
	Ready-to-fit bearing sets..... 310
	Design of bearing arrangements ..... 311
<b>Accuracy</b>	..... 312
<b>Dimension tables</b>	Spindle bearings with steel balls ..... 314
	Spindle bearings with ceramic balls..... 328
	High speed spindle bearings with steel balls, sealed..... 336
	High speed spindle bearings with ceramic balls, sealed ..... 342



# Product overview Spindle bearings

## Standard spindle bearings

B719, B70, B72



## With ceramic balls

HCB719, HCB70, HCB72



## High speed spindle bearings

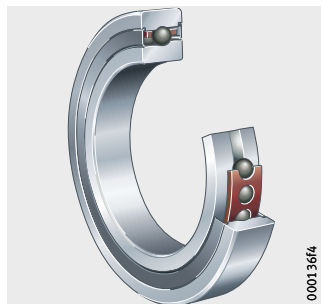
Sealed

HSS719, HSS70



## With ceramic balls Sealed

HCS719, HCS70





# Spindle bearings



**Features** Spindle bearings are single row angular contact ball bearings, comprising solid inner and outer rings and ball and cage assemblies with solid window cages. They cannot be dismantled. The bearings are available in open and sealed designs. Spindle bearings have restricted tolerances. They are particularly suitable for bearing arrangements with very high requirements for guidance accuracy and high speeds. They have proved extremely suitable for main spindle bearing arrangements in machine tools. A detailed description of spindle bearings (designs, calculation, lubrication, speeds, fits) is given in Catalogue SP 1, Super Precision Bearings.

**Radial and axial load capacity** The bearings can support axial forces in one direction as well as radial forces. Spindle bearings used in an O or X arrangement can support axial forces in both directions and moments. Bearings in a tandem arrangement can only support axial loads in one direction. Spindle bearings are available with a contact angle  $\alpha = 15^\circ$  (suffix C) or  $\alpha = 25^\circ$  (suffix E).

**Standard spindle bearings** Standard spindle bearings B70, B719 and B72 have steel balls.

**With ceramic balls** Spindle bearings HCB70, HCB719 and HCB72 have balls in standard sizes made from ceramic (hybrid bearings).

**Sealing** Spindle bearings B70..-2RSD, B719..-2RSD, B72..-2RSD, HCB70..-2RSD, HCB719..-2RSD and HCB72..-2RSD are sealed on both sides by gap seals.

**Lubrication** Sealed bearings are greased with an FAG high performance grease and are maintenance-free.

**High speed spindle bearings** High speed spindle bearings HSS70 and HSS719 have smaller steel balls.

**With ceramic balls** In addition, high speed spindle bearings HCS70 and HCS719 with ceramic balls (hybrid bearings) are available. These four series thus achieve higher speeds, have lower friction and heat generation, place less strain on the lubricant and have a longer operating life.

**Sealing** The bearings are sealed on both sides by gap seals. Open bearings of series HS70 and HS719 as well as HC70 and HC719 are also available.

**Lubrication** Sealed bearings are greased with an FAG high performance grease and are maintenance-free.

# Spindle bearings

## Further bearing designs

### X-life ultra bearings

X-life ultra bearings have bearing rings made from a nitrogen-containing, corrosion-resistant steel with a particularly fine structure (prefix X) and ceramic balls. They fulfil very high requirements for speed and load carrying capacity. The bearings have longer life compared to conventional bearings. Most series of spindle bearings are available as X-life ultra bearings.

### Direct Lube bearings

Where the limits of grease lubrication are reached, the spindle bearing range is supplemented by Direct Lube bearings (DLR). They ensure reliable supply of lubricant direct to the contact point via a circumferential annular slot and radial feed holes. DLR bearings can achieve extremely high speeds. They allow economical bearing solutions since the adjacent construction of the bearing can be of a simpler design.

### Universal designs

Spindle bearings of universal design can be fitted in any arrangement or combined in various sets without any loss of performance. The position of the pressure cone is marked on the cylindrical surface of the outer ring.

Bearings with the suffix UL are designed for slight preload in an X or O arrangement.



The preload is altered by mounting and the operating conditions.

### Ordering data

When ordering, the number of individual bearings must be stated.

## Operating temperature



The bearings are suitable for operating temperatures from  $-30\text{ °C}$  to  $+100\text{ °C}$ , restricted by the seal or cage material.

The standard grease for sealed spindle bearings is suitable up to a continuous temperature of  $+80\text{ °C}$ .

The operating temperature must be taken into consideration when selecting the lubricant.

## Cages

Spindle bearings have solid window cages made from hard fabric (suffix T). The cage is guided on the outer ring.



Check the chemical resistance of the seal or cage material to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of the cages and seals at high temperatures.

The oil change intervals must be observed.

## Suffixes

Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
C	Contact angle $15^\circ$	Standard
E	Contact angle $25^\circ$	
H	High preload <sup>1)</sup>	
L	Slight preload <sup>1)</sup>	
M	Moderate preload <sup>1)</sup>	
P4S	Tolerance class P4S	
T	Solid window cage made from hard fabric	
UL	Universal design, for example for fitting in pairs, bearing pair has slight preload in O and X arrangement	
2RSD	Spindle bearing with sealing shields on both sides (in series B and HCB)	

<sup>1)</sup> For preload values, see Catalogue SP 1, Super Precision Bearings.



# Spindle bearings

## Design and safety guidelines Operating life

High precision bearings must guide machine parts with very high precision and support forces at up to very high speeds.

They are selected predominantly from the perspectives of

- accuracy
- rigidity
- running behaviour.

In order that they can fulfil these tasks for as long as possible, the bearings must run without wear. The precondition for this is the creation of a load-bearing hydrodynamic lubricant film at the contact points of the rolling contact partners. Under these conditions, rolling bearings will achieve their fatigue life in a large number of applications. If the design is appropriate to the fatigue life, the operating life of the bearing is normally restricted by the lubricant operating life.

The decisive factors for the operating life from the perspective of load are the Hertzian pressures occurring at the contacts and the bearing kinematics. For high performance assemblies, individual design with the aid of special calculation programs is therefore advisable.

Since failure as a result of fatigue plays no part in practice in the case of high precision bearings, calculation of the rating life  $L_{10}$  in accordance with DIN ISO 281 is not suitable as a means of determining the operating life.

## Equivalent static bearing load

### Bearings with contact angle 15°

For bearings under static loading, the following applies:

Load ratio	Equivalent static load
$\frac{F_{0a}}{F_{0r}} \leq 1,09$	$P_0 = F_{0r}$
$\frac{F_{0a}}{F_{0r}} > 1,09$	$P_0 = 0,5 \cdot F_{0r} + 0,46 \cdot F_{0a}$

### Bearings with contact angle 25°

Load ratio	Equivalent static load
$\frac{F_{0a}}{F_{0r}} \leq 1,3$	$P_0 = F_{0r}$
$\frac{F_{0a}}{F_{0r}} > 1,3$	$P_0 = 0,5 \cdot F_{0r} + 0,38 \cdot F_{0a}$

$P_0$  N  
Equivalent static bearing load for combined load  
 $F_{0a}$  N  
Axial static bearing load  
 $F_{0r}$  N  
Radial static bearing load.

## Static load safety factor

In order to maintain the accuracy of the bearings, a static load safety factor  $S_0 > 3$  is required.

$$S_0 = \frac{C_{0r}}{P_0}$$

$C_{0r}$  N  
Basic static load rating according to dimension tables  
 $P_0$  N  
Equivalent static load.

If several bearings are present, the external load is distributed over the individual bearings.

For further information, see Catalogue SP 1, Super Precision Bearings.

## Speeds

The speeds of the bearing arrangements are dependent on:

- the preload of the bearings
- the elastic or rigid arrangement of the bearings in the spindle
- mounting as single bearings or in pairs
- the lubricants
- the cooling of the bearings.



The speeds stated in the dimension tables are guide values for single bearings under elastic preload and low loads.

The limiting speeds  $n_G$  given in the dimension tables are valid for lubrication with grease or minimal quantity lubrication with oil and must not be exceeded.

For a more detailed description, see Catalogue SP 1, Super Precision Bearings.

## Universal bearing sets

Universal bearings of the same sort (same bore and outside diameter) are also available as sets. They can be used in any arrangement (O, X, tandem), *Figure 1 to Figure 3*, page 310.

Sets with slight preload have the following designations:

- duplex (2 bearings), suffix DUL
- triplex (3 bearings), suffix TUL
- quadruplex (4 bearings), suffix QUL.

## Ordering data

When ordering bearings, the number of sets must be stated, not the number of single bearings.



# Spindle bearings

## Ready-to-fit bearing sets

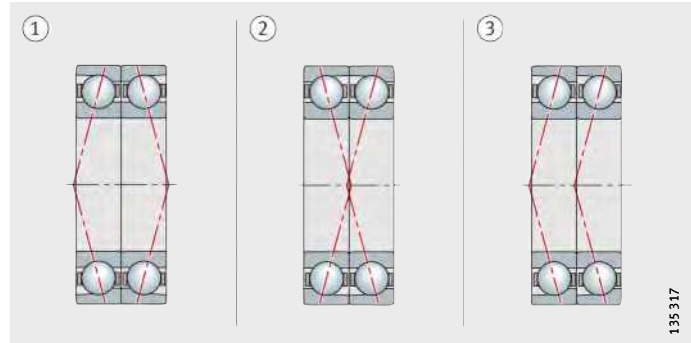
In ready-to-fit bearing sets, the bearings are supplied for use in a specifically defined arrangement.

The bearings must be fitted in the arrangement ordered.



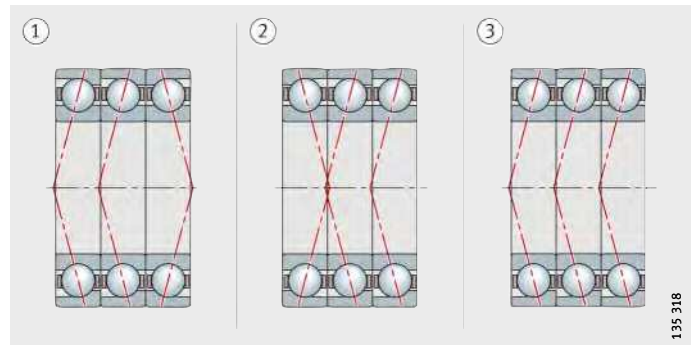
- ① DBL, O arrangement
- ② DFL, X arrangement
- ③ DTL, tandem arrangement

*Figure 1*  
Sets of 2 bearings



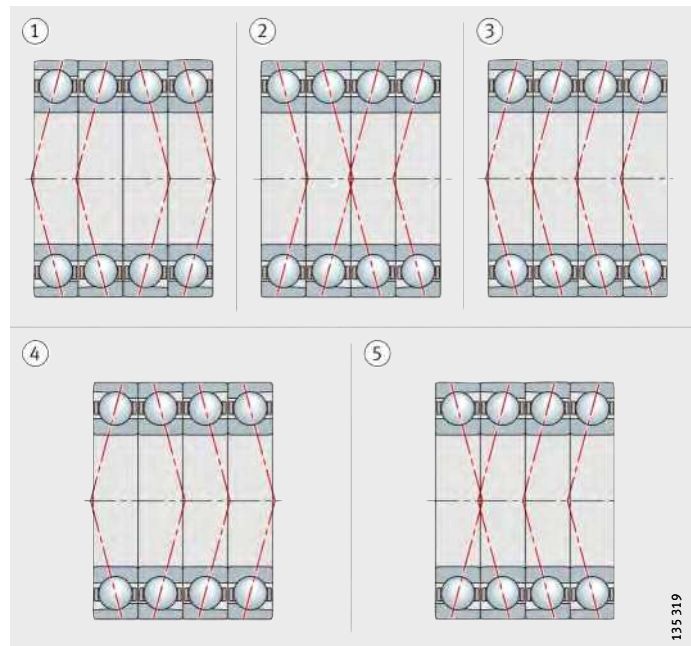
- ① TBTL, combination of O arrangement and tandem arrangement
- ② TFTL, combination of X arrangement and tandem arrangement
- ③ TTL, tandem arrangement

*Figure 2*  
Sets of 3 bearings



- ① QBCL, O arrangement
- ② QFCL, X arrangement
- ③ QTL, tandem arrangement
- ④ QBTL, combination of O arrangement and tandem arrangement
- ⑤ QFTL, combination of X arrangement and tandem arrangement

*Figure 3*  
Sets of 4 bearings



**Ordering example** 1-HSS7012-C-T-P4S-DBL

Description: two spindle bearings in O arrangement, slight preload.

**Design of  
bearing arrangements  
Shaft and housing tolerances**

For spindle bearings, fits are recommended as a function of the speeds, see Catalogue SP 1, Super Precision Bearings.

**Mounting dimensions**

The bearing tables give the maximum dimensions of the radii  $r_a$  and  $r_{a1}$  and the diameters of the abutment shoulders  $D_a$  and  $d_a$ .



# Spindle bearings

## Accuracy

The main dimensions of the bearings conform to DIN 628-1. The dimensional tolerances of the bearings correspond to tolerance class P4, the running tolerances correspond to tolerance class P2 to DIN 620-2.

The actual value codes for the bore and outside diameter as well as the nominal value deviation for the bearing width are indicated on the end faces of the inner and outer rings as well as on the packaging, where they are stated in the sequence “bore/outside diameter/bearing width”.

### Inner ring tolerance

Bore		Bore deviation		Width deviation		Width variation	Radial runout	Axial runout	
d	mm	$\Delta_{dmp}$ $\mu\text{m}$		$\Delta_{Bs}$ $\mu\text{m}$		$V_{Bs}$ $\mu\text{m}$	$K_{ia}$ $\mu\text{m}$	$S_d$ $\mu\text{m}$	$S_{ia}$ $\mu\text{m}$
over	incl.								
-	10	0	-4	0	-100	1,5	1,5	1,5	1,5
10	18	0	-4	0	-100	1,5	1,5	1,5	1,5
18	30	0	-5	0	-120	1,5	2,5	1,5	2,5
30	50	0	-6	0	-120	1,5	2,5	1,5	2,5
50	80	0	-7	0	-150	1,5	2,5	1,5	2,5
80	120	0	-8	0	-200	2,5	2,5	2,5	2,5
120	150	0	-10	0	-250	2,5	2,5	2,5	2,5
150	180	0	-10	0	-250	4	3	4	5
180	250	0	-12	0	-300	5	4	5	5

### Outer ring tolerance

Outside diameter		Outside diameter deviation		Width variation	Radial runout	Axial runout	
D	mm	$\Delta_{Dmp}$ $\mu\text{m}$		$V_{Cs}$ $\mu\text{m}$	$K_{ea}$ $\mu\text{m}$	$S_D$ $\mu\text{m}$	$S_{ea}$ $\mu\text{m}$
over	incl.						
18	30	0	-5	1,5	2,5	1,5	2,5
30	50	0	-6	1,5	2,5	1,5	2,5
50	80	0	-7	1,5	3	1,5	4
80	120	0	-8	2,5	4	2,5	5
120	150	0	-9	2,5	4	2,5	5
150	180	0	-10	2,5	5	2,5	5
180	250	0	-11	4	7	4	7
250	315	0	-13	5	7	5	7
315	400	0	-15	7	8	7	8

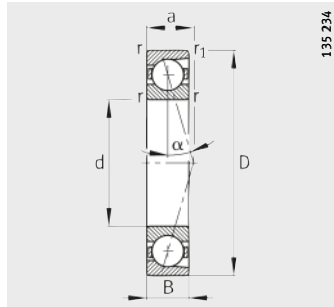
The width deviation  $\Delta_{Cs}$  is identical to  $\Delta_{Bs}$  of the corresponding inner ring.



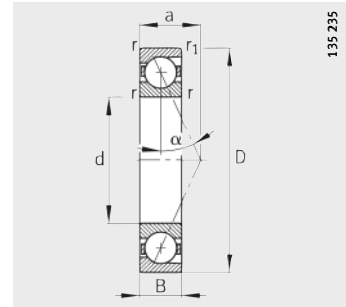


# Spindle bearings

With steel balls



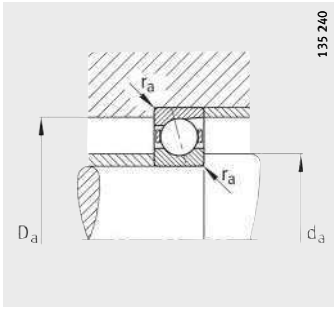
B719...-C, B70...-C, B72...-C  
 $\alpha = 15^\circ$



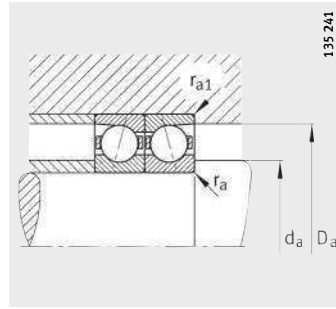
B719...-E, B70...-E, B72...-E  
 $\alpha = 25^\circ$

**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	r <sub>1</sub> min.	a ≈
B71900-C-T-P4S	0,009	10	22	6	0,3	0,3	5
B71900-E-T-P4S	0,009	10	22	6	0,3	0,3	7
B7000-C-T-P4S	0,019	10	26	8	0,3	0,3	6
B7000-E-T-P4S	0,019	10	26	8	0,3	0,3	8
B7200-C-T-P4S	0,031	10	30	9	0,6	0,6	7
B7200-E-T-P4S	0,031	10	30	9	0,6	0,6	9
B71901-C-T-P4S	0,01	12	24	6	0,3	0,3	5
B71901-E-T-P4S	0,01	12	24	6	0,3	0,3	7
B7001-C-T-P4S	0,021	12	28	8	0,3	0,3	5
B7001-E-T-P4S	0,021	12	28	8	0,3	0,3	6
B7201-C-T-P4S	0,038	12	32	10	0,6	0,6	8
B7201-E-T-P4S	0,037	12	32	10	0,6	0,6	10
B71902-C-T-P4S	0,015	15	28	7	0,3	0,3	6
B71902-E-T-P4S	0,015	15	28	7	0,3	0,3	9
B7002-C-T-P4S	0,03	15	32	9	0,3	0,3	8
B7002-E-T-P4S	0,03	15	32	9	0,3	0,3	10
B7202-C-T-P4S	0,044	15	35	11	0,6	0,6	9
B7202-E-T-P4S	0,044	15	35	11	0,6	0,6	11
B71903-C-T-P4S	0,017	17	30	7	0,3	0,3	7
B71903-E-T-P4S	0,017	17	30	7	0,3	0,3	9
B7003-C-T-P4S	0,039	17	35	10	0,3	0,3	9
B7003-E-T-P4S	0,039	17	35	10	0,3	0,3	11
B7203-C-T-P4S	0,066	17	40	12	0,6	0,6	10
B7203-E-T-P4S	0,066	17	40	12	0,6	0,6	13
B71904-C-T-P4S	0,036	20	37	9	0,3	0,3	8
B71904-E-T-P4S	0,036	20	37	9	0,3	0,3	11
B7004-C-T-P4S	0,068	20	42	12	0,6	0,6	10
B7004-E-T-P4S	0,068	20	42	12	0,6	0,6	13
B7204-C-T-P4S	0,105	20	47	14	1	1	12
B7204-E-T-P4S	0,105	20	47	14	1	1	15
B71905-C-T-P4S	0,042	25	42	9	0,3	0,3	9
B71905-E-T-P4S	0,042	25	42	9	0,3	0,3	12
B7005-C-T-P4S	0,081	25	47	12	0,6	0,6	11
B7005-E-T-P4S	0,081	25	47	12	0,6	0,6	14
B7205-C-T-P4S	0,13	25	52	15	1	1	13
B7205-E-T-P4S	0,13	25	52	15	1	1	17



Mounting dimensions



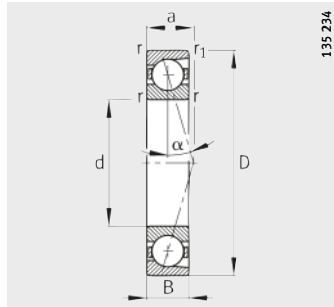
Mounting dimensions



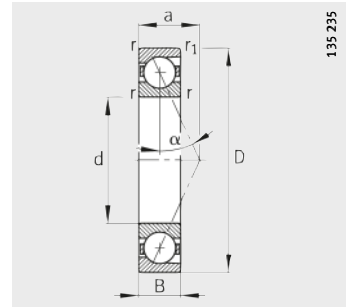
Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed	
$d_a$ h12	$D_a$ H12	$r_a$ max.	$r_{a1}$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		$n_G$ grease $\text{min}^{-1}$	$n_G$ oil $\text{min}^{-1}$
13	19,5	0,3	0,3	3 000	1 530	110	70 000	110 000
13	19,5	0,3	0,3	2 900	1 460	105	63 000	95 000
14	22	0,3	0,1	4 250	2 080	151	60 000	90 000
14	22	0,3	0,1	4 050	2 000	145	56 000	85 000
14,5	25,5	0,6	0,6	5 850	2 900	305	53 000	80 000
14,5	25,5	0,6	0,6	5 600	2 800	295	48 000	70 000
15	21,5	0,3	0,3	3 350	1 860	135	60 000	90 000
15	21,5	0,3	0,3	3 200	1 760	128	56 000	85 000
16,5	24,5	0,3	0,1	4 750	2 600	188	56 000	85 000
16,5	24,5	0,3	0,1	4 550	2 500	180	50 000	75 000
16,5	27,5	0,6	0,6	7 650	3 900	400	50 000	75 000
16,5	27,5	0,6	0,6	7 350	3 750	385	45 000	67 000
18	25,5	0,3	0,3	5 000	2 900	209	50 000	75 000
18	25,5	0,3	0,3	4 800	2 750	200	45 000	67 000
19	29	0,3	0,1	6 200	3 400	248	48 000	70 000
19	29	0,3	0,1	6 000	3 250	237	43 000	63 000
19,5	30,5	0,6	0,6	9 650	5 000	520	45 000	67 000
19,5	30,5	0,6	0,6	9 300	4 800	510	40 000	60 000
20	27,5	0,3	0,3	5 300	3 150	229	48 000	70 000
20	27,5	0,3	0,3	5 000	3 000	219	43 000	63 000
21	32	0,3	0,1	8 650	4 900	360	43 000	63 000
21	32	0,3	0,1	8 300	4 750	345	38 000	56 000
22,5	34,5	0,6	0,6	10 800	5 850	600	38 000	56 000
22,5	34,5	0,6	0,6	10 400	5 600	580	36 000	53 000
24	33,5	0,3	0,3	7 350	4 550	330	38 000	56 000
24	33,5	0,3	0,3	6 950	4 400	315	36 000	53 000
25	37	0,6	0,3	10 400	6 000	435	36 000	53 000
25	37	0,6	0,3	10 000	5 700	415	32 000	48 000
26,5	40,5	1	1	14 600	8 150	820	32 000	48 000
26,5	40,5	1	1	14 000	7 800	790	30 000	45 000
29	38,5	0,3	0,3	8 150	5 700	415	32 000	48 000
29	38,5	0,3	0,3	7 800	5 500	395	30 000	45 000
30	42	0,6	0,3	14 600	9 150	660	30 000	45 000
30	42	0,6	0,3	13 700	8 650	640	28 000	43 000
31,5	45,5	1	1	15 600	9 300	950	28 000	43 000
31,5	45,5	1	1	15 000	9 000	910	26 000	40 000

# Spindle bearings

With steel balls



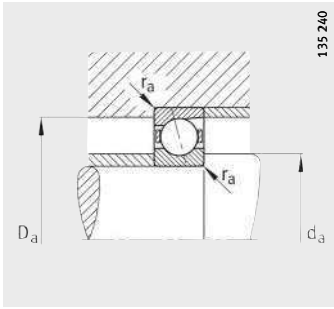
B719...-C, B70...-C, B72...-C  
 $\alpha = 15^\circ$



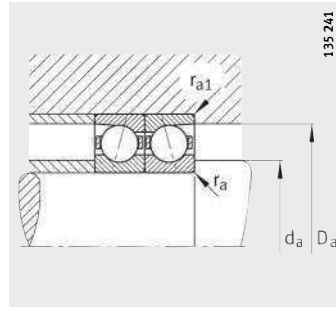
B719...-E, B70...-E, B72...-E  
 $\alpha = 25^\circ$

**Dimension table (continued)** · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	r <sub>1</sub> min.	a ≈
<b>B71906-C-T-P4S</b>	0,049	<b>30</b>	47	9	0,3	0,3	10
<b>B71906-E-T-P4S</b>	0,049	<b>30</b>	47	9	0,3	0,3	14
<b>B7006-C-T-P4S</b>	0,12	<b>30</b>	55	13	1	1	12
<b>B7006-E-T-P4S</b>	0,12	<b>30</b>	55	13	1	1	17
<b>B7206-C-T-P4S</b>	0,197	<b>30</b>	62	16	1	1	14
<b>B7206-E-T-P4S</b>	0,196	<b>30</b>	62	16	1	1	19
<b>B71907-C-T-P4S</b>	0,083	<b>35</b>	55	10	0,6	0,6	11
<b>B71907-E-T-P4S</b>	0,082	<b>35</b>	55	10	0,6	0,6	16
<b>B7007-C-T-P4S</b>	0,159	<b>35</b>	62	14	1	1	14
<b>B7007-E-T-P4S</b>	0,159	<b>35</b>	62	14	1	1	18
<b>B7207-C-T-P4S</b>	0,28	<b>35</b>	72	17	1,1	1,1	16
<b>B7207-E-T-P4S</b>	0,279	<b>35</b>	72	17	1,1	1,1	21
<b>B71908-C-T-P4S</b>	0,113	<b>40</b>	62	12	0,6	0,6	13
<b>B71908-E-T-P4S</b>	0,113	<b>40</b>	62	12	0,6	0,6	18
<b>B7008-C-T-P4S</b>	0,196	<b>40</b>	68	15	1	1	15
<b>B7008-E-T-P4S</b>	0,195	<b>40</b>	68	15	1	1	20
<b>B7208-C-T-P4S</b>	0,376	<b>40</b>	80	18	1,1	1,1	17
<b>B7208-E-T-P4S</b>	0,375	<b>40</b>	80	18	1,1	1,1	23
<b>B71909-C-T-P4S</b>	0,127	<b>45</b>	68	12	0,6	0,6	14
<b>B71909-E-T-P4S</b>	0,127	<b>45</b>	68	12	0,6	0,6	19
<b>B7009-C-T-P4S</b>	0,24	<b>45</b>	75	16	1	1	16
<b>B7009-E-T-P4S</b>	0,24	<b>45</b>	75	16	1	1	22
<b>B7209-C-T-P4S</b>	0,401	<b>45</b>	85	19	1,1	1,1	18
<b>B7209-E-T-P4S</b>	0,4	<b>45</b>	85	19	1,1	1,1	25
<b>B71910-C-T-P4S</b>	0,132	<b>50</b>	72	12	0,6	0,6	14
<b>B71910-E-T-P4S</b>	0,132	<b>50</b>	72	12	0,6	0,6	20
<b>B7010-C-T-P4S</b>	0,259	<b>50</b>	80	16	1	1	17
<b>B7010-E-T-P4S</b>	0,258	<b>50</b>	80	16	1	1	23
<b>B7210-C-T-P4S</b>	0,455	<b>50</b>	90	20	1,1	1,1	19
<b>B7210-E-T-P4S</b>	0,453	<b>50</b>	90	20	1,1	1,1	26



Mounting dimensions



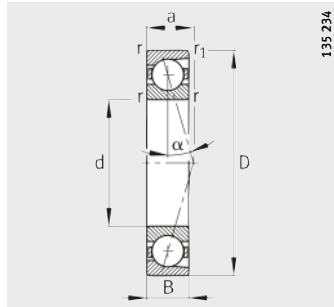
Mounting dimensions



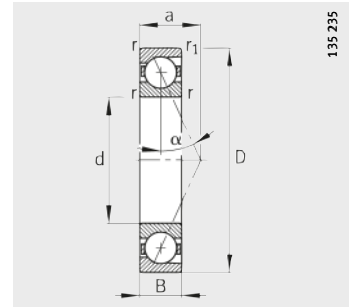
Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed	
$d_a$ h12	$D_a$ H12	$r_a$ max.	$r_{a1}$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		$n_G$ grease $\text{min}^{-1}$	$n_G$ oil $\text{min}^{-1}$
34	43,5	0,3	0,3	8 650	6 550	480	28 000	43 000
34	43,5	0,3	0,3	8 150	6 300	455	26 000	40 000
36	49	1	0,3	15 000	10 200	750	26 000	40 000
36	49	1	0,3	14 300	9 800	720	24 000	38 000
37,5	54,5	1	1	23 200	14 600	1 540	24 000	38 000
37,5	54,5	1	1	22 000	14 000	1 470	22 000	36 000
40	51,5	0,6	0,6	11 800	9 500	700	24 000	38 000
40	51,5	0,6	0,6	11 000	9 000	660	22 000	36 000
41	56	1	0,3	19 000	13 700	990	22 000	36 000
41	56	1	0,3	18 300	12 900	940	20 000	34 000
44	63	1	1	25 500	18 000	1 880	20 000	34 000
44	63	1	1	24 500	17 000	1 790	19 000	32 000
45	58,5	0,6	0,6	17 600	13 700	1 020	22 000	36 000
45	58,5	0,6	0,6	16 600	13 200	970	20 000	34 000
46	62	1	0,3	20 400	16 000	1 150	20 000	34 000
46	62	1	0,3	19 600	15 000	1 100	19 000	32 000
48	72	1	1	32 000	22 400	1 660	18 000	30 000
48	72	1	1	30 500	21 600	1 580	17 000	28 000
50	63,5	0,6	0,6	18 600	15 600	1 150	19 000	32 000
50	63,5	0,6	0,6	17 600	15 000	1 090	18 000	30 000
51	69	1	0,3	27 500	21 200	1 530	18 000	30 000
51	69	1	0,3	26 500	20 000	1 460	17 000	28 000
52,5	78	1	1	33 500	24 500	1 820	17 000	28 000
52,5	78	1	1	32 000	23 600	1 740	15 000	24 000
55	67,5	0,6	0,6	19 000	16 600	1 230	18 000	30 000
55	67,5	0,6	0,6	18 000	15 600	1 160	16 000	26 000
56	74	1	0,3	28 500	22 800	1 660	17 000	28 000
56	74	1	0,3	27 000	21 600	1 580	15 000	24 000
57	83	1	1	43 000	31 500	2 300	16 000	26 000
57	83	1	1	40 500	30 500	2 200	14 000	22 000

# Spindle bearings

With steel balls



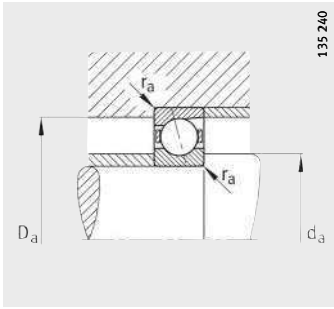
B719...-C, B70...-C, B72...-C  
 $\alpha = 15^\circ$



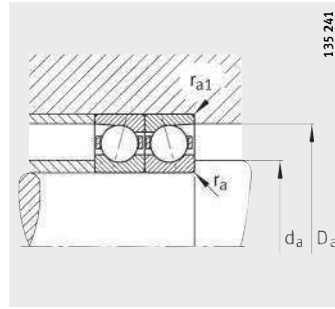
B719...-E, B70...-E, B72...-E  
 $\alpha = 25^\circ$

**Dimension table (continued)** · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	r <sub>1</sub> min.	a ≈
<b>B71911-C-T-P4S</b>	0,182	<b>55</b>	80	13	1	1	16
<b>B71911-E-T-P4S</b>	0,181	<b>55</b>	80	13	1	1	22
<b>B7011-C-T-P4S</b>	0,374	<b>55</b>	90	18	1,1	1,1	19
<b>B7011-E-T-P4S</b>	0,373	<b>55</b>	90	18	1,1	1,1	26
<b>B7211-C-T-P4S</b>	0,609	<b>55</b>	100	21	1,5	1,5	21
<b>B7211-E-T-P4S</b>	0,599	<b>55</b>	100	21	1,5	1,5	29
<b>B71912-C-T-P4S</b>	0,196	<b>60</b>	85	13	1	1	16
<b>B71912-E-T-P4S</b>	0,195	<b>60</b>	85	13	1	1	23
<b>B7012-C-T-P4S</b>	0,397	<b>60</b>	95	18	1,1	1,1	19
<b>B7012-E-T-P4S</b>	0,396	<b>60</b>	95	18	1,1	1,1	27
<b>B7212-C-T-P4S</b>	0,795	<b>60</b>	110	22	1,5	1,5	23
<b>B7212-E-T-P4S</b>	0,793	<b>60</b>	110	22	1,5	1,5	31
<b>B71913-C-T-P4S</b>	0,202	<b>65</b>	90	13	1	1	17
<b>B71913-E-T-P4S</b>	0,202	<b>65</b>	90	13	1	1	25
<b>B7013-C-T-P4S</b>	0,421	<b>65</b>	100	18	1,1	1,1	20
<b>B7013-E-T-P4S</b>	0,42	<b>65</b>	100	18	1,1	1,1	28
<b>B7213-C-T-P4S</b>	1,01	<b>65</b>	120	23	1,5	1,5	24
<b>B7213-E-T-P4S</b>	1,01	<b>65</b>	120	23	1,5	1,5	33
<b>B71914-C-T-P4S</b>	0,332	<b>70</b>	100	16	1	1	19
<b>B71914-E-T-P4S</b>	0,331	<b>70</b>	100	16	1	1	28
<b>B7014-C-T-P4S</b>	0,595	<b>70</b>	110	20	1,1	1,1	22
<b>B7014-E-T-P4S</b>	0,593	<b>70</b>	110	20	1,1	1,1	31
<b>B7214-C-T-P4S</b>	1,1	<b>70</b>	125	24	1,5	1,5	25
<b>B7214-E-T-P4S</b>	1,1	<b>70</b>	125	24	1,5	1,5	35
<b>B71915-C-T-P4S</b>	0,352	<b>75</b>	105	16	1	1	20
<b>B71915-E-T-P4S</b>	0,351	<b>75</b>	105	16	1	1	29
<b>B7015-C-T-P4S</b>	0,618	<b>75</b>	115	20	1,1	1,1	23
<b>B7015-E-T-P4S</b>	0,616	<b>75</b>	115	20	1,1	1,1	32
<b>B7215-C-T-P4S</b>	1,21	<b>75</b>	130	25	1,5	1,5	26
<b>B7215-E-T-P4S</b>	1,2	<b>75</b>	130	25	1,5	1,5	36



Mounting dimensions



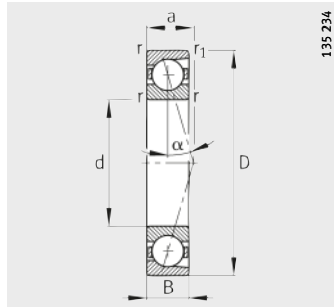
Mounting dimensions



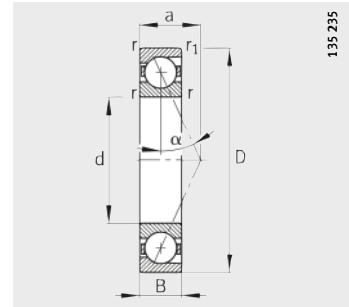
Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed	
$d_a$ h12	$D_a$ H12	$r_a$ max.	$r_{a1}$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		$n_G$ grease $\text{min}^{-1}$	$n_G$ oil $\text{min}^{-1}$
60	75,5	0,6	0,6	22 800	20 400	1 490	16 000	26 000
60	75,5	0,6	0,6	21 600	19 300	1 410	15 000	24 000
62	83	1	0,6	38 000	31 000	2 270	15 000	24 000
62	83	1	0,6	36 000	29 000	2 160	14 000	22 000
63	92	1,5	1,5	46 500	37 500	2 700	14 000	22 000
63	92	1,5	1,5	44 000	35 500	2 600	13 000	20 000
65	80,5	0,6	0,6	24 000	22 800	1 650	15 000	24 000
65	80,5	0,6	0,6	22 800	21 600	1 560	14 000	22 000
67	88	1	0,6	39 000	33 500	2 440	14 000	22 000
67	88	1	0,6	36 500	31 500	2 320	13 000	20 000
69,5	101,5	1,5	1,5	55 000	44 000	3 200	13 000	20 000
69,5	101,5	1,5	1,5	52 000	42 500	3 050	12 000	19 000
70	85,5	0,6	0,6	24 500	24 000	1 740	14 000	22 000
70	85,5	0,6	0,6	22 800	22 400	1 640	13 000	20 000
72	93	1	0,6	40 000	35 500	2 600	13 000	20 000
72	93	1	0,6	38 000	33 500	2 480	12 000	19 000
75,5	109,5	1,5	1,5	67 000	54 000	3 950	12 000	19 000
75,5	109,5	1,5	1,5	64 000	52 000	3 750	11 000	18 000
76	94,5	0,6	0,6	33 500	32 500	2 360	13 000	20 000
76	94,5	0,6	0,6	31 500	31 000	2 240	12 000	19 000
77	102	1	0,6	50 000	43 000	3 150	12 000	19 000
77	102	1	0,6	46 500	41 500	3 000	11 000	18 000
80	115	1,5	1,5	69 500	58 500	4 250	11 000	18 000
80	115	1,5	1,5	65 500	56 000	4 050	10 000	17 000
81	99,5	0,6	0,6	34 000	34 500	2 490	12 000	19 000
81	99,5	0,6	0,6	32 000	32 500	2 360	11 000	18 000
82	107	1	0,6	51 000	46 500	3 350	12 000	19 000
82	107	1	0,6	48 000	44 000	3 200	11 000	18 000
85	120	1,5	1,5	72 000	63 000	4 550	11 000	18 000
85	120	1,5	1,5	68 000	60 000	4 300	9 500	16 000

# Spindle bearings

With steel balls



B719...-C, B70...-C, B72...-C  
 $\alpha = 15^\circ$

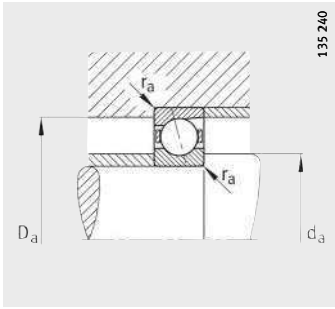


B719...-E, B70...-E, B72...-E  
 $\alpha = 25^\circ$

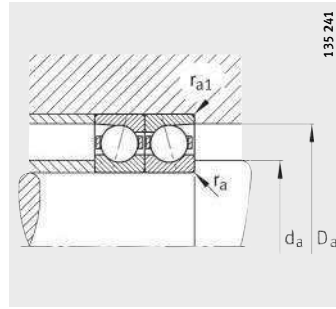
**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	r <sub>1</sub> min.	a ≈
<b>B71916-C-T-P4S</b>	0,367	<b>80</b>	110	16	1	1	21
<b>B71916-E-T-P4S</b>	0,366	<b>80</b>	110	16	1	1	30
<b>B7016-C-T-P4S</b>	0,837	<b>80</b>	125	22	1,1	1,1	25
<b>B7016-E-T-P4S</b>	0,834	<b>80</b>	125	22	1,1	1,1	35
<b>B7216-C-T-P4S</b>	1,43	<b>80</b>	140	26	2	2	28
<b>B7216-E-T-P4S</b>	1,42	<b>80</b>	140	26	2	2	39
<b>B71917-C-T-P4S</b>	0,526	<b>85</b>	120	18	1,1	1,1	23
<b>B71917-E-T-P4S</b>	0,524	<b>85</b>	120	18	1,1	1,1	33
<b>B7017-C-T-P4S</b>	0,878	<b>85</b>	130	22	1,1	1,1	25
<b>B7017-E-T-P4S</b>	0,875	<b>85</b>	130	22	1,1	1,1	36
<b>B7217-C-T-P4S</b>	1,81	<b>85</b>	150	28	2	2	30
<b>B7217-E-T-P4S</b>	1,8	<b>85</b>	150	28	2	2	42
<b>B71918-C-T-P4S</b>	0,558	<b>90</b>	125	18	1,1	1,1	23
<b>B71918-E-T-P4S</b>	0,556	<b>90</b>	125	18	1,1	1,1	34
<b>B7018-C-T-P4S</b>	1,14	<b>90</b>	140	24	1,5	1,5	27
<b>B7018-E-T-P4S</b>	1,13	<b>90</b>	140	24	1,5	1,5	39
<b>B7218-C-T-P4S</b>	2,2	<b>90</b>	160	30	2	2	32
<b>B7218-E-T-P4S</b>	2,19	<b>90</b>	160	30	2	2	44
<b>B71919-C-T-P4S</b>	0,576	<b>95</b>	130	18	1,1	1,1	24
<b>B71919-E-T-P4S</b>	0,575	<b>95</b>	130	18	1,1	1,1	35
<b>B7019-C-T-P4S</b>	1,18	<b>95</b>	145	24	1,5	1,5	28
<b>B7019-E-T-P4S</b>	1,18	<b>95</b>	145	24	1,5	1,5	40
<b>B7219-C-T-P4S</b>	2,73	<b>95</b>	170	32	2,1	2,1	34
<b>B7219-E-T-P4S</b>	2,72	<b>95</b>	170	32	2,1	2,1	47
<b>B71920-C-T-P4S</b>	0,784	<b>100</b>	140	20	1,1	1,1	26
<b>B71920-E-T-P4S</b>	0,781	<b>100</b>	140	20	1,1	1,1	38
<b>B7020-C-T-P4S</b>	1,24	<b>100</b>	150	24	1,5	1,5	29
<b>B7020-E-T-P4S</b>	1,23	<b>100</b>	150	24	1,5	1,5	41
<b>B7220-C-T-P4S</b>	3,21	<b>100</b>	180	34	2,1	2,1	36
<b>B7220-E-T-P4S</b>	3,2	<b>100</b>	180	34	2,1	2,1	50





Mounting dimensions



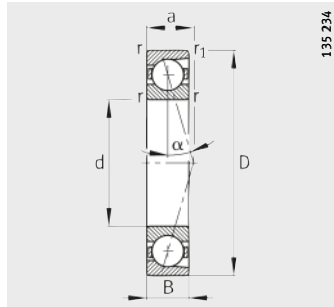
Mounting dimensions



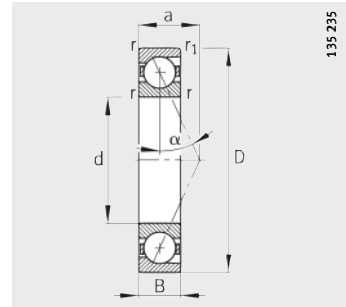
Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed	
$d_a$ h12	$D_a$ H12	$r_a$ max.	$r_{a1}$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		$n_G$ grease $\text{min}^{-1}$	$n_G$ oil $\text{min}^{-1}$
86	104	0,6	0,6	34 500	36 000	2 600	12 000	19 000
86	104	0,6	0,6	32 500	34 000	2 470	11 000	18 000
88	117	1	0,6	63 000	58 500	4 150	11 000	18 000
88	117	1	0,6	60 000	55 000	3 950	9 500	16 000
91	129	2	2	93 000	78 000	5 400	10 000	17 000
91	129	2	2	88 000	73 500	5 100	9 000	15 000
92	114	0,6	0,6	45 000	46 500	3 400	11 000	18 000
92	114	0,6	0,6	42 500	44 000	3 200	9 500	16 000
93	122	1	0,6	65 500	62 000	4 300	10 000	17 000
93	122	1	0,6	62 000	58 500	4 100	9 000	15 000
98	138	2	2	96 500	85 000	5 600	9 000	15 000
98	138	2	2	91 500	80 000	5 400	8 000	13 000
97	119	0,6	0,6	45 500	49 000	3 450	10 000	17 000
97	119	0,6	0,6	43 000	46 500	3 300	9 000	15 000
100	131	1,5	0,6	76 500	72 000	4 900	9 500	16 000
100	131	1,5	0,6	72 000	68 000	4 650	8 500	14 000
104	147	2	2	122 000	104 000	6 900	8 500	14 000
104	147	2	2	116 000	100 000	6 600	7 500	12 000
102	124	0,6	0,6	46 500	51 000	3 550	9 500	16 000
102	124	0,6	0,6	44 000	48 000	3 350	8 500	14 000
105	136	1,5	0,6	78 000	76 500	5 100	9 000	15 000
105	136	1,5	0,6	75 000	72 000	4 850	8 000	13 000
110,5	154	2	2	127 000	114 000	7 300	8 000	13 000
110,5	154	2	2	122 000	108 000	6 900	7 000	11 000
107	133	0,6	0,6	58 500	64 000	4 200	9 000	15 000
107	133	0,6	0,6	55 000	60 000	3 950	8 000	13 000
110	141	1,5	0,6	81 500	81 500	5 300	8 500	14 000
110	141	1,5	0,6	76 500	76 500	5 000	7 500	12 000
114,5	165,5	2,1	2,1	132 000	122 000	7 600	7 500	12 000
114,5	165,5	2,1	2,1	125 000	116 000	7 300	6 700	10 000

# Spindle bearings

With steel balls



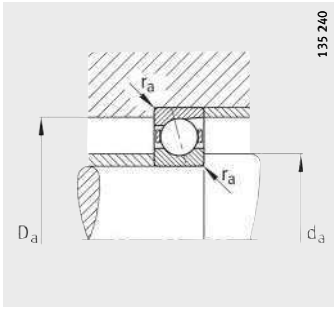
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 $\alpha = 15^\circ$



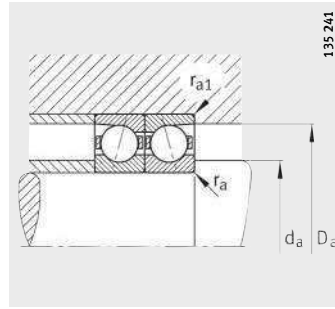
B719...-E, B70...-E, B72...-E  
 $\alpha = 25^\circ$

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	r <sub>1</sub> min.	a ≈
<b>B71921-C-T-P4S</b>	0,814	<b>105</b>	145	20	1,1	1,1	27
<b>B71921-E-T-P4S</b>	0,813	<b>105</b>	145	20	1,1	1,1	39
<b>B7021-C-T-P4S</b>	1,52	<b>105</b>	160	26	2	2	31
<b>B7021-E-T-P4S</b>	1,51	<b>105</b>	160	26	2	2	44
<b>B7221-C-T-P4S</b>	3,89	<b>105</b>	190	36	2,1	2,1	38
<b>B7221-E-T-P4S</b>	3,88	<b>105</b>	190	36	2,1	2,1	52
<b>B71922-C-T-P4S</b>	0,848	<b>110</b>	150	20	1,1	1,1	27
<b>B71922-E-T-P4S</b>	0,845	<b>110</b>	150	20	1,1	1,1	40
<b>B7022-C-T-P4S</b>	1,94	<b>110</b>	170	28	2	2	33
<b>B7022-E-T-P4S</b>	1,94	<b>110</b>	170	28	2	2	47
<b>B7222-C-T-P4S</b>	4,59	<b>110</b>	200	38	2,1	2,1	40
<b>B7222-E-T-P4S</b>	4,58	<b>110</b>	200	38	2,1	2,1	55
<b>B71924-C-T-P4S</b>	1,16	<b>120</b>	165	22	1,1	1,1	30
<b>B71924-E-T-P4S</b>	1,16	<b>120</b>	165	22	1,1	1,1	44
<b>B7024-C-T-P4S</b>	2,07	<b>120</b>	180	28	2	2	34
<b>B7024-E-T-P4S</b>	2,06	<b>120</b>	180	28	2	2	49
<b>B7224-C-T-P4S</b>	5,29	<b>120</b>	215	40	2,1	2,1	43
<b>B7224-E-T-P4S</b>	5,27	<b>120</b>	215	40	2,1	2,1	59
<b>B71926-C-T-P4S</b>	1,52	<b>130</b>	180	24	1,5	1,5	33
<b>B71926-E-T-P4S</b>	1,52	<b>130</b>	180	24	1,5	1,5	48
<b>B7026-C-T-P4S</b>	3,15	<b>130</b>	200	33	2	2	39
<b>B7026-E-T-P4S</b>	3,14	<b>130</b>	200	33	2	2	55
<b>B7226-C-T-P4S</b>	6,1	<b>130</b>	230	40	3	3	44
<b>B7226-E-T-P4S</b>	6,08	<b>130</b>	230	40	3	3	62
<b>B71928-C-T-P4S</b>	1,63	<b>140</b>	190	24	1,5	1,5	34
<b>B71928-E-T-P4S</b>	1,62	<b>140</b>	190	24	1,5	1,5	50
<b>B7028-C-T-P4S</b>	3,34	<b>140</b>	210	33	2	2	40
<b>B7028-E-T-P4S</b>	3,33	<b>140</b>	210	33	2	2	57
<b>B7228-C-T-P4S</b>	7,87	<b>140</b>	250	42	3	3	47
<b>B7228-E-T-P4S</b>	7,85	<b>140</b>	250	42	3	3	66
<b>B71930-C-T-P4S</b>	2,49	<b>150</b>	210	28	2	1	38
<b>B71930-E-T-P4S</b>	2,49	<b>150</b>	210	28	2	1	56
<b>B7030-C-T-P4S</b>	3,99	<b>150</b>	225	35	2,1	2,1	43
<b>B7030-E-T-P4S</b>	3,98	<b>150</b>	225	35	2,1	2,1	61
<b>B7230-C-T-P4S</b>	10,1	<b>150</b>	270	45	3	3	51
<b>B7230-E-T-P4S</b>	10,1	<b>150</b>	270	45	3	3	71



Mounting dimensions



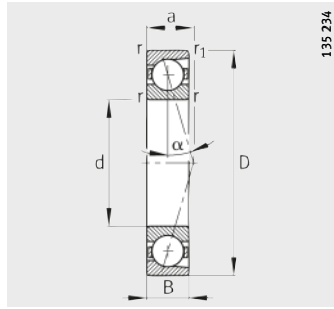
Mounting dimensions



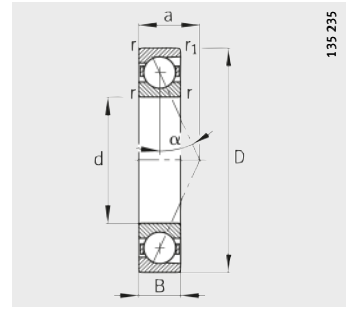
Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed	
$d_a$ h12	$D_a$ H12	$r_a$ max.	$r_{a1}$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N		$n_G$ grease min <sup>-1</sup>	$n_G$ oil min <sup>-1</sup>
112	138	0,6	0,6	58 500	64 000	4 150	8 500	14 000
112	138	0,6	0,6	55 000	60 000	3 900	7 500	12 000
116	150	2	1	83 000	85 000	5 400	8 000	13 000
116	150	2	1	78 000	81 500	5 200	7 000	11 000
120,5	174,5	2,1	2,1	163 000	146 000	8 800	7 000	11 000
120,5	174,5	2,1	2,1	156 000	140 000	8 400	6 300	9 500
117	143	0,6	0,6	58 500	67 000	4 250	8 000	13 000
117	143	0,6	0,6	56 000	63 000	4 000	7 500	12 000
121	159	2	1	110 000	110 000	6 700	7 500	12 000
121	159	2	1	104 000	104 000	6 400	6 700	10 000
126,5	183,5	2,1	2,1	163 000	150 000	8 700	6 700	10 000
126,5	183,5	2,1	2,1	153 000	143 000	8 300	6 000	9 000
128	157	0,6	0,6	73 500	85 000	5 100	7 000	11 000
128	157	0,6	0,6	69 500	80 000	4 850	6 700	10 000
131	169	2	1	112 000	116 000	6 900	6 700	10 000
131	169	2	1	106 000	110 000	6 500	6 300	9 500
140	195	2,1	2,1	204 000	196 000	11 000	6 000	9 000
140	195	2,1	2,1	196 000	186 000	10 500	5 300	8 000
139	171	0,6	0,6	86 500	100 000	5 800	6 700	10 000
139	171	0,6	0,6	81 500	95 000	5 500	6 000	9 000
142	189	2	1	143 000	150 000	8 600	6 000	9 000
142	189	2	1	137 000	143 000	8 100	5 600	8 500
148	211,5	2,5	2,5	212 000	216 000	11 600	5 600	8 500
148	211,5	2,5	2,5	204 000	204 000	11 000	5 000	7 500
149	181	0,6	0,6	90 000	108 000	6 100	6 000	9 000
149	181	0,6	0,6	85 000	102 000	5 800	5 600	8 500
152	199	2	1	146 000	160 000	8 800	5 600	8 500
152	199	2	1	140 000	150 000	8 400	5 000	7 500
163	226,5	2,5	2,5	220 000	232 000	12 100	5 000	7 500
163	226,5	2,5	2,5	212 000	224 000	11 500	4 500	6 700
160	199	1	1	122 000	143 000	7 700	5 600	8 500
160	199	1	1	114 000	134 000	7 300	5 000	7 500
163	213	2,1	1	183 000	193 000	10 300	5 300	8 000
163	213	2,1	1	173 000	186 000	9 800	4 800	7 000
178	241,5	2,5	2,5	228 000	255 000	12 600	4 500	6 700
178	241,5	2,5	2,5	216 000	240 000	12 000	4 000	6 000

# Spindle bearings

With steel balls



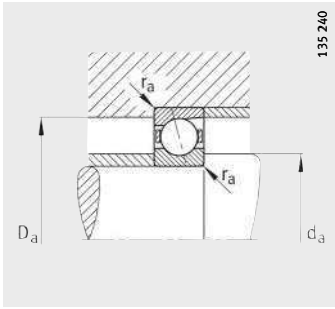
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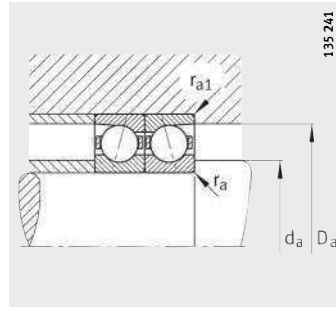
B719...-E, B70...-E, B72...-E  
 $\alpha = 25^\circ$

**Dimension table (continued)** · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions					
		d	D	B	r min.	r <sub>1</sub> min.	a ≈
<b>B71932-C-T-P4S</b>	2,62	<b>160</b>	220	28	2	1	40
<b>B71932-E-T-P4S</b>	2,61	<b>160</b>	220	28	2	1	58
<b>B7032-C-T-P4S</b>	5,01	<b>160</b>	240	38	2,1	2,1	46
<b>B7032-E-T-P4S</b>	4,99	<b>160</b>	240	38	2,1	2,1	66
<b>B7232-C-T-P4S</b>	12,9	<b>160</b>	290	48	3	3	54
<b>B7232-E-T-P4S</b>	12,9	<b>160</b>	290	48	3	3	76
<b>B71934-C-T-P4S</b>	2,78	<b>170</b>	230	28	2	1,5	41
<b>B71934-E-T-P4S</b>	2,77	<b>170</b>	230	28	2	1,5	61
<b>B7034-C-T-P4S</b>	6,51	<b>170</b>	260	42	2,1	2,1	50
<b>B7034-E-T-P4S</b>	6,48	<b>170</b>	260	42	2,1	2,1	71
<b>B7234-C-T-P4S</b>	15,6	<b>170</b>	310	52	4	4	58
<b>B7234-E-T-P4S</b>	15,6	<b>170</b>	310	52	4	4	82
<b>B71936-C-T-P4S</b>	4,13	<b>180</b>	250	33	2	1	45
<b>B71936-E-T-P4S</b>	4,11	<b>180</b>	250	33	2	1	67
<b>B7036-C-T-P4S</b>	8,77	<b>180</b>	280	46	2,1	2,1	54
<b>B7036-E-T-P4S</b>	8,74	<b>180</b>	280	46	2,1	2,1	77
<b>B7236-C-T-P4S</b>	16,3	<b>180</b>	320	52	4	4	60
<b>B7236-E-T-P4S</b>	16,3	<b>180</b>	320	52	4	4	84
<b>B71938-C-T-P4S</b>	4,31	<b>190</b>	260	33	2	1	47
<b>B71938-E-T-P4S</b>	4,29	<b>190</b>	260	33	2	1	69
<b>B7038-C-T-P4S</b>	9,18	<b>190</b>	290	46	2,1	2,1	55
<b>B7038-E-T-P4S</b>	9,15	<b>190</b>	290	46	2,1	2,1	79
<b>B7238-C-T-P4S</b>	20	<b>190</b>	340	55	4	4	63
<b>B7238-E-T-P4S</b>	19,9	<b>190</b>	340	55	4	4	89
<b>B71940-C-T-P4S</b>	6,03	<b>200</b>	280	38	2,1	1,1	51
<b>B71940-E-T-P4S</b>	6,01	<b>200</b>	280	38	2,1	1,1	75
<b>B7040-C-T-P4S</b>	11,6	<b>200</b>	310	51	2,1	2,1	60
<b>B7040-E-T-P4S</b>	11,5	<b>200</b>	310	51	2,1	2,1	85
<b>B7240-C-T-P4S</b>	24,1	<b>200</b>	360	58	4	4	67
<b>B7240-E-T-P4S</b>	24,1	<b>200</b>	360	58	4	4	94



Mounting dimensions



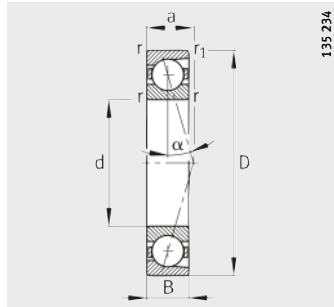
Mounting dimensions



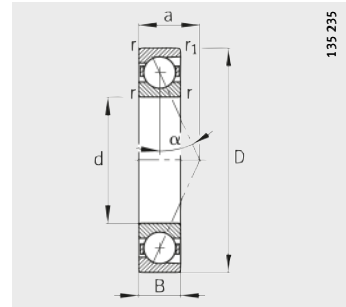
Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed	
$d_a$ h12	$D_a$ H12	$r_a$ max.	$r_{a1}$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		$n_G$ grease $\text{min}^{-1}$	$n_G$ oil $\text{min}^{-1}$
170	209	1	1	125 000	150 000	7 900	5 000	7 500
170	209	1	1	116 000	140 000	7 500	4 800	7 000
174	228	2	1	190 000	208 000	10 600	4 800	7 000
174	228	2	1	176 000	196 000	10 100	4 300	6 300
191	259	2,5	2,5	245 000	285 000	13 800	4 300	6 300
191	259	2,5	2,5	232 000	270 000	13 200	3 800	5 600
180	219	1	1	129 000	163 000	8 300	4 800	7 000
180	219	1	1	122 000	150 000	7 900	4 300	6 300
185	246	2	1	236 000	270 000	13 300	4 500	6 700
185	246	2	1	224 000	255 000	12 600	4 000	6 000
205	275	3	3	300 000	360 000	16 800	3 800	5 600
205	275	3	3	280 000	345 000	16 000	3 600	5 300
192	238	1	1	163 000	204 000	10 200	4 500	6 700
192	238	1	1	156 000	193 000	9 700	4 000	6 000
196	264	2	1	245 000	285 000	13 800	4 000	6 000
196	264	2	1	232 000	275 000	13 100	3 800	5 600
213,5	286,5	3	3	305 000	390 000	17 600	3 800	5 600
213,5	286,5	3	3	290 000	365 000	16 800	3 400	5 000
202	247	1	1	166 000	212 000	10 400	4 300	6 300
202	247	1	1	156 000	200 000	9 900	3 800	5 600
206	274	2	1	250 000	305 000	14 300	3 800	5 600
206	274	2	1	236 000	290 000	13 600	3 600	5 300
223,5	306,5	3	3	315 000	415 000	18 300	3 400	5 000
223,5	306,5	3	3	300 000	390 000	17 400	3 200	4 800
214	266	1	1	204 000	255 000	11 900	3 800	5 600
214	266	1	1	193 000	240 000	11 300	3 600	5 300
217	293	2	1	305 000	390 000	17 500	3 600	5 300
217	293	2	1	290 000	365 000	16 700	3 200	4 800
238,5	321,5	3	3	325 000	440 000	19 000	3 200	4 800
238,5	321,5	3	3	310 000	415 000	18 000	3 000	4 500

# Spindle bearings

With steel balls



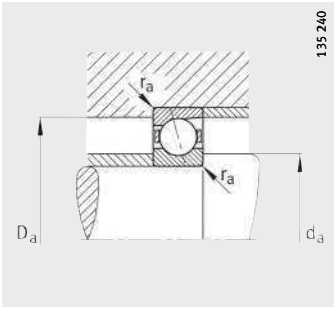
B719...-C, B70...-C, B72...-C  
 $\alpha = 15^\circ$



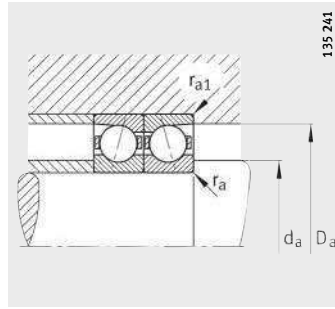
B719...-E, B70...-E, B72...-E  
 $\alpha = 25^\circ$

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r	r <sub>1</sub>	a
					min.	min.	≈
<b>B71944-C-T-P4S</b>	6,57	<b>220</b>	300	38	2,1	1,1	54
<b>B71944-E-T-P4S</b>	6,55	<b>220</b>	300	38	2,1	1,1	80
<b>B7044-C-T-P4S</b>	15,7	<b>220</b>	340	56	3	3	66
<b>B7044-E-T-P4S</b>	15,6	<b>220</b>	340	56	3	3	93
<b>B7244-C-T-P4S</b>	33	<b>220</b>	400	65	4	4	74
<b>B7244-E-T-P4S</b>	32,9	<b>220</b>	400	65	4	4	105
<b>B71948-C-T-P4S</b>	7,08	<b>240</b>	320	38	2,1	1,1	57
<b>B71948-E-T-P4S</b>	7,06	<b>240</b>	320	38	2,1	1,1	84
<b>B7048-C-T-P4S</b>	16,7	<b>240</b>	360	56	3	3	68
<b>B7048-E-T-P4S</b>	16,7	<b>240</b>	360	56	3	3	98



Mounting dimensions



Mounting dimensions



Mounting dimensions

Basic load ratings

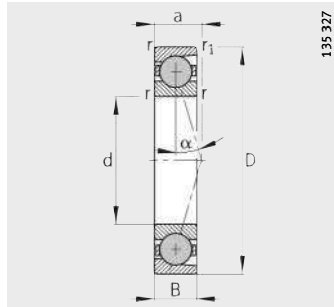
Fatigue limit load

Limiting speed

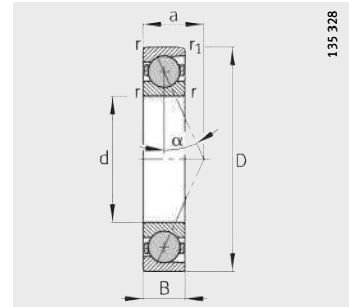
d <sub>a</sub> h12	D <sub>a</sub> H12	r <sub>a</sub> max.	r <sub>a1</sub> max.	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	C <sub>ur</sub> N	Limiting speed	
							n <sub>G</sub> grease min <sup>-1</sup>	n <sub>G</sub> oil min <sup>-1</sup>
234	286	1	1	216 000	285 000	12 900	3 600	5 300
234	286	1	1	204 000	270 000	12 200	3 200	4 800
239	321	2,5	1	325 000	440 000	19 000	3 200	4 800
239	321	2,5	1	310 000	415 000	18 000	3 000	4 500
264	356	3	3	400 000	560 000	23 200	2 800	4 300
264	356	3	3	380 000	540 000	22 100	2 600	4 000
254	307	1	1	224 000	310 000	13 500	3 200	4 800
254	307	1	1	212 000	285 000	12 800	3 000	4 500
260	341	2,5	1	335 000	465 000	19 500	3 000	4 500
260	341	2,5	1	315 000	440 000	18 500	2 800	4 300

# Spindle bearings

With ceramic balls



HCB719...-C, HCB70...-C,  
HCB72...-C  
 $\alpha = 15^\circ$

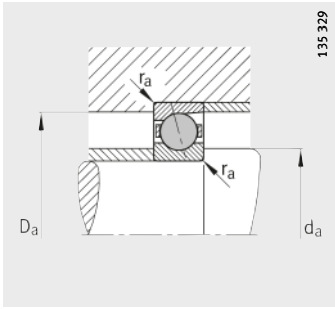


HCB719...-E, HCB70...-E,  
HCB72...-E  
 $\alpha = 25^\circ$

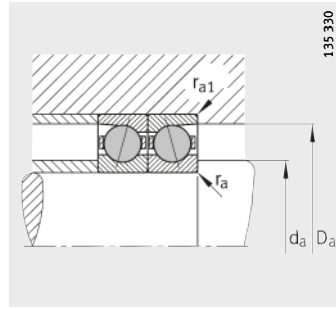
**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	r <sub>1</sub> min.	a ≈
HCB71900-C-T-P4S	0,01	10	22	6	0,3	0,3	5
HCB71900-E-T-P4S	0,01	10	22	6	0,3	0,3	7
HCB7000-C-T-P4S	0,02	10	26	8	0,3	0,3	6
HCB7000-E-T-P4S	0,02	10	26	8	0,3	0,3	8
HCB7200-C-T-P4S	0,03	10	30	9	0,6	0,6	7
HCB7200-E-T-P4S	0,03	10	30	9	0,6	0,6	9
HCB71901-C-T-P4S	0,02	12	24	6	0,3	0,3	5
HCB71901-E-T-P4S	0,02	12	24	6	0,3	0,3	7
HCB7001-C-T-P4S	0,02	12	28	8	0,3	0,3	7
HCB7001-E-T-P4S	0,02	12	28	8	0,3	0,3	9
HCB7201-C-T-P4S	0,03	12	32	10	0,6	0,6	8
HCB7201-E-T-P4S	0,03	12	32	10	0,6	0,6	10
HCB71902-C-T-P4S	0,02	15	28	7	0,3	0,3	6
HCB71902-E-T-P4S	0,02	15	28	7	0,3	0,3	9
HCB7002-C-T-P4S	0,03	15	32	9	0,3	0,3	8
HCB7002-E-T-P4S	0,03	15	32	9	0,3	0,3	10
HCB7202-C-T-P4S	0,04	15	35	11	0,6	0,6	9
HCB7202-E-T-P4S	0,04	15	35	11	0,6	0,6	11
HCB71903-C-T-P4S	0,02	17	30	7	0,3	0,3	7
HCB71903-E-T-P4S	0,02	17	30	7	0,3	0,3	9
HCB7003-C-T-P4S	0,04	17	35	10	0,3	0,3	9
HCB7003-E-T-P4S	0,04	17	35	10	0,3	0,3	11
HCB7203-C-T-P4S	0,06	17	40	12	0,6	0,6	10
HCB7203-E-T-P4S	0,06	17	40	12	0,6	0,6	13
HCB71904-C-T-P4S	0,03	20	37	9	0,3	0,3	8
HCB71904-E-T-P4S	0,03	20	37	9	0,3	0,3	11
HCB7004-C-T-P4S	0,07	20	42	12	0,6	0,6	10
HCB7004-E-T-P4S	0,07	20	42	12	0,6	0,6	13
HCB7204-C-T-P4S	0,1	20	47	14	1	1	12
HCB7204-E-T-P4S	0,1	20	47	14	1	1	15
HCB71905-C-T-P4S	0,04	25	42	9	0,3	0,3	9
HCB71905-E-T-P4S	0,04	25	42	9	0,3	0,3	12
HCB7005-C-T-P4S	0,07	25	47	12	0,6	0,6	11
HCB7005-E-T-P4S	0,07	25	47	12	0,6	0,6	14
HCB7205-C-T-P4S	0,12	25	52	15	1	1	13
HCB7205-E-T-P4S	0,12	25	52	15	1	1	17





Mounting dimensions



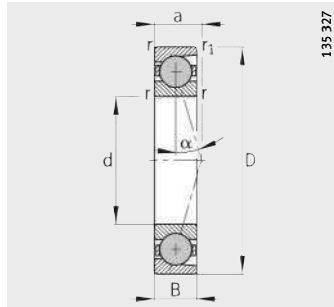
Mounting dimensions



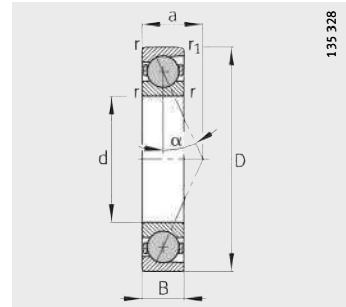
Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed	
$d_a$ h12	$D_a$ H12	$r_a$ max.	$r_{a1}$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		$n_G$ grease $\text{min}^{-1}$	$n_G$ oil $\text{min}^{-1}$
13	19,5	0,3	0,3	2 080	1 060	78	90 000	150 000
13	19,5	0,3	0,3	1 990	1 010	75	75 000	120 000
14	22	0,3	0,1	2 900	1 440	107	80 000	130 000
14	22	0,3	0,1	2 800	1 390	102	67 000	100 000
14,5	25,5	0,6	0,6	4 000	2 040	217	70 000	110 000
14,5	25,5	0,6	0,6	3 850	1 960	208	60 000	90 000
15	21,5	0,3	0,3	2 320	1 290	95	80 000	130 000
15	21,5	0,3	0,3	2 210	1 230	91	67 000	100 000
16,5	24,5	0,3	0,1	3 300	1 810	133	70 000	110 000
16,5	24,5	0,3	0,1	3 150	1 730	128	60 000	90 000
16,5	27,5	0,6	0,6	5 300	2 700	285	63 000	95 000
16,5	27,5	0,6	0,6	5 100	2 600	275	56 000	85 000
18	25,5	0,3	0,3	3 450	2 010	148	67 000	100 000
18	25,5	0,3	0,3	3 300	1 920	141	56 000	85 000
19	29	0,3	0,1	4 300	2 360	176	60 000	90 000
19	29	0,3	0,1	4 100	2 260	168	50 000	75 000
19,5	30,5	0,6	0,6	6 700	3 500	370	56 000	85 000
19,5	30,5	0,6	0,6	6 400	3 350	360	48 000	70 000
20	27,5	0,3	0,3	3 650	2 200	162	60 000	90 000
20	27,5	0,3	0,3	3 450	2 100	155	50 000	75 000
21	32	0,3	0,1	6 000	3 450	255	53 000	80 000
21	32	0,3	0,1	5 800	3 300	246	45 000	67 000
22,5	34,5	0,6	0,6	7 500	4 050	425	50 000	75 000
22,5	34,5	0,6	0,6	7 200	3 900	410	43 000	63 000
24	33,5	0,3	0,3	5 000	3 200	234	50 000	75 000
24	33,5	0,3	0,3	4 800	3 050	223	43 000	63 000
25	37	0,6	0,3	7 200	4 200	310	45 000	67 000
25	37	0,6	0,3	6 900	4 000	295	38 000	56 000
26,5	40,5	1	1	10 100	5 600	580	43 000	63 000
26,5	40,5	1	1	9 700	5 400	560	36 000	53 000
29	38,5	0,3	0,3	5 200	3 550	260	43 000	63 000
29	38,5	0,3	0,3	5 300	3 800	280	36 000	53 000
30	42	0,6	0,3	10 000	6 300	470	38 000	56 000
30	42	0,6	0,3	9 600	6 000	450	34 000	50 000
31,5	45,5	1	1	10 800	6 500	670	36 000	53 000
31,5	45,5	1	1	10 300	6 200	640	32 000	48 000

# Spindle bearings

With ceramic balls



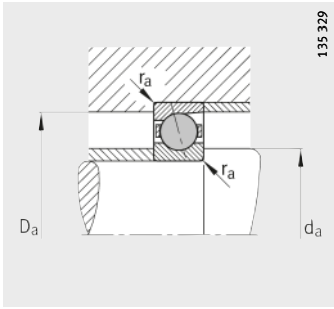
HCB719...-C, HCB70...-C,  
HCB72...-C  
 $\alpha = 15^\circ$



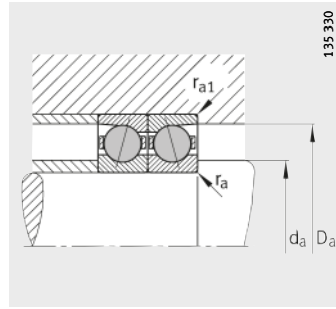
HCB719...-E, HCB70...-E,  
HCB72...-E  
 $\alpha = 25^\circ$

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	r <sub>1</sub> min.	a ≈
HCB71906-C-T-P4S	0,05	30	47	9	0,3	0,3	10
HCB71906-E-T-P4S	0,05	30	47	9	0,3	0,3	14
HCB7006-C-T-P4S	0,11	30	55	13	1	1	12
HCB7006-E-T-P4S	0,11	30	55	13	1	1	16
HCB7206-C-T-P4S	0,19	30	62	16	1	1	14
HCB7206-E-T-P4S	0,19	30	62	16	1	1	19
HCB71907-C-T-P4S	0,08	35	55	10	0,6	0,6	11
HCB71907-E-T-P4S	0,08	35	55	10	0,6	0,6	16
HCB7007-C-T-P4S	0,15	35	62	14	1	1	14
HCB7007-E-T-P4S	0,15	35	62	14	1	1	18
HCB7207-C-T-P4S	0,28	35	72	17	1,1	1,1	16
HCB7207-E-T-P4S	0,28	35	72	17	1,1	1,1	21
HCB71908-C-T-P4S	0,11	40	62	12	0,6	0,6	13
HCB71908-E-T-P4S	0,11	40	62	12	0,6	0,6	18
HCB7008-C-T-P4S	0,19	40	68	15	1	1	15
HCB7008-E-T-P4S	0,19	40	68	15	1	1	20
HCB7208-C-T-P4S	0,37	40	80	18	1,1	1,1	17
HCB7208-E-T-P4S	0,37	40	80	18	1,1	1,1	23
HCB71909-C-T-P4S	0,13	45	68	12	0,6	0,6	14
HCB71909-E-T-P4S	0,13	45	68	12	0,6	0,6	19
HCB7009-C-T-P4S	0,23	45	75	16	1	1	16
HCB7009-E-T-P4S	0,23	45	75	16	1	1	22
HCB7209-C-T-P4S	0,41	45	85	19	1,1	1,1	18
HCB7209-E-T-P4S	0,41	45	85	19	1,1	1,1	25
HCB71910-C-T-P4S	0,13	50	72	12	0,6	0,6	14
HCB71910-E-T-P4S	0,13	50	72	12	0,6	0,6	20
HCB7010-C-T-P4S	0,25	50	80	16	1	1	17
HCB7010-E-T-P4S	0,25	50	80	16	1	1	23
HCB7210-C-T-P4S	0,46	50	90	20	1,1	1,1	19
HCB7210-E-T-P4S	0,46	50	90	20	1,1	1,1	26
HCB71911-C-T-P4S	0,18	55	80	13	1	1	16
HCB71911-E-T-P4S	0,18	55	80	13	1	1	22
HCB7011-C-T-P4S	0,37	55	90	18	1,1	1,1	19
HCB7011-E-T-P4S	0,37	55	90	18	1,1	1,1	26
HCB7211-C-T-P4S	0,61	55	100	21	1,5	1,5	21
HCB7211-E-T-P4S	0,61	55	100	21	1,5	1,5	29



Mounting dimensions



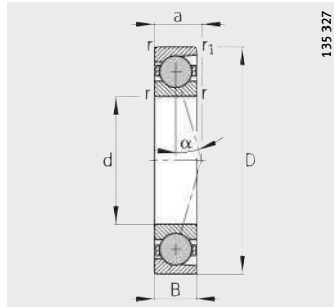
Mounting dimensions



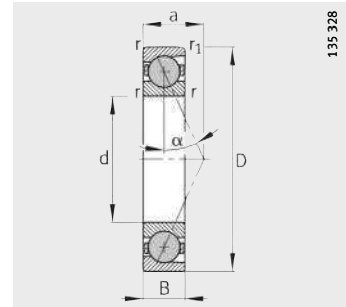
Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed	
$d_a$ h12	$D_a$ H12	$r_a$ max.	$r_{a1}$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		$n_G$ grease $\text{min}^{-1}$	$n_G$ oil $\text{min}^{-1}$
34	43,5	0,3	0,3	5 900	4 600	340	36 000	53 000
34	43,5	0,3	0,3	5 600	4 350	320	32 000	48 000
36	49	1	0,3	10 400	7 200	530	32 000	48 000
36	49	1	0,3	9 900	6 800	510	28 000	43 000
37,5	54,5	1	1	15 900	10 200	1 090	30 000	45 000
37,5	54,5	1	1	15 200	9 800	1 040	26 000	40 000
40	51,5	0,6	0,6	8 100	6 600	495	32 000	48 000
40	51,5	0,6	0,6	7 700	6 300	470	26 000	40 000
41	56	1	0,3	13 200	9 500	700	28 000	43 000
41	56	1	0,3	12 600	9 100	670	24 000	38 000
44	63	1	1	17 600	12 500	1 330	26 000	40 000
44	63	1	1	16 800	11 900	1 270	22 000	36 000
45	58,5	0,6	0,6	12 100	9 600	720	28 000	43 000
45	58,5	0,6	0,6	11 500	9 100	680	24 000	38 000
46	62	1	0,3	14 200	11 100	820	26 000	40 000
46	62	1	0,3	13 500	10 500	780	22 000	36 000
48	72	1	1	22 100	15 600	1 170	24 000	38 000
48	72	1	1	21 100	14 900	1 120	20 000	34 000
50	63,5	0,6	0,6	12 800	10 900	820	24 000	38 000
50	63,5	0,6	0,6	12 100	10 300	770	22 000	36 000
51	69	1	0,3	19 100	14 700	1 090	24 000	38 000
51	69	1	0,3	18 100	14 000	1 030	20 000	34 000
52,5	78	1	1	23 200	17 200	1 290	22 000	36 000
52,5	78	1	1	22 100	16 400	1 230	18 000	30 000
55	67,5	0,6	0,6	13 100	11 600	870	22 000	36 000
55	67,5	0,6	0,6	12 300	11 000	820	20 000	34 000
56	74	1	0,3	19 700	15 900	1 170	22 000	36 000
56	74	1	0,3	18 700	15 200	1 120	18 000	30 000
57	83	1	1	29 500	22 100	1 630	20 000	34 000
57	83	1	1	28 000	21 100	1 560	17 000	28 000
60	75,5	0,6	0,6	15 800	14 300	1 050	20 000	34 000
60	75,5	0,6	0,6	14 900	13 500	1 000	18 000	30 000
62	83	1	0,6	26 000	21 500	1 610	19 000	32 000
62	83	1	0,6	24 800	20 400	1 530	17 000	28 000
63	92	1,5	1,5	32 000	26 000	1 910	18 000	30 000
63	92	1,5	1,5	30 500	24 700	1 820	15 000	24 000

# Spindle bearings

With ceramic balls



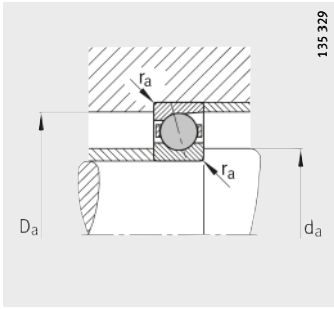
HCB719...-C, HCB70...-C,  
HCB72...-C  
 $\alpha = 15^\circ$



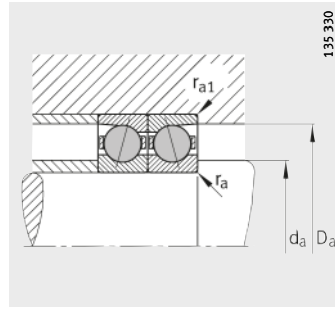
HCB719...-E, HCB70...-E,  
HCB72...-E  
 $\alpha = 25^\circ$

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	r <sub>1</sub> min.	a ≈
HCB71912-C-T-P4S	0,19	60	85	13	1	1	16
HCB71912-E-T-P4S	0,19	60	85	13	1	1	23
HCB7012-C-T-P4S	0,4	60	95	18	1,1	1,1	19
HCB7012-E-T-P4S	0,4	60	95	18	1,1	1,1	27
HCB7212-C-T-P4S	0,8	60	110	22	1,5	1,5	23
HCB7212-E-T-P4S	0,8	60	110	22	1,5	1,5	31
HCB71913-C-T-P4S	0,2	65	90	13	1	1	17
HCB71913-E-T-P4S	0,2	65	90	13	1	1	25
HCB7013-C-T-P4S	0,42	65	100	18	1,1	1,1	20
HCB7013-E-T-P4S	0,42	65	100	18	1,1	1,1	28
HCB7213-C-T-P4S	1,02	65	120	23	1,5	1,5	24
HCB7213-E-T-P4S	1,02	65	120	23	1,5	1,5	33
HCB71914-C-T-P4S	0,33	70	100	16	1	1	19
HCB71914-E-T-P4S	0,33	70	100	16	1	1	28
HCB7014-C-T-P4S	0,59	70	110	20	1,1	1,1	22
HCB7014-E-T-P4S	0,59	70	110	20	1,1	1,1	31
HCB7214-C-T-P4S	1,12	70	125	24	1,5	1,5	25
HCB7214-E-T-P4S	1,12	70	125	24	1,5	1,5	35
HCB71915-C-T-P4S	0,35	75	105	16	1	1	20
HCB71915-E-T-P4S	0,35	75	105	16	1	1	29
HCB7015-C-T-P4S	0,62	75	115	20	1,1	1,1	23
HCB7015-E-T-P4S	0,62	75	115	20	1,1	1,1	32
HCB7215-C-T-P4S	1,21	75	130	25	1,5	1,5	26
HCB7215-E-T-P4S	1,21	75	130	25	1,5	1,5	36
HCB71916-C-T-P4S	0,37	80	110	16	1	1	21
HCB71916-E-T-P4S	0,37	80	110	16	1	1	30
HCB7016-C-T-P4S	0,84	80	125	22	1,1	1,1	25
HCB7016-E-T-P4S	0,84	80	125	22	1,1	1,1	35
HCB71917-C-T-P4S	0,53	85	120	18	1,1	1,1	23
HCB71917-E-T-P4S	0,53	85	120	18	1,1	1,1	33
HCB7017-C-T-P4S	0,88	85	130	22	1,1	1,1	25
HCB7017-E-T-P4S	0,88	85	130	22	1,1	1,1	36
HCB71918-C-T-P4S	0,55	90	125	18	1,1	1,1	23
HCB71918-E-T-P4S	0,55	90	125	18	1,1	1,1	34
HCB7018-C-T-P4S	1,15	90	140	24	1,5	1,5	27
HCB7018-E-T-P4S	1,15	90	140	24	1,5	1,5	39



Mounting dimensions



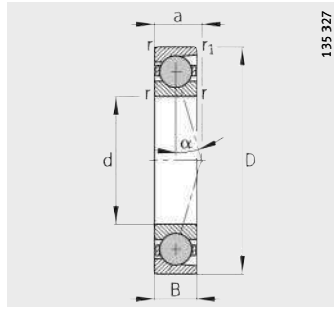
Mounting dimensions



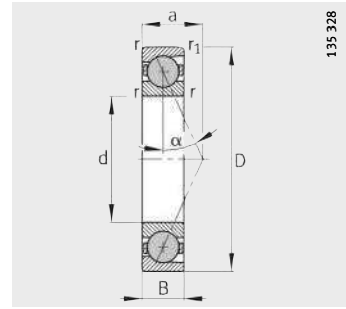
Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed	
$d_a$ h12	$D_a$ H12	$r_a$ max.	$r_{a1}$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		$n_G$ grease $\text{min}^{-1}$	$n_G$ oil $\text{min}^{-1}$
65	80,5	0,6	0,6	16 600	15 800	1 170	19 000	32 000
65	80,5	0,6	0,6	15 600	15 000	1 100	17 000	28 000
67	88	1	0,6	27 000	23 100	1 730	18 000	30 000
67	88	1	0,6	25 500	21 900	1 650	15 000	24 000
69,5	101,5	1,5	1,5	38 000	30 500	2 260	16 000	26 000
69,5	101,5	1,5	1,5	36 000	29 000	2 150	14 000	22 000
70	85,5	0,6	0,6	16 800	16 700	1 230	18 000	30 000
70	85,5	0,6	0,6	15 900	15 800	1 160	15 000	24 000
72	93	1	0,6	27 500	24 700	1 850	17 000	28 000
72	93	1	0,6	26 000	23 500	1 760	15 000	24 000
75,5	109,5	1,5	1,5	46 000	37 500	2 800	15 000	24 000
75,5	109,5	1,5	1,5	44 000	36 000	2 650	13 000	20 000
76	94,5	0,6	0,6	23 100	22 700	1 670	16 000	26 000
76	94,5	0,6	0,6	21 800	21 500	1 580	14 000	22 000
77	102	1	0,6	34 000	30 000	2 230	16 000	26 000
77	102	1	0,6	32 500	29 000	2 120	13 000	20 000
80	115	1,5	1,5	48 000	40 500	3 000	14 000	22 000
80	115	1,5	1,5	45 500	38 500	2 900	12 000	19 000
81	99,5	0,6	0,6	23 500	23 900	1 760	16 000	26 000
81	99,5	0,6	0,6	22 200	22 700	1 670	13 000	20 000
82	107	1	0,6	35 000	32 500	2 380	15 000	24 000
82	107	1	0,6	33 500	30 500	2 260	13 000	20 000
85	120	1,5	1,5	49 500	43 500	3 200	14 000	22 000
85	120	1,5	1,5	47 000	41 500	3 050	12 000	19 000
86	104	0,6	0,6	23 900	25 000	1 850	15 000	24 000
86	104	0,6	0,6	22 500	23 700	1 750	13 000	20 000
88	117	1	0,6	44 000	40 500	2 950	14 000	22 000
88	117	1	0,6	41 500	38 500	2 800	12 000	19 000
92	114	0,6	0,6	31 000	32 500	2 400	13 000	20 000
92	114	0,6	0,6	29 500	30 500	2 270	12 000	19 000
93	122	1	0,6	45 000	43 000	3 050	13 000	20 000
93	122	1	0,6	42 500	41 000	2 900	11 000	18 000
97	119	0,6	0,6	31 500	34 000	2 460	13 000	20 000
97	119	0,6	0,6	30 000	32 000	2 330	11 000	18 000
100	131	1,5	0,6	53 000	50 000	3 450	12 000	19 000
100	131	1,5	0,6	50 000	47 500	3 300	10 000	17 000

# Spindle bearings

With ceramic balls



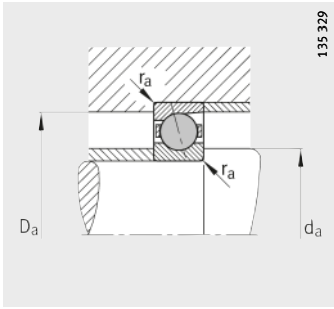
HCB719...-C, HCB70...-C,  
 $\alpha = 15^\circ$



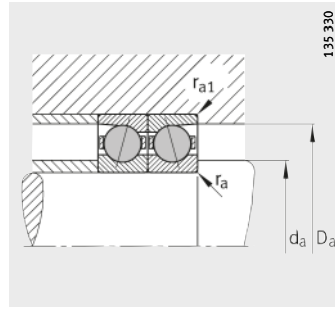
HCB719...-E, HCB70...-E,  
 $\alpha = 25^\circ$

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	r <sub>1</sub> min.	a ≈
HCB71919-C-T-P4S	0,58	<b>95</b>	130	18	1,1	1,1	24
HCB71919-E-T-P4S	0,58	<b>95</b>	130	18	1,1	1,1	35
HCB7019-C-T-P4S	1,2	<b>95</b>	145	24	1,5	1,5	28
HCB7019-E-T-P4S	1,2	<b>95</b>	145	24	1,5	1,5	40
HCB71920-C-T-P4S	0,79	<b>100</b>	140	20	1,1	1,1	26
HCB71920-E-T-P4S	0,79	<b>100</b>	140	20	1,1	1,1	38
HCB7020-C-T-P4S	1,25	<b>100</b>	150	24	1,5	1,5	29
HCB7020-E-T-P4S	1,25	<b>100</b>	150	24	1,5	1,5	41
HCB71921-C-T-P4S	0,82	<b>105</b>	145	20	1,1	1,1	27
HCB71921-E-T-P4S	0,82	<b>105</b>	145	20	1,1	1,1	39
HCB7021-C-T-P4S	1,49	<b>105</b>	160	26	2	2	31
HCB7021-E-T-P4S	1,49	<b>105</b>	160	26	2	2	44
HCB71922-C-T-P4S	0,85	<b>110</b>	150	20	1,1	1,1	27
HCB71922-E-T-P4S	0,85	<b>110</b>	150	20	1,1	1,1	40
HCB7022-C-T-P4S	1,95	<b>110</b>	170	28	2	2	33
HCB7022-E-T-P4S	1,95	<b>110</b>	170	28	2	2	47
HCB71924-C-T-P4S	1,12	<b>120</b>	165	22	1,1	1,1	30
HCB71924-E-T-P4S	1,12	<b>120</b>	165	22	1,1	1,1	44
HCB7024-C-T-P4S	2,12	<b>120</b>	180	28	2	2	34
HCB7024-E-T-P4S	2,12	<b>120</b>	180	28	2	2	49
HCB71926-C-T-P4S	1,49	<b>130</b>	180	24	1,5	1,5	33
HCB71926-E-T-P4S	1,49	<b>130</b>	180	24	1,5	1,5	48
HCB7026-C-T-P4S	3,21	<b>130</b>	200	33	2	2	39
HCB7026-E-T-P4S	3,21	<b>130</b>	200	33	2	2	55
HCB71928-C-T-P4S	1,65	<b>140</b>	190	24	1,5	1,5	34
HCB71928-E-T-P4S	1,65	<b>140</b>	190	24	1,5	1,5	50
HCB7028-C-T-P4S	3,34	<b>140</b>	210	33	2	2	40
HCB7028-E-T-P4S	3,34	<b>140</b>	210	33	2	2	57



Mounting dimensions



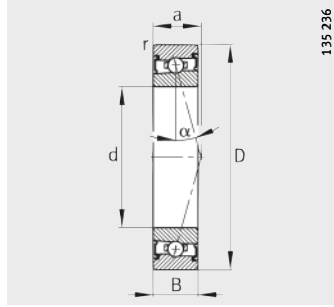
Mounting dimensions



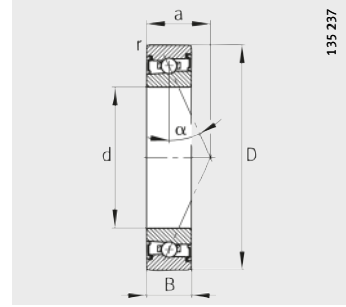
Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed	
$d_a$ h12	$D_a$ H12	$r_a$ max.	$r_{a1}$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		$n_G$ grease $\text{min}^{-1}$	$n_G$ oil $\text{min}^{-1}$
102	124	0,6	0,6	32 000	35 500	2 500	12 000	19 000
102	124	0,6	0,6	30 500	33 500	2 380	10 000	17 000
105	136	1,5	0,6	54 000	53 000	3 600	11 000	18 000
105	136	1,5	0,6	51 000	51 000	3 450	9 500	16 000
107	133	0,6	0,6	40 500	44 500	2 950	11 000	18 000
107	133	0,6	0,6	38 000	42 000	2 800	9 500	16 000
110	141	1,5	0,6	56 000	56 000	3 750	11 000	18 000
110	141	1,5	0,6	53 000	53 000	3 550	9 000	15 000
112	138	0,6	0,6	40 000	44 500	2 950	11 000	18 000
112	138	0,6	0,6	38 000	42 000	2 800	9 000	15 000
116	150	2	1	57 000	60 000	3 850	10 000	17 000
116	150	2	1	54 000	57 000	3 650	8 500	14 000
117	143	0,6	0,6	41 000	46 500	3 000	10 000	17 000
117	143	0,6	0,6	38 500	43 500	2 850	9 000	15 000
121	159	2	1	76 000	76 000	4 750	9 500	16 000
121	159	2	1	72 000	72 000	4 500	8 000	13 000
128	157	0,6	0,6	51 000	59 000	3 600	9 000	15 000
128	157	0,6	0,6	48 000	55 000	3 450	8 000	13 000
131	169	2	1	77 000	81 000	4 900	8 500	14 000
131	169	2	1	73 000	77 000	4 650	7 500	12 000
139	171	0,6	0,6	60 000	70 000	4 100	8 500	14 000
139	171	0,6	0,6	46 000	53 000	3 200	7 000	11 000
142	189	2	1	100 000	104 000	6 100	7 500	12 000
142	189	2	1	95 000	99 000	5 800	6 700	10 000
149	181	0,6	0,6	62 000	76 000	4 350	7 500	12 000
149	181	0,6	0,6	47 500	57 000	3 350	6 700	10 000
152	199	2	1	102 000	110 000	6 300	7 000	11 000
152	199	2	1	97 000	105 000	5 900	6 300	9 500

# High speed spindle bearings

With steel balls  
Sealed



HSS719...-C, HSS70...-C  
 $\alpha = 15^\circ$

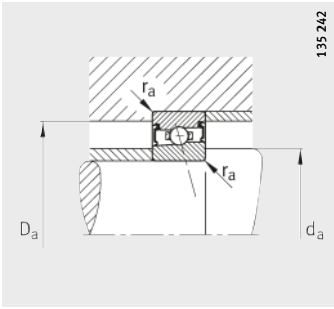


HSS719...-E, HSS70...-E  
 $\alpha = 25^\circ$

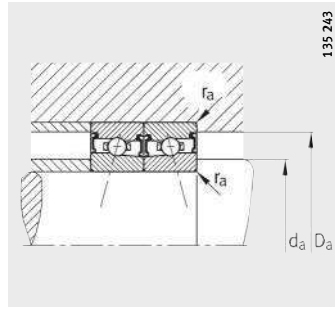
**Dimension table** - Dimensions in mm

Designation	Mass m ≈ kg	Dimensions				
		d	D	B	r min.	a ≈
HSS71900-C-T-P4S	0,01	10	22	6	0,3	5
HSS71900-E-T-P4S	0,01	10	22	6	0,3	7
HSS7000-C-T-P4S	0,02	10	26	8	0,3	6
HSS7000-E-T-P4S	0,02	10	26	8	0,3	8
HSS71901-C-T-P4S	0,01	12	24	6	0,3	5
HSS71901-E-T-P4S	0,01	12	24	6	0,3	7
HSS7001-C-T-P4S	0,022	12	28	8	0,3	7
HSS7001-E-T-P4S	0,022	12	28	8	0,3	9
HSS71902-C-T-P4S	0,015	15	28	7	0,3	6
HSS71902-E-T-P4S	0,015	15	28	7	0,3	9
HSS7002-C-T-P4S	0,033	15	32	9	0,3	8
HSS7002-E-T-P4S	0,033	15	32	9	0,3	10
HSS71903-C-T-P4S	0,017	17	30	7	0,3	7
HSS71903-E-T-P4S	0,017	17	30	7	0,3	9
HSS7003-C-T-P4S	0,044	17	35	10	0,3	9
HSS7003-E-T-P4S	0,044	17	35	10	0,3	11
HSS71904-C-T-P4S	0,041	20	37	9	0,3	8
HSS71904-E-T-P4S	0,041	20	37	9	0,3	11
HSS7004-C-T-P4S	0,074	20	42	12	0,6	10
HSS7004-E-T-P4S	0,074	20	42	12	0,6	13
HSS71905-C-T-P4S	0,047	25	42	9	0,3	9
HSS71905-E-T-P4S	0,047	25	42	9	0,3	12
HSS7005-C-T-P4S	0,085	25	47	12	0,6	11
HSS7005-E-T-P4S	0,085	25	47	12	0,6	14
HSS71906-C-T-P4S	0,047	30	47	9	0,3	10
HSS71906-E-T-P4S	0,047	30	47	9	0,3	14
HSS7006-C-T-P4S	0,121	30	55	13	1	12
HSS7006-E-T-P4S	0,121	30	55	13	1	16
HSS71907-C-T-P4S	0,076	35	55	10	0,6	11
HSS71907-E-T-P4S	0,076	35	55	10	0,6	16
HSS7007-C-T-P4S	0,166	35	62	14	1	14
HSS7007-E-T-P4S	0,166	35	62	14	1	18
HSS71908-C-T-P4S	0,122	40	62	12	0,6	13
HSS71908-E-T-P4S	0,122	40	62	12	0,6	18
HSS7008-C-T-P4S	0,208	40	68	15	1	15
HSS7008-E-T-P4S	0,208	40	68	15	1	20





Mounting dimensions



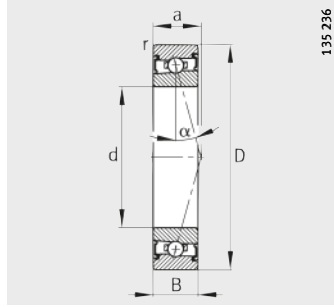
Mounting dimensions



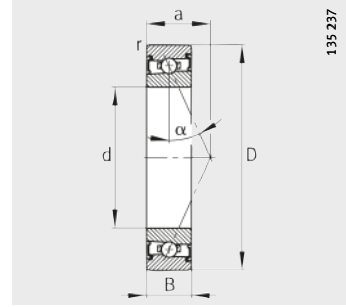
Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ grease $min^{-1}$
$d_a$ h12	$D_a$ H12	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		
13	19,5	0,3	1 960	1 100	67	90 000
13	19,5	0,3	1 860	1 040	64	75 000
14	22	0,3	2 750	1 600	97	80 000
14	22	0,3	2 600	1 500	92	67 000
15	21,5	0,3	2 040	1 200	74	80 000
15	21,5	0,3	1 930	1 140	71	67 000
16,5	24,5	0,3	2 700	1 630	99	70 000
16,5	24,5	0,3	2 550	1 530	94	60 000
18	25,5	0,3	2 800	1 760	107	67 000
18	25,5	0,3	2 650	1 660	102	56 000
19	29	0,3	3 750	2 450	152	60 000
19	29	0,3	3 550	2 320	145	50 000
20	27,5	0,3	2 900	1 900	116	60 000
20	27,5	0,3	2 700	1 800	110	50 000
21	32	0,3	3 800	2 650	165	53 000
21	32	0,3	3 650	2 500	157	45 000
24	33,5	0,3	3 900	2 850	178	50 000
24	33,5	0,3	3 750	2 700	168	43 000
25	37	0,6	6 200	4 550	280	45 000
25	37	0,6	5 850	4 300	265	38 000
29	38,5	0,3	4 250	3 350	212	43 000
29	38,5	0,3	4 000	3 150	201	36 000
30	42	0,6	6 300	4 900	305	38 000
30	42	0,6	6 000	4 650	285	34 000
34	43,5	0,3	6 400	5 200	320	36 000
34	43,5	0,3	6 000	4 900	305	32 000
36	49	1	8 800	7 100	435	32 000
36	49	1	8 300	6 700	415	28 000
40	51,5	0,6	6 950	6 200	390	32 000
40	51,5	0,6	6 550	5 850	370	26 000
41	56	1	9 300	8 300	510	28 000
41	56	1	8 800	7 800	485	24 000
45	58,5	0,6	7 200	6 950	445	28 000
45	58,5	0,6	6 800	6 400	420	24 000
46	62	1	10 000	9 300	590	26 000
46	62	1	9 300	8 650	560	22 000

# High speed spindle bearings

With steel balls  
Sealed



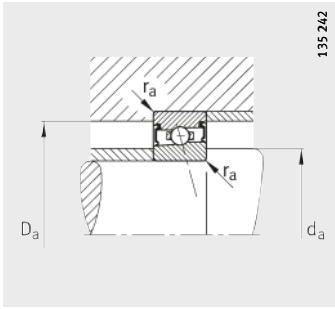
HSS719..-C, HSS70..-C  
 $\alpha = 15^\circ$



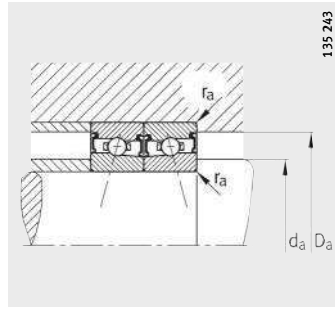
HSS719..-E, HSS70..-E  
 $\alpha = 25^\circ$

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	a ≈
HSS71909-C-T-P4S	0,132	45	68	12	0,6	14
HSS71909-E-T-P4S	0,132	45	68	12	0,6	19
HSS7009-C-T-P4S	0,273	45	75	16	1	16
HSS7009-E-T-P4S	0,272	45	75	16	1	22
HSS71910-C-T-P4S	0,133	50	72	12	0,6	14
HSS71910-E-T-P4S	0,133	50	72	12	0,6	20
HSS7010-C-T-P4S	0,296	50	80	16	1	17
HSS7010-E-T-P4S	0,295	50	80	16	1	23
HSS71911-C-T-P4S	0,198	55	80	13	1	16
HSS71911-E-T-P4S	0,198	55	80	13	1	22
HSS7011-C-T-P4S	0,411	55	90	18	1,1	19
HSS7011-E-T-P4S	0,41	55	90	18	1,1	26
HSS71912-C-T-P4S	0,22	60	85	13	1	16
HSS71912-E-T-P4S	0,22	60	85	13	1	23
HSS7012-C-T-P4S	0,453	60	95	18	1,1	19
HSS7012-E-T-P4S	0,453	60	95	18	1,1	27
HSS71913-C-T-P4S	0,226	65	90	13	1	17
HSS71913-E-T-P4S	0,226	65	90	13	1	25
HSS7013-C-T-P4S	0,468	65	100	18	1,1	20
HSS7013-E-T-P4S	0,468	65	100	18	1,1	28
HSS71914-C-T-P4S	0,354	70	100	16	1	19
HSS71914-E-T-P4S	0,353	70	100	16	1	28
HSS7014-C-T-P4S	0,644	70	110	20	1,1	22
HSS7014-E-T-P4S	0,643	70	110	20	1,1	31
HSS71915-C-T-P4S	0,38	75	105	16	1	20
HSS71915-E-T-P4S	0,379	75	105	16	1	29
HSS7015-C-T-P4S	0,68	75	115	20	1,1	23
HSS7015-E-T-P4S	0,679	75	115	20	1,1	32
HSS71916-C-T-P4S	0,385	80	110	16	1	21
HSS71916-E-T-P4S	0,385	80	110	16	1	30
HSS7016-C-T-P4S	0,931	80	125	22	1,1	25
HSS7016-E-T-P4S	0,929	80	125	22	1,1	35
HSS71917-C-T-P4S	0,58	85	120	18	1,1	23
HSS71917-E-T-P4S	0,579	85	120	18	1,1	33
HSS7017-C-T-P4S	0,975	85	130	22	1,1	25
HSS7017-E-T-P4S	0,974	85	130	22	1,1	36



Mounting dimensions



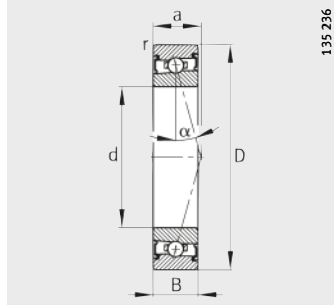
Mounting dimensions



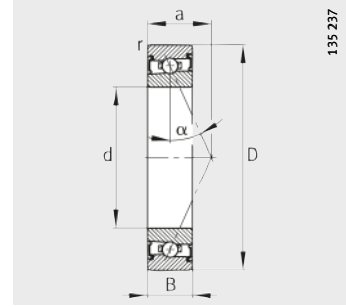
Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ grease $\text{min}^{-1}$
$d_a$ h12	$D_a$ H12	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		
50	63,5	0,6	10 000	9 650	610	24 000
50	63,5	0,6	9 500	9 000	580	22 000
51	69	1	12 900	12 200	770	24 000
51	69	1	12 200	11 400	730	20 000
55	67,5	0,6	10 400	10 200	670	22 000
55	67,5	0,6	9 800	9 650	630	20 000
56	74	1	13 400	13 200	840	22 000
56	74	1	12 500	12 200	790	18 000
60	75,5	0,6	13 400	13 700	870	20 000
60	75,5	0,6	12 700	12 700	830	18 000
62	83	1	18 600	19 000	1 180	19 000
62	83	1	17 600	17 600	1 120	17 000
65	80,5	0,6	14 000	14 600	940	19 000
65	80,5	0,6	13 200	13 400	890	17 000
67	88	1	19 300	20 000	1 280	18 000
67	88	1	18 300	19 000	1 210	15 000
70	85,5	0,6	14 300	15 300	1 010	18 000
70	85,5	0,6	13 400	14 300	960	15 000
72	93	1	20 000	21 600	1 380	17 000
72	93	1	19 000	20 000	1 310	15 000
76	94,5	0,6	18 300	20 000	1 330	16 000
76	94,5	0,6	17 300	18 600	1 250	14 000
77	102	1	26 000	28 000	1 770	16 000
77	102	1	24 500	26 000	1 670	13 000
81	99,5	0,6	19 000	21 200	1 420	16 000
81	99,5	0,6	17 600	20 000	1 340	13 000
82	107	1	26 500	29 000	1 850	15 000
82	107	1	25 000	27 000	1 740	13 000
86	104	0,6	21 200	24 000	1 590	15 000
86	104	0,6	19 600	22 400	1 500	13 000
88	117	1	31 500	34 500	2 220	14 000
88	117	1	30 000	32 500	2 100	12 000
92	114	0,6	22 000	26 000	1 720	14 000
92	114	0,6	20 400	24 500	1 630	12 000
93	122	1	32 000	36 000	2 250	13 000
93	122	1	30 000	33 500	2 130	11 000

# High speed spindle bearings

With steel balls  
Sealed



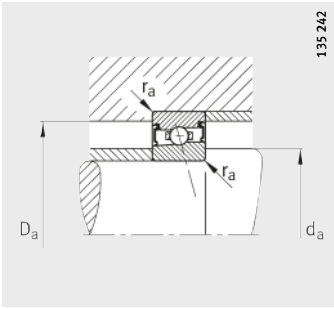
HSS719..-C, HSS70..-C  
 $\alpha = 15^\circ$



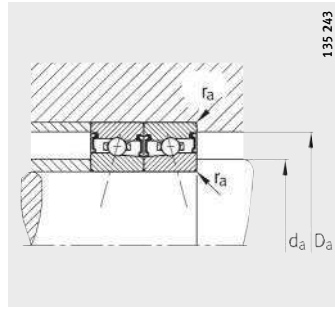
HSS719..-E, HSS70..-E  
 $\alpha = 25^\circ$

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	a ≈
HSS71918-C-T-P4S	0,589	90	125	18	1,1	23
HSS71918-E-T-P4S	0,588	90	125	18	1,1	34
HSS7018-C-T-P4S	1,28	90	140	24	1,5	27
HSS7018-E-T-P4S	1,27	90	140	24	1,5	39
HSS71919-C-T-P4S	0,615	95	130	18	1,1	24
HSS71919-E-T-P4S	0,614	95	130	18	1,1	35
HSS7019-C-T-P4S	1,33	95	145	24	1,5	28
HSS7019-E-T-P4S	1,33	95	145	24	1,5	40
HSS71920-C-T-P4S	0,861	100	140	20	1,1	26
HSS71920-E-T-P4S	0,859	100	140	20	1,1	38
HSS7020-C-T-P4S	1,39	100	150	24	1,5	29
HSS7020-E-T-P4S	1,38	100	150	24	1,5	41
HSS71921-C-T-P4S	0,897	105	145	20	1,1	27
HSS71921-E-T-P4S	0,87	105	145	20	1,1	39
HSS7021-C-T-P4S	1,71	105	160	26	2	31
HSS7021-E-T-P4S	1,71	105	160	26	2	44
HSS71922-C-T-P4S	0,933	110	150	20	1,1	27
HSS71922-E-T-P4S	0,932	110	150	20	1,1	40
HSS7022-C-T-P4S	2,17	110	170	28	2	33
HSS7022-E-T-P4S	2,17	110	170	28	2	47
HSS71924-C-T-P4S	1,3	120	165	22	1,1	30
HSS71924-E-T-P4S	1,3	120	165	22	1,1	44
HSS7024-C-T-P4S	2,33	120	180	28	2	34
HSS7024-E-T-P4S	2,33	120	180	28	2	49
HSS71926-C-T-P4S	1,71	130	180	24	1,5	33
HSS71926-E-T-P4S	1,71	130	180	24	1,5	48
HSS7026-C-T-P4S	3,52	130	200	33	2	39
HSS7026-E-T-P4S	3,51	130	200	33	2	55



Mounting dimensions



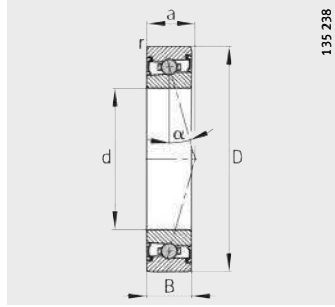
Mounting dimensions



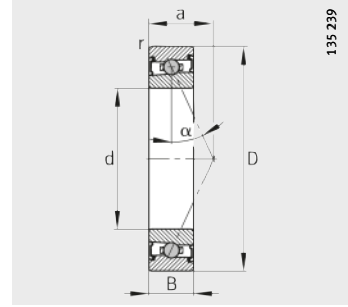
Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ grease $\text{min}^{-1}$
$d_a$ h12	$D_a$ H12	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		
97	119	0,6	23 600	28 500	1 860	13 000
97	119	0,6	22 400	26 500	1 750	11 000
100	131	1,5	37 500	43 000	2 550	12 000
100	131	1,5	35 500	40 000	2 410	10 000
102	124	0,6	24 500	30 000	1 930	12 000
102	124	0,6	22 800	28 000	1 820	10 000
105	136	1,5	38 000	44 000	2 600	11 000
105	136	1,5	35 500	41 500	2 450	9 500
107	133	0,6	29 000	36 000	2 200	11 000
107	133	0,6	27 500	33 500	2 080	9 500
110	141	1,5	38 000	45 500	2 650	11 000
110	141	1,5	36 000	42 500	2 490	9 000
112	138	0,6	30 000	38 000	2 280	11 000
112	138	0,6	28 000	35 500	2 150	9 000
116	150	2	49 000	58 500	3 250	10 000
116	150	2	46 500	54 000	3 050	8 500
117	143	0,6	34 500	44 000	2 550	10 000
117	143	0,6	32 500	40 500	2 430	9 000
121	159	2	50 000	60 000	3 300	9 500
121	159	2	46 500	56 000	3 100	8 000
128	157	0,6	36 500	48 000	2 750	9 000
128	157	0,6	34 000	45 000	2 600	8 000
131	169	2	51 000	63 000	3 400	8 500
131	169	2	48 000	58 500	3 200	7 500
139	171	0,6	41 500	56 000	3 000	8 500
139	171	0,6	39 000	52 000	2 850	7 000
142	189	2	65 500	83 000	4 250	7 500
142	189	2	62 000	78 000	4 000	6 700

# High speed spindle bearings

With ceramic balls  
Sealed



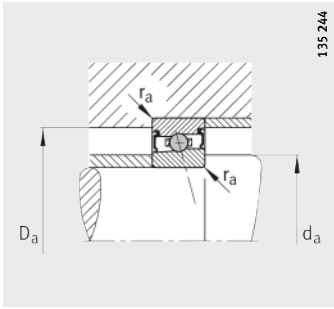
HCS719...-C, HCS70...-C  
 $\alpha = 15^\circ$



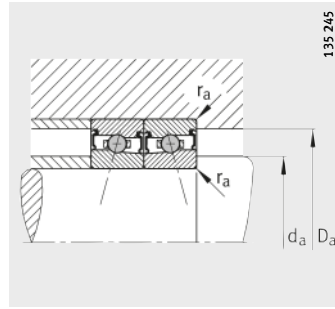
HCS719...-E, HCS70...-E  
 $\alpha = 25^\circ$

**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	a ≈
HCS71900-C-T-P4S	0,01	10	22	6	0,3	5
HCS71900-E-T-P4S	0,009	10	22	6	0,3	7
HCS7000-C-T-P4S	0,02	10	26	8	0,3	6
HCS7000-E-T-P4S	0,02	10	26	8	0,3	8
HCS71901-C-T-P4S	0,01	12	24	6	0,3	5
HCS71901-E-T-P4S	0,01	12	24	6	0,3	7
HCS7001-C-T-P4S	0,022	12	28	8	0,3	7
HCS7001-E-T-P4S	0,022	12	28	8	0,3	9
HCS71902-C-T-P4S	0,015	15	28	7	0,3	6
HCS71902-E-T-P4S	0,015	15	28	7	0,3	9
HCS7002-C-T-P4S	0,033	15	32	9	0,3	8
HCS7002-E-T-P4S	0,033	15	32	9	0,3	10
HCS71903-C-T-P4S	0,017	17	30	7	0,3	7
HCS71903-E-T-P4S	0,017	17	30	7	0,3	9
HCS7003-C-T-P4S	0,044	17	35	10	0,3	9
HCS7003-E-T-P4S	0,044	17	35	10	0,3	11
HCS71904-C-T-P4S	0,041	20	37	9	0,3	8
HCS71904-E-T-P4S	0,041	20	37	9	0,3	11
HCS7004-C-T-P4S	0,074	20	42	12	0,6	10
HCS7004-E-T-P4S	0,074	20	42	12	0,6	13
HCS71905-C-T-P4S	0,047	25	42	9	0,3	9
HCS71905-E-T-P4S	0,047	25	42	9	0,3	12
HCS7005-C-T-P4S	0,085	25	47	12	0,6	11
HCS7005-E-T-P4S	0,085	25	47	12	0,6	14
HCS71906-C-T-P4S	0,047	30	47	9	0,3	10
HCS71906-E-T-P4S	0,047	30	47	9	0,3	14
HCS7006-C-T-P4S	0,123	30	55	13	1	12
HCS7006-E-T-P4S	0,123	30	55	13	1	16
HCS71907-C-T-P4S	0,076	35	55	10	0,6	11
HCS71907-E-T-P4S	0,076	35	55	10	0,6	16
HCS7007-C-T-P4S	0,168	35	62	14	1	14
HCS7007-E-T-P4S	0,168	35	62	14	1	18
HCS71908-C-T-P4S	0,122	40	62	12	0,6	13
HCS71908-E-T-P4S	0,122	40	62	12	0,6	18
HCS7008-C-T-P4S	0,211	40	68	15	1	15
HCS7008-E-T-P4S	0,211	40	68	15	1	20



Mounting dimensions



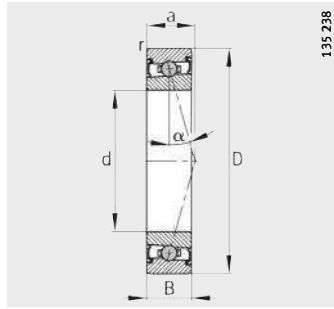
Mounting dimensions



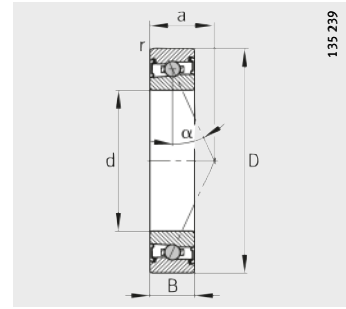
Mounting dimensions			Basic load ratings		Fatigue limit load $C_{Ur}$ N	Limiting speed $n_G$ grease $\text{min}^{-1}$
$d_a$ h12	$D_a$ H12	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		
13	19,5	0,3	1 360	760	47,5	100 000
13	19,5	0,3	1 290	720	45,5	85 000
14	22	0,3	1 900	1 100	68	90 000
14	22	0,3	1 800	1 050	65	75 000
15	21,5	0,3	1 410	840	53	90 000
15	21,5	0,3	1 330	800	50	75 000
16,5	24,5	0,3	1 870	1 130	70	80 000
16,5	24,5	0,3	1 770	1 070	67	70 000
18	25,5	0,3	1 940	1 230	76	75 000
18	25,5	0,3	1 830	1 170	72	63 000
19	29	0,3	2 600	1 700	108	70 000
19	29	0,3	2 450	1 610	103	60 000
20	27,5	0,3	1 990	1 330	82	70 000
20	27,5	0,3	1 880	1 260	78	60 000
21	32	0,3	2 650	1 840	117	63 000
21	32	0,3	2 500	1 740	111	53 000
24	33,5	0,3	2 700	1 980	126	56 000
24	33,5	0,3	2 550	1 870	119	48 000
25	37	0,6	4 300	3 200	198	53 000
25	37	0,6	4 100	3 000	188	45 000
29	38,5	0,3	2 900	2 360	150	48 000
29	38,5	0,3	2 750	2 200	142	40 000
30	42	0,6	4 350	3 450	214	45 000
30	42	0,6	4 100	3 250	203	38 000
34	43,5	0,3	4 400	3 650	227	43 000
34	43,5	0,3	4 150	3 450	215	36 000
36	49	1	6 000	4 950	310	38 000
36	49	1	5 700	4 700	295	32 000
40	51,5	0,6	4 800	4 350	275	36 000
40	51,5	0,6	4 500	4 050	260	30 000
41	56	1	6 500	5 800	365	34 000
41	56	1	6 100	5 400	345	28 000
45	58,5	0,6	5 000	4 800	315	32 000
45	58,5	0,6	4 750	4 500	295	28 000
46	62	1	6 800	6 500	415	30 000
46	62	1	6 400	6 100	395	26 000

# High speed spindle bearings

With ceramic balls  
Sealed



HCS719...-C, HCS70...-C  
 $\alpha = 15^\circ$

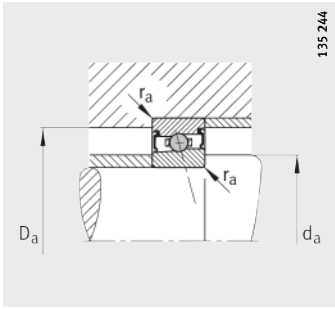


HCS719...-E, HCS70...-E  
 $\alpha = 25^\circ$

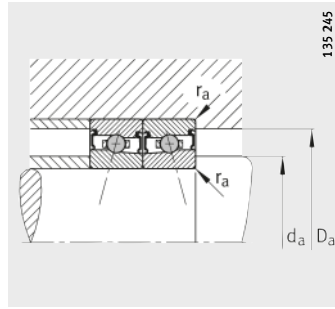
**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	a ≈
HCS71909-C-T-P4S	0,135	45	68	12	0,6	14
HCS71909-E-T-P4S	0,135	45	68	12	0,6	19
HCS7009-C-T-P4S	0,248	45	75	16	1	16
HCS7009-E-T-P4S	0,247	45	75	16	1	22
HCS71910-C-T-P4S	0,136	50	72	12	0,6	14
HCS71910-E-T-P4S	0,136	50	72	12	0,6	20
HCS7010-C-T-P4S	0,269	50	80	16	1	17
HCS7010-E-T-P4S	0,268	50	80	16	1	23
HCS71911-C-T-P4S	0,17	55	80	13	1	16
HCS71911-E-T-P4S	0,17	55	80	13	1	22
HCS7011-C-T-P4S	0,348	55	90	18	1,1	19
HCS7011-E-T-P4S	0,347	55	90	18	1,1	26
HCS71912-C-T-P4S	0,19	60	85	13	1	16
HCS71912-E-T-P4S	0,19	60	85	13	1	23
HCS7012-C-T-P4S	0,388	60	95	18	1,1	19
HCS7012-E-T-P4S	0,388	60	95	18	1,1	27
HCS71913-C-T-P4S	0,194	65	90	13	1	17
HCS71913-E-T-P4S	0,194	65	90	13	1	25
HCS7013-C-T-P4S	0,402	65	100	18	1,1	20
HCS7013-E-T-P4S	0,402	65	100	18	1,1	28
HCS71914-C-T-P4S	0,322	70	100	16	1	19
HCS71914-E-T-P4S	0,321	70	100	16	1	28
HCS7014-C-T-P4S	0,611	70	110	20	1,1	22
HCS7014-E-T-P4S	0,61	70	110	20	1,1	31
HCS71915-C-T-P4S	0,347	75	105	16	1	20
HCS71915-E-T-P4S	0,346	75	105	16	1	29
HCS7015-C-T-P4S	0,645	75	115	20	1,1	23
HCS7015-E-T-P4S	0,644	75	115	20	1,1	32
HCS71916-C-T-P4S	0,317	80	110	16	1	21
HCS71916-E-T-P4S	0,317	80	110	16	1	30
HCS7016-C-T-P4S	0,873	80	125	22	1,1	25
HCS7016-E-T-P4S	0,871	80	125	22	1,1	35
HCS71917-C-T-P4S	0,512	85	120	18	1,1	23
HCS71917-E-T-P4S	0,511	85	120	18	1,1	33
HCS7017-C-T-P4S	0,916	85	130	22	1,1	25
HCS7017-E-T-P4S	0,915	85	130	22	1,1	36





Mounting dimensions



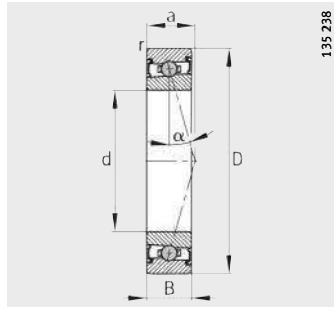
Mounting dimensions



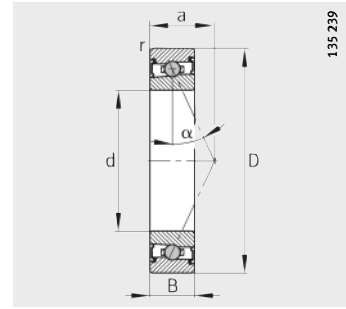
Mounting dimensions			Basic load ratings		Fatigue limit load $C_{Ur}$ N	Limiting speed $n_G$ grease $\text{min}^{-1}$
$d_a$ h12	$D_a$ H12	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		
50	63,5	0,6	6 900	6 700	435	28 000
50	63,5	0,6	6 500	6 300	410	24 000
51	69	1	8 900	8 600	550	26 000
51	69	1	8 400	8 000	520	24 000
55	67,5	0,6	7 100	7 200	470	26 000
55	67,5	0,6	6 700	6 700	445	22 000
56	74	1	9 200	9 200	590	24 000
56	74	1	8 700	8 600	560	22 000
60	75,5	0,6	9 300	9 500	620	24 000
60	75,5	0,6	8 800	8 800	590	20 000
62	83	1	13 000	13 200	840	22 000
62	83	1	12 200	12 300	790	19 000
65	80,5	0,6	9 600	10 100	670	22 000
65	80,5	0,6	9 000	9 400	630	19 000
67	88	1	13 400	14 000	910	20 000
67	88	1	12 600	13 100	860	18 000
70	85,5	0,6	9 900	10 700	720	20 000
70	85,5	0,6	9 300	10 000	680	18 000
72	93	1	13 800	15 000	980	20 000
72	93	1	13 000	14 000	930	17 000
76	94,5	0,6	12 700	14 000	940	19 000
76	94,5	0,6	11 900	13 100	890	16 000
77	102	1	18 000	19 500	1 250	18 000
77	102	1	17 000	18 200	1 190	15 000
81	99,5	0,6	13 000	14 800	1 010	18 000
81	99,5	0,6	12 200	13 800	950	15 000
82	107	1	18 200	20 100	1 310	17 000
82	107	1	17 200	18 700	1 240	15 000
86	104	0,6	14 500	16 800	1 130	17 000
86	104	0,6	13 700	15 600	1 060	15 000
88	117	1	21 700	24 300	1 570	16 000
88	117	1	20 500	22 700	1 480	13 000
92	114	0,6	15 100	18 100	1 220	16 000
92	114	0,6	14 200	16 900	1 150	13 000
93	122	1	22 000	25 000	1 590	15 000
93	122	1	20 700	23 400	1 510	13 000

# High speed spindle bearings

With ceramic balls  
Sealed



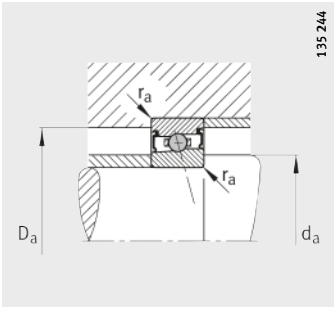
HCS719..-C, HCS70..-C  
 $\alpha = 15^\circ$



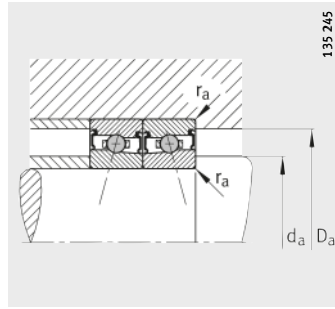
HCS719..-E, HCS70..-E  
 $\alpha = 25^\circ$

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	a ≈
HCS71918-C-T-P4S	0,588	<b>90</b>	125	18	1,1	23
HCS71918-E-T-P4S	0,587	<b>90</b>	125	18	1,1	34
HCS7018-C-T-P4S	1,19	<b>90</b>	140	24	1,5	27
HCS7018-E-T-P4S	1,18	<b>90</b>	140	24	1,5	39
HCS71919-C-T-P4S	0,615	<b>95</b>	130	18	1,1	24
HCS71919-E-T-P4S	0,614	<b>95</b>	130	18	1,1	35
HCS7019-C-T-P4S	1,24	<b>95</b>	145	24	1,5	28
HCS7019-E-T-P4S	1,24	<b>95</b>	145	24	1,5	40
HCS71920-C-T-P4S	0,818	<b>100</b>	140	20	1,1	26
HCS71920-E-T-P4S	0,816	<b>100</b>	140	20	1,1	38
HCS7020-C-T-P4S	1,29	<b>100</b>	150	24	1,5	29
HCS7020-E-T-P4S	1,29	<b>100</b>	150	24	1,5	41
HCS71921-C-T-P4S	0,851	<b>105</b>	145	20	1,1	27
HCS71921-E-T-P4S	0,85	<b>105</b>	145	20	1,1	39
HCS7021-C-T-P4S	1,59	<b>105</b>	160	26	2	31
HCS7021-E-T-P4S	1,59	<b>105</b>	160	26	2	44
HCS71922-C-T-P4S	0,859	<b>110</b>	150	20	1,1	27
HCS71922-E-T-P4S	0,858	<b>110</b>	150	20	1,1	40
HCS7022-C-T-P4S	2,05	<b>110</b>	170	28	2	33
HCS7022-E-T-P4S	2,05	<b>110</b>	170	28	2	47
HCS71924-C-T-P4S	1,22	<b>120</b>	165	22	1,1	30
HCS71924-E-T-P4S	1,22	<b>120</b>	165	22	1,1	44
HCS7024-C-T-P4S	2,2	<b>120</b>	180	28	2	34
HCS7024-E-T-P4S	2,2	<b>120</b>	180	28	2	49
HCS71926-C-T-P4S	1,59	<b>130</b>	180	24	1,5	33
HCS71926-E-T-P4S	1,59	<b>130</b>	180	24	1,5	48
HCS7026-C-T-P4S	3,52	<b>130</b>	200	33	2	39
HCS7026-E-T-P4S	3,51	<b>130</b>	200	33	2	55



Mounting dimensions

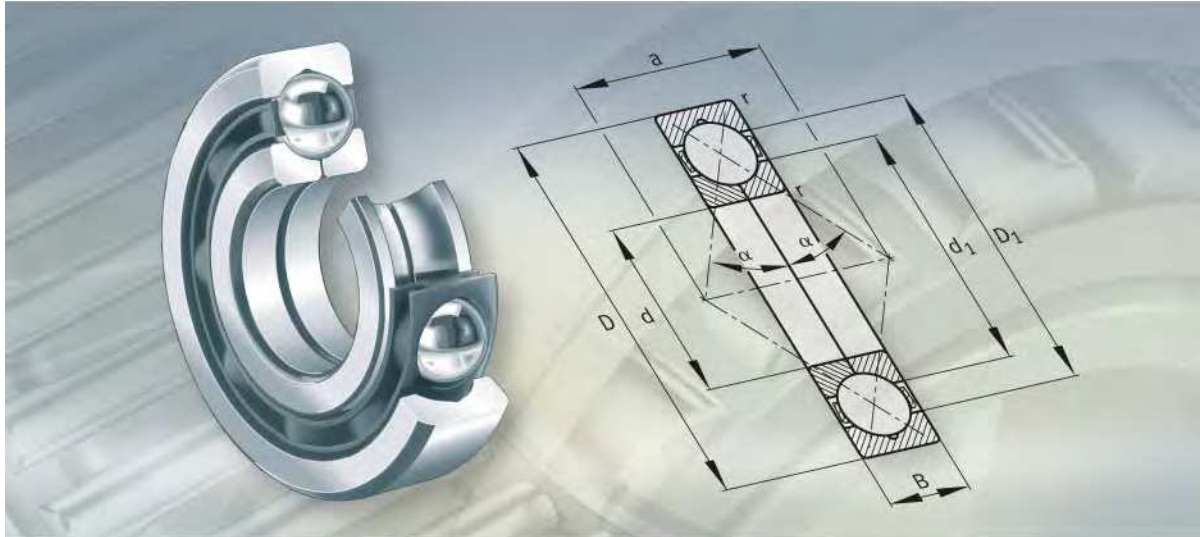


Mounting dimensions



Mounting dimensions			Basic load ratings		Fatigue limit load $C_{Ur}$ N	Limiting speed $n_G$ grease $\text{min}^{-1}$
$d_a$ h12	$D_a$ H12	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		
97	119	0,6	16 400	19 800	1 320	15 000
97	119	0,6	15 500	18 500	1 240	13 000
100	131	1,5	26 000	30 000	1 810	14 000
100	131	1,5	24 300	28 000	1 710	12 000
102	124	0,6	16 800	20 800	1 360	14 000
102	124	0,6	15 800	19 400	1 290	12 000
105	136	1,5	26 000	31 000	1 840	13 000
105	136	1,5	24 600	28 500	1 730	11 000
107	133	0,6	20 200	25 000	1 560	13 000
107	133	0,6	19 000	23 400	1 470	11 000
110	141	1,5	26 500	31 500	1 860	12 000
110	141	1,5	24 900	29 500	1 760	11 000
112	138	0,6	20 700	26 500	1 620	12 000
112	138	0,6	19 500	24 600	1 530	11 000
116	150	2	34 000	40 500	2 300	12 000
116	150	2	32 000	38 000	2 180	10 000
117	143	0,6	24 100	30 500	1 820	12 000
117	143	0,6	22 600	28 500	1 720	10 000
121	159	2	34 500	42 000	2 330	11 000
121	159	2	32 500	39 000	2 200	9 000
128	157	0,6	25 000	33 500	1 950	11 000
128	157	0,6	23 700	31 000	1 830	9 000
131	169	2	35 500	44 500	2 410	10 000
131	169	2	33 000	41 500	2 280	8 500
139	171	0,6	29 000	39 000	2 140	9 500
139	171	0,6	27 000	36 500	2 010	8 000
142	189	2	45 500	58 000	3 000	9 000
142	189	2	42 500	54 000	2 850	7 500

**FAG**



**Four point contact bearings**

# Four point contact bearings

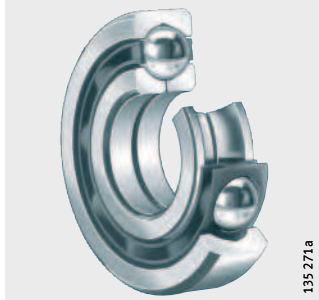
	Page
<b>Product overview</b>	Four point contact bearings ..... 350
<b>Features</b>	Axial load capacity in both directions..... 351
	Operating temperature ..... 352
	Cages..... 352
	Suffixes..... 352
<b>Design and safety guidelines</b>	Equivalent dynamic bearing load ..... 353
	Equivalent static bearing load..... 353
	Minimum axial load..... 353
	Application as axial bearings only..... 353
	Speeds..... 353
	Design of bearing arrangements ..... 354
<b>Accuracy</b>	Axial internal clearance ..... 354
<b>Dimension tables</b>	Four point contact bearings ..... 356



## Product overview Four point contact bearings

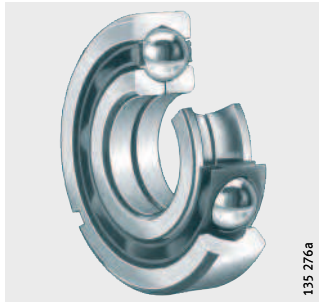
**Without retaining slots**

QJ2, QJ3



**With retaining slots**

QJ2..-N2, QJ3..-N2



# Four point contact bearings

<b>Features</b>	<p>Four point contact bearings are single row angular contact ball bearings and therefore require significantly less space in an axial direction than double row designs.</p> <p>The bearings comprise solid outer rings, split inner rings and ball and cage assemblies with brass or polyamide cages. The two-piece inner rings allow a large complement of balls to be accommodated. The inner ring halves are matched to the particular bearing and must not be interchanged with those of other bearings of the same size. The outer ring with the ball and cage assembly can be mounted separately from the two inner ring halves.</p>
<b>Axial load capacity in both directions</b>	<p>Due to the design of the rolling element raceways with their high raceway shoulders, the contact angle of <math>35^\circ</math> and the large number of rolling elements, four point contact bearings have a high load carrying capacity. They can support high axial forces in both directions as well as small radial loads.</p>
<b>With or without retaining slots in the outer ring</b>	<p>Single row four point contact bearings capable of supporting axial loads in both directions are often combined with a radial bearing and used as an axial bearing with radial clearance in a housing. For quick and secure location, larger four point contact bearings therefore have two retaining slots in the outer ring offset by <math>180^\circ</math>. These bearings have the suffix N2.</p>
<b>Compensation of angular misalignments</b>	<p>The possible skewing of the inner rings in relation to the outer ring depends on the bearing load, the operating clearance and the bearing size and is very small. Four point contact bearings are not therefore suitable for the compensation of angular misalignments in housing bores or due to shaft deflections.</p> <p>Skewing of the bearing rings increases the running noise, places increased strain on the cages and has a harmful influence on the operating life of the bearings.</p>
<b>Sealing</b>	<p>Four point contact bearings are not sealed.</p>
<b>Lubrication</b>	<p>They are not greased and can be lubricated with grease or oil.</p>



# Four point contact bearings

## Operating temperature

Bearings with solid brass cages can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ .

Bearings with an outside diameter of more than 240 mm are dimensionally stable up to  $+200\text{ }^{\circ}\text{C}$ .



Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to  $+120\text{ }^{\circ}\text{C}$ .

## Cages

Standard cages for four point contact bearings, see table.

Four point contact bearings with brass cages have the suffix MPA. These window cages are guided on the outer ring.

Cages made from glass fibre reinforced polyamide are indicated by the suffix TVP.



Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

## Cage and bore code

Series	Solid brass cage <sup>1)</sup>	Polyamide window cage <sup>1)</sup>
	Bore code	
QJ2	up to 07, 10, 13, from 16	08, 09, 11, 12, 14, 15
QJ3	04, from 10	05 to 09

<sup>1)</sup> Other cage designs available by agreement. In such cages, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

## Suffixes

Suffixes for available designs: see table.

## Available designs

Suffix	Description	Design
C3	Axial internal clearance larger than normal	Special design, available by agreement
MPA	Solid brass cage	Standard
TVP	Window cage made from glass fibre reinforced polyamide 66	
N2	Two retaining slots in outer ring	Standard for larger bearings



**Design and safety guidelines**  
**Equivalent dynamic bearing load**

**Load ratio and equivalent dynamic load**

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic bearing load
$\frac{F_a}{F_r} \leq 0,95$	$P = F_r + 0,66 \cdot F_a$
$\frac{F_a}{F_r} > 0,95$	$P = 0,6 \cdot F_r + 1,07 \cdot F_a$

P N  
 Equivalent dynamic bearing load for combined load  
 $F_a$  N  
 Axial dynamic bearing load  
 $F_r$  N  
 Radial dynamic bearing load.

**Equivalent static bearing load**

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + 0,58 \cdot F_{0a}$$

$P_0$  N  
 Equivalent static bearing load for combined load  
 $F_{0a}$  N  
 Axial static bearing load  
 $F_{0r}$  N  
 Radial static bearing load.

**Minimum axial load**

In order to ensure low friction in the bearing, especially at high speeds, a minimum axial load is required. In order to prevent an excessive increase in friction, the axial force should be sufficiently high that the rolling bearings are in contact with the inner and outer ring raceway at only one point. This is ensured if  $F_a \geq 1,2 \cdot F_r$ .

**Application as axial bearings only**

If four point contact bearings are to be used as axial bearings only, the outer ring must have a large radial clearance in the housing. As a result, the bearings are not subjected to radial load.

**Speeds**

High speeds can be achieved if four point contact ball bearings are subjected to purely axial load.

ISO 15 312 does not give thermal reference speeds for these bearings.



The dimension tables therefore only state the limiting speeds  $n_G$ . These values are for oil lubrication and must not be exceeded. If higher speeds are required, please contact us.



# Four point contact bearings

## Design of bearing arrangements

### Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see tables, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

### Mounting dimensions

The dimension tables give the maximum dimension of the radius  $r_a$  and the diameters of the abutment shoulders  $D_a$  and  $d_a$ .

### Accuracy

The main dimensions of the bearings conform to DIN 628-4.

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.

### Axial internal clearance

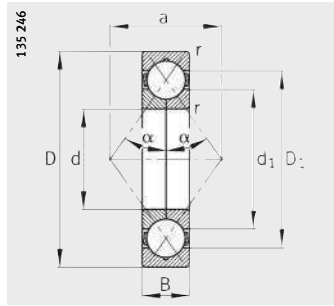
The axial internal clearance corresponds to internal clearance group CN to DIN 628-4.

### Axial internal clearance

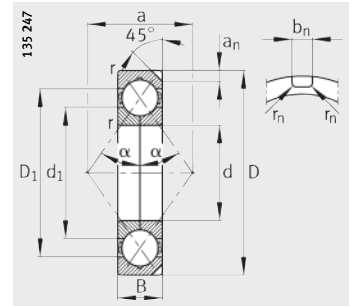
Bore d mm		Axial internal clearance							
		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
18	40	30	70	60	110	100	150	140	190
40	60	40	90	80	130	120	170	160	210
60	80	50	100	90	140	130	180	170	220
80	100	60	120	100	160	140	200	180	240
100	140	70	140	120	180	160	220	200	260
140	180	80	160	140	200	180	240	220	280
180	220	100	180	160	220	200	260	240	300
220	260	120	200	180	240	220	300	280	360



# Four point contact bearings



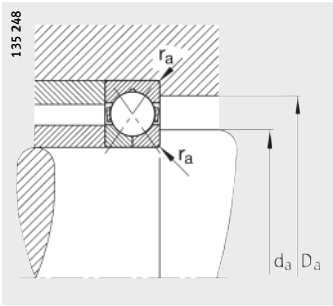
Without retaining slots  
 $\alpha = 35^\circ$



N2, two retaining slots  
 $\alpha = 35^\circ$

**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions							
		d	D	B	r	D <sub>1</sub>	d <sub>1</sub>	a	a <sub>n</sub>
					min.	≈	≈	≈	
QJ304-MPA	0,184	20	52	15	1,1	41,4	30,6	26	–
QJ205-MPA	0,171	25	52	15	1	43,1	34,2	27	–
QJ305-TVP	0,256	25	62	17	1,1	49,5	37,5	31	–
QJ206-MPA	0,254	30	62	16	1	50,7	40,3	32	–
QJ306-TVP	0,379	30	72	19	1,1	58	43,9	36	–
QJ207-MPA	0,359	35	72	17	1,1	59,1	47,9	38	–
QJ307-TVP	0,516	35	80	21	1,5	64,8	50,7	41	–
QJ208-TVP	0,399	40	80	18	1,1	66,8	53,6	42	–
QJ308-TVP	0,695	40	90	23	1,5	73,4	56,6	46	–
QJ209-TVP	0,467	45	85	19	1,1	72	58,4	45	–
QJ309-TVP	0,934	45	100	25	1,5	81,7	63,6	51	–
QJ210-MPA	0,609	50	90	20	1,1	76,4	63,6	49	–
QJ310-MPA	1,39	50	110	27	2	89,6	70,8	56	–
QJ211-TVP	0,697	55	100	21	1,5	84,7	70,6	54	–
QJ311-MPA	1,76	55	120	29	2	97,8	77,5	61	–
QJ212-TVP	0,889	60	110	22	1,5	93	77,3	60	–
QJ312-MPA	2,2	60	130	31	2,1	106,9	84,2	67	–
QJ213-MPA	1,27	65	120	23	1,5	101,5	84,1	65	–
QJ313-MPA	2,71	65	140	33	2,1	114,4	90,9	72	–
QJ214-TVP	1,22	70	125	24	1,5	106,3	89	68	–
QJ314-MPA	3,29	70	150	35	2,1	123,6	97,6	77	–
QJ215-TVP	1,34	75	130	25	1,5	111,5	94	72	–
QJ315-N2-MPA	3,95	75	160	37	2,1	131	104,3	82	10,1
QJ216-MPA	1,84	80	140	26	2	119,6	100,9	77	–
QJ316-N2-MPA	4,65	80	170	39	2,1	140,8	110,6	88	10,1
QJ217-MPA	2,3	85	150	28	2	128,6	107,5	82	–
QJ317-N2-MPA	5,54	85	180	41	3	148,6	117,8	93	11,7
QJ218-N2-MPA	2,8	90	160	30	2	136,1	114,2	88	8,1
QJ318-N2-MPA	6,44	90	190	43	3	157,1	124,5	98	11,7
QJ219-N2-MPA	3,41	95	170	32	2,1	144,4	121	93	8,1
QJ319-N2-MPA	7,45	95	200	45	3	165,4	131,2	103	11,7
QJ220-N2-MPA	4,1	100	180	34	2,1	153,6	127,7	98	10,1
QJ320-N2-MPA	9,04	100	215	47	3	176,6	138,9	110	11,7
QJ221-N2-MPA	4,81	105	190	36	2,1	161,6	134,7	103	10,1

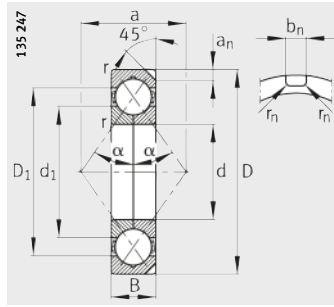


Mounting dimensions

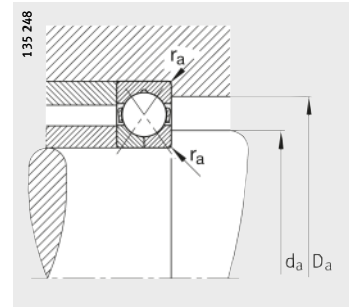


		Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$
$b_n$	$r_n$	$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N		
-	-	27	45	1	30 000	19 600	990	28 000
-	-	31	46	1	25 500	18 600	950	26 000
-	-	32	55	1	44 000	31 500	1 590	14 000
-	-	36	56	1	36 500	27 500	1 410	20 000
-	-	37	65	1	58 500	43 000	2 170	11 000
-	-	42	65	1	44 000	35 500	1 800	18 000
-	-	44	71	1,5	62 000	51 000	2 550	9 500
-	-	47	73	1	56 000	46 500	2 380	9 500
-	-	49	81	1,5	86 500	68 000	3 500	8 500
-	-	52	78	1	64 000	57 000	2 900	8 500
-	-	54	91	1,5	102 000	83 000	4 550	7 500
-	-	57	83	1	61 000	56 000	2 900	13 000
-	-	61	99	2	110 000	91 500	4 950	11 000
-	-	64	91	1,5	80 000	76 500	3 900	7 000
-	-	66	109	2	127 000	108 000	5 900	10 000
-	-	69	101	1,5	96 500	93 000	4 800	6 300
-	-	72	118	2,1	146 000	127 000	6 700	9 000
-	-	74	111	1,5	104 000	104 000	3 950	9 500
-	-	77	128	2,1	163 000	146 000	7 900	8 500
-	-	79	116	1,5	118 000	122 000	6 800	5 600
-	-	82	138	2,1	183 000	166 000	8 600	8 000
-	-	84	121	1,5	125 000	129 000	6 800	5 300
8,5	2	87	148	2,1	212 000	204 000	10 500	7 000
-	-	91	129	2	132 000	137 000	7 100	8 000
8,5	2	92	158	2,1	224 000	220 000	10 800	7 000
-	-	96	139	2	153 000	160 000	8 100	7 000
10,5	2	99	166	2,5	245 000	255 000	11 700	6 300
6,5	1	101	149	2	176 000	186 000	8 800	7 000
10,5	2	104	176	2,5	265 000	285 000	12 900	6 000
6,5	1	107	158	2,1	200 000	212 000	10 100	6 300
10,5	2	109	186	2,5	285 000	310 000	14 100	6 000
8,5	2	112	168	2,1	224 000	240 000	11 200	6 000
10,5	2	114	201	2,5	325 000	365 000	16 300	5 600
8,5	2	117	178	2,1	232 000	260 000	11 600	6 000

# Four point contact bearings



N2, two retaining slots  
 $\alpha = 35^\circ$



Mounting dimensions

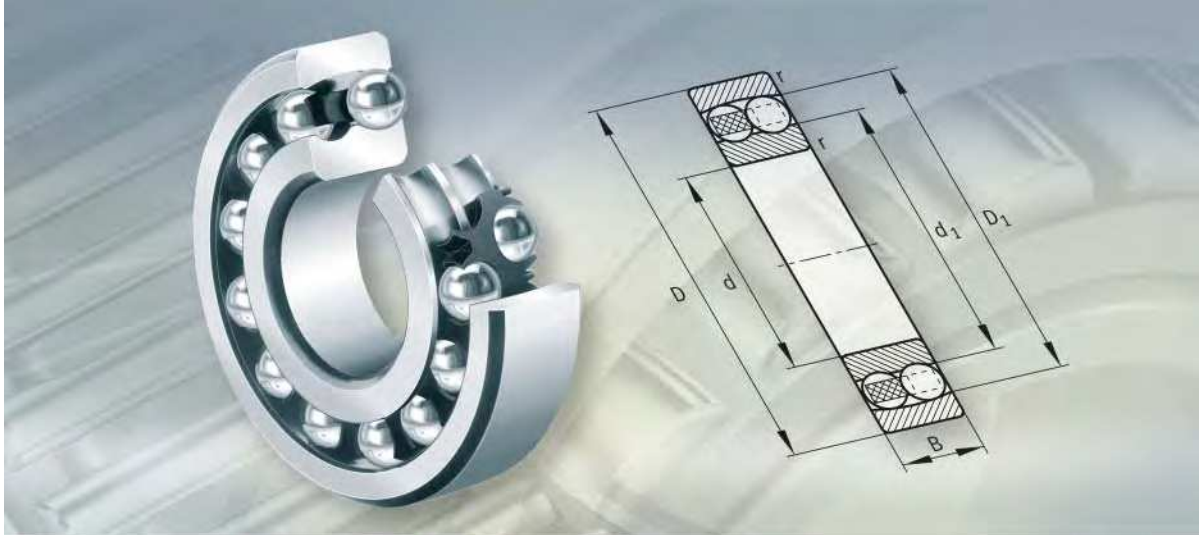
Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions							
		d	D	B	r	$D_1$	$d_1$	a	$a_n$
QJ222-N2-MPA	5,66	110	200	38	2,1	169,8	141,6	109	10,1
QJ322-N2-MPA	12,2	110	240	50	3	195,5	156,4	123	11,7
QJ224-N2-MPA	6,74	120	215	40	2,1	183,6	152,8	117	11,7
QJ324-N2-MPA	15,6	120	260	55	3	210,6	169,8	133	11,7
QJ226-N2-MPA	7,66	130	230	40	3	195	165,4	127	11,7
QJ326-N2-MPA	19,2	130	280	58	4	228	184	144	12,7
QJ228-N2-MPA	9,69	140	250	42	3	210,5	180	137	11,7
QJ328-N2-MPA	23,2	140	300	62	4	243	197	154	12,7
QJ230-N2-MPA	12,2	150	270	45	3	226,7	193,7	147	11,7
QJ330-N2-MPA	28	150	320	65	4	261	211,3	165	12,7
QJ232-N2-MPA	15,3	160	290	48	3	240	210	158	12,7
QJ332-N2-MPA	32,8	160	340	68	4	279,9	222,7	175	12,7
QJ234-N2-MPA	18,9	170	310	52	4	260,5	221,4	168	12,7
QJ334-N2-MPA	38,4	170	360	72	4	292	238	186	12,7
QJ236-N2-MPA	19,6	180	320	52	4	269	231	175	12,7
QJ336-N2-MPA	44,9	180	380	75	4	311	249,1	196	12,7
QJ238-N2-MPA	23,8	190	340	55	4	286,3	245,8	186	12,7
QJ338-N2-MPA	52,1	190	400	78	5	327	262,5	207	12,7
QJ240-N2-MPA	28	200	360	58	4	302	258,6	196	12,7
QJ244-N2-MPA	38,6	220	400	65	4	336	284,6	217	12,7
QJ344-N2-MPA	77,1	220	460	88	5	378	302	238	15
QJ248-N2-MPA	53,1	240	440	72	4	367	312,5	238	15
QJ348-N2-MPA	98,2	240	500	95	5	410	330,7	259	15



		Mounting dimensions			Basic load ratings		Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>
b <sub>n</sub>	r <sub>n</sub>	d <sub>a</sub> min.	D <sub>a</sub> max.	r <sub>a</sub> max.	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N		
8,5	2	122	188	2,1	250 000	285 000	12 300	5 600
10,5	2	124	226	2,5	345 000	415 000	17 400	5 300
10,5	2	132	203	2,1	280 000	340 000	13 800	5 300
10,5	2	134	246	2,5	380 000	480 000	19 300	5 000
10,5	2	144	216	2,5	290 000	365 000	14 500	5 000
10,5	2	147	263	3	425 000	570 000	21 600	4 800
10,5	2	154	236	2,5	315 000	415 000	16 500	4 800
10,5	2	157	283	3	475 000	655 000	19 700	4 300
10,5	2	164	256	2,5	345 000	480 000	18 400	4 500
10,5	2	167	303	3	510 000	735 000	25 500	3 800
10,5	2	174	276	2,5	375 000	530 000	16 800	4 300
10,5	2	177	323	3	585 000	865 000	29 500	3 600
10,5	2	187	293	3	425 000	630 000	22 800	3 800
10,5	2	187	343	3	585 000	915 000	24 900	3 200
10,5	2	197	303	3	430 000	670 000	18 900	3 600
10,5	2	197	363	3	680 000	1 080 000	33 000	3 000
10,5	2	207	323	3	455 000	735 000	24 400	3 200
10,5	2	210	380	4	735 000	1 250 000	37 000	2 800
10,5	2	217	343	3	510 000	850 000	22 600	3 000
10,5	2	237	383	3	630 000	1 120 000	31 000	2 800
12,5	2,5	240	440	4	900 000	1 660 000	44 500	2 800
12,5	2,5	257	423	3	680 000	1 270 000	30 500	2 800
12,5	2,5	260	480	4	1 020 000	1 960 000	52 000	2 600

**FAG**



**Self-aligning ball bearings**



# Self-aligning ball bearings

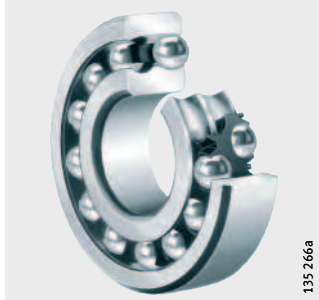
	Page
<b>Product overview</b>	Self-aligning ball bearings ..... 362
<b>Features</b>	Radial and axial load capacity..... 363
	Compensation of angular misalignments ..... 363
	Operating temperature ..... 363
	Cages ..... 364
	Suffixes..... 364
<b>Design and safety guidelines</b>	Equivalent dynamic bearing load ..... 365
	Equivalent static bearing load..... 365
	Minimum load ..... 365
	Speeds..... 365
	Design of bearing arrangements ..... 366
<b>Accuracy</b>	Radial internal clearance of bearings with cylindrical bore..... 367
	Radial internal clearance of bearings with tapered bore..... 367
<b>Dimension tables</b>	Self-aligning ball bearings with cylindrical bore, open or sealed ..... 368
	Self-aligning ball bearings with cylindrical or tapered bore, open or sealed ..... 370
	Self-aligning ball bearings with cylindrical or tapered bore, open ..... 378
	Self-aligning ball bearings with extended inner ring ..... 382
	Self-aligning ball bearings with adapter sleeve, open or sealed ..... 384
	Self-aligning ball bearings with adapter sleeve, open ..... 388



# Product overview Self-aligning ball bearings

**With cylindrical or tapered bore**

10, 12, 13,  
22, 23



12..-K, 13..-K,  
22..-K, 23..-K



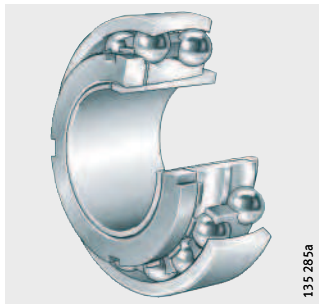
**Lip seals**

22..-2RS, 22..-K-2RS,  
23..-2RS

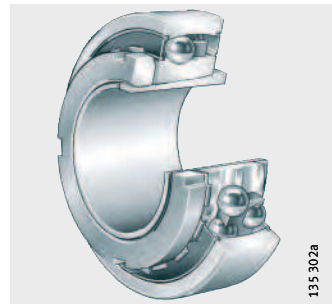


**With adapter sleeve**  
Without or with lip seals

12..-K + H, 13..-K + H,  
22..-K + H, 23..-K + H

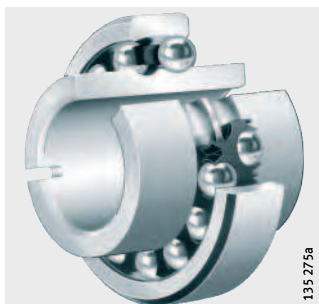


22..-K-2RS + H




**With extended inner ring**

112



# Self-aligning ball bearings

<b>Features</b>	Self-aligning ball bearings are double row, self-retaining units comprising outer rings with a concave raceway, inner rings with a cylindrical or tapered bore and ball and cage assemblies. The bearings are available in open and sealed designs.
<b>Radial and axial load capacity</b>	Self-aligning ball bearings can support axial forces in both directions as well as radial forces.
<b>With cylindrical or tapered bore</b>	Bearings of series 12, 13, 22 and 23 are available with a cylindrical or tapered bore. Bearings with a tapered bore have a bore taper of 1:12 and the suffix K.
<b>With adapter sleeve</b>	Self-aligning ball bearings with a tapered bore are also available with an adapter sleeve, locknut and tab washer. Adapter sleeves must be ordered in addition to the bearing.
<b>With extended inner ring</b>	Bearings of series 112 have an extended inner ring, a locating slot on one side of the inner ring and are located by means of dowel pins. These bearings are intended for simple bearing arrangements with conventional shafts. Due to the bearing bore tolerance (J7), they are very easy to fit.
<b>Sealing</b>	Self-aligning ball bearings of series 12, 13, 22 and 23 are also available in sealed designs. Sealed bearings have contact seals on both sides and the suffix 2RS.
<b>Lubrication</b>	Sealed bearings are greased with a high quality grease and are maintenance-free.
<b>Compensation of angular misalignments</b>	Under normal operating conditions and with a rotating inner ring, self-aligning ball bearings can swivel approx. 4° about their central position; sealed bearings can swivel by max. 1,5°. As a result, they permit skewing between the inner and outer ring and can thus compensate misalignments, shaft deflections and housing deformations. If the outer ring rotates or the inner ring undergoes tumbling motion, the angular adjustment facility is smaller. In this case, please contact us.
<b>Operating temperature</b>	Open bearings with brass cages can be used at operating temperatures from -30 °C to +150 °C.  Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C. Sealed self-aligning ball bearings are suitable for operating temperatures from -30 °C to +100 °C, restricted by the grease and seal material.



# Self-aligning ball bearings

**Cages** The standard cages for self-aligning ball bearings are shown in the table Cage and bore code.

Self-aligning ball bearings with cages made from glass fibre reinforced polyamide 66 have the suffix TVH.

Ball-guided solid brass cages are indicated by the suffix M.



Check the chemical resistance of polyamide to synthetic greases and oils and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

## Cage and bore code

Series	Solid polyamide cage <sup>1)</sup> Bore code	Solid brass cage <sup>1)</sup>
10	8	–
12	up to 18	from 19
13	up to 13	from 14
22	up to 13, 15, 16, 18	14, 17, from 19
23	up to 13	from 14
112	04 to 12	–

<sup>1)</sup> Other cage designs available by agreement. In such cages, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

## Suffixes

Suffixes for available designs: see table.

## Available designs

Suffix	Description	Design
C3	Radial internal clearance larger than normal	Standard for tapered bore
K	Tapered bore	Standard
M	Solid brass cage	
TVH	Solid cage made from glass fibre reinforced polyamide 66	
2RS	Contact seals on both sides	

**Design and safety guidelines**  
**Equivalent dynamic bearing load**

**Load ratio and equivalent dynamic load**

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq e$	$P = F_r + Y_1 \cdot F_a$
$\frac{F_a}{F_r} > e$	$P = 0,65 \cdot F_r + Y_2 \cdot F_a$

P N  
 Equivalent dynamic bearing load for combined load  
 $F_a$  N  
 Axial dynamic bearing load  
 $F_r$  N  
 Radial dynamic bearing load  
 $e, Y_1, Y_2$  –  
 Factors from dimension tables.



**Equivalent static bearing load**

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

$P_0$  N  
 Equivalent static bearing load for combined load  
 $F_{0a}$  N  
 Axial static bearing load  
 $F_{0r}$  N  
 Radial static bearing load  
 $Y_0$  –  
 Factor from dimension tables.

**Minimum load**

In order to ensure slippage-free operation, the bearings must be subjected to sufficient load. If insufficient load is applied (for example at high speeds during a test run), slippage can occur that may lead to bearing damage if lubrication is inadequate. The minimum load should be  $P/C_r = 0,01$ .

**Speeds**



If the reference speed  $n_B$  in the dimension tables is higher than the limiting speed  $n_G$ , the higher value cannot be used. In bearings with contact seals (suffix 2RS), the speed is limited by the permissible sliding speed of the sealing lips, so only the limiting speed  $n_G$  is given in the tables.

# Self-aligning ball bearings

## Design of bearing arrangements

### Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

### Mounting dimensions

The dimension tables give the maximum dimension of the radius  $r_a$  and the diameters of the abutment shoulders  $D_a$  and  $d_a$ .

Bearings with a tapered inner ring bore are:

- located either directly on tapered shaft seats or
- located on a cylindrical shaft seat using an adapter sleeve, locknut and tab washer.

If high axial forces are present, a support ring can be used.

For fitting, attention must be paid to the support ring dimensions given in the dimension tables.

### Ball projection



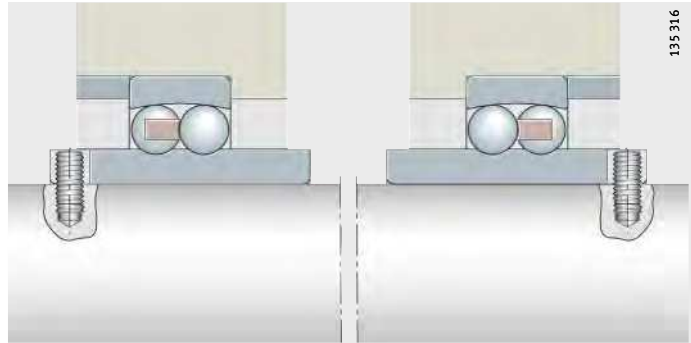
In some bearings with a brass cage, the balls project to a certain extent at the sides. The projection  $C_1$  must be taken into consideration when designing the adjacent construction.

Values for  $C_1$ : see dimension tables page 380 and page 389.

### Location of series 122

These bearings are axially located by means of thread studs that engage in the slot in the inner ring, *Figure 1*. The studs also prevent the inner rings creeping on the shaft.

If a shaft is to be supported by two bearings, the locating slots must be arranged on the sides of the bearing facing towards or away from each other, *Figure 1*.



*Figure 1*  
Location and arrangement of bearings

## Accuracy

The main dimensions of the bearings conform to DIN 630.  
The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620-2.  
In series 112, the bearing bore has a J7 tolerance.

## Radial internal clearance of bearings with cylindrical bore

The radial internal clearance is CN in accordance with DIN 620-4.

### Radial internal clearance

Bore		Radial internal clearance			
d mm		CN μm		C3 μm	
over	incl.	min.	max.	min.	max.
–	6	5	15	10	20
6	10	6	17	12	25
10	14	6	19	13	26
14	18	8	21	15	28
18	24	10	23	17	30
24	30	11	24	19	35
30	40	13	29	23	40
40	50	14	31	25	44
50	65	16	36	30	50
65	80	18	40	35	60
80	100	22	48	42	70
100	120	25	56	50	83
120	140	30	68	60	100
140	160	35	80	70	120



## Radial internal clearance of bearings with tapered bore

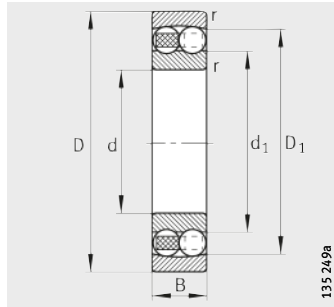
Bearings with a tapered bore have the internal clearance group C3 in accordance with DIN 620-4.

### Radial internal clearance

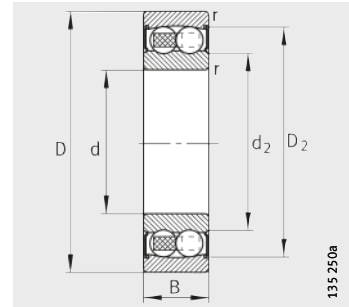
Bore		Radial internal clearance			
d mm		CN μm		C3 μm	
over	incl.	min.	max.	min.	max.
18	24	13	26	20	33
24	30	15	28	23	39
30	40	19	35	29	46
40	50	22	39	33	52
50	65	27	47	41	61
65	80	35	57	50	75
80	100	42	68	62	90
100	120	50	81	75	108
120	140	60	98	90	130
140	160	65	110	100	150

# Self-aligning ball bearings

With cylindrical bore  
Open or sealed



Cylindrical bore

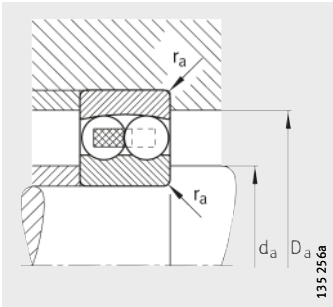


Cylindrical bore  
Seal 2RS

**Dimension table** - Dimensions in mm

Designation	Mass m ≈ kg	Dimensions							
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈	d <sub>2</sub> ≈
135-TVH	0,01	5	19	6	0,3	14,5	–	10,1	–
126-TVH	0,009	6	19	6	0,3	14,5	–	10,1	–
127-TVH	0,014	7	22	7	0,3	16,8	–	12,4	–
108-TVH	0,014	8	22	7	0,3	16,8	–	12,4	–
129-TVH	0,022	9	26	8	0,6	20	–	14,5	–
1200-TVH	0,034	10	30	9	0,6	23,5	–	16,3	–
2200-2RS-TVH	0,053	10	30	14	0,6	–	25,9	–	14,1
2200-TVH	0,045	10	30	14	0,6	24,2	–	15,1	–
1201-TVH	0,041	12	32	10	0,6	25,4	–	18,2	–
2201-2RS-TVH	0,058	12	32	14	0,6	–	27,9	–	16,2
2201-TVH	0,05	12	32	14	0,6	26,2	–	17,1	–
1202-TVH	0,048	15	35	11	0,6	29,2	–	20,2	–
2202-2RS-TVH	0,061	15	35	14	0,6	–	31	–	19
2202-TVH	0,057	15	35	14	0,6	29,5	–	20,3	–
2302-TVH	0,111	15	42	17	1	34,8	–	22,5	–
1203-TVH	0,073	17	40	12	0,6	32,3	–	23,7	–
2203-2RS-TVH	0,098	17	40	16	0,6	–	34,3	–	21,7
2203-TVH	0,054	17	40	16	0,6	34,1	–	23,9	–
1303-TVH	0,065	17	47	14	1	37,3	–	26,7	–
2303-2RS-TVH	0,175	17	47	19	1	–	40,3	–	23,9
2303-TVH	0,155	17	47	19	1	37,3	–	26,2	–





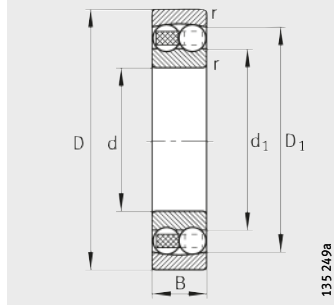
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ min <sup>-1</sup>	Reference speed $n_B$ min <sup>-1</sup>
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	$e$	$Y_1$	$Y_2$	$Y_0$			
7,4	16,6	0,3	2 600	475	0,35	1,82	2,82	1,91	29,5	36 000	34 500
8,4	16,6	0,3	2 600	475	0,35	1,82	2,82	1,91	29,5	36 000	41 500
9,4	19,6	0,3	2 750	560	0,33	1,92	2,97	2,01	34,5	36 000	36 000
10,6	19,4	0,3	2 750	560	0,33	1,92	2,97	2,01	34,5	36 000	–
13,2	21,8	0,6	3 950	800	0,32	1,95	3,01	2,04	50	32 000	32 500
14,2	25,8	0,6	5 700	1 180	0,32	1,95	3,02	2,05	73	30 000	30 000
14,2	25,8	0,6	5 700	1 180	0,32	1,95	3,02	2,05	73	18 000	–
14,2	25,8	0,6	8 800	1 730	0,58	1,09	1,69	1,14	107	28 000	29 000
16,2	27,8	0,6	5 700	1 260	0,37	1,69	2,62	1,77	78	30 000	29 000
16,2	27,8	0,6	5 700	1 260	0,37	1,69	2,62	1,77	78	17 000	–
16,2	27,8	0,6	9 400	1 920	0,53	1,2	1,85	1,25	120	26 000	26 000
19,2	30,8	0,6	7 700	1 730	0,34	1,86	2,88	1,95	108	26 000	26 000
19,2	30,8	0,6	7 700	1 730	0,34	1,86	2,88	1,95	108	15 000	–
19,2	30,8	0,6	9 600	2 080	0,46	1,37	2,13	1,44	130	24 000	21 900
20,6	36,4	1	17 000	3 700	0,51	1,23	1,91	1,29	232	18 000	18 600
21,2	35,8	0,6	8 100	2 000	0,33	1,93	2,99	2,03	124	22 000	23 600
21,2	35,8	0,6	8 100	2 000	0,33	1,93	2,99	2,03	124	14 000	–
21,2	35,8	0,6	11 800	2 750	0,46	1,37	2,12	1,43	171	19 000	19 300
22,6	41,4	1	12 900	3 150	0,32	1,94	3	2,03	197	18 000	18 500
22,6	41,4	1	12 900	3 150	0,32	1,94	3	2,03	197	11 000	–
22,6	41,4	1	13 900	3 150	0,53	1,19	1,85	1,25	197	17 000	16 900

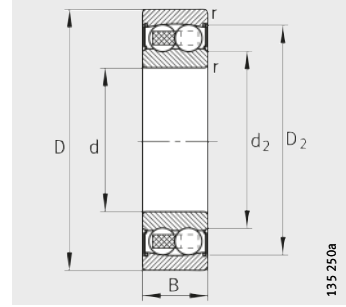


# Self-aligning ball bearings

With cylindrical or tapered bore  
Open or sealed



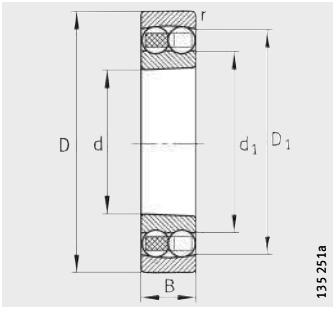
Cylindrical bore



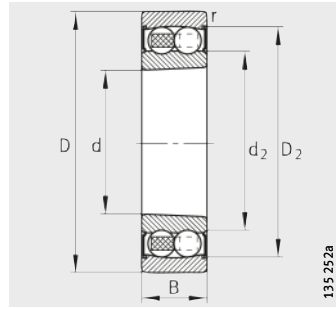
Cylindrical bore  
Seal 2RS

**Dimension table** (continued) · Dimensions in mm

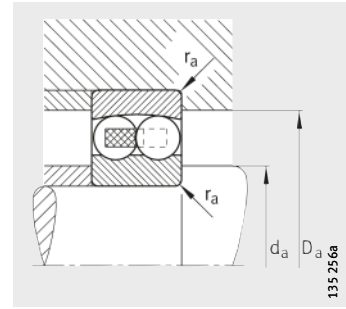
Designation	Mass m ≈ kg	Dimensions							
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈	d <sub>2</sub> ≈
<b>1204-K-TVH-C3</b>	0,116	<b>20</b>	47	14	1	38,1	–	29,2	–
<b>1204-TVH</b>	0,118	<b>20</b>	47	14	1	38,1	–	29,2	–
<b>2204-2RS-TVH</b>	0,151	<b>20</b>	47	18	1	–	41,7	–	25,9
<b>2204-TVH</b>	0,134	<b>20</b>	47	18	1	39,5	–	28	–
<b>1304-TVH</b>	0,163	<b>20</b>	52	15	1,1	41,9	–	31,6	–
<b>2304-2RS-TVH</b>	0,23	<b>20</b>	52	21	1,1	–	45,2	–	27,2
<b>2304-TVH</b>	0,206	<b>20</b>	52	21	1,1	41,5	–	29,1	–
<b>1205-K-TVH-C3</b>	0,135	<b>25</b>	52	15	1	43,9	–	33,3	–
<b>1205-TVH</b>	0,138	<b>25</b>	52	15	1	43,9	–	33,3	–
<b>2205-2RS-TVH</b>	0,161	<b>25</b>	52	18	1	–	46,3	–	30,7
<b>2205-K-2RS-TVH-C3</b>	0,157	<b>25</b>	52	18	1	–	46,3	–	30,7
<b>2205-K-TVH-C3</b>	0,152	<b>25</b>	52	18	1	44,7	–	32,3	–
<b>2205-TVH</b>	0,156	<b>25</b>	52	18	1	44,7	–	32,3	–
<b>1305-K-TVH-C3</b>	0,254	<b>25</b>	62	17	1,1	50,8	–	38,1	–
<b>1305-TVH</b>	0,258	<b>25</b>	62	17	1,1	50,8	–	38,1	–
<b>2305-2RS-TVH</b>	0,367	<b>25</b>	62	24	1,1	–	53,2	–	33,5
<b>2305-K-TVH-C3</b>	0,328	<b>25</b>	62	24	1,1	50,1	–	35,5	–
<b>2305-TVH</b>	0,335	<b>25</b>	62	24	1,1	50,1	–	35,5	–
<b>1206-K-TVH-C3</b>	0,217	<b>30</b>	62	16	1	51,9	–	40,1	–
<b>1206-TVH</b>	0,221	<b>30</b>	62	16	1	51,9	–	40,1	–
<b>2206-2RS-TVH</b>	0,274	<b>30</b>	62	20	1	–	54,3	–	37,3
<b>2206-K-2RS-TVH-C3</b>	0,268	<b>30</b>	62	20	1	–	54,3	–	37,3
<b>2206-K-TVH-C3</b>	0,246	<b>30</b>	62	20	1	54	–	38,5	–
<b>2206-TVH</b>	0,252	<b>30</b>	62	20	1	54	–	38,5	–
<b>1306-K-TVH-C3</b>	0,379	<b>30</b>	72	19	1,1	59,4	–	45	–
<b>1306-TVH</b>	0,384	<b>30</b>	72	19	1,1	59,4	–	45	–
<b>2306-2RS-TVH</b>	0,554	<b>30</b>	72	27	1,1	–	63	–	40,6
<b>2306-K-TVH-C3</b>	0,476	<b>30</b>	72	27	1,1	59,3	–	41,5	–
<b>2306-TVH</b>	0,488	<b>30</b>	72	27	1,1	59,3	–	41,5	–



Tapered bore  
K = taper 1:12



Tapered bore  
K = taper 1:12  
Seal 2RS

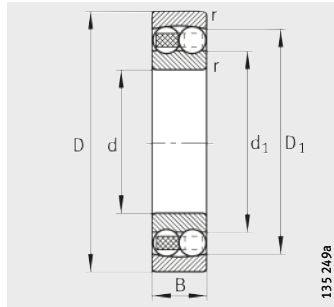


Mounting dimensions

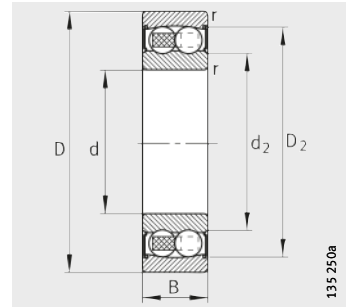
Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	e	$Y_1$	$Y_2$	$Y_0$			
25,6	41,4	1	10 100	2 600	0,28	2,24	3,46	2,34	161	18 000	20 700
25,6	41,4	1	10 100	2 600	0,28	2,24	3,46	2,34	161	18 000	20 700
25,6	41,4	1	10 100	2 600	0,28	2,24	3,46	2,34	161	11 000	–
25,6	41,4	1	14 700	3 500	0,44	1,45	2,24	1,51	219	17 000	17 400
27	45	1	12 700	3 300	0,29	2,17	3,35	2,27	206	16 000	16 100
27	45	1	12 700	3 300	0,29	2,17	3,35	2,27	206	10 000	–
27	45	1	17 600	4 250	0,51	1,23	1,9	1,29	265	16 000	16 400
30,6	46,4	1	12 300	3 250	0,27	2,37	3,66	2,48	203	16 000	18 100
30,6	46,4	1	12 300	3 250	0,27	2,37	3,66	2,48	203	16 000	18 100
30,6	46,4	1	12 300	3 250	0,27	2,37	3,66	2,48	203	9 500	–
30,6	46,4	1	12 300	3 250	0,27	2,37	3,66	2,48	203	9 500	–
30,6	46,4	1	17 300	4 400	0,35	1,78	2,75	1,86	275	15 000	14 900
30,6	46,4	1	17 300	4 400	0,35	1,78	2,75	1,86	275	15 000	14 900
32	55	1	18 300	4 950	0,28	2,29	3,54	2,4	310	14 000	13 900
32	55	1	18 300	4 950	0,28	2,29	3,54	2,4	310	14 000	13 900
32	55	1	18 300	4 950	0,28	2,29	3,54	2,4	310	8 000	–
32	55	1	25 000	6 500	0,48	1,32	2,04	1,38	405	13 000	14 100
32	55	1	25 000	6 500	0,48	1,32	2,04	1,38	405	13 000	14 100
35,6	56,4	1	15 900	4 600	0,25	2,53	3,91	2,65	285	14 000	15 400
35,6	56,4	1	15 900	4 600	0,25	2,53	3,91	2,65	285	14 000	15 400
35,6	56,4	1	15 900	4 600	0,25	2,53	3,91	2,65	285	8 000	–
35,6	56,4	1	15 900	4 600	0,25	2,53	3,91	2,65	285	8 000	–
35,6	56,4	1	26 000	6 900	0,3	2,13	3,29	2,23	430	12 000	12 700
35,6	56,4	1	26 000	6 900	0,3	2,13	3,29	2,23	430	12 000	12 700
37	65	1	21 700	6 300	0,26	2,39	3,71	2,51	390	11 000	12 200
37	65	1	21 700	6 300	0,26	2,39	3,71	2,51	390	11 000	12 200
37	65	1	21 700	6 300	0,26	2,39	3,71	2,51	390	6 700	–
37	65	1	32 500	8 700	0,45	1,4	2,17	1,47	540	10 000	12 300
37	65	1	32 500	8 700	0,45	1,4	2,17	1,47	540	10 000	12 300

# Self-aligning ball bearings

With cylindrical or tapered bore  
Open or sealed



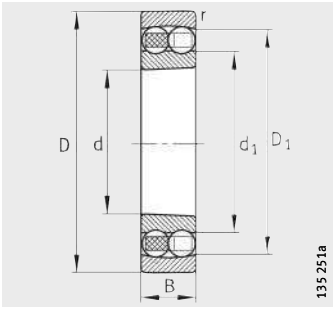
Cylindrical bore



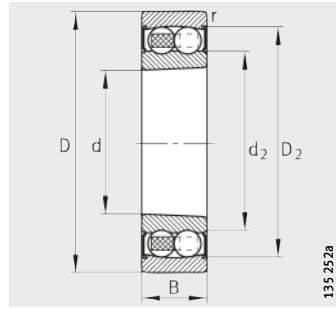
Cylindrical bore  
Seal 2RS

**Dimension table** (continued) · Dimensions in mm

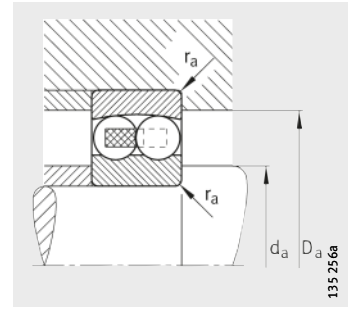
Designation	Mass m ≈ kg	Dimensions							
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈	d <sub>2</sub> ≈
1207-K-TVH-C3	0,319	35	72	17	1,1	59,6	–	47,7	–
1207-TVH	0,324	35	72	17	1,1	59,6	–	47,7	–
2207-2RS-TVH	0,442	35	72	23	1,1	–	64,3	–	43,5
2207-K-2RS-TVH-C3	0,432	35	72	23	1,1	–	64,3	–	43,5
2207-K-TVH-C3	0,38	35	72	23	1,1	62,9	–	45,7	–
2207-TVH	0,389	35	72	23	1,1	62,9	–	45,7	–
1307-K-TVH-C3	0,5	35	80	21	1,5	67,5	–	51,3	–
1307-TVH	0,507	35	80	21	1,5	67,5	–	51,3	–
2307-2RS-TVH	0,744	35	80	31	1,5	–	69,1	–	44,9
2307-K-TVH-C3	0,96	35	80	31	1,5	66,8	–	46,9	–
2307-TVH	0,975	35	80	31	1,5	66,8	–	46,9	–
1208-K-TVH-C3	0,408	40	80	18	1,1	67,8	–	54	–
1208-TVH	0,414	40	80	18	1,1	67,8	–	54	–
2208-2RS-TVH	0,528	40	80	23	1,1	–	71,1	–	49,2
2208-K-2RS-TVH-C3	0,517	40	80	23	1,1	–	71,1	–	49,2
2208-K-TVH-C3	0,465	40	80	23	1,1	70,7	–	52,5	–
2208-TVH	0,476	40	80	23	1,1	70,7	–	52,5	–
1308-K-TVH-C3	0,698	40	90	23	1,5	75,3	–	57,8	–
1308-TVH	0,708	40	90	23	1,5	75,3	–	57,8	–
2308-2RS-TVH	1,01	40	90	33	1,5	–	78	–	51
2308-K-TVH-C3	0,899	40	90	33	1,5	75	–	53,7	–
2308-TVH	0,922	40	90	33	1,5	75	–	53,7	–
1209-K-TVH-C3	0,454	45	85	19	1,1	72,7	–	57,7	–
1209-TVH	0,462	45	85	19	1,1	72,7	–	57,7	–
2209-2RS-TVH	0,548	45	85	23	1,1	–	75,4	–	53,8
2209-K-2RS-TVH-C3	0,535	45	85	23	1,1	–	75,4	–	53,8
2209-K-TVH-C3	0,505	45	85	23	1,1	75,9	–	59	–
2209-TVH	0,517	45	85	23	1,1	75,9	–	59	–
1309-K-TVH-C3	0,939	45	100	25	1,5	84,1	–	64,1	–
1309-TVH	0,953	45	100	25	1,5	84,1	–	64,1	–
2309-2RS-TVH	1,34	45	100	36	1,5	–	86,6	–	57,5
2309-K-TVH-C3	1,19	45	100	36	1,5	84,2	–	60,1	–
2309-TVH	1,22	45	100	36	1,5	84,2	–	60,1	–



Tapered bore  
K = taper 1:12



Tapered bore  
K = taper 1:12  
Seal 2RS



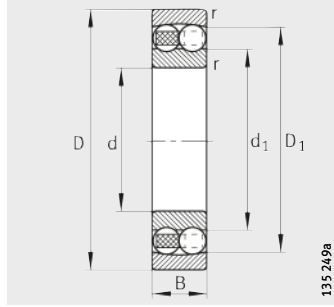
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N	e	$Y_1$	$Y_2$	$Y_0$			
42	65	1	16 000	5 100	0,22	2,8	4,34	2,94	315	12 000	13 200
42	65	1	16 000	5 100	0,22	2,8	4,34	2,94	315	12 000	13 200
42	65	1	16 000	5 100	0,22	2,8	4,34	2,94	315	7 000	–
42	65	1	16 000	5 100	0,22	2,8	4,34	2,94	315	7 000	–
42	65	1	33 000	8 900	0,3	2,13	3,29	2,23	560	9 500	11 500
42	65	1	33 000	8 900	0,3	2,13	3,29	2,23	560	9 500	11 500
44	71	1,5	25 500	7 800	0,26	2,47	3,82	2,59	485	9 500	10 900
44	71	1,5	25 500	7 800	0,26	2,47	3,82	2,59	485	9 500	10 900
44	71	1,5	25 500	7 800	0,26	2,47	3,82	2,59	485	6 000	–
44	71	1,5	40 500	11 100	0,47	1,35	2,1	1,42	690	9 000	11 600
44	71	1,5	40 500	11 100	0,47	1,35	2,1	1,42	690	9 000	11 600
47	73	1	19 400	6 500	0,22	2,9	4,49	3,04	400	10 000	11 600
47	73	1	19 400	6 500	0,22	2,9	4,49	3,04	400	10 000	11 600
47	73	1	19 400	6 500	0,22	2,9	4,49	3,04	400	6 300	–
47	73	1	19 400	6 500	0,22	2,9	4,49	3,04	400	6 300	–
47	73	1	32 500	9 400	0,26	2,43	3,76	2,54	580	9 000	9 700
47	73	1	32 500	9 400	0,26	2,43	3,76	2,54	580	9 000	9 700
49	81	1,5	30 000	9 600	0,25	2,52	3,9	2,64	600	8 500	10 000
49	81	1,5	30 000	9 600	0,25	2,52	3,9	2,64	600	8 500	10 000
49	81	1,5	30 000	9 600	0,25	2,52	3,9	2,64	600	5 300	–
49	81	1,5	46 000	13 400	0,43	1,45	2,25	1,52	830	8 000	10 300
49	81	1,5	46 000	13 400	0,43	1,45	2,25	1,52	830	8 000	10 300
52	78	1	22 000	7 300	0,21	3,04	4,7	3,18	455	9 000	11 100
52	78	1	22 000	7 300	0,21	3,04	4,7	3,18	455	9 000	11 100
52	78	1	22 000	7 300	0,21	3,04	4,7	3,18	455	5 600	–
52	78	1	22 000	7 300	0,21	3,04	4,7	3,18	455	5 600	–
52	78	1	28 500	8 900	0,26	2,43	3,76	2,54	550	8 500	8 700
52	78	1	28 500	8 900	0,26	2,43	3,76	2,54	550	8 500	8 700
54	91	1,5	38 500	12 600	0,25	2,5	3,87	2,62	780	7 500	9 300
54	91	1,5	38 500	12 600	0,25	2,5	3,87	2,62	780	7 500	9 300
54	91	1,5	38 500	12 600	0,25	2,5	3,87	2,62	780	4 800	–
54	91	1,5	55 000	16 500	0,43	1,48	2,29	1,55	1 030	7 000	9 400
54	91	1,5	55 000	16 500	0,43	1,48	2,29	1,55	1 030	7 000	9 400

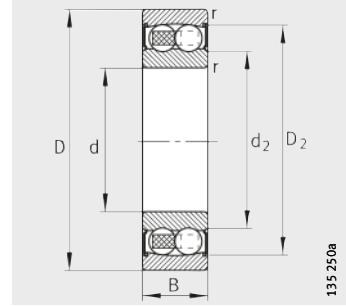


# Self-aligning ball bearings

With cylindrical or tapered bore  
Open or sealed



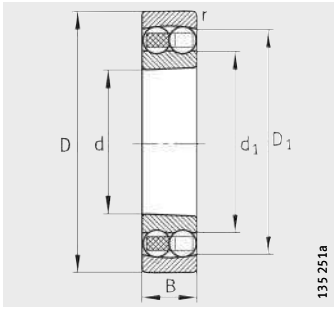
Cylindrical bore



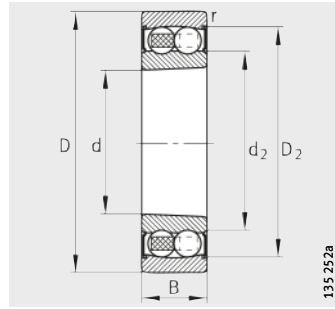
Cylindrical bore  
Seal 2RS

**Dimension table** (continued) · Dimensions in mm

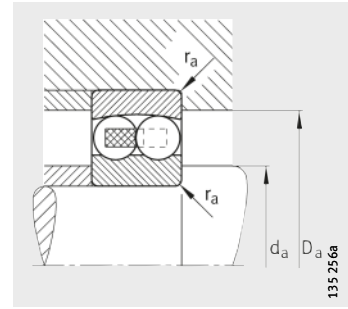
Designation	Mass m ≈ kg	Dimensions							
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈	d <sub>2</sub> ≈
<b>1210-K-TVH-C3</b>	0,516	<b>50</b>	90	20	1,1	77,6	–	62,7	–
<b>1210-TVH</b>	0,526	<b>50</b>	90	20	1,1	77,6	–	62,7	–
<b>2210-2RS-TVH</b>	0,606	<b>50</b>	90	23	1,1	–	80	–	60,6
<b>2210-K-2RS-TVH-C3</b>	0,593	<b>50</b>	90	23	1,1	–	80	–	60,6
<b>2210-K-TVH-C3</b>	0,543	<b>50</b>	90	23	1,1	81	–	64	–
<b>2210-TVH</b>	0,556	<b>50</b>	90	23	1,1	81	–	64	–
<b>1310-K-TVH-C3</b>	1,52	<b>50</b>	110	27	2	91,9	–	71,2	–
<b>1310-TVH</b>	1,54	<b>50</b>	110	27	2	91,9	–	71,2	–
<b>2310-2RS-TVH</b>	1,82	<b>50</b>	110	40	2	–	96	–	65,9
<b>2310-TVH</b>	1,64	<b>50</b>	110	40	2	92	–	66,9	–
<b>1211-K-TVH-C3</b>	0,682	<b>55</b>	100	21	1,5	86,9	–	69,5	–
<b>1211-TVH</b>	0,693	<b>55</b>	100	21	1,5	86,9	–	69,5	–
<b>2211-2RS-TVH</b>	0,825	<b>55</b>	100	25	1,5	–	88,9	–	68
<b>2211-K-2RS-TVH-C3</b>	0,808	<b>55</b>	100	25	1,5	–	88,9	–	68
<b>2211-K-TVH-C3</b>	0,73	<b>55</b>	100	25	1,5	90	–	69,6	–
<b>2211-TVH</b>	0,746	<b>55</b>	100	25	1,5	90	–	69,6	–
<b>1311-K-TVH-C3</b>	1,55	<b>55</b>	120	29	2	101,6	–	78	–
<b>1311-TVH</b>	1,57	<b>55</b>	120	29	2	101,6	–	78	–
<b>2311-2RS-TVH</b>	2,28	<b>55</b>	120	43	2	–	107	–	70,5
<b>2311-K-TVH-C3</b>	2,02	<b>55</b>	120	43	2	100,7	–	71,7	–
<b>2311-TVH</b>	2,07	<b>55</b>	120	43	2	100,7	–	71,7	–



Tapered bore  
K = taper 1:12



Tapered bore  
K = taper 1:12  
Seal 2RS



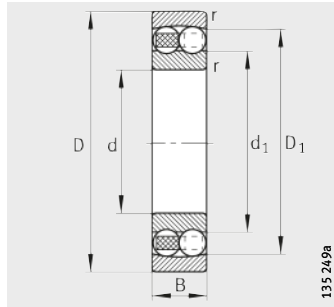
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	e	$Y_1$	$Y_2$	$Y_0$			
57	83	1	22 900	8 000	0,2	3,17	4,9	3,32	500	8 500	10 500
57	83	1	22 900	8 000	0,2	3,17	4,9	3,32	500	8 500	10 500
57	83	1	22 900	8 000	0,2	3,17	4,9	3,32	500	5 300	–
57	83	1	22 900	8 000	0,2	3,17	4,9	3,32	500	5 300	–
57	83	1	28 500	9 400	0,24	2,61	4,05	2,74	580	8 000	8 000
57	83	1	28 500	9 400	0,24	2,61	4,05	2,74	580	8 000	8 000
61	99	2	42 000	14 100	0,24	2,6	4,03	2,73	880	6 700	8 700
61	99	2	42 000	14 100	0,24	2,6	4,03	2,73	880	6 700	8 700
61	99	2	42 000	14 100	0,24	2,6	4,03	2,73	880	4 300	–
61	99	2	66 000	19 900	0,43	1,47	2,27	1,54	1 240	6 300	9 000
64	91	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	7 500	9 300
64	91	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	7 500	9 300
64	91	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	4 800	–
64	91	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	4 800	–
64	91	1,5	39 000	12 400	0,22	2,92	4,52	3,06	770	6 700	7 500
64	91	1,5	39 000	12 400	0,22	2,92	4,52	3,06	770	6 700	7 500
66	109	2	52 000	17 700	0,24	2,66	4,12	2,79	1 100	6 000	8 100
66	109	2	52 000	17 700	0,24	2,66	4,12	2,79	1 100	6 000	8 100
66	109	2	52 000	17 700	0,24	2,66	4,12	2,79	1 100	3 800	–
66	109	2	77 000	23 800	0,42	1,51	2,33	1,58	1 480	5 600	8 500
66	109	2	77 000	23 800	0,42	1,51	2,33	1,58	1 480	5 600	8 500

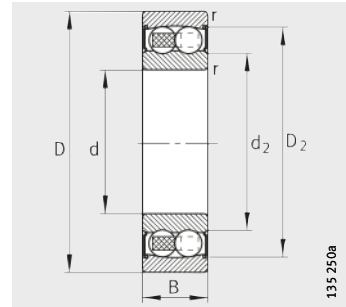


# Self-aligning ball bearings

With cylindrical or tapered bore  
Open or sealed



Cylindrical bore

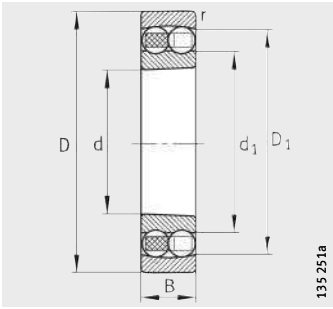


Cylindrical bore  
Seal 2RS

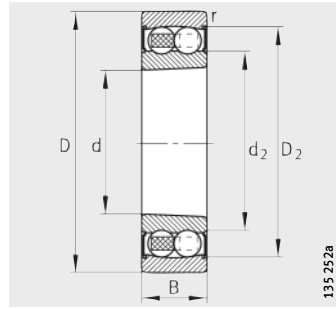
**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions							
		d	D	B	r min.	D <sub>1</sub> ≈	D <sub>2</sub> ≈	d <sub>1</sub> ≈	d <sub>2</sub> ≈
1212-K-TVH-C3	0,88	60	110	22	1,5	95,8	–	78	–
1212-TVH	0,894	60	110	22	1,5	95,8	–	78	–
2212-2RS-TVH	1,13	60	110	28	1,5	–	98,5	–	70,4
2212-K-2RS-TVH-C3	1,13	60	110	28	1,5	–	98,5	–	70,4
2212-K-TVH-C3	1,03	60	110	28	1,5	98,8	–	76,6	–
2212-TVH	1,06	60	110	28	1,5	98,8	–	76,6	–
1312-K-TVH-C3	1,94	60	130	31	2,1	112,2	–	87	–
1312-TVH	1,97	60	130	31	2,1	112,2	–	87	–
2312-K-TVH-C3	2,52	60	130	46	2,1	109,1	–	77	–
2312-TVH	2,58	60	130	46	2,1	109,1	–	77	–
1213-K-TVH-C3	1,13	65	120	23	1,5	103,2	–	85,2	–
1213-TVH	1,14	65	120	23	1,5	103,2	–	85,2	–
2213-2RS-TVH	1,53	65	120	31	1,5	–	106,6	–	78
2213-K-2RS-TVH-C3	1,5	65	120	31	1,5	–	106,6	–	78
2213-K-TVH-C3	1,33	65	120	31	1,5	107,5	–	82,4	–
2213-TVH	1,36	65	120	31	1,5	107,5	–	82,4	–
1313-K-TVH-C3	2,41	65	140	33	2,1	118,8	–	92,7	–
1313-TVH	2,44	65	140	33	2,1	118,8	–	92,7	–
2313-K-TVH-C3	3,16	65	140	48	2,1	118,9	–	85,6	–
2313-TVH	3,23	65	140	48	2,1	118,9	–	85,6	–
1214-K-TVH-C3	1,23	70	125	24	1,5	106,6	–	87,7	–
1214-TVH	1,25	70	125	24	1,5	106,6	–	87,7	–
2214-2RS-TVH	1,59	70	125	31	1,5	–	111,4	–	84,7
2214-M	1,69	70	125	31	1,5	108,9	–	87,6	–
1314-M	3,22	70	150	35	2,1	126,4	–	97,7	–
2314-M	4,38	70	150	51	2,1	127,2	–	91,5	–
1215-K-TVH-C3	1,32	75	130	25	1,5	114,1	–	93,7	–
1215-TVH	1,34	75	130	25	1,5	114,1	–	93,7	–
2215-K-TVH-C3	1,6	75	130	31	1,5	114,3	–	93,3	–
2215-TVH	1,6	75	130	31	1,5	114,3	–	93,3	–
1315-K-M-C3	3,81	75	160	37	2,1	134,8	–	104,4	–
1315-M	3,86	75	160	37	2,1	134,8	–	104,4	–
2315-K-M-C3	5,21	75	160	55	2,1	136,7	–	100,5	–
2315-M	5,33	75	160	55	2,1	136,7	–	100,5	–

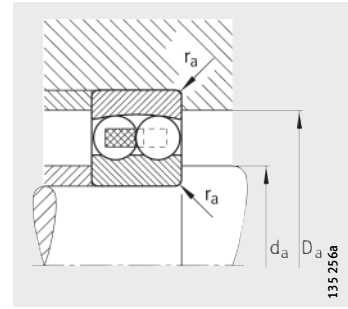




Tapered bore  
K = taper 1:12



Tapered bore  
K = taper 1:12  
Seal 2RS



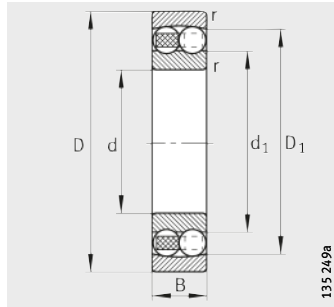
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ min <sup>-1</sup>	Reference speed $n_B$ min <sup>-1</sup>
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N	e	$Y_1$	$Y_2$	$Y_0$			
69	101	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	6 700	8 500
69	101	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	6 700	8 500
69	101	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	4 300	–
69	101	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	4 300	–
69	101	1,5	48 000	16 300	0,23	2,69	4,16	2,82	1 020	6 300	7 100
69	101	1,5	48 000	16 300	0,23	2,69	4,16	2,82	1 020	6 300	7 100
72	118	2,1	58 000	20 600	0,23	2,77	4,28	2,9	1 280	5 300	7 300
72	118	2,1	58 000	20 600	0,23	2,77	4,28	2,9	1 280	5 300	7 300
72	118	2,1	89 000	28 000	0,41	1,55	2,4	1,62	1 740	5 000	8 000
72	118	2,1	89 000	28 000	0,41	1,55	2,4	1,62	1 740	5 000	8 000
74	111	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	6 300	7 900
74	111	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	6 300	7 900
74	111	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	4 000	–
74	111	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	4 000	–
74	111	1,5	58 000	19 000	0,23	2,78	4,31	2,92	1 190	5 300	6 900
74	111	1,5	58 000	19 000	0,23	2,78	4,31	2,92	1 190	5 300	6 900
77	128	2,1	63 000	22 700	0,23	2,75	4,26	2,88	1 380	5 000	7 100
77	128	2,1	63 000	22 700	0,23	2,75	4,26	2,88	1 380	5 000	7 100
77	128	2,1	98 000	32 000	0,39	1,62	2,51	1,7	1 980	4 800	7 300
77	128	2,1	98 000	32 000	0,39	1,62	2,51	1,7	1 980	4 800	7 300
79	116	1,5	35 000	13 700	0,19	3,36	5,21	3,52	850	6 000	7 900
79	116	1,5	35 000	13 700	0,19	3,36	5,21	3,52	850	6 000	7 900
79	116	1,5	35 000	13 700	0,19	3,36	5,21	3,52	850	3 800	–
79	116	1,5	44 000	16 900	0,27	2,34	3,62	2,45	1 050	8 500	6 600
82	138	2,1	75 000	27 500	0,23	2,79	4,32	2,93	1 620	7 000	6 900
82	138	2,1	112 000	37 000	0,38	1,65	2,55	1,73	2 210	6 300	6 900
84	121	1,5	39 000	15 500	0,19	3,32	5,15	3,48	950	5 600	7 400
84	121	1,5	39 000	15 500	0,19	3,32	5,15	3,48	950	5 600	7 400
84	121	1,5	44 500	17 600	0,26	2,47	3,82	2,59	1 080	5 300	6 200
84	121	1,5	44 500	17 600	0,26	2,47	3,82	2,59	1 080	5 300	6 200
87	148	2,1	80 000	29 500	0,23	2,77	4,29	2,9	1 690	6 300	6 600
87	148	2,1	80 000	29 500	0,23	2,77	4,29	2,9	1 690	6 300	6 600
87	148	2,1	124 000	42 000	0,38	1,64	2,54	1,72	2 420	6 000	6 700
87	148	2,1	124 000	42 000	0,38	1,64	2,54	1,72	2 420	6 000	6 700

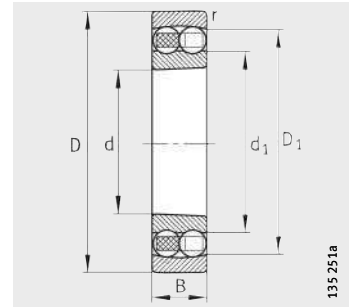


# Self-aligning ball bearings

With cylindrical or tapered bore  
Open



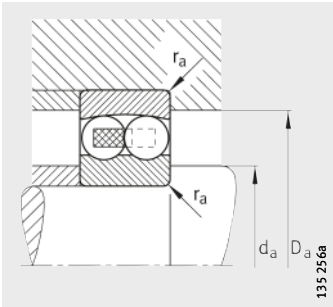
Cylindrical bore



Tapered bore  
K = taper 1:12

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d	D	B	r min.	D <sub>1</sub> ≈	d <sub>1</sub> ≈
1216-K-TVH-C3	1,62	80	140	26	2	122,1	102
1216-TVH	1,65	80	140	26	2	122,1	102
2216-K-TVH-C3	1,97	80	140	33	2	120,8	99,5
2216-TVH	2,01	80	140	33	2	120,8	99,5
1316-K-M-C3	4,5	80	170	39	2,1	144,3	110,2
1316-M	4,56	80	170	39	2,1	144,3	110,2
2316-K-M-C3	6,18	80	170	58	2,1	144,5	107,6
2316-M	6,31	80	170	58	2,1	144,5	107,6
1217-K-TVH-C3	2,03	85	150	28	2	130,4	107,5
1217-TVH	2,07	85	150	28	2	130,4	107,5
2217-K-M-C3	2,73	85	150	36	2	130	105,2
2217-M	2,79	85	150	36	2	130	105,2
1317-K-M-C3	5,32	85	180	41	3	152	117,2
1317-M	5,39	85	180	41	3	152	117,2
2317-K-M-C3	7,36	85	180	60	3	153,3	114
2317-M	7,35	85	180	60	3	153,3	114
1218-K-TVH-C3	2,48	90	160	30	2	138,7	112,7
1218-TVH	2,52	90	160	30	2	138,7	112,7
2218-K-TVH-C3	3,18	90	160	40	2	139,4	111,5
2218-TVH	3,18	90	160	40	2	139,4	111,5
1318-K-M-C3	6,27	90	190	43	3	159,9	124,4
1318-M	6,35	90	190	43	3	159,9	124,4
2318-K-M-C3	8,6	90	190	64	3	161	115,7
2318-M	8,78	90	190	64	3	161	115,7



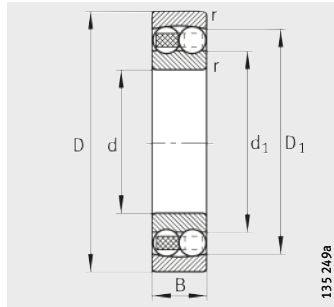
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load $C_{Ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	e	$Y_1$	$Y_2$	$Y_0$			
91	129	2	40 000	16 800	0,16	3,9	6,03	4,08	990	5 000	6 800
91	129	2	40 000	16 800	0,16	3,9	6,03	4,08	990	5 000	6 800
91	129	2	49 500	19 800	0,25	2,48	3,84	2,6	1 180	5 000	6 000
91	129	2	49 500	19 800	0,25	2,48	3,84	2,6	1 180	5 000	6 000
92	158	2,1	89 000	33 000	0,22	2,87	4,44	3	1 810	6 000	6 300
92	158	2,1	89 000	33 000	0,22	2,87	4,44	3	1 810	6 000	6 300
92	158	2,1	139 000	48 500	0,37	1,7	2,62	1,78	2 700	5 600	6 400
92	158	2,1	139 000	48 500	0,37	1,7	2,62	1,78	2 700	5 600	6 400
96	139	2	49 500	20 600	0,17	3,73	5,78	3,91	1 180	4 800	6 700
96	139	2	49 500	20 600	0,17	3,73	5,78	3,91	1 180	4 800	6 700
96	139	2	59 000	23 400	0,26	2,46	3,81	2,58	1 340	7 000	5 800
96	139	2	59 000	23 400	0,26	2,46	3,81	2,58	1 340	7 000	5 800
99	166	2,5	99 000	37 500	0,22	2,88	4,46	3,02	2 010	5 600	6 000
99	166	2,5	99 000	37 500	0,22	2,88	4,46	3,02	2 010	5 600	6 000
99	166	2,5	143 000	51 000	0,37	1,68	2,61	1,76	2 750	5 300	6 100
99	166	2,5	143 000	51 000	0,37	1,68	2,61	1,76	2 750	5 300	6 100
101	149	2	57 000	23 300	0,17	3,74	5,79	3,92	1 300	4 500	6 600
101	149	2	57 000	23 300	0,17	3,74	5,79	3,92	1 300	4 500	6 600
101	149	2	71 000	28 500	0,27	2,33	3,61	2,44	1 580	4 300	5 700
101	149	2	71 000	28 500	0,27	2,33	3,61	2,44	1 580	4 300	5 700
104	176	2,5	109 000	42 500	0,22	2,83	4,38	2,97	2 230	5 300	5 800
104	176	2,5	109 000	42 500	0,22	2,83	4,38	2,97	2 230	5 300	5 800
104	176	2,5	156 000	57 000	0,39	1,63	2,53	1,71	3 000	5 000	5 900
104	176	2,5	156 000	57 000	0,39	1,63	2,53	1,71	3 000	5 000	5 900

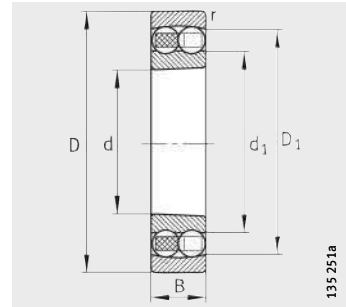


# Self-aligning ball bearings

With cylindrical or tapered bore  
Open



Cylindrical bore

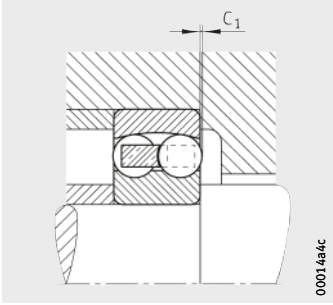


Tapered bore  
K = taper 1:12

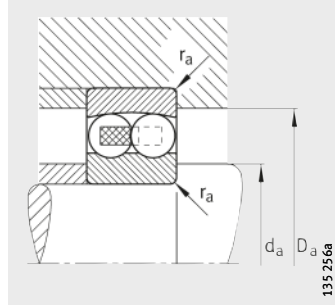
**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	d <sub>1</sub> ≈	C <sub>1</sub> <sup>1)</sup>
<b>1219-K-M-C3</b>	3,28	<b>95</b>	170	32	2,1	148,2	120,5	–
<b>1219-M</b>	3,32	<b>95</b>	170	32	2,1	148,2	120,5	–
<b>2219-K-M-C3</b>	4,24	<b>95</b>	170	43	2,1	148,6	118,9	–
<b>2219-M</b>	4,33	<b>95</b>	170	43	2,1	148,6	118,9	–
<b>1319-K-M-C3</b>	7,2	<b>95</b>	200	45	3	170,5	127,7	1,6
<b>1319-M</b>	7,29	<b>95</b>	200	45	3	170,5	127,6	1,6
<b>2319-K-M-C3</b>	9,97	<b>95</b>	200	67	3	168,5	121,6	–
<b>2319-M</b>	10,2	<b>95</b>	200	67	3	168,5	121,6	–
<b>1220-K-M-C3</b>	3,94	<b>100</b>	180	34	2,1	155,2	127,7	–
<b>1220-M</b>	3,99	<b>100</b>	180	34	2,1	155,2	127,7	–
<b>2220-K-M-C3</b>	5,1	<b>100</b>	180	46	2,1	156,9	124,4	–
<b>2220-M</b>	5,21	<b>100</b>	180	46	2,1	156,9	124,4	–
<b>1320-K-M-C3</b>	8,95	<b>100</b>	215	47	3	182,6	135,5	2,4
<b>1320-M</b>	9,06	<b>100</b>	215	47	3	182,6	135,5	2,4
<b>2320-K-M-C3</b>	12,7	<b>100</b>	215	73	3	183	130,8	–
<b>2320-M</b>	12,9	<b>100</b>	215	73	3	183	130,8	–
<b>1221-M</b>	4,75	<b>105</b>	190	36	2,1	164,4	133,9	–
<b>1321-M</b>	10,3	<b>105</b>	225	49	3	191,3	143,2	2,5
<b>1222-K-M-C3</b>	5,49	<b>110</b>	200	38	2,1	173,9	140,7	–
<b>1222-M</b>	5,57	<b>110</b>	200	38	2,1	173,9	140,7	–
<b>2222-K-M-C3</b>	7,27	<b>110</b>	200	53	2,1	174,1	136,9	–
<b>2222-M</b>	7,45	<b>110</b>	200	53	2,1	174,1	136,9	–
<b>1322-K-M-C3</b>	12,2	<b>110</b>	240	50	3	203,2	154,7	2,7
<b>1322-M</b>	12,3	<b>110</b>	240	50	3	203,2	154,5	2,7
<b>2322-K-M-C3</b>	17,5	<b>110</b>	240	80	3	203	145,5	–
<b>2322-M</b>	18,1	<b>110</b>	240	80	3	203	145,5	–
<b>1224-M</b>	7,13	<b>120</b>	215	42	2,1	187,3	149	1,8
<b>1226-M</b>	8,67	<b>130</b>	230	46	3	200,1	161,5	0,6
<b>1228-M</b>	11,2	<b>140</b>	250	50	3	221,2	175	2,7
<b>1230-M</b>	14,6	<b>150</b>	270	54	3	237,9	186,7	3,8

<sup>1)</sup> The projection must be taken into consideration when designing the adjacent construction.



Ball projection  $C_1$



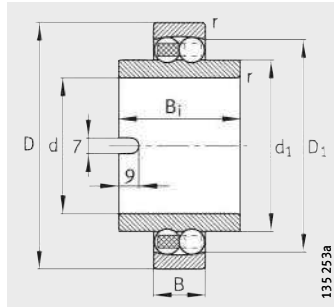
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	$e$	$Y_1$	$Y_2$	$Y_0$			
107	158	2,1	64 000	27 000	0,17	3,73	5,78	3,91	1 450	6 000	6 200
107	158	2,1	64 000	27 000	0,17	3,73	5,78	3,91	1 450	6 000	6 200
107	158	2,1	84 000	34 000	0,27	2,32	3,59	2,43	1 840	6 000	5 600
107	158	2,1	84 000	34 000	0,27	2,32	3,59	2,43	1 840	6 000	5 600
109	186	2,5	134 000	50 000	0,23	2,73	4,23	2,86	2 550	5 000	5 700
109	186	2,5	134 000	50 000	0,23	2,73	4,23	2,86	2 550	5 000	5 700
109	186	2,5	167 000	63 000	0,38	1,66	2,57	1,74	3 250	4 800	5 600
109	186	2,5	167 000	63 000	0,38	1,66	2,57	1,74	3 250	4 800	5 600
112	168	2,1	70 000	29 500	0,18	3,58	5,53	3,75	1 550	5 600	6 100
112	168	2,1	70 000	29 500	0,18	3,58	5,53	3,75	1 550	5 600	6 100
112	168	2,1	98 000	40 000	0,27	2,33	3,61	2,44	2 120	5 600	5 400
112	168	2,1	98 000	40 000	0,27	2,33	3,61	2,44	2 120	5 600	5 400
114	201	2,5	145 000	57 000	0,24	2,68	4,15	2,81	2 800	4 800	5 400
114	201	2,5	145 000	57 000	0,24	2,68	4,15	2,81	2 800	4 800	5 400
114	201	2,5	196 000	78 000	0,38	1,67	2,58	1,75	3 900	4 500	5 200
114	201	2,5	196 000	78 000	0,38	1,67	2,58	1,75	3 900	4 500	5 200
117	178	2,1	75 000	32 000	0,18	3,54	5,48	3,71	1 640	5 300	5 900
119	211	2,5	158 000	64 000	0,23	2,75	4,25	2,88	3 100	4 500	5 200
122	188	2,1	89 000	38 000	0,17	3,61	5,59	3,78	1 900	5 000	5 700
122	188	2,1	89 000	38 000	0,17	3,61	5,59	3,78	1 900	5 000	5 700
122	188	2,1	126 000	51 000	0,28	2,23	3,45	2,33	2 550	5 000	5 200
122	188	2,1	126 000	51 000	0,28	2,23	3,45	2,33	2 550	5 000	5 200
124	226	2,5	165 000	71 000	0,23	2,79	4,32	2,92	3 300	4 500	4 700
124	226	2,5	165 000	71 000	0,23	2,79	4,32	2,92	3 300	4 500	4 700
124	226	2,5	221 000	94 000	0,37	1,69	2,62	1,77	4 400	4 300	4 600
124	226	2,5	221 000	94 000	0,37	1,69	2,62	1,77	4 400	4 300	4 600
132	203	2,1	121 000	52 000	0,2	3,11	4,81	3,25	2 500	4 800	5 600
144	216	2,5	125 000	55 000	0,19	3,24	5,02	3,4	2 550	4 500	5 400
154	236	2,5	163 000	74 000	0,21	3,05	4,71	3,19	3 300	4 300	4 950
164	256	2,5	180 000	86 000	0,22	2,9	4,49	3,04	3 700	3 800	4 550

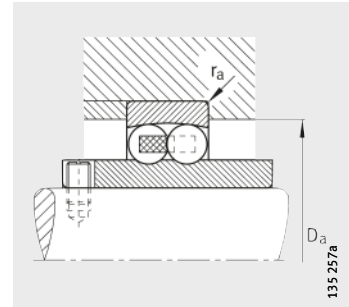


# Self-aligning ball bearings

With extended inner ring



Extended inner ring



Mounting dimensions

**Dimension table** - Dimensions in mm

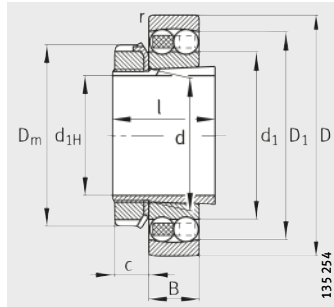
Designation	Mass m ≈kg	Dimensions							Mounting dimensions	
		d	D	B	r min.	B <sub>i</sub>	D <sub>1</sub> ≈	d <sub>1</sub> ≈	D <sub>a</sub> max.	r <sub>a</sub> max.
11204-TVH	0,085	20	47	14	1	40	38,1	29,2	41,4	1
11205-TVH	0,226	25	52	15	1	44	43,9	33,3	46,4	1
11206-TVH	0,364	30	62	16	1	48	51,9	40,1	56,4	1
11207-TVH	0,554	35	72	17	1,1	52	59,6	47,7	65	1
11208-TVH	0,722	40	80	18	1,1	56	67,8	54	73	1
11209-TVH	0,78	45	85	19	1,1	58	72,7	57,7	78	1
11210-TVH	0,866	50	90	20	1,1	58	77,6	62,7	83	1
11211-TVH	1,13	55	100	21	1,5	60	86,9	69,5	91	1,5
11212-TVH	1,51	60	110	22	1,5	62	95,8	78	101	1,5



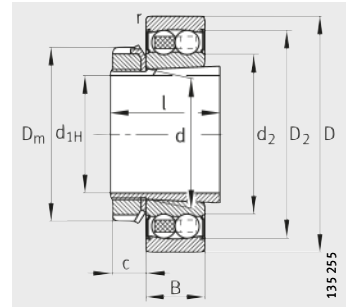
Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed
dyn. $C_r$ N	stat. $C_{0r}$ N	e	$Y_1$	$Y_2$	$Y_0$	$C_{ur}$ N	$n_G$ $\text{min}^{-1}$
10 100	2 600	0,28	2,24	3,46	2,34	161	13 000
12 300	3 250	0,27	2,37	3,66	2,48	203	10 000
15 900	4 600	0,25	2,53	3,91	2,65	285	8 500
16 000	5 100	0,22	2,8	4,34	2,94	315	7 500
19 400	6 500	0,22	2,9	4,49	3,04	400	6 700
22 000	7 300	0,21	3,04	4,7	3,18	455	6 000
22 900	8 000	0,2	3,17	4,9	3,32	500	5 600
27 000	9 900	0,19	3,31	5,12	3,47	620	5 000
30 500	11 400	0,18	3,47	5,37	3,64	710	4 500

# Self-aligning ball bearings

With adapter sleeve  
Open or sealed



Open

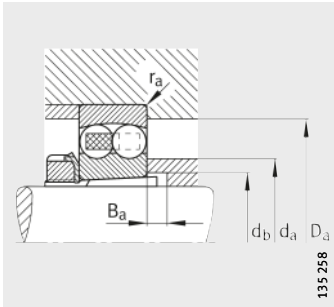


Seal 2RS

**Dimension table** - Dimensions in mm

Designation		Mass m		Dimensions									
Bearing	Adapter sleeve	Bearing	Adapter sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>	d <sub>2</sub>	D <sub>m</sub>
		≈kg	≈kg					min.	≈	≈	≈	≈	
<b>1204-K-TVH-C3</b>	<b>H204</b>	0,116	0,041	<b>17</b>	20	47	14	1	38,1	-	29,2	-	32
<b>1205-K-TVH-C3</b>	<b>H205</b>	0,135	0,069	<b>20</b>	25	52	15	1	43,9	-	33,3	-	38
<b>2205-K-2RS-TVH-C3</b>	<b>H305</b>	0,157	0,075	<b>20</b>	25	52	18	1	-	46,3	-	30,7	38
<b>2205-K-TVH-C3</b>	<b>H305</b>	0,152	0,075	<b>20</b>	25	52	18	1	44,7	-	32,3	-	38
<b>1305-K-TVH-C3</b>	<b>H305</b>	0,254	0,075	<b>20</b>	25	62	17	1,1	50,8	-	38,1	-	38
<b>2305-K-TVH-C3</b>	<b>H2305</b>	0,328	0,085	<b>20</b>	25	62	24	1,1	50,1	-	35,5	-	38
<b>1206-K-TVH-C3</b>	<b>H206</b>	0,217	0,091	<b>25</b>	30	62	16	1	51,9	-	40,1	-	45
<b>2206-K-2RS-TVH-C3</b>	<b>H306</b>	0,268	0,099	<b>25</b>	30	62	20	1	-	54,3	-	37,3	45
<b>2206-K-TVH-C3</b>	<b>H306</b>	0,246	0,099	<b>25</b>	30	62	20	1	54	-	38,5	-	45
<b>1306-K-TVH-C3</b>	<b>H306</b>	0,379	0,099	<b>25</b>	30	72	19	1,1	59,4	-	45	-	45
<b>2306-K-TVH-C3</b>	<b>H2306</b>	0,476	0,116	<b>25</b>	30	72	27	1,1	59,3	-	41,5	-	45
<b>1207-K-TVH-C3</b>	<b>H207</b>	0,319	0,129	<b>30</b>	35	72	17	1,1	59,6	-	47,7	-	57
<b>2207-K-2RS-TVH-C3</b>	<b>H307</b>	0,432	0,147	<b>30</b>	35	72	23	1,1	-	64,3	-	43,5	57
<b>2207-K-TVH-C3</b>	<b>H307</b>	0,38	0,147	<b>30</b>	35	72	23	1,1	62,9	-	45,7	-	57
<b>1307-K-TVH-C3</b>	<b>H307</b>	0,5	0,147	<b>30</b>	35	80	21	1,5	67,5	-	51,3	-	57
<b>2307-K-TVH-C3</b>	<b>H2307</b>	0,96	0,171	<b>30</b>	35	80	31	1,5	66,8	-	46,9	-	52
<b>1208-K-TVH-C3</b>	<b>H208</b>	0,408	0,17	<b>35</b>	40	80	18	1,1	67,8	-	54	-	58
<b>2208-K-2RS-TVH-C3</b>	<b>H308</b>	0,517	0,185	<b>35</b>	40	80	23	1,1	-	71,1	-	49,2	58
<b>2208-K-TVH-C3</b>	<b>H308</b>	0,465	0,185	<b>35</b>	40	80	23	1,1	70,7	-	52,5	-	58
<b>1308-K-TVH-C3</b>	<b>H308</b>	0,698	0,185	<b>35</b>	40	90	23	1,5	75,3	-	57,8	-	58
<b>2308-K-TVH-C3</b>	<b>H2308</b>	0,899	0,222	<b>35</b>	40	90	33	1,5	75	-	53,7	-	58
<b>1209-K-TVH-C3</b>	<b>H209</b>	0,454	0,216	<b>40</b>	45	85	19	1,1	72,7	-	57,7	-	65
<b>2209-K-2RS-TVH-C3</b>	<b>H309</b>	0,535	0,246	<b>40</b>	45	85	23	1,1	-	75,4	-	53,8	65
<b>2209-K-TVH-C3</b>	<b>H309</b>	0,505	0,246	<b>40</b>	45	85	23	1,1	75,9	-	59	-	65
<b>1309-K-TVH-C3</b>	<b>H309</b>	0,939	0,246	<b>40</b>	45	100	25	1,5	84,1	-	64,1	-	65
<b>2309-K-TVH-C3</b>	<b>H2309</b>	1,19	0,283	<b>40</b>	45	100	36	1,5	84,2	-	60,1	-	65





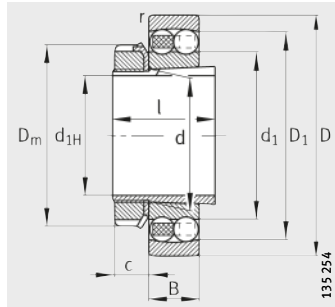
Mounting dimensions

l	c	Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load N	Limiting speed $n_G$ min <sup>-1</sup>	Reference speed $n_B$ min <sup>-1</sup>
		$d_a$ max.	$D_a$ max.	$d_b$ min.	$B_a$ min.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	e	$Y_1$	$Y_2$	$Y_0$			
24	7	27	41,4	23	5	1	10 100	2 600	0,28	2,24	3,46	2,34	161	18 000	20 700
26	9	32	46,4	28	5	1	12 300	3 250	0,27	2,37	3,66	2,48	203	16 000	18 100
29	9	32	46,4	28	5	1	12 300	3 250	0,27	2,37	3,66	2,48	203	9 500	–
29	9	32	46,4	28	5	1	17 300	4 400	0,35	1,78	2,75	1,86	275	15 000	14 900
29	9	35	55	28	6	1	18 300	4 950	0,28	2,29	3,54	2,4	310	14 000	13 900
35	9	34	55	30	5	1	25 000	6 500	0,48	1,32	2,04	1,38	405	13 000	14 100
27	9	38	56,4	33	5	1	15 900	4 600	0,25	2,53	3,91	2,65	285	14 000	15 400
31	9	38	56,4	33	5	1	15 900	4 600	0,25	2,53	3,91	2,65	285	8 000	–
31	9	38	56,4	33	5	1	26 000	6 900	0,3	2,13	3,29	2,23	430	12 000	12 700
31	9	42	65	33	6	1	21 700	6 300	0,26	2,39	3,71	2,51	390	11 000	12 200
38	9	40	65	35	5	1	32 500	8 700	0,45	1,4	2,17	1,47	540	10 000	12 300
29	10	45	65	38	5	1	16 000	5 100	0,22	2,8	4,34	2,94	315	12 000	13 200
35	10	45	65	38	5	1	16 000	5 100	0,22	2,8	4,34	2,94	315	7 000	–
35	10	44	65	39	5	1	33 000	8 900	0,3	2,13	3,29	2,23	560	9 500	11 500
35	10	49	71	39	8	1,5	25 500	7 800	0,26	2,47	3,82	2,59	485	9 500	10 900
43	10	45	71	40	5	1,5	40 500	11 100	0,47	1,35	2,1	1,42	690	9 000	11 600
31	11	52	73	43	5	1	19 400	6 500	0,22	2,9	4,49	3,04	400	10 000	11 600
36	11	52	73	43	5	1	19 400	6 500	0,22	2,9	4,49	3,04	400	6 300	–
36	11	50	73	44	5	1	32 500	9 400	0,26	2,43	3,76	2,54	580	9 000	9 700
36	11	55	81	44	5	1,5	30 000	9 600	0,25	2,52	3,9	2,64	600	8 500	10 000
46	11	51	81	45	5	1,5	46 000	13 400	0,43	1,45	2,25	1,52	830	8 000	10 300
33	12	57	78	48	5	1	22 000	7 300	0,21	3,04	4,7	3,18	455	9 000	11 100
39	12	57	78	48	5	1	22 000	7 300	0,21	3,04	4,7	3,18	455	5 600	–
39	12	56	78	50	8	1	28 500	8 900	0,26	2,43	3,76	2,54	550	8 500	8 700
39	12	61	91	50	5	1,5	38 500	12 600	0,25	2,5	3,87	2,62	780	7 500	9 300
50	12	57	91	50	5	1,5	55 000	16 500	0,43	1,48	2,29	1,55	1 030	7 000	9 400

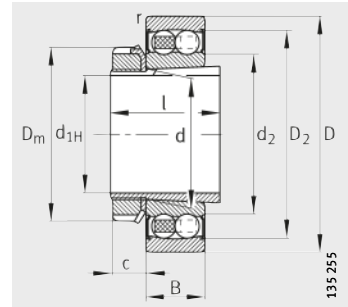


# Self-aligning ball bearings

With adapter sleeve  
Open or sealed



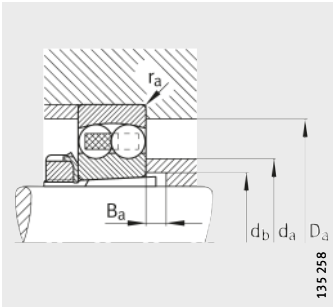
Open



Seal 2RS

Dimension table (continued) · Dimensions in mm

Designation		Mass m		Dimensions									
Bearing	Adapter sleeve	Bearing	Adapter sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	D <sub>2</sub>	d <sub>1</sub>	d <sub>2</sub>	D <sub>m</sub>
		≈kg	≈kg					min.	≈	≈	≈	≈	
1210-K-TVH-C3	H210	0,516	0,264	45	50	90	20	1,1	77,6	–	62,7	–	70
2210-K-2RS-TVH-C3	H310	0,593	0,301	45	50	90	23	1,1	–	80	–	60,6	70
2210-K-TVH-C3	H310	0,543	0,301	45	50	90	23	1,1	81	–	64	–	70
1310-K-TVH-C3	H310	1,52	0,301	45	50	110	27	2	91,9	–	71,2	–	70
1211-K-TVH-C3	H211	0,682	0,292	50	55	100	21	1,5	86,9	–	69,5	–	75
2211-K-2RS-TVH-C3	H311	0,808	0,35	50	55	100	25	1,5	–	88,9	–	68	75
2211-K-TVH-C3	H311	0,73	0,35	50	55	100	25	1,5	90	–	69,6	–	75
1311-K-TVH-C3	H311	1,55	0,35	50	55	120	29	2	101,6	–	78	–	75
2311-K-TVH-C3	H2311	2,02	0,426	50	55	120	43	2	100,7	–	71,7	–	75
1212-K-TVH-C3	H212	0,88	0,325	55	60	110	22	1,5	95,8	–	78	–	80
2212-K-2RS-TVH-C3	H312	1,13	0,373	55	60	110	28	1,5	–	98,5	–	70,4	80
2212-K-TVH-C3	H312	1,03	0,373	55	60	110	28	1,5	98,8	–	76,6	–	80
1312-K-TVH-C3	H312	1,94	0,373	55	60	130	31	2,1	112,2	–	87	–	80
2312-K-TVH-C3	H2312	2,52	0,464	55	60	130	46	2,1	109,1	–	77	–	80
1213-K-TVH-C3	H213	1,13	0,393	60	65	120	23	1,5	103,2	–	85,2	–	92
2213-K-2RS-TVH-C3	H313	1,5	0,452	60	65	120	31	1,5	–	106,6	–	78	92
2213-K-TVH-C3	H313	1,33	0,452	60	65	120	31	1,5	107,5	–	82,4	–	92
1313-K-TVH-C3	H313	2,41	0,452	60	65	140	33	2,1	118,8	–	92,7	–	92
2313-K-TVH-C3	H2313	3,16	0,553	60	65	140	48	2,1	118,9	–	85,6	–	92
1214-K-TVH-C3	H214	1,23	0,603	60	70	125	24	1,5	106,6	–	87,7	–	98
1215-K-TVH-C3	H215	1,32	0,693	65	75	130	25	1,5	114,1	–	93,7	–	98
2215-K-TVH-C3	H315	1,6	0,826	65	75	130	31	1,5	114,3	–	93,3	–	104
1315-K-M-C3	H315	3,81	0,826	65	75	160	37	2,1	134,8	–	104,4	–	104
2315-K-M-C3	H2315	5,21	1,05	65	75	160	55	2,1	136,7	–	100,5	–	98
1216-K-TVH-C3	H216	1,62	0,876	70	80	140	26	2	122,1	–	102	–	105
2216-K-TVH-C3	H316	1,97	1,01	70	80	140	33	2	120,8	–	99,5	–	105
1316-K-M-C3	H316	4,5	1,01	70	80	170	39	2,1	144,3	–	110,2	–	105
2316-K-M-C3	H2316	6,18	1,27	70	80	170	58	2,1	144,5	–	107,6	–	105
1217-K-TVH-C3	H217	2,03	0,995	75	85	150	28	2	130,4	–	107,5	–	110
2217-K-M-C3	H317	2,73	1,16	75	85	150	36	2	130	–	105,2	–	110
1317-K-M-C3	H317	5,32	1,16	75	85	180	41	3	152	–	117,2	–	110
2317-K-M-C3	H2317	7,36	1,44	75	85	180	60	3	153,3	–	114	–	110



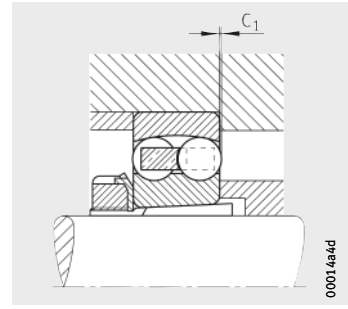
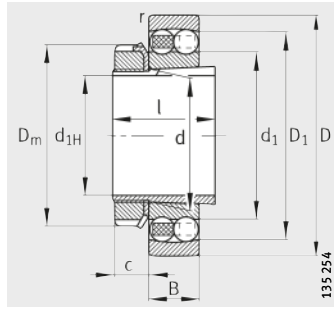
Mounting dimensions

l	c ≈	Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>	Reference speed n <sub>B</sub> min <sup>-1</sup>
		d <sub>a</sub> max.	D <sub>a</sub> max.	d <sub>b</sub> min.	B <sub>a</sub> min.	r <sub>a</sub> max.	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>			
35	13	62	83	53	5	1	22 900	8 000	0,2	3,17	4,9	3,32	500	8 500	10 500
42	13	62	83	53	5	1	22 900	8 000	0,2	3,17	4,9	3,32	500	5 300	–
42	13	61	83	55	10	1	28 500	9 400	0,24	2,61	4,05	2,74	580	8 000	8 000
42	13	68	99	55	5	2	42 000	14 100	0,24	2,6	4,03	2,73	880	6 700	8 700
37	13	69	91	60	6	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	7 500	9 300
45	13	69	91	60	6	1,5	27 000	9 900	0,19	3,31	5,12	3,47	620	4 800	–
45	13	68	91	60	10	1,5	39 000	12 400	0,22	2,92	4,52	3,06	770	6 700	7 500
45	13	74	109	60	6	2	52 000	17 700	0,24	2,66	4,12	2,79	1 100	6 000	8 100
59	13	69	109	61	6	2	77 000	23 800	0,42	1,51	2,33	1,58	1 480	5 600	8 500
38	13	75	101	64	5	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	6 700	8 500
47	13	75	101	64	5	1,5	30 500	11 400	0,18	3,47	5,37	3,64	710	4 300	–
47	13	73	101	65	8	1,5	48 000	16 300	0,23	2,69	4,16	2,82	1 020	6 300	7 100
47	13	83	118	65	5	2,1	58 000	20 600	0,23	2,77	4,28	2,9	1 280	5 300	7 300
62	13	74	118	66	5	2,1	89 000	28 000	0,41	1,55	2,4	1,62	1 740	5 000	8 000
40	14	83	111	70	5	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	6 300	7 900
50	14	83	111	70	5	1,5	31 000	12 400	0,18	3,57	5,52	3,74	770	4 000	–
50	14	79	111	70	8	1,5	58 000	19 000	0,23	2,78	4,31	2,92	1 190	5 300	6 900
50	14	89	128	70	5	2,1	63 000	22 700	0,23	2,75	4,26	2,88	1 380	5 000	7 100
65	14	82	128	72	5	2,1	98 000	32 000	0,39	1,62	2,51	1,7	1 980	4 800	7 300
41	14	86	116	75	5	1,5	35 000	13 700	0,19	3,36	5,21	3,52	850	6 000	7 900
43	15	92	121	80	5	1,5	39 000	15 500	0,19	3,32	5,15	3,48	950	5 600	7 400
55	15	90	121	80	12	1,5	44 500	17 600	0,26	2,47	3,82	2,59	1 080	5 300	6 200
55	15	100	148	80	5	2,1	80 000	29 500	0,23	2,77	4,29	2,9	1 690	6 300	6 600
73	15	94	148	82	5	2,1	124 000	42 000	0,38	1,64	2,54	1,72	2 420	6 000	6 700
46	17	99	129	85	5	2	40 000	16 800	0,16	3,9	6,03	4,08	990	5 000	6 800
59	17	96	129	85	12	2	49 500	19 800	0,25	2,48	3,84	2,6	1 180	5 000	6 000
59	17	107	158	85	5	2,1	89 000	33 000	0,22	2,87	4,44	3	1 810	6 000	6 300
78	17	100	158	88	5	2,1	139 000	48 500	0,37	1,7	2,62	1,78	2 700	5 600	6 400
50	18	105	139	90	6	2	49 500	20 600	0,17	3,73	5,78	3,91	1 180	4 800	6 700
63	18	102	139	91	12	2	59 000	23 400	0,26	2,46	3,81	2,58	1 340	7 000	5 800
63	18	114	166	91	6	2,5	99 000	37 500	0,22	2,88	4,46	3,02	2 010	5 600	6 000
82	18	106	166	94	6	2,5	143 000	51 000	0,37	1,68	2,61	1,76	2 750	5 300	6 100



# Self-aligning ball bearings

With adapter sleeve  
Open

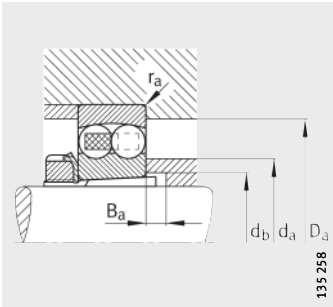


Ball projection  $C_1$ <sup>1)</sup>

**Dimension table** (continued) · Dimensions in mm

Designation		Mass m		Dimensions									
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	$d_{1H}$	d	D	B	r min.	$D_1$ ≈	$d_1$ ≈	$D_m$	l	c ≈
<b>1218-K-TVH-C3</b>	<b>H218</b>	2,48	1,17	<b>80</b>	90	160	30	2	138,7	112,7	126	52	18
<b>2218-K-TVH-C3</b>	<b>H318</b>	3,18	1,36	<b>80</b>	90	160	40	2	139,4	111,5	126	65	18
<b>1318-K-M-C3</b>	<b>H318</b>	6,27	1,36	<b>80</b>	90	190	43	3	159,9	124,4	126	65	18
<b>2318-K-M-C3</b>	<b>H2318</b>	8,6	1,68	<b>80</b>	90	190	64	3	161	115,7	126	86	18
<b>1219-K-M-C3</b>	<b>H219</b>	3,28	1,32	<b>85</b>	95	170	32	2,1	148,2	120,5	125	55	19
<b>2219-K-M-C3</b>	<b>H319</b>	4,24	1,51	<b>85</b>	95	170	43	2,1	148,6	118,9	125	68	19
<b>1319-K-M-C3</b>	<b>H319</b>	7,2	1,51	<b>85</b>	95	200	45	3	170,5	127,7	125	68	19
<b>2319-K-M-C3</b>	<b>H2319</b>	9,97	1,89	<b>85</b>	95	200	67	3	168,5	121,6	133	90	19
<b>1220-K-M-C3</b>	<b>H220</b>	3,94	1,48	<b>90</b>	100	180	34	2,1	155,2	127,7	130	58	20
<b>2220-K-M-C3</b>	<b>H320</b>	5,1	1,69	<b>90</b>	100	180	46	2,1	156,9	124,4	130	71	20
<b>1320-K-M-C3</b>	<b>H320</b>	8,95	1,69	<b>90</b>	100	215	47	3	182,6	135,5	130	71	20
<b>2320-K-M-C3</b>	<b>H2320</b>	12,7	2,17	<b>90</b>	100	215	73	3	183	130,8	142	97	20
<b>1222-K-M-C3</b>	<b>H222</b>	5,49	1,9	<b>100</b>	110	200	38	2,1	173,9	140,7	145	63	21
<b>2222-K-M-C3</b>	<b>H322</b>	7,27	2,15	<b>100</b>	110	200	53	2,1	174,1	136,9	154	77	21
<b>1322-K-M-C3</b>	<b>H322</b>	12,2	2,15	<b>100</b>	110	240	50	3	203,2	154,7	154	77	21
<b>2322-K-M-C3</b>	<b>H2322</b>	17,5	2,74	<b>100</b>	110	240	80	3	203	145,5	154	105	21

<sup>1)</sup> The projection must be taken into consideration when designing the adjacent construction.



Mounting dimensions

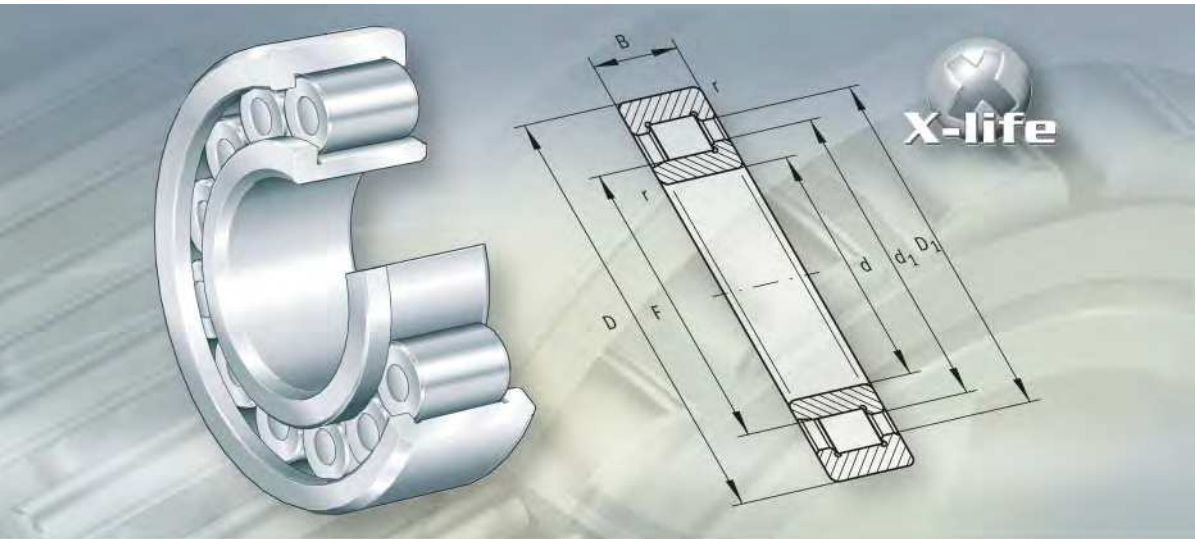
C <sub>1</sub> <sup>1)</sup>	Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
	d <sub>a</sub> max.	D <sub>a</sub> max.	d <sub>b</sub> min.	B <sub>a</sub> min.	r <sub>a</sub> max.	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub> N	n <sub>G</sub> min <sup>-1</sup>	n <sub>B</sub> min <sup>-1</sup>
-	110	149	95	6	2	57 000	23 300	0,17	3,74	5,79	3,92	1 300	4 500	6 600
-	108	149	96	10	2	71 000	28 500	0,27	2,33	3,61	2,44	1 580	4 300	5 700
-	120	176	96	6	2,5	109 000	42 500	0,22	2,83	4,38	2,97	2 230	5 300	5 800
-	112	176	100	6	2,5	156 000	57 000	0,39	1,63	2,53	1,71	3 000	5 000	5 900
-	117	158	100	7	2,1	64 000	27 000	0,17	3,73	5,78	3,91	1 450	6 000	6 200
-	114	158	102	9	2,1	84 000	34 000	0,27	2,32	3,59	2,43	1 840	6 000	5 600
1,6	126	186	102	7	2,5	134 000	50 000	0,23	2,73	4,23	2,86	2 550	5 000	5 700
-	117	186	105	7	2,5	167 000	63 000	0,38	1,66	2,57	1,74	3 250	4 800	5 600
-	124	168	106	7	2,1	70 000	29 500	0,18	3,58	5,53	3,75	1 550	5 600	6 100
-	120	168	108	8	2,1	98 000	40 000	0,27	2,33	3,61	2,44	2 120	5 600	5 400
2,4	132	201	108	7	2,5	145 000	57 000	0,24	2,68	4,15	2,81	2 800	4 800	5 400
-	125	201	110	7	2,5	196 000	78 000	0,38	1,67	2,58	1,75	3 900	4 500	5 200
-	138	188	116	7	2,1	89 000	38 000	0,17	3,61	5,59	3,78	1 900	5 000	5 700
-	132	188	118	6	2,1	126 000	51 000	0,28	2,23	3,45	2,33	2 550	5 000	5 200
2,7	150	226	118	9	2,5	165 000	71 000	0,23	2,79	4,32	2,92	3 300	4 500	4 700
-	139	226	121	7	2,5	221 000	94 000	0,37	1,69	2,62	1,77	4 400	4 300	4 600







**FAG**



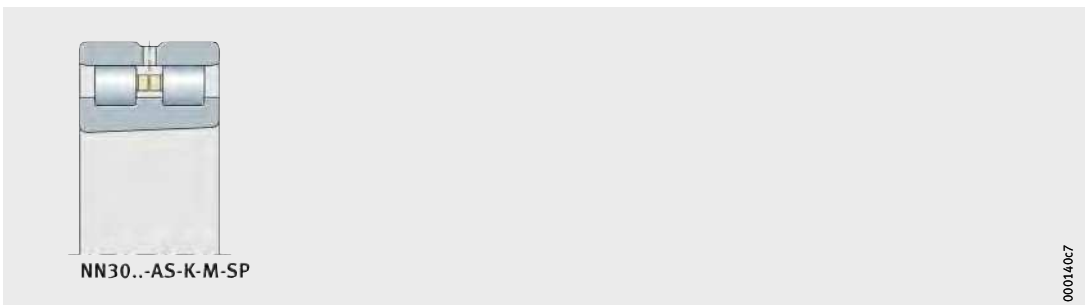
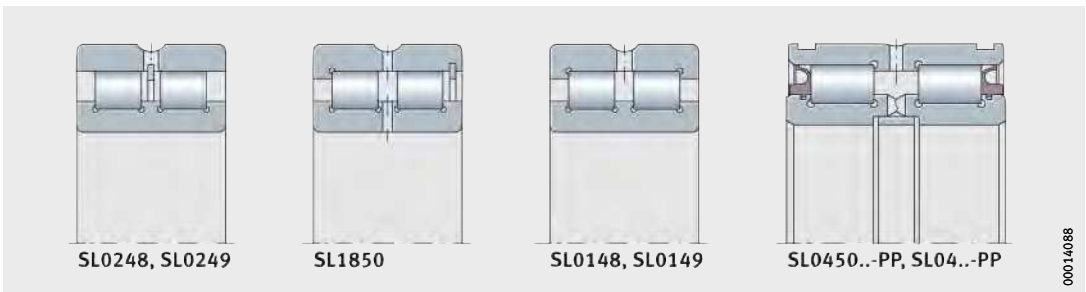
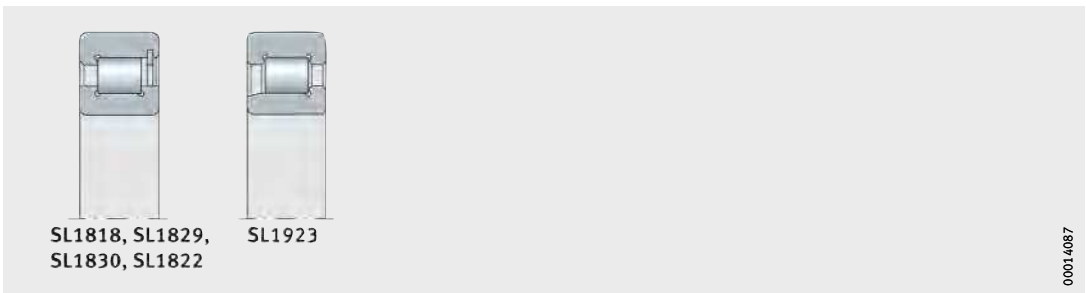
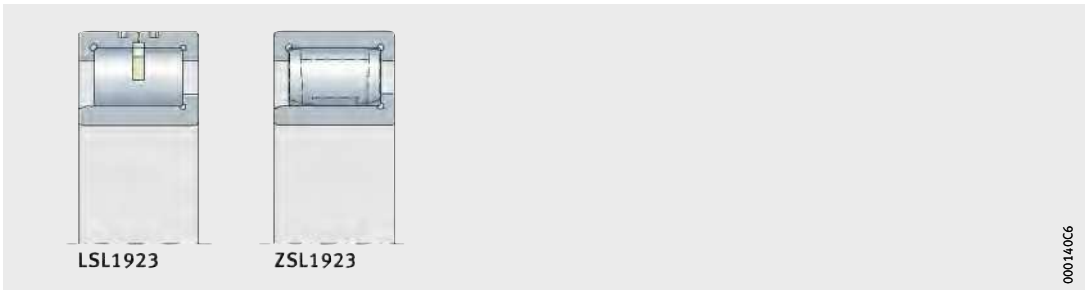
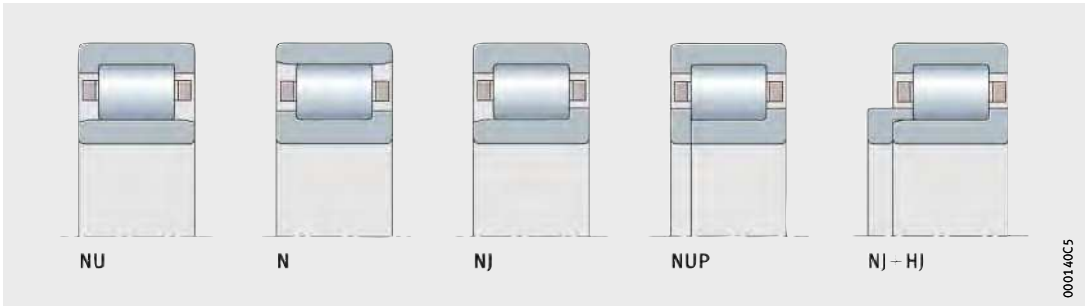
## Cylindrical roller bearings

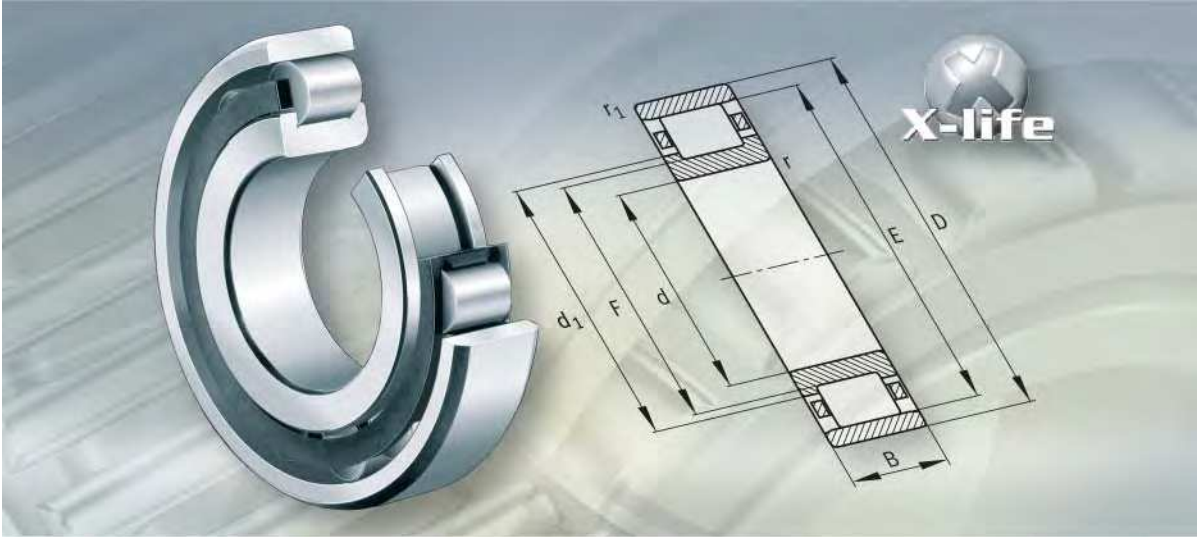
- Cylindrical roller bearings with cage
- Cylindrical roller bearings with disc cage or spacers
- Single row full complement cylindrical roller bearings
- Double row full complement cylindrical roller bearings
- High precision cylindrical roller bearings

# Cylindrical roller bearings

<b>X-life</b> <b>Cylindrical roller bearings with cage</b>	..... 394
	Single row cylindrical roller bearings with cage have a very high radial load carrying capacity and are suitable for higher speeds compared to full complement designs. The rollers are guided between rigid ribs in one of the two bearing rings and are combined by means of the cage to form a unit with this ring. Since one bearing ring of this type can always be removed, the rings can be mounted separately. The bearings are available as non-locating, semi-locating and locating bearings.
<b>X-life</b> <b>Cylindrical roller bearings with disc cage or spacers</b>	..... 446
	In these cylindrical roller bearings, contact between the rolling elements is prevented by a brass disc cage or plastic spacers. The bearings constitute the transition from the full complement bearing design to the cage type bearing. The rollers are guided in the inner ring between rigid ribs. The inner ring is separable and can therefore be mounted separately. The bearings are exclusively in the form of semi-locating bearings.
<b>X-life</b> <b>Single row full complement cylindrical roller bearings</b>	..... 460
	These single bearings have full complement cylindrical roller sets. The rolling elements are guided by ribs on the bearing rings. Since they have the maximum possible number of rolling elements, bearings with a full complement of cylindrical rollers have extremely high load carrying capacity and high rigidity. Due to the kinematic conditions, however, they do not achieve the high speeds that are possible when using cylindrical roller bearings with cage. The bearings are exclusively in the form of semi-locating bearings.
<b>Double row full complement cylindrical roller bearings</b>	..... 478
	The rolling elements are guided by ribs on the bearing rings. The bearings have extremely high load carrying capacity and rigidity. However, they do not achieve the high speeds that are possible when using cylindrical roller bearings with a cage. In cable sheave bearings (bearings with grooves in the outer rings), the bearing rings can easily be axially located using retaining rings. Double row full complement bearings are available as non-locating, semi-locating and locating bearings.
<b>High precision cylindrical roller bearings</b>	..... 500
	Cylindrical roller bearings of this design are double row high precision bearings (non-locating bearings) for machine tools and correspond to tolerance class SP. They are used to give radial support for main spindles. The bearings are separable and are therefore easier to fit and dismantle. The inner ring has a tapered bore for optimum setting of the radial internal clearance.







Cylindrical roller bearings with cage

# Cylindrical roller bearings with cage

		Page
<b>Product overview</b>	Cylindrical roller bearings with cage.....	396
<b>Features</b>	<b>X-life</b> .....	397
	Non-locating bearings .....	397
	Semi-locating bearings.....	397
	Locating bearings .....	398
	Sealing.....	398
	Lubrication.....	398
	Operating temperature .....	398
	Cages.....	398
	Suffixes.....	399
<b>Design and safety guidelines</b>	Permissible skewing.....	400
	Axial load carrying capacity.....	400
	Minimum radial load .....	401
	Equivalent dynamic bearing load .....	402
	Equivalent static bearing load.....	402
	Design of bearing arrangements .....	402
<b>Accuracy</b>	Radial internal clearance .....	403
<b>Dimension tables</b>	Cylindrical roller bearings with cage, non-locating bearings.....	404
	Cylindrical roller bearings with cage, semi-locating and locating bearings.....	420

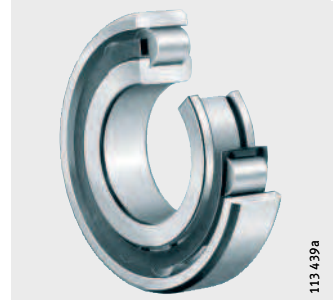
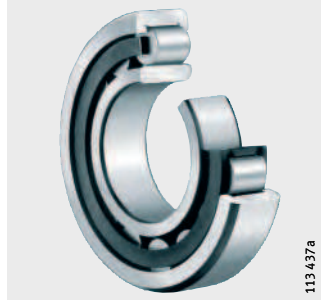


# Product overview Cylindrical roller bearings with cage

## Non-locating bearings

NU10, NU19, NU2...-E, NU3...-E,  
NU4, NU22...-E, NU23...-E

N2...-E, N3...-E



## Semi-locating bearings

NJ2...-E, NJ3...-E, NJ4, NJ22...-E, NJ23...-E



## Locating bearings

With rib washer

NUP2...-E, NUP3...-E, NUP22...-E, NUP23...-E



With L-section ring

NJ2...-E + HJ, NJ3...-E + HJ, NJ4 + HJ,  
NJ22...-E + HJ, NJ23...-E + HJ



# Cylindrical roller bearings with cage

**Features** Single row cylindrical roller bearings with cage are units comprising solid inner and outer rings together with cylindrical roller and cage assemblies. The outer rings have rigid ribs on both sides or no ribs, the inner rings have one or two rigid ribs or are designed without ribs. The cage prevents the cylindrical rollers from coming into contact with each other during rolling.

The cage type bearings are very rigid, can support high radial loads and, due to the cage, are suitable for higher speeds than the full complement designs. Bearings with the suffix E have a higher capacity roller set and are thus designed for very high load carrying capacity.

The bearings are separable and are therefore easier to fit and dismantle. Both bearing rings can be given a tight fit by this process.

Single row cylindrical roller bearings with cage are available as non-locating, semi-locating and locating bearings.

## X-life

Numerous sizes are supplied in the X-life grade. These bearings are indicated in the dimension tables.

Bearings of X-life quality have, for example, lower roughness  $R_a$  and higher geometrical accuracy of the raceways than comparable designs that are not X-life. As a result, these bearings have higher load carrying capacity and longer life for the same dimensioning. In certain applications, this means that a smaller bearing arrangement can be designed.



## Non-locating bearings

Cylindrical roller bearings NU and N are non-locating bearings and can support radial forces only. In series NU, the outer ring has two ribs, while the inner ring has no ribs. Bearings N have two ribs on the inner ring and an outer ring without ribs.

### Axial displacement

The outer and inner ring can be axially displaced relative to each other from the central position by the value "s".

## Semi-locating bearings

Cylindrical roller bearings NJ are semi-locating bearings. Semi-locating bearings can support not only high radial forces but also axial forces in one direction and can therefore guide shafts axially in one direction. They act as non-locating bearings in the opposite direction.

The bearings have two ribs on the outer ring and one rib on the inner ring.



## Bearings with L-section ring

Non-locating bearings NU can be combined with an L-section ring HJ to form a semi-locating bearing unit. They must not be installed with two L-section rings (due to the risk of jamming).

### Axial displacement

The outer and inner ring can be axially displaced relative to each other in one direction only by the value "s".

# Cylindrical roller bearings with cage

<b>Locating bearings</b>	Cylindrical roller bearings NUP and NJ with HJ are locating bearings. They can support not only high radial forces but also axial forces in both directions and can therefore guide shafts axially in both directions.
<b>Bearings with rib washer</b>	Type NUP has two ribs on the outer ring and one rigid rib on the inner ring. A loose rib washer is fitted on the opposite side.
<b>Bearings with L-section ring</b>	Non-locating bearings NJ can be combined with an L-section ring HJ to form a locating bearing unit. This design has two ribs on the outer ring, one rib on the inner ring and an L-section ring for the ribless side of the inner ring. The L-section rings suitable for the bearings are indicated in the dimension tables. The bearing and L-section ring must be ordered separately.
<b>L-section rings</b>	L-section rings are advantageous where, under high loads, the seating surface of the inner ring in NUP bearings with a loose rib washer is too small to provide a sufficiently high bearing seat. In some applications, they make it easier to fit and dismantle the bearings.
<b>Sealing</b>	The bearings are supplied without seals.
<b>Lubrication</b>	They can be lubricated from the end faces using grease or oil.
<b>Operating temperature</b>	Single row cylindrical roller bearings with cage can be used at operating temperatures from $-30\text{ °C}$ to $+150\text{ °C}$ . For continuous operating temperatures above $+120\text{ °C}$ , please contact us.
	Bearings with a plastic cage (suffix TVP2) are suitable up to $+120\text{ °C}$ ; the operating life is heavily dependent on the lubricant used.
<b>Cages</b>	The suffix M1 indicates bearings with brass cages guided by rollers. Cylindrical roller bearings with the suffix TVP2 have a cage made from glass fibre reinforced polyamide PA66. Other cage suffixes: see table Available designs, page 399.
	Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives. Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures. The oil change intervals must be observed.
<b>Standard cages</b>	Standard cages for single row cylindrical roller bearings: see table, page 399.

## Bearing series and cage material

Series	Solid cage made from polyamide PA66 TVP2 Bore code	Solid brass cage M1
NU10	–	from 05
NU19	–	from 92
NU2..-E	up to 26	from 28
NU3..-E	up to 28	from 30
NU4	–	All
NU22..-E	up to 26	from 28
NU23..-E	up to 22	from 24
N2..-E	up to 20, 22 to 26	21, from 28
N3..-E	up to 16	from 17
NJ2..-E	up to 26	from 28
NJ3..-E	up to 28	from 30
NJ4	–	All
NJ22..-E	up to 26	from 28
NJ23..-E	up to 22	from 24
NUP2..-E	up to 26	from 28
NUP3..-E	up to 28	from 30
NUP22..-E	up to 26	from 28
NUP23..-E	up to 22	from 24



### Other cage designs

Other cage designs are available by agreement. In such cages, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

### Suffixes

Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
C3	Radial internal clearance larger than normal	by agreement
C4	Radial internal clearance larger than C3	
J30P	Black oxide coated	
E	Increased capacity design	Standard
EX	Increased capacity design, design modified in accordance with standard (parts from these bearings must not be interchanged with parts from bearings of the same size of the previous design E)	
M1	Solid brass cage, two-piece, roller-guided	
TVP2	Solid window cage made from glass fibre reinforced polyamide PA66	
JP3	Sheet steel window cage, single-piece, roller-guided	by agreement
MP1A	Solid brass cage, single-piece, rib-guided on outer ring	
MP1B	Machined brass cage, single-piece, rib-guided on inner ring	
M1A	Solid brass cage, two-piece, rib-guided on outer ring	
M1B	Solid brass cage, two-piece, rib-guided on inner ring	

# Cylindrical roller bearings with cage

## Design and safety guidelines

### Permissible skewing

There is no significant reduction in rating life if the misalignment of the inner ring relative to the outer ring does not exceed the following values:

4' in bearings of series 10, 19, 2, 3, 4

3' in bearings of series 22, 23.

### Axial load carrying capacity

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces
- tilting of the bearing.



Ribs subjected to load must be supported across their entire height.

The permissible axial load  $F_{a\ per}$  must not be exceeded, in order to avoid an unacceptable increase in temperature.

The axial limiting load  $F_{a\ max}$  must not be exceeded, in order to avoid impermissible pressure at the contact surfaces.

The ratio  $F_a/F_r$  should not exceed the value 0,4.

Continuous axial loading without simultaneous radial loading is not permissible.

### Permissible and maximum axial load

$$F_{a\ per} = k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{0,6} \leq F_{a\ max}$$

$$F_{a\ max} = 0,075 \cdot k_B \cdot d_M^{2,1}$$

$F_{a\ per}$  N  
Permissible axial load

$F_{a\ max}$  N  
Axial limiting load

$k_S$  –  
Factor dependent on the lubrication method, see table, page 401

$k_B$  –  
Factor dependent on the bearing series, see table, page 401

$d_M$  mm  
Mean bearing diameter  $(d + D)/2$ , see dimension table

$n$   $\text{min}^{-1}$   
Operating speed.



**Factor  $k_S$   
for the lubrication method**

Lubrication method <sup>1)</sup>	Factor $k_S$
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ( $\nu < 0,5 \cdot \nu_1$ )	7,5 to 10
Poor heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)	12 to 18
Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ( $\nu > 2 \cdot \nu_1$ )	16 to 24

<sup>1)</sup> Doped oils should be used, e.g. CLP (DIN 51 517) and HLP (DIN 51 524) of ISO-VG classes 32 to 460 and ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

**Bearing factor  $k_B$**

Series	Bearing factor $k_B$
NJ2...E, NJ22...E, NUP2...E, NUP22...E	15
NJ3...E, NJ23...E, NUP3...E, NUP23...E	20
NJ4	22



Skewing of the bearing, for example due to shaft deflection, can lead to alternating stresses on the inner ring ribs. In this case, the axial load must be restricted to  $F_{as}$  for bearing tilting of up to max. 2 angular minutes.

$$F_{as} = 20 \cdot d_M^{1,42}$$

If even greater tilting is present, special strength analysis is required.

**Minimum radial load**

In continuous operation, a minimum radial load of the order of  $F_{r \min} = C_{0r}/60$  is necessary.

If  $F_{r \min} < C_{0r}/60$ , please contact us.



# Cylindrical roller bearings with cage

## Equivalent dynamic bearing load Non-locating bearings

For bearings under dynamic loading, the following applies:

$$P = F_r$$

## Semi-locating and locating bearings

If an axial force  $F_a$  is present in addition to the radial force  $F_r$ , the load ratio must be taken into consideration.

## Load ratio and equivalent dynamic load

Load ratio	Equivalent dynamic bearing load
$\frac{F_a}{F_r} \leq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = 0,92 \cdot F_r + Y \cdot F_a$

$P$  N  
Equivalent dynamic bearing load for combined load  
 $F_a$  N  
Axial dynamic bearing load  
 $F_r$  N  
Radial dynamic bearing load  
 $e, Y$  –  
Factors: see table Factors e and Y.

## Factors e and Y

Series	Calculation factors	
	e	Y
NJ2, NUP2, NJ3, NUP3, NJ4	0,2	0,6
NJ22, NUP22, NJ23, NUP23	0,3	0,4

## Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

## Design of bearing arrangements Shaft and housing tolerances

Recommended shaft tolerances for bearings with cylindrical bore, see table, page 150.  
Recommended housing tolerances for radial bearings, see table, page 152.

## Axial location

In order to prevent lateral creep of the bearing rings, they must be located by force or physical locking means.  
The abutment shoulders (shaft and housing) should be sufficiently high and perpendicular to the bearing axis.  
The transition from the bearing seat to the abutment shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. The minimum values for the chamfer dimensions  $r$  in the dimension tables must be observed.

In the case of semi-locating bearings, the bearing rings only require support on one side, on the rib supporting the axial load.



Full support must be provided for ribs transmitting forces in axially loaded bearings.

**Accuracy** The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620.

**Radial internal clearance** The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

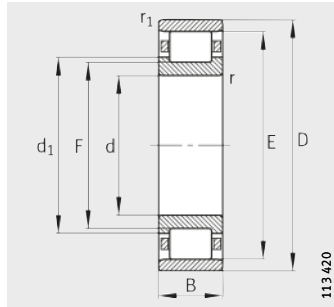
**Radial internal clearance**

Bore d mm		Radial internal clearance					
		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75
24	30	20	45	35	60	50	75
30	40	25	50	45	70	60	85
40	50	30	60	50	80	70	100
50	65	40	70	60	90	80	110
65	80	40	75	65	100	90	125
80	100	50	85	75	110	105	140
100	120	50	90	85	125	125	165
120	140	60	105	100	145	145	190
140	160	70	120	115	165	165	215
160	180	75	125	120	170	170	220
180	200	90	145	140	195	195	250
200	225	105	165	160	220	220	280
225	250	110	175	170	235	235	300
250	280	125	195	190	260	260	330
280	315	130	205	200	275	275	350
315	355	145	225	225	305	305	385
355	400	190	280	280	370	370	460
400	450	210	310	310	410	410	510
450	500	220	330	330	440	440	550
500	560	240	360	360	480	480	600
560	630	260	380	380	500	500	620
630	710	285	425	425	565	565	705

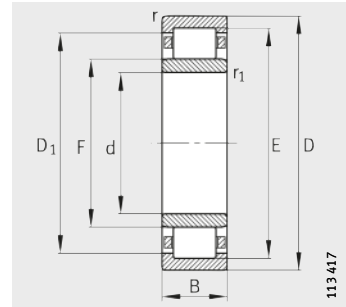


# Cylindrical roller bearings with cage

Non-locating bearings



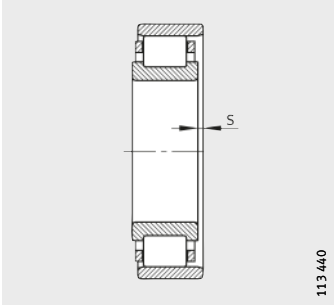
N



NU

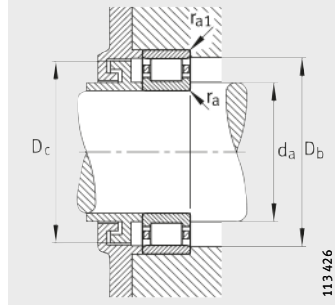
**Dimension table** - Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions									
			d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
						min.	min.				≈	≈
N202-E-TVP2	XL	0,047	15	35	11	0,6	0,3	0,5	30,3	19,3	–	21,6
NU202-E-TVP2	XL	0,048	15	35	11	0,6	0,3	1,6	30,3	19,3	28	–
N203-E-TVP2	XL	0,068	17	40	12	0,6	0,3	1,2	35,1	22,1	–	24,9
NU203-E-TVP2	XL	0,069	17	40	12	0,6	0,3	1,2	35,1	22,1	32,5	–
NU2203-E-TVP2	XL	0,051	17	40	16	0,6	0,3	1,7	35,1	22,1	32,5	–
NU303-E-TVP2	XL	0,121	17	47	14	1	0,6	1,2	40,2	24,2	37,1	–
N204-E-TVP2	XL	0,112	20	47	14	1	0,6	0,8	41,5	26,5	–	29,7
NU204-E-TVP2	XL	0,114	20	47	14	1	0,6	0,8	41,5	26,5	38,8	–
NU2204-E-TVP2	XL	0,146	20	47	18	1	0,6	1,8	41,5	26,5	38,8	–
NU304-E-TVP2	XL	0,153	20	52	15	1,1	0,6	1	45,5	27,5	42,4	–
NU2304-E-TVP2	XL	0,215	20	52	21	1,1	0,6	1,9	45,5	27,5	42,4	–
NU1005-M1	XL	0,092	25	47	12	0,6	0,3	2,4	41,5	30,5	39,3	–
N205-E-TVP2	XL	0,135	25	52	15	1	0,6	1,3	46,5	31,5	–	34,7
NU205-E-TVP2	XL	0,137	25	52	15	1	0,6	1,2	46,5	31,5	43,8	–
NU2205-E-TVP2	XL	0,165	25	52	18	1	0,6	1,7	46,5	31,5	43,8	–
N305-E-TVP2	XL	0,242	25	62	17	1,1	1,1	1,4	54	34	–	38,1
NU305-E-TVP2	XL	0,245	25	62	17	1,1	1,1	1,5	54	34	50,7	–
NU2305-E-TVP2	XL	0,349	25	62	24	1,1	1,1	1,9	54	34	50,7	–
NU1006-M1	XL	0,134	30	55	13	1	0,6	2,4	48,5	36,5	46,1	–
N206-E-TVP2	XL	0,205	30	62	16	1	0,6	1,4	55,5	37,5	–	41,1
NU206-E-TVP2	XL	0,207	30	62	16	1	0,6	1,5	55,5	37,5	52,5	–
NU2206-E-TVP2	XL	0,255	30	62	20	1	0,6	1,6	55,5	37,5	52,5	–
N306-E-TVP2	XL	0,366	30	72	19	1,1	1,1	0,6	62,5	40,5	–	45
NU306-E-TVP2	XL	0,368	30	72	19	1,1	1,1	1,2	62,5	40,5	59,2	–
NU2306-E-TVP2	XL	0,529	30	72	27	1,1	1,1	2,2	62,5	40,5	59,2	–
NU406-M1	XL	0,859	30	90	23	1,5	1,5	2,3	73	45	68,4	–
NU1007-M1	XL	0,177	35	62	14	1	0,6	2,6	55	42	52,4	–
N207-E-TVP2	XL	0,301	35	72	17	1,1	0,6	0,7	64	44	–	48
NU207-E-TVP2	XL	0,303	35	72	17	1,1	0,6	0,7	64	44	61	–
NU2207-E-TVP2	XL	0,406	35	72	23	1,1	0,6	2,2	64	44	61	–
N307-E-TVP2	XL	0,486	35	80	21	1,5	1,1	0,6	70,2	46,2	–	51
NU307-E-TVP2	XL	0,486	35	80	21	1,5	1,1	0,6	70,2	46,2	66,6	–
NU2307-E-TVP2	XL	0,723	35	80	31	1,5	1,1	3	70,2	46,2	66,6	–
NU407-M1	XL	1,14	35	100	25	1,5	1,5	2,6	83	53	78,2	–



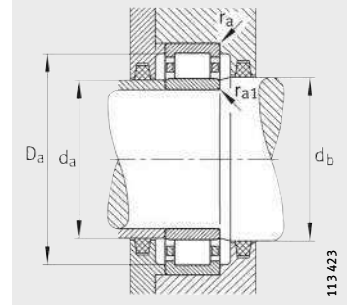
113 440

1) Axial displacement "s" for N and NU



113 426

Mounting dimensions for N



113 423

Mounting dimensions for NU

Mounting dimensions

Basic load ratings

Fatigue limit load

Limiting speed

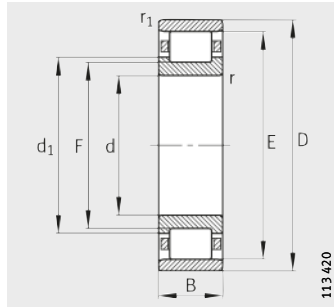
Reference speed

d <sub>a</sub>		d <sub>b</sub>	D <sub>a</sub>	D <sub>b</sub>	D <sub>c</sub>	r <sub>a</sub>	r <sub>a1</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	min.	max.	min.	max.	max.	max.	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
17,4	–	–	32,6	31	29	0,6	0,3	15 100	10 400	1 470	22 000	17 600
17,4	18,5	20	32,6	–	–	0,6	0,3	15 100	10 400	1 290	22 000	17 600
21	–	–	36	36	34	0,6	0,3	20 800	14 600	2 110	18 000	15 400
21	21,5	23	36	–	–	0,6	0,3	20 800	14 600	1 820	18 000	15 400
21	21,5	23	36	–	–	0,6	0,3	28 500	21 900	3 500	18 000	13 300
21,2	23,5	25	42,8	–	–	1	0,6	30 000	21 200	2 650	16 000	13 700
24	–	–	41	43	40	1	0,6	32 500	24 700	3 850	16 000	13 100
24	26	29	41	–	–	1	0,6	32 500	24 700	3 100	16 000	13 100
24	26	29	41	–	–	1	0,6	38 500	31 000	5 000	16 000	11 400
24	27	30	45	–	–	1	0,6	36 500	26 000	3 250	14 000	12 100
24	27	30	45	–	–	1	0,6	48 500	38 000	6 300	14 000	9 900
27	30	32	44	–	–	0,6	0,3	16 700	12 900	1 520	28 000	13 100
29	–	–	46	48	45	1	0,6	34 500	27 500	4 350	15 000	11 800
29	31	34	46	–	–	1	0,6	34 500	27 500	3 500	15 000	11 800
29	31	34	46	–	–	1	0,5	41 500	34 500	5 700	15 000	9 800
32	–	–	55	55	53	1	1	48 000	36 500	5 800	12 000	10 200
32	33	37	55	–	–	1	1	48 000	36 500	4 700	12 000	10 200
32	33	37	55	–	–	1	1	66 000	55 000	9 400	12 000	8 400
33	35	38	50	–	–	1	0,6	22 900	19 300	2 400	24 000	11 000
34	–	–	56	57	54	1	0,6	45 000	36 000	5 700	12 000	9 800
34	37	40	56	–	–	1	0,6	45 000	36 000	4 650	12 000	9 800
34	37	40	56	–	–	1	0,6	57 000	48 500	8 100	12 000	8 200
37	–	–	65	64	61	1	1	61 000	48 000	8 000	10 000	9 000
37	40	44	65	–	–	1	1	61 000	48 000	6 400	10 000	9 000
37	40	44	65	–	–	1	1	86 000	75 000	13 200	10 000	7 300
41	44	47	79	–	–	1,5	1,5	83 000	64 000	10 400	14 000	–
38	41	44	57	–	–	1	0,6	29 000	26 000	3 150	20 000	9 700
39	–	–	65	65	63	1	0,6	58 000	48 500	7 900	10 000	8 300
39	43	46	65	–	–	1	0,6	58 000	48 500	6 400	10 000	8 300
39	43	46	65	–	–	1	0,6	72 000	64 000	10 800	10 000	7 300
42	–	–	71	71	69	1,5	1	76 000	63 000	10 700	9 000	8 100
42	45	48	71	–	–	1,5	1	76 000	63 000	8 600	9 000	8 100
42	45	48	71	–	–	1,5	1	108 000	98 000	17 400	9 000	6 700
46	52	55	89	–	–	1,5	1,5	102 000	83 000	10 900	12 000	–

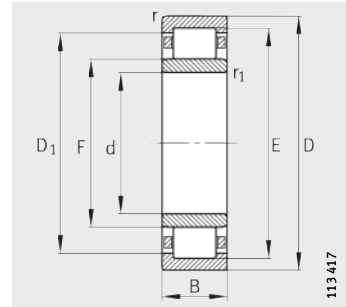


# Cylindrical roller bearings with cage

Non-locating bearings



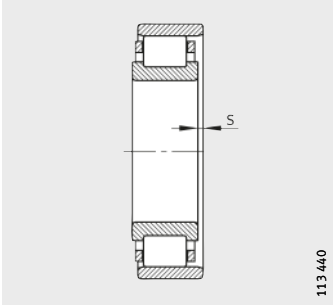
N



NU

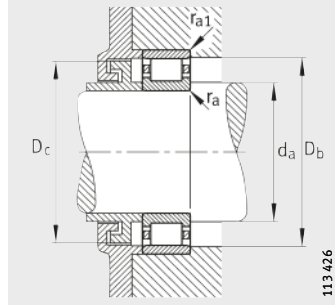
Dimension table (continued) · Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions									
			d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
						min.	min.				≈	≈
NU1008-M1	XL	0,216	40	68	15	1	0,6	2	61	47	58,2	–
N208-E-TVP2	XL	0,358	40	80	18	1,1	1,1	1	71,5	49,5	–	54
NU208-E-TVP2	XL	0,379	40	80	18	1,1	1,1	1	71,5	49,5	68,3	–
NU2208-E-TVP2	XL	0,492	40	80	23	1,1	1,1	1,5	71,5	49,5	68,3	–
N308-E-TVP2	XL	0,656	40	90	23	1,5	1,5	1,2	80	52	–	57,6
NU308-E-TVP2	XL	0,659	40	90	23	1,5	1,5	1,3	80	52	75,9	–
NU2308-E-TVP2	XL	0,958	40	90	33	1,5	1,5	2,7	80	52	75,9	–
NU408-M1	XL	1,47	40	110	27	2	2	2,8	92	58	86,4	–
NU1009-M1	XL	0,277	45	75	16	1	0,6	2,5	67,5	52,5	64,5	–
N209-E-TVP2	XL	0,434	45	85	19	1,1	1,1	1	76,5	54,5	–	59
NU209-E-TVP2	XL	0,434	45	85	19	1,1	1,1	1	76,5	54,5	73,3	–
NU2209-E-TVP2	XL	0,532	45	85	23	1,1	1,1	1,5	76,5	54,5	73,3	–
N309-E-TVP2	XL	0,891	45	100	25	1,5	1,5	1	88,5	58,5	–	64,4
NU309-E-TVP2	XL	0,893	45	100	25	1,5	1,5	1	88,5	58,5	84,1	–
NU2309-E-TVP2	XL	1,3	45	100	36	1,5	1,5	2,5	88,5	58,5	84,1	–
NU409-M1	XL	1,87	45	120	29	2	2	2,9	100,5	64,5	94,6	–
NU1010-M1	XL	0,305	50	80	16	1	0,6	2,1	72,5	57,5	69,5	–
N210-E-TVP2	XL	0,488	50	90	20	1,1	1,1	1,3	81,5	59,5	–	64
NU210-E-TVP2	XL	0,49	50	90	20	1,1	1,1	1,3	81,5	59,5	78,3	–
NU2210-E-TVP2	XL	0,573	50	90	23	1,1	1,1	1,3	81,5	59,5	78,3	–
N310-E-TVP2	XL	1,16	50	110	27	2	2	1,7	97	65	–	71,3
NU310-E-TVP2	XL	1,16	50	110	27	2	2	1,7	97	65	92,5	–
NU2310-E-TVP2	XL	1,75	50	110	40	2	2	3,2	97	65	92,5	–
NU410-M1	XL	2,33	50	130	31	2,1	2,1	3	110,8	70,8	104,3	–
NU1011-E-M1	XL	0,451	55	90	18	1,1	1	2,1	82	64	79,2	–
N211-E-TVP2	XL	0,668	55	100	21	1,5	1,1	0,8	90	66	–	70,8
NU211-E-TVP2	XL	0,665	55	100	21	1,5	1,1	0,8	90	66	86,6	–
NU2211-E-TVP2	XL	0,796	55	100	25	1,5	1,1	1,3	90	66	86,6	–
N311-E-TVP2	XL	1,48	55	120	29	2	2	1,8	106,5	70,5	–	77,5
NU311-E-TVP2	XL	1,48	55	120	29	2	2	1,8	106,5	70,5	101,4	–
NU2311-E-TVP2	XL	2,23	55	120	43	2	2	3,3	106,5	70,5	101,4	–
NU411-M1	XL	2,83	55	140	33	2,1	2,1	3,3	117,2	77,2	110,7	–



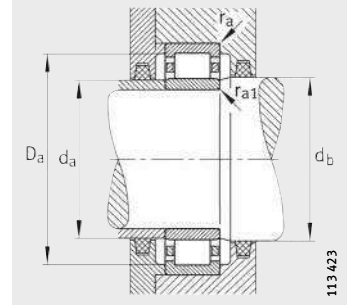
113 440

1) Axial displacement "s" for N and NU



113 426

Mounting dimensions for N



113 423

Mounting dimensions for NU

Mounting dimensions

Basic load ratings

Fatigue limit load

Limiting speed

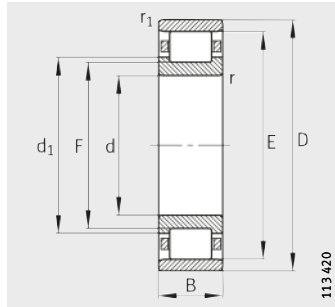
Reference speed

d <sub>a</sub>		d <sub>b</sub>	D <sub>a</sub>	D <sub>b</sub>	D <sub>c</sub>	r <sub>a</sub>	r <sub>a1</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	min.	max.	min.	max.	max.	max.	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
43	46	49	63	–	–	1	0,6	33 500	30 500	3 350	19 000	8 900
47	–	–	73	73	70	1	1	63 000	53 000	8 700	9 000	7 600
47	49	52	73	–	–	1	1	63 000	53 000	7 000	9 000	7 600
47	49	52	73	–	–	1	1	83 000	75 000	12 900	9 000	6 400
49	–	–	81	81	79	1,5	1,5	95 000	78 000	12 900	7 500	7 300
49	51	55	81	–	–	1,5	1,5	95 000	78 000	10 400	7 500	7 300
49	51	55	81	–	–	1,5	1,5	132 000	119 000	20 700	7 500	6 000
53	57	60	97	–	–	2	2	119 000	95 000	12 700	11 000	–
48	52	54	70	–	–	1	0,6	40 000	37 500	4 800	16 000	8 100
52	–	–	78	78	75	1	1	72 000	63 000	10 600	8 500	7 100
52	54	57	78	–	–	1	1	72 000	63 000	8 600	8 500	7 100
52	54	57	78	–	–	1	1	87 000	82 000	14 100	8 500	5 800
54	–	–	91	90	87	1,5	1,5	115 000	98 000	16 400	6 700	6 500
54	57	60	91	–	–	1,5	1,5	115 000	98 000	13 300	6 700	6 500
54	57	60	91	–	–	1,5	1,5	162 000	153 000	27 000	6 700	5 400
58	63	66	107	–	–	2	2	143 000	119 000	16 000	9 500	–
53	57	59	75	–	–	1	0,6	42 500	41 500	5 300	15 000	7 400
57	–	–	83	83	80	1	1	75 000	69 000	11 500	8 000	6 700
57	58	62	83	–	–	1	1	75 000	69 000	9 300	8 000	6 700
57	58	62	83	–	–	1	1	92 000	88 000	15 300	8 000	5 400
61	–	–	99	98	96	2	2	130 000	113 000	19 100	6 300	6 100
61	63	67	99	–	–	2	2	130 000	113 000	15 500	6 300	6 100
61	63	67	99	–	–	2	2	192 000	187 000	33 000	6 300	5 000
64	69	73	116	–	–	2	2	175 000	148 000	25 000	8 500	–
60	63	65	84	–	–	1,1	1	61 000	60 000	7 100	13 000	6 900
62	–	–	91	91	89	1,5	1	99 000	95 000	16 300	7 000	5 800
62	65	68	91	–	–	1,5	1	99 000	95 000	13 200	7 000	5 800
62	65	68	91	–	–	1,5	1	117 000	118 000	20 700	7 000	4 750
66	–	–	109	108	105	2	2	159 000	139 000	23 600	5 600	5 600
66	69	72	109	–	–	2	2	159 000	139 000	19 100	5 600	5 600
66	69	72	109	–	–	2	2	235 000	230 000	41 000	5 600	4 600
69	76	79	126	–	–	2	2	187 000	164 000	22 400	8 000	–

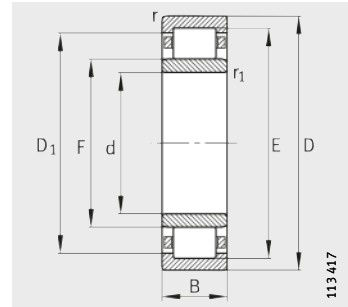


# Cylindrical roller bearings with cage

Non-locating bearings



N

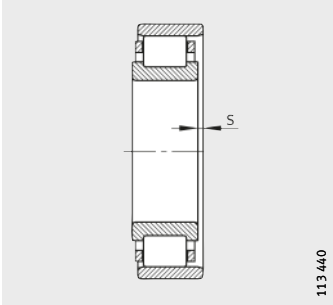


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Dimension table (continued) · Dimensions in mm

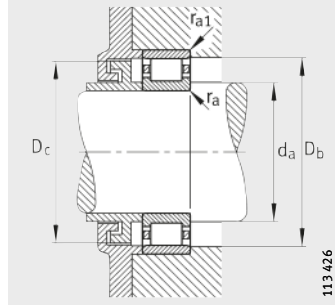
Designation	X-life	Mass m ≈ kg	Dimensions									
			d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
						min.	min.				≈	≈
NU1012-M1	XL	0,48	60	95	18	1,1	1	3,3	85,5	69,5	82,3	–
N212-E-TVP2	XL	0,827	60	110	22	1,5	1,5	1,6	100	72	–	77,6
NU212-E-TVP2	XL	0,824	60	110	22	1,5	1,5	1,6	100	72	96,1	–
NU2212-E-TVP2	XL	1,08	60	110	28	1,5	1,5	1,6	100	72	96,1	–
N312-E-TVP2	XL	1,84	60	130	31	2,1	2,1	1,9	115	77	–	84,4
NU312-E-TVP2	XL	1,85	60	130	31	2,1	2,1	1,8	115	77	109,6	–
NU2312-E-TVP2	XL	2,78	60	130	46	2,1	2,1	3,5	115	77	109,6	–
NU412-M1	XL	2,3	60	150	35	2,1	2,1	3,4	127	83	119,5	–
NU1013-M1	XL	0,507	65	100	18	1,1	1	3,3	90,5	74,5	87,3	–
N213-E-TVP2	XL	1,05	65	120	23	1,5	1,5	1,4	108,5	78,5	–	84,4
NU213-E-TVP2	XL	1,04	65	120	23	1,5	1,5	1,4	108,5	78,5	104,3	–
NU2213-E-TVP2	XL	1,43	65	120	31	1,5	1,5	1,9	108,5	78,5	104,3	–
N313-E-TVP2	XL	2,28	65	140	33	2,1	2,1	1,4	124,5	82,5	–	90,5
NU313-E-TVP2	XL	2,28	65	140	33	2,1	2,1	1,5	124,5	82,5	118,6	–
NU2313-E-TVP2	XL	3,32	65	140	48	2,1	2,1	4	124,5	82,5	118,6	–
NU413-M1	XL	4,08	65	160	37	2,1	2,1	3,5	135,3	89,3	127,7	–
NU1014-M1	XL	0,706	70	110	20	1,1	1	2,5	100	80	96	–
N214-E-TVP2	XL	1,16	70	125	24	1,5	1,5	1,6	113,5	83,5	–	89,4
NU214-E-TVP2	XL	1,15	70	125	24	1,5	1,5	1,6	113,5	83,5	109,4	–
NU2214-E-TVP2	XL	1,52	70	125	31	1,5	1,5	1,6	113,5	83,5	109,4	–
N314-E-TVP2	XL	2,79	70	150	35	2,1	2,1	1,6	133	89	–	97,4
NU314-E-TVP2	XL	2,79	70	150	35	2,1	2,1	1,7	133	89	126,8	–
NU2314-E-TVP2	XL	4,02	70	150	51	2,1	2,1	4,7	133	89	126,8	–
NU414-M1	XL	5,97	70	180	42	3	3	4	152	100	142,7	–
NU1015-M1	XL	0,737	75	115	20	1,1	1	2,5	105	85	101,7	–
N215-E-TVP2	XL	1,29	75	130	25	1,5	1,5	1,1	118,5	88,5	–	94,4
NU215-E-TVP2	XL	1,27	75	130	25	1,5	1,5	1,2	118,5	88,5	114,4	–
NU2215-E-TVP2	XL	1,6	75	130	31	1,5	1,5	1,6	118,5	88,5	114,4	–
N315-E-TVP2	XL	3,34	75	160	37	2,1	2,1	1,1	143	95	–	104,1
NU315-E-TVP2	XL	3,33	75	160	37	2,1	2,1	1,2	143	95	136,2	–
NU2315-E-TVP2	XL	4,95	75	160	55	2,1	2,1	4,2	143	95	136,2	–
NU415-M1	XL	7,09	75	190	45	3	3	4,5	160,5	104,5	150,7	–





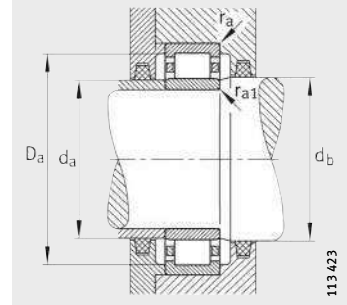
113 440

1) Axial displacement "s" for N and NU



113 426

Mounting dimensions for N



113 423

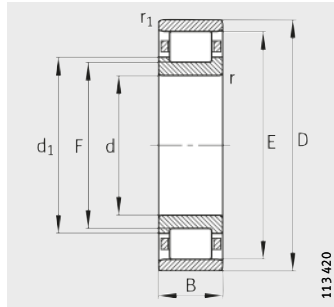
Mounting dimensions for NU

Mounting dimensions								Basic load ratings		Fatigue limit load $C_{Ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$		$d_b$	$D_a$	$D_b$	$D_c$	$r_a$	$r_{a1}$	dyn.	stat.			
min.	max.							$C_r$	$C_{Or}$			
65	68	71	89	–	–	1,1	1	52 000	55 000	7 100	13 000	6 400
69	–	–	101	101	99	1,5	1,5	111 000	102 000	16 800	6 300	5 400
69	71	75	101	–	–	1,5	1,5	111 000	102 000	13 900	6 300	5 400
69	71	75	101	–	–	1,5	1,5	151 000	152 000	26 500	6 300	4 400
72	–	–	118	116	114	2,1	2,1	177 000	157 000	26 500	5 000	5 300
72	75	79	118	–	–	2,1	2,1	177 000	157 000	21 700	5 000	5 300
72	75	79	118	–	–	2,1	2,1	265 000	260 000	47 000	5 000	4 300
74	82	85	136	–	–	2	2	211 000	184 000	24 700	7 500	–
70	73	76	94	–	–	1,1	1	53 000	58 000	7 500	12 000	5 900
74	–	–	111	110	107	1,5	1,5	127 000	119 000	19 800	6 000	5 000
74	77	81	111	–	–	1,5	1,5	127 000	119 000	16 300	6 000	5 000
74	77	81	111	–	–	1,5	1,5	176 000	181 000	32 000	5 600	4 150
77	–	–	128	126	123	2,1	2,1	214 000	191 000	32 000	4 800	4 900
77	81	85	128	–	–	2,1	2,1	214 000	191 000	26 000	4 800	4 900
77	81	85	128	–	–	2,1	2,1	295 000	285 000	50 000	4 800	4 050
79	88	91	146	–	–	2	2	230 000	203 000	26 500	7 000	–
75	78	82	104	–	–	1	1	75 000	78 000	10 600	11 000	5 500
79	–	–	116	115	112	1,5	1,5	140 000	137 000	23 100	5 300	4 750
79	82	86	116	–	–	1,5	1,5	140 000	137 000	19 000	5 300	4 750
79	82	86	116	–	–	1,5	1,5	184 000	194 000	34 000	5 300	3 900
82	–	–	138	135	131	2,1	2,1	242 000	222 000	37 000	4 500	4 550
82	87	92	138	–	–	2,1	2,1	242 000	222 000	30 000	4 500	4 550
82	87	92	138	–	–	2,1	2,1	325 000	325 000	56 000	4 500	3 850
86	99	102	164	–	–	2,5	2,5	285 000	255 000	33 500	6 300	–
80	83	87	109	–	–	1,1	1	76 000	82 000	11 100	10 000	5 200
84	–	–	121	120	117	1,5	1,5	154 000	156 000	26 500	5 300	4 500
84	87	90	121	–	–	1,5	1,5	154 000	156 000	21 700	5 300	4 500
84	87	90	121	–	–	1,5	1,5	191 000	207 000	36 000	5 300	3 700
87	–	–	148	145	141	2,1	2,1	285 000	265 000	43 000	4 000	4 200
87	93	97	148	–	–	2,1	2,1	285 000	265 000	34 500	4 000	4 200
87	93	97	148	–	–	2,1	2,1	390 000	395 000	67 000	4 000	3 600
91	103	107	174	–	–	2,5	2,5	325 000	295 000	37 500	6 000	–

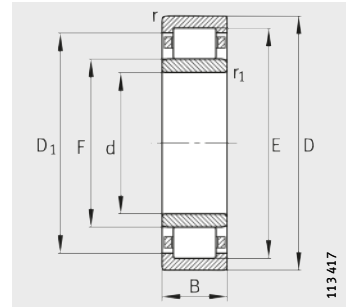


# Cylindrical roller bearings with cage

Non-locating bearings



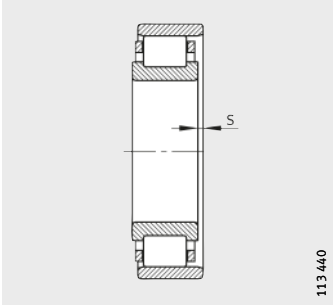
N



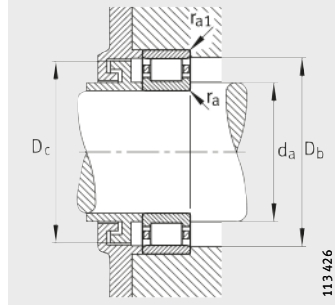
NU

Dimension table (continued) · Dimensions in mm

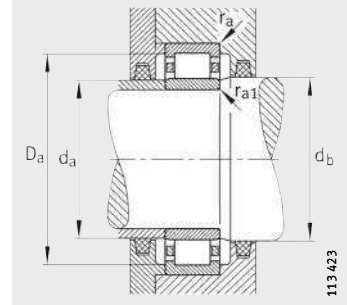
Designation	X-life	Mass m ≈ kg	Dimensions									
			d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
						min.	min.				≈	≈
NU1016-M1	XL	0,99	80	125	22	1,1	1	2,7	113,5	91,5	109,8	–
N216-E-TVP2	XL	1,55	80	140	26	2	2	1,2	127,3	95,3	–	101,5
NU216-E-TVP2	XL	1,55	80	140	26	2	2	1,3	127,3	95,3	122,9	–
NU2216-E-TVP2	XL	2,01	80	140	33	2	2	1,3	127,3	95,3	122,9	–
N316-E-TVP2	XL	4,12	80	170	39	2,1	2,1	0,6	151	101	–	110,4
NU316-E-TVP2	XL	3,96	80	170	39	2,1	2,1	0,7	151	101	143,9	–
NU2316-E-TVP2	XL	5,89	80	170	58	2,1	2,1	3,7	151	101	143,9	–
NU416-M1	XL	8,37	80	200	48	3	3	4,6	170	110	159,7	–
NU1017-M1	XL	1,04	85	130	22	1,1	1	4	118,5	96,5	114,8	–
N217-E-TVP2	XL	1,92	85	150	28	2	2	0,7	136,5	100,5	–	107,5
NU217-E-TVP2	XL	1,91	85	150	28	2	2	0,8	136,5	100,5	131,5	–
NU2217-E-TVP2	XL	2,5	85	150	36	2	2	1,3	136,5	100,5	131,5	–
N317-E-M1	XL	5,3	85	180	41	3	3	1,1	160	108	–	117,8
NU317-E-TVP2	XL	4,62	85	180	41	3	3	1,3	160	108	152,7	–
NU2317-E-TVP2	XL	6,72	85	180	60	3	3	4,7	160	108	152,7	–
NU417-M1	XL	9,85	85	210	52	4	4	5,2	177	113	165,7	–
NU1018-M1	XL	1,31	90	140	24	1,5	1,1	3	127	103	122,9	–
N218-E-TVP2	XL	2,37	90	160	30	2	2	1,4	145	107	–	114,3
NU218-E-TVP2	XL	2,36	90	160	30	2	2	1,5	145	107	139,7	–
NU2218-E-TVP2	XL	3,17	90	160	40	2	2	2,5	145	107	139,7	–
N318-E-M1	XL	6,19	90	190	43	3	3	1,3	169,5	113,5	–	124
NU318-E-TVP2	XL	5,39	90	190	43	3	3	1,5	169,5	113,5	161,6	–
NU2318-E-TVP2	XL	8,04	90	190	64	3	3	5	169,5	113,5	161,6	–
NU418-M1	XL	11,8	90	225	54	4	4	5	191,5	123,5	179,7	–
NU1019-M1	XL	1,41	95	145	24	1,5	1,1	4,1	132	108	127,9	–
N219-E-TVP2	XL	2,89	95	170	32	2,1	2,1	0,6	154,5	112,5	–	120,5
NU219-E-TVP2	XL	2,88	95	170	32	2,1	2,1	0,7	154,5	112,5	148,6	–
NU2219-E-TVP2	XL	3,9	95	170	43	2,1	2,1	2,2	154,5	112,5	148,6	–
N319-E-M1	XL	7,05	95	200	45	3	3	1,4	177,5	121,5	–	132
NU319-E-TVP2	XL	6,32	95	200	45	3	3	1,4	177,5	121,5	169,6	–
NU2319-E-TVP2	XL	9,4	95	200	67	3	3	5,6	177,5	121,5	169,6	–
NU419-M1	XL	13,9	95	240	55	4	4	5,2	201,5	133,5	189,7	–



1) Axial displacement "s" for N and NU



Mounting dimensions for N



Mounting dimensions for NU

Mounting dimensions

Basic load ratings

Fatigue limit load

Limiting speed

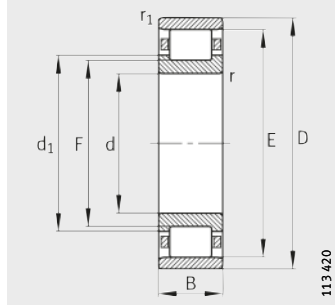
Reference speed

d <sub>a</sub>		d <sub>b</sub>	D <sub>a</sub>	D <sub>b</sub>	D <sub>c</sub>	r <sub>a</sub>	r <sub>a1</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	min.	max.	min.	max.	max.	max.	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
85	90	94	119	-	-	1	1	91 000	99 000	13 600	9 500	5 000
91	-	-	129	129	126	2	2	165 000	167 000	27 500	4 800	4 250
91	94	97	129	-	-	2	2	165 000	167 000	22 600	4 800	4 250
91	94	97	129	-	-	2	2	220 000	243 000	42 000	4 800	3 450
92	-	-	158	153	149	2,1	2,1	300 000	275 000	46 000	3 800	4 150
92	99	105	158	-	-	2,1	2,1	300 000	275 000	37 000	3 800	4 150
92	99	105	158	-	-	2,1	2,1	420 000	425 000	73 000	3 800	3 500
96	109	112	184	-	-	2,5	2,5	395 000	365 000	57 000	5 600	-
90	95	99	124	-	-	1	1	93 000	103 000	14 000	9 000	4 750
96	-	-	139	138	135	2	2	194 000	194 000	31 500	4 500	4 100
96	99	104	139	-	-	2	2	194 000	194 000	26 000	4 500	4 100
96	99	104	139	-	-	2	2	255 000	275 000	46 500	4 500	3 350
99	-	-	166	162	158	2,5	2,5	340 000	325 000	53 000	5 600	3 850
99	106	110	166	-	-	2,5	2,5	320 000	300 000	40 000	3 600	4 000
99	106	110	166	-	-	2,5	2,5	435 000	445 000	75 000	3 600	3 350
105	111	115	190	-	-	3	3	420 000	385 000	60 000	5 300	-
96	101	106	133	-	-	1,5	1	111 000	124 000	16 800	8 500	4 550
101	-	-	149	147	143	2	2	215 000	217 000	35 000	4 300	3 950
101	105	109	149	-	-	2	2	215 000	217 000	28 500	4 300	3 950
101	105	109	149	-	-	2	2	285 000	315 000	52 000	4 300	3 300
104	-	-	176	171	168	2,5	2,5	370 000	350 000	55 000	5 300	3 750
104	111	117	176	-	-	2,5	2,5	370 000	350 000	44 000	3 400	3 750
104	111	117	176	-	-	2,5	2,5	510 000	530 000	86 000	3 400	3 050
110	122	125	205	-	-	3	3	465 000	425 000	67 000	5 000	-
101	106	111	138	-	-	1,5	1	113 000	130 000	17 300	8 000	4 350
107	-	-	158	156	153	2,1	2,1	260 000	265 000	41 500	3 800	3 700
107	111	116	158	-	-	2,1	2,1	260 000	265 000	34 000	3 800	3 700
107	111	116	158	-	-	2,1	2,1	340 000	370 000	60 000	3 800	3 100
109	-	-	186	179	176	2,5	2,5	390 000	380 000	59 000	5 300	3 600
109	119	124	186	-	-	2,5	2,5	390 000	380 000	48 000	3 400	3 600
109	119	124	186	-	-	2,5	2,5	540 000	580 000	93 000	3 400	2 850
115	132	136	220	-	-	3	3	495 000	470 000	73 000	4 800	-

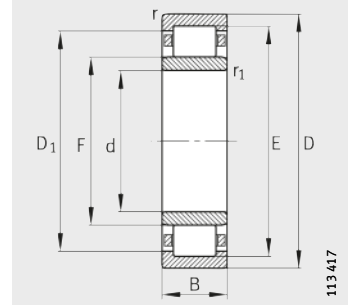


# Cylindrical roller bearings with cage

Non-locating bearings



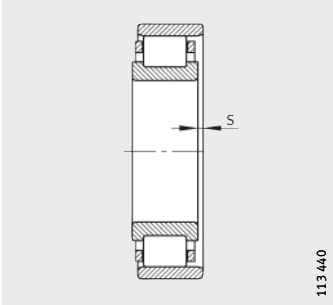
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NU

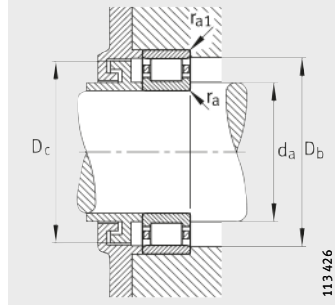
Dimension table (continued) · Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions									
			d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
						min.	min.				≈	≈
NU1020-M1	XL	1,46	100	150	24	1,5	1,1	4,3	137	113	132,9	–
N220-E-TVP2	XL	3,5	100	180	34	2,1	2,1	1,4	163	119	–	127,3
NU220-E-TVP2	XL	3,49	100	180	34	2,1	2,1	1,5	163	119	156,9	–
NU2220-E-TVP2	XL	4,77	100	180	46	2,1	2,1	2,5	163	119	156,9	–
N320-E-M1	XL	8,75	100	215	47	3	3	1,2	191,5	127,5	–	139,4
NU320-E-TVP2	XL	7,67	100	215	47	3	3	1,2	191,5	127,5	182	–
NU2320-E-TVP2	XL	12,1	100	215	73	3	3	4,2	191,5	127,5	182	–
NU420-M1	XL	15,8	100	250	58	4	4	5,7	211	139	198,2	–
NU1021-M1	XL	1,84	105	160	26	2	1,1	4,5	145,5	119,5	141	–
N221-E-M1	XL	4,63	105	190	36	2,1	2,1	1,2	171,5	125,5	–	134,5
NU221-E-TVP2	XL	4,08	105	190	36	2,1	2,1	1,3	171,5	125,5	165,1	–
NU421-M1	XL	17,7	105	260	60	4	4	5,7	220,5	144,5	207,4	–
NU1022-M1	XL	2,31	110	170	28	2	1,1	3,2	155	125	149,7	–
N222-E-TVP2	XL	4,85	110	200	38	2,1	2,1	1,4	180,5	132,5	–	141,6
NU222-E-TVP2	XL	4,84	110	200	38	2,1	2,1	1,5	180,5	132,5	173,8	–
NU2222-E-TVP2	XL	6,76	110	200	53	2,1	2,1	4	180,5	132,5	173,8	–
N322-E-M1	XL	11,7	110	240	50	3	3	1,3	211	143	–	155,6
NU322-E-TVP2	XL	10,3	110	240	50	3	3	1,3	211	143	200,9	–
NU2322-E-TVP2	XL	16,6	110	240	80	3	3	5,8	211	143	200,9	–
NU422-M1	XL	22,4	110	280	65	4	4	6,2	235	155	220,9	–
NU1024-M1	XL	2,47	120	180	28	2	1,1	3,2	165	135	159,7	–
N224-E-TVP2	XL	5,67	120	215	40	2,1	2,1	1,4	195,5	143,5	–	153,2
NU224-E-TVP2	XL	5,8	120	215	40	2,1	2,1	1,4	195,5	143,5	187,8	–
NU2224-E-TVP2	XL	8,38	120	215	58	2,1	2,1	4,5	195,5	143,5	187,8	–
N324-E-M1	XL	15,1	120	260	55	3	3	3,5	230	154	–	168,7
NU324-E-TVP2	XL	13,3	120	260	55	3	3	3,5	230	154	218,7	–
NU2324-E-M1	XL	23,2	120	260	86	3	3	7,2	230	154	218,7	–
NU424-M1	XL	30,8	120	310	72	5	5	6,9	260	170	243,9	–
NU1026-M1	XL	3,81	130	200	33	2	1,1	3,9	182	148	175,9	–
N226-E-TVP2	XL	6,51	130	230	40	3	3	1,2	209,5	153,5	–	164
NU226-E-TVP2	XL	6,5	130	230	40	3	3	1,2	209,5	153,5	201,2	–
NU2226-E-TVP2	XL	10,4	130	230	64	3	3	5,2	209,5	153,5	201,2	–
N326-E-M1	XL	18,4	130	280	58	4	4	3,5	247	167	–	181,7
NU326-E-TVP2	XL	16,2	130	280	58	4	4	3,5	247	167	235,2	–
NU2326-E-M1	XL	28,8	130	280	93	4	4	8,1	247	167	235,2	–



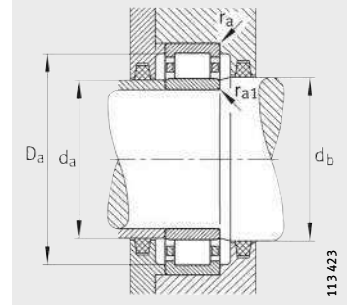
113 440

1) Axial displacement "s" for N and NU



113 426

Mounting dimensions for N



113 423

Mounting dimensions for NU

Mounting dimensions

Basic load ratings

Fatigue limit load

Limiting speed

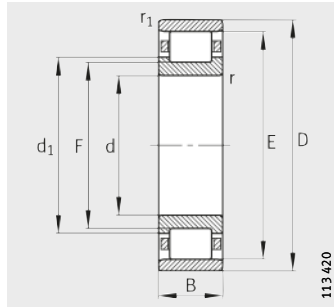
Reference speed

d <sub>a</sub>		d <sub>b</sub>	D <sub>a</sub>	D <sub>b</sub>	D <sub>c</sub>	r <sub>a</sub>	r <sub>a1</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	min.	max.	min.	max.	max.	max.	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
106	111	116	143	–	–	1,5	1	116 000	135 000	17 900	7 500	4 150
112	–	–	168	165	161	2,1	2,1	295 000	305 000	47 500	3 800	3 500
112	117	122	168	–	–	2,1	2,1	295 000	305 000	38 500	3 800	3 500
112	117	122	168	–	–	2,1	2,1	395 000	445 000	72 000	3 800	2 900
114	–	–	201	193	190	2,5	2,5	450 000	425 000	65 000	5 000	3 400
114	125	132	201	–	–	2,5	2,5	450 000	425 000	53 000	3 200	3 400
114	125	132	201	–	–	2,5	2,5	680 000	720 000	114 000	3 200	2 550
120	137	141	230	–	–	3	3	550 000	530 000	79 000	4 800	–
111	118	122	151	–	–	2	1	131 000	153 000	19 400	7 000	4 050
117	–	–	178	173	170	2,1	2,1	310 000	320 000	49 000	5 600	3 450
117	123	128	178	–	–	2,1	2,1	310 000	320 000	40 000	3 600	3 450
125	143	147	240	–	–	3	3	610 000	590 000	70 000	4 500	–
116	124	128	161	–	–	2	1	166 000	190 000	24 200	7 000	3 850
122	–	–	188	182	179	2	2	345 000	365 000	56 000	3 400	3 300
122	130	135	188	–	–	2,1	2,1	345 000	365 000	56 000	3 400	3 300
122	130	135	188	–	–	2,1	2,1	455 000	520 000	81 000	3 400	2 800
124	–	–	226	213	209	2,5	2,5	520 000	510 000	78 000	4 800	3 000
124	140	145	226	–	–	2,5	2,5	495 000	475 000	59 000	3 000	3 100
124	140	145	226	–	–	2,5	2,5	750 000	800 000	126 000	2 800	2 320
130	153	157	260	–	–	3	3	680 000	660 000	96 000	4 500	–
126	134	138	171	–	–	2	1	174 000	207 000	26 000	6 300	3 550
132	–	–	203	197	194	2,1	2,1	390 000	415 000	64 000	3 200	3 100
132	141	146	203	–	–	2,1	2,1	390 000	415 000	52 000	3 200	3 100
132	141	146	203	–	–	2,1	2,1	530 000	610 000	97 000	3 200	2 550
134	–	–	246	232	228	2,5	2,5	610 000	600 000	87 000	4 500	2 700
134	151	156	246	–	–	2,5	2,5	610 000	600 000	70 000	2 800	2 700
134	151	156	246	–	–	2,5	2,5	930 000	1 010 000	153 000	4 300	2 000
144	168	172	286	–	–	4	4	850 000	840 000	96 000	3 800	–
136	146	151	191	–	–	2	1	212 000	250 000	31 000	5 600	3 500
144	–	–	216	212	207	2,5	2,5	425 000	445 000	65 000	3 000	2 850
144	151	158	216	–	–	2,5	2,5	425 000	445 000	54 000	3 000	2 850
144	151	158	216	–	–	2,5	2,5	620 000	730 000	111 000	3 000	2 300
147	–	–	263	249	245	3	3	720 000	720 000	103 000	4 300	2 460
147	164	169	263	–	–	3	3	680 000	670 000	79 000	2 600	2 460
147	164	169	263	–	–	3	3	1 080 000	1 220 000	180 000	3 800	1 780

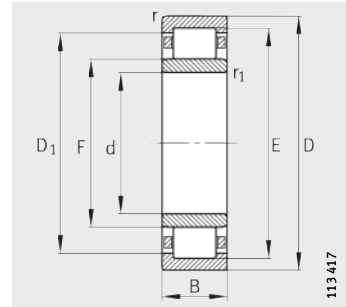


# Cylindrical roller bearings with cage

Non-locating bearings



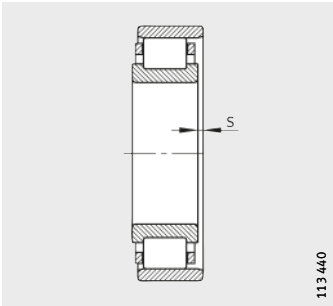
N



NU

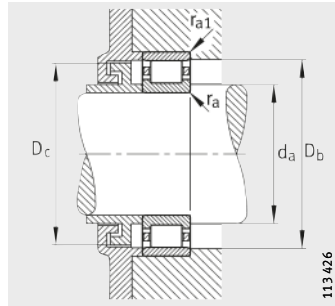
Dimension table (continued) · Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions									
			d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
						min.	min.				≈	≈
NU1028-M1	XL	3,94	140	210	33	2	1,1	3,8	192	158	185,9	–
N228-E-M1	XL	9,3	140	250	42	3	3	2	225	169	–	179,4
NU228-E-M1	XL	9,31	140	250	42	3	3	2	225	169	216,7	–
NU2228-E-M1	XL	14,5	140	250	68	3	3	7	225	169	216,7	–
N328-E-M1	XL	22,5	140	300	62	4	4	5,2	264	180	–	195,4
NU328-E-TVP2	XL	20,1	140	300	62	4	4	5,2	264	180	251,7	–
NU2328-E-M1	XL	36	140	300	102	4	4	9,2	264	180	251,7	–
NU1030-M1	XL	4,93	150	225	35	2,1	1,5	4,2	205,5	169,5	199	–
N230-E-M1	XL	11,7	150	270	45	3	3	4	242	182	–	193,1
NU230-E-M1	XL	11,8	150	270	45	3	3	4	242	182	233,2	–
NU2230-E-M1	XL	18,4	150	270	73	3	3	7,5	242	182	233,2	–
N330-E-M1	XL	26,8	150	320	65	4	4	5,5	283	193	–	209,5
NU330-E-M1	XL	26,8	150	320	65	4	4	5,5	283	193	269,8	–
NU2330-E-M1	XL	43,2	150	320	108	4	4	9,7	283	193	269,8	–
NU1032-M1	XL	5,92	160	240	38	2,1	1,5	4,3	220	180	212,9	–
N232-E-M1	XL	14,6	160	290	48	3	3	4,1	259	195	–	206,8
NU232-E-M1	XL	14,6	160	290	48	3	3	4,1	259	195	249,6	–
NU2232-E-M1	XL	23,5	160	290	80	3	3	7,2	261	193	251,1	–
N332-E-M1	–	32,6	160	340	68	4	4	5,5	300	204	–	221,6
NU332-E-M1	–	31,8	160	340	68	4	4	5,6	300	204	286	–
NU2332-E-M1	–	51,5	160	340	114	4	4	9,9	300	204	286	–
NU1034-M1	XL	8,03	170	260	42	2,1	2,1	4,8	237	193	229,1	–
N234-E-M1	XL	18	170	310	52	4	4	4,3	279	207	–	218,4
NU234-E-M1	XL	18,1	170	310	52	4	4	4,3	279	207	268,5	–
NU2234-E-M1	XL	29,4	170	310	86	4	4	7,2	281	205	269,9	–
N334-E-M1	–	37,9	170	360	72	4	4	5,9	318	218	–	237
NU334-E-M1	–	38	170	360	72	4	4	6	318	218	301,6	–
NU2334-EX-M1	–	61,4	170	360	120	4	4	10,2	320	216	303	–
NU1036-M1	XL	10,5	180	280	46	2,1	2,1	5	255	205	245,9	–
N236-E-M1	XL	18,9	180	320	52	4	4	4,7	289	217	–	230,2
NU236-E-M1	XL	18,9	180	320	52	4	4	4,7	289	217	278,6	–
NU2236-E-M1	XL	30,5	180	320	86	4	4	7,2	291	215	280	–
NU336-E-M1	–	43,9	180	380	75	4	4	6,1	335	231	319,8	–
NU2336-EX-M1	–	71,8	180	380	126	4	4	10,5	339	227	320,8	–



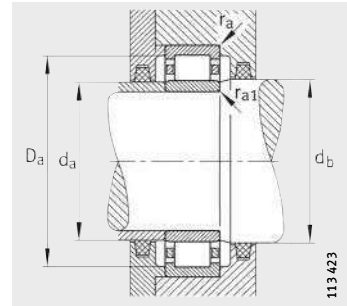
113 440

1) Axial displacement "s" for N and NU



113 426

Mounting dimensions for N



113 423

Mounting dimensions for NU

Mounting dimensions

Basic load ratings

Fatigue limit load

Limiting speed

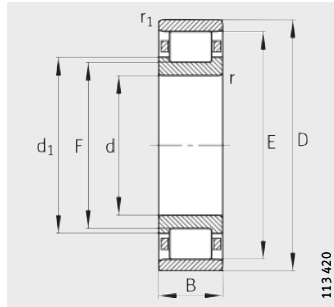
Reference speed

d <sub>a</sub>		d <sub>b</sub>	D <sub>a</sub>	D <sub>b</sub>	D <sub>c</sub>	r <sub>a</sub>	r <sub>a1</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	min.	max.	min.	max.	max.	max.	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
146	156	161	201	-	-	2	1	216 000	265 000	32 000	5 300	3 250
154	-	-	236	227	223	2,5	2,5	460 000	510 000	72 000	4 800	2 600
154	166	171	236	-	-	2,5	2,5	460 000	510 000	59 000	4 800	2 600
154	166	171	236	-	-	2,5	2,5	670 000	830 000	123 000	4 500	2 080
157	-	-	283	266	262	3	3	790 000	800 000	113 000	3 800	2 200
157	176	182	283	-	-	3	3	790 000	800 000	92 000	2 400	2 200
157	176	182	283	-	-	3	3	1 210 000	1 390 000	202 000	3 600	1 640
158	167	173	215	-	-	2,1	1,5	248 000	310 000	37 000	5 000	3 100
164	-	-	256	244	240	2,5	2,5	520 000	590 000	82 000	4 500	2 390
164	179	184	256	-	-	2,5	2,5	520 000	590 000	68 000	4 500	2 390
164	179	184	256	-	-	2,5	2,5	780 000	970 000	142 000	4 300	1 860
167	-	-	303	285	281	3	3	900 000	930 000	126 000	3 600	1 970
167	190	195	303	-	-	3	3	900 000	930 000	103 000	3 600	1 970
167	190	195	303	-	-	3	3	1 380 000	1 600 000	226 000	3 200	1 480
168	178	184	230	-	-	2,1	1,5	290 000	355 000	42 500	4 800	3 000
174	-	-	276	261	257	2,5	2,5	590 000	670 000	93 000	4 300	2 190
174	192	197	276	-	-	2,5	2,5	590 000	670 000	76 000	4 300	2 190
174	192	197	276	-	-	2,5	2,5	940 000	1 170 000	172 000	3 800	1 670
177	-	-	323	302	298	3	3	865 000	1 060 000	114 000	3 000	1 790
177	200	211	323	-	-	3	3	865 000	1 060 000	96 000	3 000	1 790
177	200	211	323	-	-	3	3	1 320 000	1 830 000	204 000	3 000	1 350
180	190	197	250	-	-	2,1	2,1	350 000	435 000	49 500	4 500	2 800
187	-	-	293	281	277	3	3	700 000	780 000	107 000	3 600	2 010
187	204	211	293	-	-	3	3	700 000	780 000	88 000	3 600	2 010
187	204	211	293	-	-	3	3	1 130 000	1 400 000	198 000	3 200	1 500
187	-	-	343	320	316	3	3	965 000	1 220 000	132 000	3 000	1 630
187	215	221	343	-	-	3	3	965 000	1 220 000	105 000	3 000	1 630
187	214	218	343	-	-	3	3	1 500 000	2 080 000	231 000	2 800	1 230
190	203	209	270	-	-	2,1	2,1	425 000	520 000	61 000	4 500	2 550
197	-	-	303	292	286	3	3	730 000	830 000	112 000	3 600	1 880
197	214	221	303	-	-	3	3	730 000	830 000	93 000	3 600	1 880
197	214	221	303	-	-	3	3	1 180 000	1 490 000	209 000	3 200	1 390
197	228	234	363	-	-	3	3	1 040 000	1 320 000	112 000	2 800	1 520
197	225	229	363	-	-	3	3	1 660 000	2 320 000	260 000	2 800	1 130

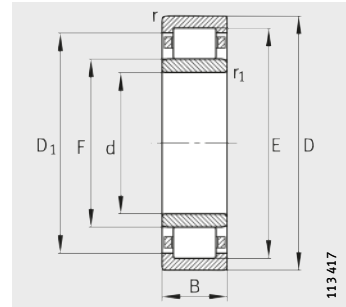


# Cylindrical roller bearings with cage

Non-locating bearings



N

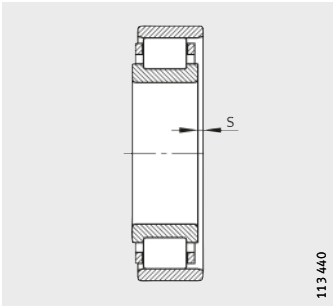


NU

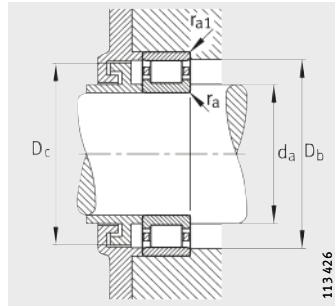
Dimension table (continued) · Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions									
			d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
						min.	min.				≈	≈
NU1038-M1	XL	10,9	190	290	46	2,1	2,1	5	265	215	255,9	–
N238-E-M1	–	22,8	190	340	55	4	4	4,7	306	230	–	244
NU238-E-M1	–	22,8	190	340	55	4	4	4,7	306	230	295	–
NU2238-E-M1	–	37,1	190	340	92	4	4	8	308	228	296,4	–
NU338-E-M1	–	50,6	190	400	78	5	5	6,3	353	245	336	–
NU2338-EX-M1	–	83,1	190	400	132	5	5	11	360	240	340,5	–
NU1040-M1	XL	14,1	200	310	51	2,1	2,1	8,3	281	229	271,5	–
N240-E-M1	–	27,2	200	360	58	4	4	4,8	323	243	–	257,6
NU240-E-M1	–	27,2	200	360	58	4	4	4,8	323	243	311,5	–
NU2240-E-M1	–	44,7	200	360	98	4	4	8,2	325	241	312,9	–
NU340-E-M1	–	57,3	200	420	80	5	5	6,3	370	258	351,8	–
NU2340-EX-M1	–	95,6	200	420	138	5	5	11,3	377	253	356,9	–
NU1044-M1	–	20,5	220	340	56	3	3	6,2	310	250	298,9	–
NU244-E-M1	–	38,5	220	400	65	4	4	5,5	358	268	344,9	–
NU2244-EX-M1	–	61,6	220	400	108	4	4	8,4	367	259	349,4	–
NU344-E-M1	–	75,5	220	460	88	5	5	7	406	282	386	–
NU2344-EX-M1	–	121	220	460	145	5	5	11,9	413	277	391,2	–
NU1048-M1	–	19,8	240	360	56	3	3	6,4	330	270	318,9	–
N248-E-M1	–	51,5	240	440	72	4	4	6	393	293	–	312
NU248-E-M1	–	51,8	240	440	72	4	4	6	393	293	376,6	–
NU2248-EX-M1	–	82,8	240	440	120	4	4	10,2	399	287	380,7	–
NU348-E-M1	–	95,7	240	500	95	5	5	7,4	442	306	421,2	–
NU2348-EX-M1	–	151	240	500	155	5	5	13,3	447	303	424	–
NU1052-M1	–	29,7	260	400	65	4	4	7,2	364	296	351,3	–
NU252-E-M1	–	68,4	260	480	80	5	5	6,2	429	317	410,8	–
NU2252-E-M1	–	109	260	480	130	5	5	10,5	433	313	413,6	–
NU352-E-M1	–	121	260	540	102	6	6	10	477	337	454,6	–
NU2352-EX-M1	–	189	260	540	165	6	6	13,7	484	324	458,4	–
NU1056-M1	–	31,3	280	420	65	4	4	7,2	384	316	371,3	–
NU256-E-M1	–	72,1	280	500	80	5	5	6,3	449	337	430,8	–
NU2256-E-M1	–	114	280	500	130	5	5	10,5	453	333	436	–
NU356-E-M1	–	147	280	580	108	6	6	8,7	512	362	488	–
NU2356-EX-M1	–	234	280	580	175	6	6	13,8	521	351	493,8	–

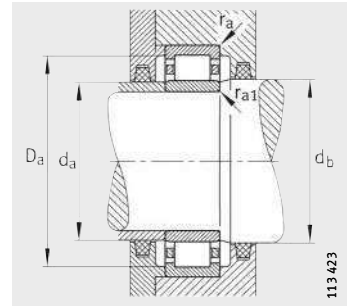




1) Axial displacement "s" for N and NU



Mounting dimensions for N



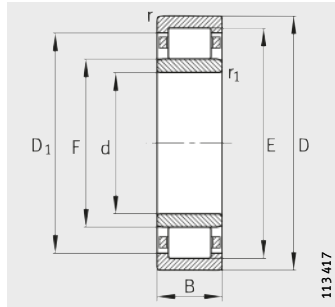
Mounting dimensions for NU

Mounting dimensions								Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$		$d_b$	$D_a$	$D_b$	$D_c$	$r_a$	$r_{a1}$	dyn. $C_r$ N	stat. $C_{0r}$ N			
min.	max.	min.	max.	min.	max.	max.	max.					
200	213	219	280	–	–	2,1	2,1	435 000	550 000	63 000	4 300	2 410
207	–	–	323	309	303	3	3	680 000	930 000	100 000	3 200	1 750
207	227	234	323	–	–	3	3	680 000	930 000	85 000	3 200	1 750
207	227	234	323	–	–	3	3	1 100 000	1 660 000	184 000	3 000	1 300
210	242	248	380	–	–	4	4	1 120 000	1 430 000	120 000	2 800	1 430
210	237,8	242,2	380	–	–	4	4	1 900 000	2 650 000	285 000	2 600	1 030
210	226	233	300	–	–	2,1	2,1	470 000	600 000	68 000	3 800	2 310
217	–	–	343	326	320	3	3	750 000	1 040 000	110 000	3 000	1 620
217	240	247	343	–	–	3	3	750 000	1 040 000	94 000	3 000	1 620
217	240	247	343	–	–	3	3	1 220 000	1 860 000	206 000	2 800	1 210
220	255	261	400	–	–	4	4	1 180 000	1 530 000	128 000	2 600	1 340
220	250,7	255,3	400	–	–	4	4	2 040 000	2 900 000	310 000	2 400	960
232	248	254	328	–	–	2,5	2,5	510 000	765 000	69 000	3 200	2 040
237	265	271	383	–	–	3	3	950 000	1 320 000	109 000	2 800	1 400
237	256,7	261,3	383	–	–	3	3	1 630 000	2 360 000	250 000	2 600	1 020
240	279	285	440	–	–	4	4	1 430 000	1 900 000	152 000	2 400	1 160
240	274,7	279,3	440	–	–	4	4	2 360 000	3 350 000	340 000	2 200	840
252	268	275	348	–	–	2,5	2,5	540 000	850 000	74 000	3 000	1 840
257	–	–	423	396	390	3	3	1 140 000	1 600 000	163 000	2 600	1 240
257	290	296	423	–	–	3	3	1 140 000	1 600 000	132 000	2 600	1 240
257	284,5	289,5	423	–	–	3	3	1 830 000	2 800 000	295 000	2 400	910
260	303	309	480	–	–	4	4	1 730 000	2 280 000	176 000	2 200	1 010
260	300,5	305,5	480	–	–	4	4	2 600 000	3 750 000	375 000	2 000	770
275	292	300	385	–	–	3	3	655 000	1 020 000	90 000	2 800	1 690
280	314	320	460	–	–	4	4	1 340 000	1 900 000	154 000	2 400	1 120
280	310	316	460	–	–	4	4	2 160 000	3 350 000	345 000	2 200	790
286	334,3	339,7	514	–	–	5	5	1 900 000	2 600 000	198 000	2 000	920
286	321,3	326,7	514	–	–	5	5	3 100 000	4 500 000	435 000	1 800	670
295	312	321	405	–	–	3	3	680 000	1 100 000	96 000	2 800	1 550
300	334	340	480	–	–	4	4	1 400 000	2 000 000	163 000	2 200	1 040
300	330	336	480	–	–	4	4	2 280 000	3 600 000	360 000	2 000	730
306	359	366	554	–	–	5	5	2 160 000	3 050 000	224 000	1 900	810
306	348	354	554	–	–	5	5	3 550 000	5 200 000	495 000	1 600	600

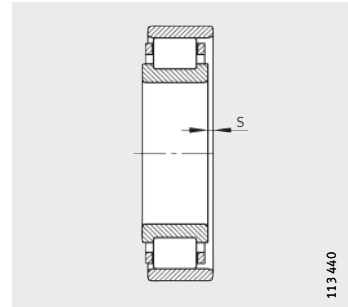


# Cylindrical roller bearings with cage

Non-locating bearings



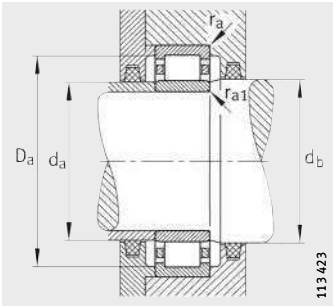
NU



1) Axial displacement "s" for N and NU

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions								
		d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>
					min.	min.				≈
<b>NU1060-M1</b>	44,6	<b>300</b>	460	74	4	4	7,9	420	340	405,2
<b>NU260-E-M1</b>	90,4	<b>300</b>	540	85	5	5	6,9	484	364	464,6
<b>NU2260-EX-M1</b>	143	<b>300</b>	540	140	5	5	12,2	495	355	472,6
<b>NU1064-M1</b>	46,9	<b>320</b>	480	74	4	4	11,5	440	360	425,1
<b>NU264-EX-M1</b>	113	<b>320</b>	580	92	5	5	7,5	520	392	499,4
<b>NU2264-EX-M1</b>	180	<b>320</b>	580	150	5	5	11,9	530	380	506
<b>NU1068-M1</b>	63,2	<b>340</b>	520	82	5	5	12,5	475	385	458,2
<b>NU1072-M1</b>	66	<b>360</b>	540	82	5	5	12,5	495	405	478,1
<b>NU2272-E-M1</b>	254	<b>360</b>	650	170	6	6	15	588	428	562
<b>NU1076-M1</b>	69,1	<b>380</b>	560	82	5	5	9	515	425	498,1
<b>NU2276-E-M1</b>	288	<b>380</b>	680	175	6	6	13,8	615	451	588,8
<b>NU1080-M1</b>	89,8	<b>400</b>	600	90	5	5	13,5	550	450	531,5
<b>NU1084-M1</b>	92,9	<b>420</b>	620	90	5	5	9,6	570	470	551,5
<b>NU1088-M1</b>	107	<b>440</b>	650	94	6	6	9,8	597	493	577,6
<b>NU1992-M1</b>	63,1	<b>460</b>	620	74	4	4	8,4	578	502	562,8
<b>NU1092-M1</b>	125	<b>460</b>	680	100	6	6	11,2	624	516	603,9
<b>NU1996-M1</b>	74,2	<b>480</b>	650	78	5	5	6,8	605	525	589
<b>NU1096-M1</b>	129	<b>480</b>	700	100	6	6	10,7	644	536	623,9
<b>NU10/500-M1</b>	133	<b>500</b>	720	100	6	6	10,7	664	556	643,9
<b>NU19/560-M1</b>	105	<b>560</b>	750	85	5	5	9,6	700	610	682
<b>NU10/560-M1</b>	213	<b>560</b>	820	115	6	6	9,8	754	626	731
<b>NU19/600-M1</b>	125	<b>600</b>	800	90	5	5	9,9	748	652	730,7
<b>NU19/670-M1</b>	186	<b>670</b>	900	103	6	6	11,3	839	731	817
<b>NU19/710-M1</b>	213	<b>710</b>	950	106	6	6	9,3	886	774	867,7



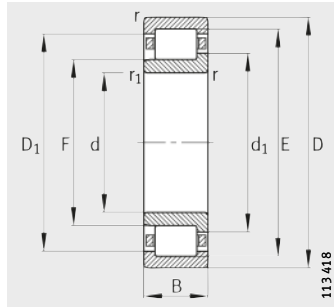
Mounting dimensions for NU

Mounting dimensions						Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$		$d_b$	$D_a$	$r_a$	$r_{a1}$	dyn. $C_r$ N	stat. $C_{0r}$ N			
min.	max.									
315	336	345	445	3	3	900 000	1 430 000	120 000	2 400	1 390
320	359	367	520	4	4	1 600 000	2 320 000	182 000	2 000	930
320	352	358	520	4	4	2 700 000	4 150 000	395 000	1 900	660
335	356	365	465	3	3	915 000	1 500 000	124 000	2 400	1 300
340	388,5	395,5	560	4	4	1 800 000	2 700 000	204 000	1 900	850
340	376,5	383,5	560	4	4	3 150 000	4 900 000	460 000	1 600	580
357	381	390	503	4	4	1 120 000	1 830 000	147 000	2 200	1 190
377	400	410	523	4	4	1 140 000	1 900 000	151 000	2 200	1 120
386	424	432	624	5	5	3 600 000	5 700 000	520 000	1 400	520
397	420	430	543	4	4	1 180 000	2 000 000	156 000	2 000	1 050
406	446	456	654	5	5	4 050 000	6 700 000	610 000	1 400	455
417	445	455	583	4	4	1 370 000	2 320 000	177 000	1 900	980
437	465	475	603	4	4	1 400 000	2 450 000	183 000	1 800	920
463	488	498	627	5	5	1 560 000	2 750 000	203 000	1 600	860
475	498	506	605	3	3	1 020 000	1 960 000	135 000	1 800	–
483	510	522	657	5	5	1 660 000	3 000 000	218 000	1 600	820
497	521	529	633	4	4	1 140 000	2 240 000	172 000	1 800	–
503	530	542	677	5	5	1 700 000	3 100 000	225 000	1 500	780
523	550	562	697	5	5	1 760 000	3 200 000	232 000	1 500	750
577	606	614	733	4	4	1 460 000	3 000 000	215 000	1 400	–
583	620	632	797	5	5	2 700 000	5 100 000	355 000	1 200	590
617	647	657	783	4	4	1 700 000	3 450 000	249 000	1 400	–
693	726	736	877	5	5	2 040 000	4 250 000	300 000	1 200	–
733	769	779	927	5	5	2 240 000	4 750 000	300 000	1 100	–

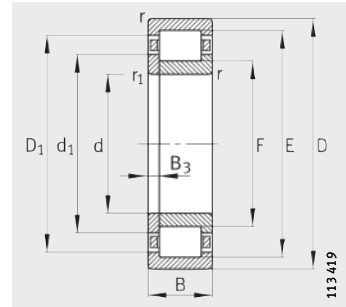


# Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



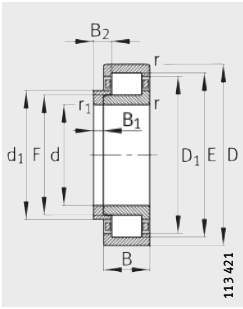
NJ  
Semi-locating bearings



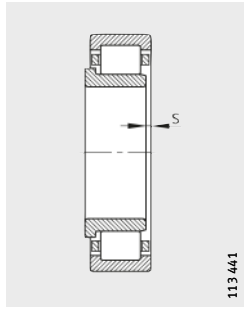
NUP  
Locating bearings

**Dimension table** - Dimensions in mm

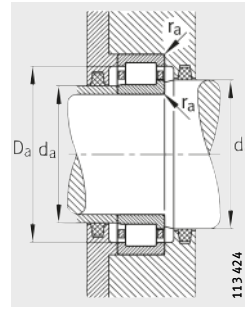
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing	L-section ring	d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
			≈kg	≈kg	min.	min.	≈	≈						
NJ202-E-TVP2	XL	–	0,049	–	15	35	11	0,6	0,3	1,6	30,3	19,3	28	21,6
NJ202-E-TVP2	XL	HJ202-E	0,049	0,005	15	35	11	0,6	0,3	–	30,3	19,3	28	21,6
NJ203-E-TVP2	XL	–	0,07	–	17	40	12	0,6	0,3	1,2	35,1	22,1	32,5	24,7
NJ203-E-TVP2	XL	HJ203-E	0,07	0,008	17	40	12	0,6	0,3	–	35,1	22,1	32,5	24,7
NUP203-E-TVP2	XL	–	0,073	–	17	40	12	0,6	0,3	–	35,1	22,1	32,5	24,7
NJ2203-E-TVP2	XL	–	0,053	–	17	40	16	0,6	0,3	1,7	35,1	22,1	32,5	24,7
NJ2203-E-TVP2	XL	HJ2203-E	0,053	0,008	17	40	16	0,6	0,3	–	35,1	22,1	32,5	24,7
NUP2203-E-TVP2	XL	–	0,055	–	17	40	16	0,6	0,6	–	35,1	22,1	32,5	24,7
NJ303-E-TVP2	XL	–	0,124	–	17	47	14	1	0,6	1,2	40,2	24,2	37,1	27,6
NJ303-E-TVP2	XL	HJ303-E	0,124	0,014	17	47	14	1	0,6	–	40,2	24,2	37,1	27,6
NUP303-E-TVP2	XL	–	0,142	–	17	47	14	1	0,6	–	40,2	24,2	37,1	27,6
NJ204-E-TVP2	XL	–	0,117	–	20	47	14	1	0,6	1	41,5	26,5	38,8	29,7
NJ204-E-TVP2	XL	HJ204-E	0,117	0,011	20	47	14	1	0,6	–	41,5	26,5	38,8	29,7
NUP204-E-TVP2	XL	–	0,119	–	20	47	14	1	0,6	–	41,5	26,5	38,8	29,7
NJ2204-E-TVP2	XL	–	0,15	–	20	47	18	1	0,6	1,8	41,5	26,5	38,8	29,7
NJ2204-E-TVP2	XL	HJ2204-E	0,15	0,012	20	47	18	1	0,6	–	41,5	26,5	38,8	29,7
NUP2204-E-TVP2	XL	–	0,154	–	20	47	18	1	0,6	–	41,5	26,5	38,8	29,7
NJ304-E-TVP2	XL	–	0,156	–	20	52	15	1,1	0,6	1	45,5	27,5	42,4	31,3
NJ304-E-TVP2	XL	HJ304-E	0,156	0,017	20	52	15	1,1	0,6	–	45,5	27,5	42,4	31,3
NUP304-E-TVP2	XL	–	0,16	–	20	52	15	1,1	0,6	–	45,5	27,5	42,4	31,3
NJ2304-E-TVP2	XL	–	0,219	–	20	52	21	1,1	0,6	1,9	45,5	27,5	42,4	31,3
NJ2304-E-TVP2	XL	HJ2304-E	0,219	0,019	20	52	21	1,1	0,6	–	45,5	27,5	42,4	31,3
NUP2304-E-TVP2	XL	–	0,224	–	20	52	21	1,1	0,6	–	45,5	27,5	42,4	31,3
NJ205-E-TVP2	XL	–	0,14	–	25	52	15	1	0,6	1,2	46,5	31,5	43,8	34,7
NJ205-E-TVP2	XL	HJ205-E	0,14	0,014	25	52	15	1	0,6	–	46,5	31,5	43,8	34,7
NUP205-E-TVP2	XL	–	0,145	–	25	52	15	1	0,6	–	46,5	31,5	43,8	34,7
NJ2205-E-TVP2	XL	–	0,17	–	25	52	18	1	0,6	1,7	46,5	31,5	43,8	34,7
NJ2205-E-TVP2	XL	HJ2205-E	0,17	0,015	25	52	18	1	0,6	–	46,5	31,5	43,8	34,7
NUP2205-E-TVP2	XL	–	0,174	–	25	52	18	1	0,6	–	46,5	31,5	43,8	34,7
NJ305-E-TVP2	XL	–	0,25	–	25	62	17	1,1	1,1	1,5	54	34	50,7	38,1
NJ305-E-TVP2	XL	HJ305-E	0,25	0,025	25	62	17	1,1	1,1	–	54	34	50,7	38,1
NUP305-E-TVP2	XL	–	0,256	–	25	62	17	1,1	1,1	–	54	34	50,7	38,1
NJ2305-E-TVP2	XL	–	0,356	–	25	62	24	1,1	1,1	1,9	54	34	50,7	38,1
NJ2305-E-TVP2	XL	HJ2305-E	0,356	0,027	25	62	24	1,1	1,1	–	54	34	50,7	38,1
NUP2305-E-TVP2	XL	–	0,364	–	25	62	24	1,1	1,1	–	54	34	50,7	38,1



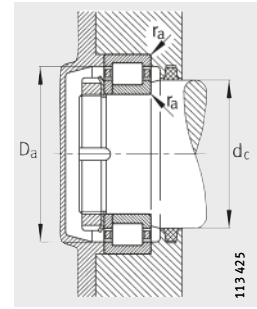
NJ and HJ  
Locating bearings



1) Axial  
displacement "s"  
for NJ



Mounting dimensions  
for NJ



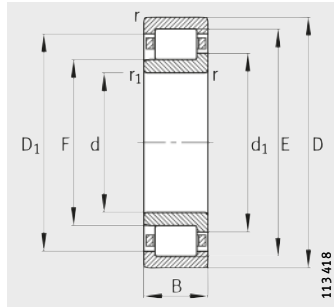
Mounting dimensions  
for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	d <sub>a</sub>		d <sub>c</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	C <sub>ur</sub> N	n <sub>G</sub> min <sup>-1</sup>	n <sub>B</sub> min <sup>-1</sup>
			min. <sup>2)</sup>	max.								
-	-	-	17,4	18,5	22	32,6	0,6	15 100	10 400	1 460	22 000	17 600
2,5	5	-	17,4	-	22	32,6	0,6	15 100	10 400	1 460	22 000	17 600
-	-	-	21	21,5	28	36	0,6	20 800	14 600	2 100	18 000	15 400
3	5,5	-	21	-	28	36	0,6	20 800	14 600	2 100	18 000	15 400
-	-	2,5	21	-	28	36	0,6	20 800	14 600	2 110	18 000	15 400
-	-	-	21	21,5	26	36	0,6	28 500	21 900	3 500	18 000	13 300
3	6	-	21	-	26	36	0,6	28 500	21 900	3 500	18 000	13 300
-	-	3	21	-	26	36	0,6	28 500	21 900	3 500	18 000	13 300
-	-	-	21,2	23,5	28	42,8	1	30 000	21 200	3 300	16 000	13 700
4	6,5	-	21,2	-	28	42,8	1	30 000	21 200	3 300	16 000	13 700
-	-	2,5	21,2	-	28	42,8	1	30 000	21 200	3 250	16 000	13 700
-	-	-	24	26	32	41	1	32 500	24 700	3 850	16 000	13 100
3	5,5	-	24	-	32	41	1	32 500	24 700	3 850	16 000	13 100
-	-	2,5	24	-	32	41	1	32 500	24 700	3 850	16 000	13 100
-	-	-	24	26	32	41	1	38 500	31 000	5 000	16 000	11 400
3	6,5	-	24	-	32	41	1	38 500	31 000	5 000	16 000	11 400
-	-	3,5	24	-	32	41	1	38 500	31 000	5 000	16 000	11 400
-	-	-	24	27	33	45	1	36 500	26 000	4 050	14 000	12 100
4	6,5	-	24	-	33	45	1	36 500	26 000	4 050	14 000	12 100
-	-	2,5	24	-	33	45	1	36 500	26 000	4 050	14 000	12 100
-	-	-	24	27	33	45	1	48 500	38 000	6 300	14 000	9 900
4	7,5	-	24	-	33	45	1	48 500	38 000	6 300	14 000	9 900
-	-	3,5	24	-	33	45	1	48 500	38 000	6 300	14 000	9 900
-	-	-	29	31	37	46	1	34 500	27 500	4 350	15 000	11 800
3	6	-	29	-	37	46	1	34 500	27 500	4 350	15 000	11 800
-	-	3	29	-	37	46	1	34 500	27 500	4 350	15 000	11 800
-	-	-	29	31	37	46	1	41 500	34 500	5 700	15 000	9 800
3	6,5	-	29	-	37	46	1	41 500	34 500	5 700	15 000	9 800
-	-	3,5	29	-	37	46	1	41 500	34 500	5 700	15 000	9 800
-	-	-	32	33	40	55	1	48 000	36 500	5 800	12 000	10 200
4	7	-	32	-	40	55	1	48 000	36 500	5 800	12 000	10 200
-	-	3	32	-	40	55	1	48 000	36 500	5 800	12 000	10 200
-	-	-	32	33	40	55	1	66 000	55 000	9 400	12 000	8 400
4	8	-	32	-	40	55	1	66 000	55 000	9 400	12 000	8 400
-	-	4	32	-	40	55	1	66 000	55 000	9 400	12 000	8 400

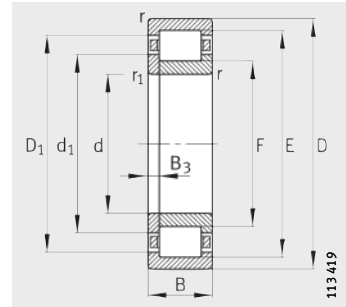
<sup>2)</sup> If axial load is present, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

# Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



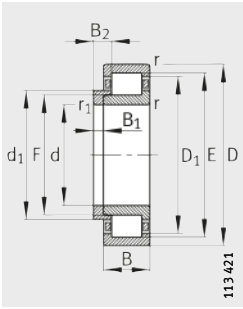
NJ  
Semi-locating bearings



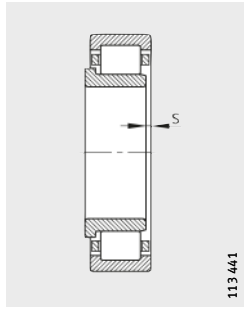
NUP  
Locating bearings

**Dimension table** (continued) · Dimensions in mm

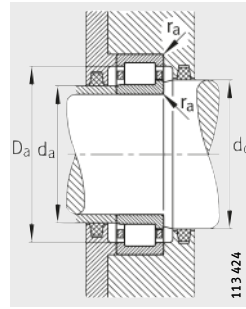
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing	L-section ring	d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
			≈kg	≈kg				min.	min.			≈	≈	
NJ206-E-TVP2	XL	–	0,213	–	30	62	16	1	0,6	1,5	55,5	37,5	52,5	41,1
NJ206-E-TVP2	XL	HJ206-E	0,213	0,024	30	62	16	1	0,6	–	55,5	37,5	52,5	41,1
NUP206-E-TVP2	XL	–	0,219	–	30	62	16	1	0,6	–	55,5	37,5	52,5	41,1
NJ2206-E-TVP2	XL	–	0,261	–	30	62	20	1	0,6	1,6	55,5	37,5	52,5	41,3
NJ2206-E-TVP2	XL	HJ2206-E	0,261	0,025	30	62	20	1	0,6	–	55,5	37,5	52,5	41,3
NUP2206-E-TVP2	XL	–	0,268	–	30	62	20	1	0,6	–	55,5	37,5	52,5	41,3
NJ306-E-TVP2	XL	–	0,376	–	30	72	19	1,1	1,1	1,2	62,5	40,5	59,2	45
NJ306-E-TVP2	XL	HJ306-E	0,376	0,042	30	72	19	1,1	1,1	–	62,5	40,5	59,2	45
NUP306-E-TVP2	XL	–	0,385	–	30	72	19	1,1	1,1	–	62,5	40,5	59,2	45
NJ2306-E-TVP2	XL	–	0,54	–	30	72	27	1,1	1,1	2,2	62,5	40,5	59,2	45
NJ2306-E-TVP2	XL	HJ2306-E	0,54	0,044	30	72	27	1,1	1,1	–	62,5	40,5	59,2	45
NUP2306-E-TVP2	XL	–	0,551	–	30	72	27	1,1	1,1	–	62,5	40,5	59,2	45
NJ406-M1	XL	–	0,859	–	30	90	23	1,5	1,5	2,3	73	45	68,4	50,3
NJ406-M1	XL	HJ406	0,859	0,082	30	90	23	1,5	1,5	–	73	45	68,4	50,3
NJ207-E-TVP2	XL	–	0,309	–	35	72	17	1,1	0,6	0,7	64	44	61	48
NJ207-E-TVP2	XL	HJ207-E	0,309	0,032	35	72	17	1,1	0,6	–	64	44	61	48
NUP207-E-TVP2	XL	–	0,317	–	35	72	17	1,1	0,6	–	64	44	61	48
NJ2207-E-TVP2	XL	–	0,416	–	35	72	23	1,1	0,6	2,2	64	44	61	48
NJ2207-E-TVP2	XL	HJ2207-E	0,416	0,035	35	72	23	1,1	0,6	–	64	44	61	48
NUP2207-E-TVP2	XL	–	0,427	–	35	72	23	1,1	0,6	–	64	44	61	48
NJ307-E-TVP2	XL	–	0,496	–	35	80	21	1,5	1,1	0,6	70,2	46,2	66,6	51
NJ307-E-TVP2	XL	HJ307-E	0,496	0,06	35	80	21	1,5	1,1	–	70,2	46,2	66,6	51
NUP307-E-TVP2	XL	–	0,506	–	35	80	21	1,5	1,1	–	70,2	46,2	66,6	51
NJ2307-E-TVP2	XL	–	0,736	–	35	80	31	1,5	1,1	2,1	70,2	46,2	66,6	51
NJ2307-E-TVP2	XL	HJ2307-E	0,736	0,063	35	80	31	1,5	1,1	–	70,2	46,2	66,6	51
NUP2307-E-TVP2	XL	–	0,751	–	35	80	31	1,5	1,5	–	70,2	46,2	66,6	51
NJ407-M1	XL	–	1,16	–	35	100	25	1,5	1,5	2,6	83	53	78,2	58,8
NJ407-M1	XL	HJ407	1,16	0,127	35	100	25	1,5	1,5	–	83	53	78,2	58,8



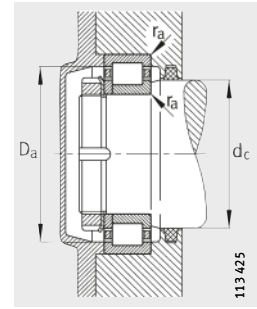
NJ and HJ  
Locating bearings



1) Axial  
displacement "s"  
for NJ



Mounting dimensions  
for NJ



Mounting dimensions  
for NUP

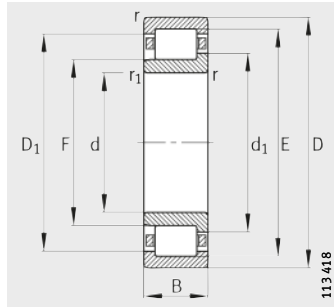
			Mounting dimensions					Basic load ratings		Fatigue limit load $C_{Ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$B_1$	$B_2$	$B_3$	$d_a$		$d_c$ min.	$D_a$ max. <sup>2)</sup>	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N			
			min. <sup>2)</sup>	max.								
-	-	-	34	37	44	56	1	45 000	36 000	5 700	12 000	9 800
4	7	-	34	-	44	56	1	45 000	36 000	5 700	12 000	9 800
-	-	3	34	-	44	56	1	45 000	36 000	5 700	12 000	9 800
-	-	-	34	37	44	56	1	57 000	48 500	8 100	12 000	8 200
4	7,5	-	34	-	44	56	1	57 000	48 500	8 100	12 000	8 200
-	-	3,5	34	-	44	56	1	57 000	48 500	8 100	12 000	8 200
-	-	-	37	40	48	65	1	61 000	48 000	8 000	10 000	9 000
5	8,5	-	37	-	48	65	1	61 000	48 000	8 000	10 000	9 000
-	-	3,5	37	-	48	65	1	61 000	48 000	8 000	10 000	9 000
-	-	-	37	40	48	65	1	86 000	75 000	13 200	10 000	7 300
5	9,5	-	37	-	48	65	1	86 000	75 000	13 200	10 000	7 300
-	-	4,5	37	-	48	65	1	86 000	75 000	13 200	10 000	7 300
-	-	-	41	44	52	79	1,5	83 000	64 000	8 500	14 000	-
7	11,5	-	41	-	52	79	1,5	83 000	64 000	8 500	14 000	-
-	-	-	39	43	50	65	1	58 000	48 500	7 900	10 000	8 300
4	7	-	39	-	50	65	1	58 000	48 500	7 900	10 000	8 300
-	-	3	39	-	50	65	1	58 000	48 500	7 900	10 000	8 300
-	-	-	39	43	50	65	1	72 000	64 000	10 800	10 000	7 300
4	8,5	-	39	-	50	65	1	72 000	64 000	10 800	10 000	7 300
-	-	4,5	39	-	50	65	1	72 000	64 000	10 800	10 000	7 300
-	-	-	42	45	53	71	1,5	76 000	63 000	10 700	9 000	8 100
6	9,5	-	42	-	53	71	1,5	76 000	63 000	10 700	9 000	8 100
-	-	3,5	42	-	53	71	1,5	76 000	63 000	10 700	9 000	8 100
-	-	-	42	45	53	71	1,5	108 000	98 000	17 400	9 000	6 700
6	11	-	42	-	53	71	1,5	108 000	98 000	17 400	9 000	6 700
-	-	5	42	-	53	71	1,5	108 000	98 000	17 400	9 000	6 700
-	-	-	46	52	61	89	1,5	102 000	83 000	13 600	12 000	-
8	13	-	46	-	61	89	1,5	102 000	83 000	13 600	12 000	-

<sup>2)</sup> If axial load is present, observe the dimensions  $D_1$  and  $d_1$ .

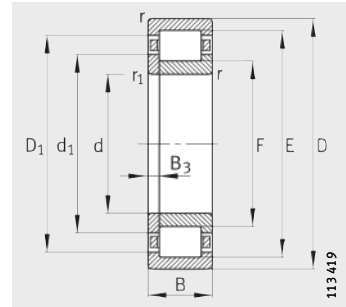


# Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



NJ  
Semi-locating bearings

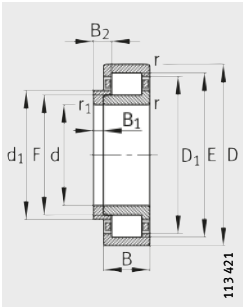


NUP  
Locating bearings

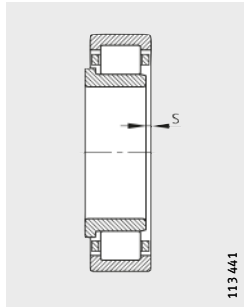
**Dimension table** (continued) · Dimensions in mm

Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈ kg	L-section ring ≈ kg	d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
								min.	min.				≈	≈
NJ208-E-TVP2	XL	–	0,389	–	40	80	18	1,1	1,1	1	71,5	49,5	68,3	54
NJ208-E-TVP2	XL	HJ208-E	0,389	0,049	40	80	18	1,1	1,1	–	71,5	49,5	68,3	54
NUP208-E-TVP2	XL	–	0,399	–	40	80	18	1,1	1,1	–	71,5	49,5	68,3	54
NJ2208-E-TVP2	XL	–	0,504	–	40	80	23	1,1	1,1	1,5	71,5	49,5	68,3	54
NJ2208-E-TVP2	XL	HJ2208-E	0,504	0,05	40	80	23	1,1	1,1	–	71,5	49,5	68,3	54
NUP2208-E-TVP2	XL	–	0,518	–	40	80	23	1,1	1,1	–	71,5	49,5	68,3	54
NJ308-E-TVP2	XL	–	0,674	–	40	90	23	1,5	1,5	1,3	80	52	75,9	57,6
NJ308-E-TVP2	XL	HJ308-E	0,674	0,087	40	90	23	1,5	1,5	–	80	52	75,9	57,6
NUP308-E-TVP2	XL	–	0,688	–	40	90	23	1,5	1,5	–	80	52	75,9	57,6
NJ2308-E-TVP2	XL	–	0,978	–	40	90	33	1,5	1,5	2,7	80	52	75,9	57,6
NJ2308-E-TVP2	XL	HJ2308-E	0,978	0,091	40	90	33	1,5	1,5	–	80	52	75,9	57,6
NUP2308-E-TVP2	XL	–	0,999	–	40	90	33	1,5	1,5	–	80	52	75,9	57,6
NJ408-M1	XL	–	1,5	–	40	110	27	2	2	2,8	92	58	86,4	64,6
NJ408-M1	XL	HJ408	1,5	0,148	40	110	27	2	2	–	92	58	86,4	64,6
NJ209-E-TVP2	XL	–	0,445	–	45	85	19	1,1	1,1	1,9	76,5	54,5	73,3	59
NJ209-E-TVP2	XL	HJ209-E	0,445	0,054	45	85	19	1,1	1,1	–	76,5	54,5	73,3	59
NUP209-E-TVP2	XL	–	0,457	–	45	85	19	1,1	1,1	–	76,5	54,5	73,3	59
NJ2209-E-TVP2	XL	–	0,544	–	45	85	23	1,1	1,1	1,5	76,5	54,5	73,3	59
NJ2209-E-TVP2	XL	HJ2209-E	0,544	0,055	45	85	23	1,1	1,1	–	76,5	54,5	73,3	59
NUP2209-E-TVP2	XL	–	0,559	–	45	85	23	1,1	1,1	–	76,5	54,5	73,3	59
NJ309-E-TVP2	XL	–	0,913	–	45	100	25	1,5	1,5	1	88,5	58,5	84,1	64,4
NJ309-E-TVP2	XL	HJ309-E	0,913	0,109	45	100	25	1,5	1,5	–	88,5	58,5	84,1	64,4
NUP309-E-TVP2	XL	–	0,937	–	45	100	25	1,5	1,5	–	88,5	58,5	84,1	64,4
NJ2309-E-TVP2	XL	–	1,33	–	45	100	36	1,5	1,5	2,5	88,5	58,5	84,1	64,4
NJ2309-E-TVP2	XL	HJ2309-E	1,33	0,115	45	100	36	1,5	1,5	–	88,5	58,5	84,1	64,4
NUP2309-E-TVP2	XL	–	1,36	–	45	100	36	1,5	1,5	–	88,5	58,5	84,1	64,4
NJ409-M1	XL	–	1,84	–	45	120	29	2	2	2,9	100,5	64,5	94,6	71,6
NJ409-M1	XL	HJ409	1,84	0,181	45	120	29	2	2	–	100,5	64,5	94,6	71,6

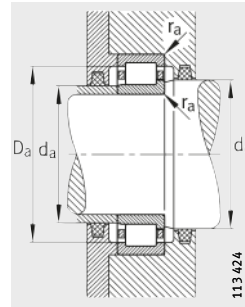




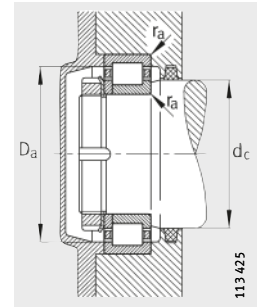
NJ and HJ  
Locating bearings



1) Axial displacement "s" for NJ



Mounting dimensions for NJ



Mounting dimensions for NUP

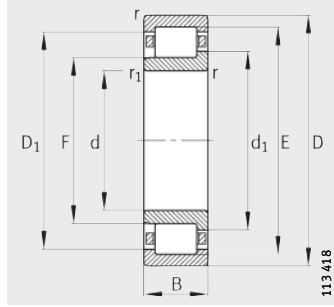
			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	d <sub>a</sub>		d <sub>c</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
			min. <sup>2)</sup>	max.								
-	-	-	47	49	56	73	1	63 000	53 000	8 700	9 000	7 600
5	8,5	-	47	-	56	73	1	63 000	53 000	8 700	9 000	7 600
-	-	3,5	47	-	56	73	1	63 000	53 000	8 700	9 000	7 600
-	-	-	47	49	56	73	1	83 000	75 000	12 900	9 000	6 400
5	9	-	47	-	56	73	1	83 000	75 000	12 900	9 000	6 400
-	-	4	47	-	56	73	1	83 000	75 000	12 900	9 000	6 400
-	-	-	49	51	60	81	1,5	95 000	78 000	12 900	7 500	7 300
7	11	-	49	-	60	81	1,5	95 000	78 000	12 900	7 500	7 300
-	-	4	49	-	60	81	1,5	95 000	78 000	12 900	7 500	7 300
-	-	-	49	51	60	81	1,5	132 000	119 000	20 700	7 500	6 000
7	12,5	-	49	-	60	81	1,5	132 000	119 000	20 700	7 500	6 000
-	-	5,5	49	-	60	81	1,5	132 000	119 000	20 700	7 500	6 000
-	-	-	53	57	67	97	2	119 000	95 000	15 800	11 000	-
8	13	-	53	-	67	97	2	119 000	95 000	15 800	11 000	-
-	-	-	52	54	61	78	1	72 000	63 000	10 600	8 500	7 100
5	8,5	-	52	-	61	78	1	72 000	63 000	10 600	8 500	7 100
-	-	3,5	52	-	61	78	1	72 000	63 000	10 600	8 500	7 100
-	-	-	52	54	61	78	1	87 000	82 000	14 100	8 500	5 800
5	9	-	52	-	61	78	1	87 000	82 000	14 100	8 500	5 800
-	-	4	52	-	61	78	1	87 000	82 000	14 100	8 500	5 800
-	-	-	54	57	66	91	1,5	115 000	98 000	16 400	6 700	6 500
7	11,5	-	54	-	66	91	1,5	115 000	98 000	16 400	6 700	6 500
-	-	4,5	54	-	66	91	1,5	115 000	98 000	16 400	6 700	6 500
-	-	-	54	57	66	91	1,5	162 000	153 000	27 000	6 700	5 400
7	13	-	54	-	66	91	1,5	162 000	153 000	27 000	6 700	5 400
-	-	6	54	-	66	91	1,5	162 000	153 000	27 000	6 700	5 400
-	-	-	58	63	74	107	2	143 000	119 000	16 000	6 000	-
8	13,5	-	58	-	74	107	2	143 000	119 000	16 000	6 000	-

<sup>2)</sup> If axial load is present, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

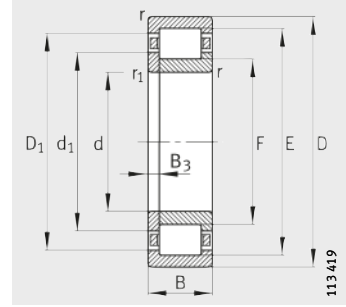


# Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



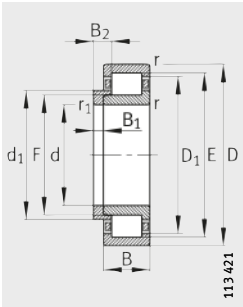
NJ  
Semi-locating bearings



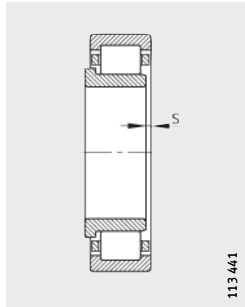
NUP  
Locating bearings

Dimension table (continued) · Dimensions in mm

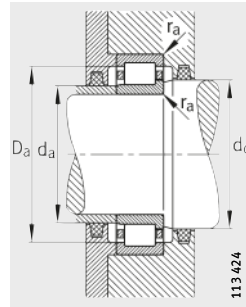
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈ kg	L-section ring ≈ kg	d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
								min.	min.				≈	≈
NJ210-E-TVP2	XL	–	0,503	–	50	90	20	1,1	1,1	1,3	81,5	59,5	78,3	64
NJ210-E-TVP2	XL	HJ210-E	0,503	0,06	50	90	20	1,1	1,1	–	81,5	59,5	78,3	64
NUP210-E-TVP2	XL	–	0,517	–	50	90	20	1,1	1,1	–	81,5	59,5	78,3	64
NJ2210-E-TVP2	XL	–	0,586	–	50	90	23	1,1	1,1	1,3	81,5	59,5	78,3	64
NJ2210-E-TVP2	XL	HJ210-E	0,586	0,06	50	90	23	1,1	1,1	–	81,5	59,5	78,3	64
NUP2210-E-TVP2	XL	–	0,597	–	50	90	23	1,1	1,1	–	81,5	59,5	78,3	64
NJ310-E-TVP2	XL	–	1,19	–	50	110	27	2	2	1,7	97	65	92,5	71,3
NJ310-E-TVP2	XL	HJ310-E	1,19	0,149	50	110	27	2	2	–	97	65	92,5	71,3
NUP310-E-TVP2	XL	–	1,21	–	50	110	27	2	2	–	97	65	92,5	71,3
NJ2310-E-TVP2	XL	–	1,77	–	50	110	40	2	2	4,2	97	65	92,5	71,3
NJ2310-E-TVP2	XL	HJ2310-E	1,77	0,156	50	110	40	2	2	–	97	65	92,5	71,3
NUP2310-E-TVP2	XL	–	1,82	–	50	110	40	2	2	–	97	65	92,5	71,3
NJ410-M1	XL	–	2,36	–	50	130	31	2,1	2,1	3	110,8	70,8	104,3	78,6
NJ410-M1	XL	HJ410	2,36	0,238	50	130	31	2,1	2,1	–	110,8	70,8	104,3	78,6
NJ211-E-TVP2	XL	–	0,679	–	55	100	21	1,5	1,1	0,8	90	66	86,6	70,8
NJ211-E-TVP2	XL	HJ211-E	0,679	0,087	55	100	21	1,5	1,1	–	90	66	86,6	70,8
NUP211-E-TVP2	XL	–	0,693	–	55	100	21	1,5	1,1	–	90	66	86,6	70,8
NJ2211-E-TVP2	XL	–	0,812	–	55	100	25	1,5	1,1	1,3	90	66	86,6	70,8
NJ2211-E-TVP2	XL	HJ2211-E	0,812	0,087	55	100	25	1,5	1,1	–	90	66	86,6	70,8
NUP2211-E-TVP2	XL	–	0,828	–	55	100	25	1,5	1,1	–	90	66	86,6	70,8
NJ311-E-TVP2	XL	–	1,51	–	55	120	29	2	2	1,8	106,5	70,5	101,4	77,5
NJ311-E-TVP2	XL	HJ311-E	1,51	0,192	55	120	29	2	2	–	106,5	70,5	101,4	77,5
NUP311-E-TVP2	XL	–	1,54	–	55	120	29	2	2	–	106,5	70,5	101,4	77,5
NJ2311-E-TVP2	XL	–	2,27	–	55	120	43	2	2	3,3	106,5	70,5	101,4	77,5
NJ2311-E-TVP2	XL	HJ2311-E	2,27	0,2	55	120	43	2	2	–	106,5	70,5	101,4	77,5
NUP2311-E-TVP2	XL	–	2,31	–	55	120	43	2	2	–	106,5	70,5	101,4	77,5
NJ411-M1	XL	–	2,88	–	55	140	33	2,1	2,1	3,3	117,2	77,2	110,7	85
NJ411-M1	XL	HJ411	2,88	0,302	55	140	33	2,1	2,1	–	117,2	77,2	110,7	85



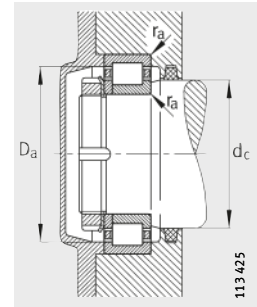
NJ and HJ  
Locating bearings



1) Axial  
displacement "s"  
for NJ



Mounting dimensions  
for NJ



Mounting dimensions  
for NUP

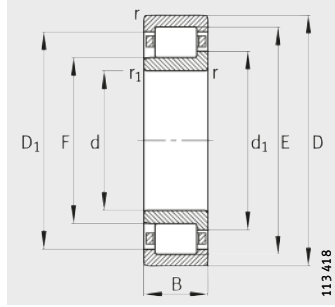
			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	d <sub>a</sub>		d <sub>c</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
			min. <sup>2)</sup>	max.	min.	max. <sup>2)</sup>	max.	N	N			
-	-	-	57	58	67	83	1	75 000	69 000	11 500	8 000	6 700
5	9	-	57	-	67	83	1	75 000	69 000	11 500	8 000	6 700
-	-	4	57	-	67	83	1	75 000	69 000	11 500	8 000	6 700
-	-	-	57	58	67	83	1	92 000	88 000	15 300	8 000	5 400
5	9	-	57	-	67	83	1	92 000	88 000	15 300	8 000	5 400
-	-	4	57	-	67	83	1	92 000	88 000	15 300	8 000	5 400
-	-	-	61	63	73	99	2	130 000	113 000	19 100	6 300	6 100
8	13	-	61	-	73	99	2	130 000	113 000	19 100	6 300	6 100
-	-	5	61	-	73	99	2	130 000	113 000	19 100	6 300	6 100
-	-	-	61	63	73	99	2	192 000	187 000	33 000	6 300	5 000
8	14,5	-	61	-	73	99	2	192 000	187 000	33 000	6 300	5 000
-	-	6,5	61	-	73	99	2	192 000	187 000	33 000	6 300	5 000
-	-	-	64	69	81	116	2	175 000	148 000	20 200	8 500	-
9	14,5	-	64	-	81	116	2	175 000	148 000	20 200	8 500	-
-	-	-	62	65	73	91	1,5	99 000	95 000	16 300	7 000	5 800
6	9,5	-	62	-	73	91	1,5	99 000	95 000	16 300	7 000	5 800
-	-	3,5	62	-	73	91	1,5	99 000	95 000	16 300	7 000	5 800
-	-	-	62	65	73	91	1,5	117 000	118 000	20 700	7 000	4 750
6	10	-	62	-	73	91	1,5	117 000	118 000	20 700	7 000	4 750
-	-	4	62	-	73	91	1,5	117 000	118 000	20 700	7 000	4 750
-	-	-	66	69	80	109	2	159 000	139 000	23 600	5 600	6 000
9	14	-	66	-	80	109	2	159 000	139 000	23 600	5 600	6 000
-	-	5	66	-	80	109	2	159 000	139 000	23 600	5 600	5 600
-	-	-	66	69	80	109	2	235 000	230 000	41 000	5 600	4 600
9	15,5	-	66	-	80	109	2	235 000	230 000	41 000	5 600	4 600
-	-	6,5	66	-	80	109	2	235 000	230 000	41 000	5 600	4 600
-	-	-	69	76	87	126	2,1	187 000	164 000	28 000	8 000	-
10	16,5	-	69	-	87	126	2,1	187 000	164 000	28 000	8 000	-

<sup>2)</sup> If axial load is present, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

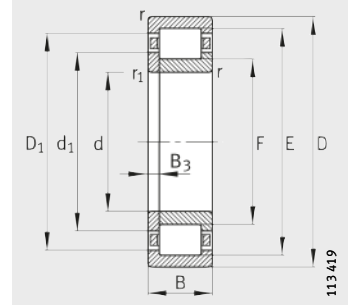


# Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



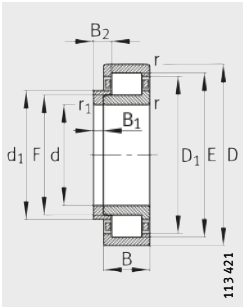
NJ  
Semi-locating bearings



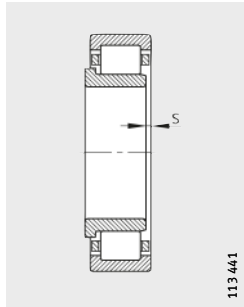
NUP  
Locating bearings

**Dimension table** (continued) · Dimensions in mm

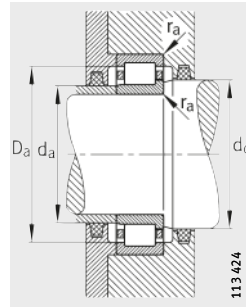
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing	L-section ring	d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
			≈ kg	≈ kg				min.	min.			≈	≈	
NJ212-E-TVP2	XL	–	0,845	–	60	110	22	1,5	1,5	1,6	100	72	96,1	77,6
NJ212-E-TVP2	XL	HJ212-E	0,845	0,106	60	110	22	1,5	1,5	–	100	72	96,1	77,6
NUP212-E-TVP2	XL	–	0,865	–	60	110	22	1,5	1,5	–	100	72	96,1	77,6
NJ2212-E-TVP2	XL	–	1,1	–	60	110	28	1,5	1,5	1,6	100	72	96,1	77,6
NJ2212-E-TVP2	XL	HJ212-E	1,1	0,106	60	110	28	1,5	1,5	–	100	72	96,1	77,6
NUP2212-E-TVP2	XL	–	1,12	–	60	110	28	1,5	1,5	–	100	72	96,1	77,6
NJ312-E-TVP2	XL	–	1,89	–	60	130	31	2,1	2,1	1,8	115	77	109,6	84,4
NJ312-E-TVP2	XL	HJ312-E	1,89	0,229	60	130	31	2,1	2,1	–	115	77	109,6	84,4
NUP312-E-TVP2	XL	–	1,93	–	60	130	31	2,1	2,1	–	115	77	109,6	84,4
NJ2312-E-TVP2	XL	–	2,83	–	60	130	46	2,1	2,1	3,5	115	77	109,6	84,4
NJ2312-E-TVP2	XL	HJ2312-E	2,83	0,238	60	130	46	2,1	2,1	–	115	77	109,6	84,4
NUP2312-E-TVP2	XL	–	2,88	–	60	130	46	2,1	2,1	–	115	77	109,6	84,4
NJ412-M1	XL	–	3,42	–	60	150	35	2,1	2,1	3,4	127	83	119,5	91,6
NJ412-M1	XL	HJ412	3,42	0,347	60	150	35	2,1	2,1	–	127	83	119,5	91,6
NJ213-E-TVP2	XL	–	1,06	–	65	120	23	1,5	1,5	1,4	108,5	78,5	104,3	84,4
NJ213-E-TVP2	XL	HJ213-E	1,06	0,127	65	120	23	1,5	1,5	–	108,5	78,5	104,3	84,4
NUP213-E-TVP2	XL	–	1,09	–	65	120	23	1,5	1,5	–	108,5	78,5	104,3	84,4
NJ2213-E-TVP2	XL	–	1,46	–	65	120	31	1,5	1,5	1,9	108,5	78,5	104,3	84,4
NJ2213-E-TVP2	XL	HJ2213-E	1,46	0,13	65	120	31	1,5	1,5	–	108,5	78,5	104,3	84,4
NUP2213-E-TVP2	XL	–	1,54	–	65	120	31	1,5	1,5	–	108,5	78,5	104,3	84,4
NJ313-E-TVP2	XL	–	2,32	–	65	140	33	2,1	2,1	1,5	124,5	82,5	118,6	90,5
NJ313-E-TVP2	XL	HJ313-E	2,32	0,285	65	140	33	2,1	2,1	–	124,5	82,5	118,6	90,5
NUP313-E-TVP2	XL	–	2,37	–	65	140	33	2,1	2,1	–	124,5	82,5	118,6	90,5
NJ2313-E-TVP2	XL	–	3,38	–	65	140	48	2,1	2,1	4	124,5	82,5	118,6	90,5
NJ2313-E-TVP2	XL	HJ2313-E	3,38	0,303	65	140	48	2,1	2,1	–	124,5	82,5	118,6	90,5
NUP2313-E-TVP2	XL	–	3,45	–	65	140	48	2,1	2,1	–	124,5	82,5	118,6	90,5
NJ413-M1	XL	–	4,15	–	65	160	37	2,1	2,1	3,5	135,3	89,3	127,7	98,3
NJ413-M1	XL	HJ413	4,15	0,432	65	160	37	2,1	2,1	–	135,3	89,3	127,7	98,3



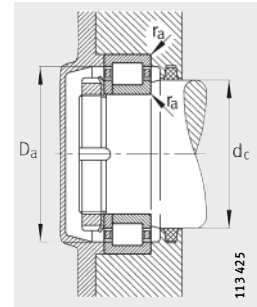
NJ and HJ  
Locating bearings



1) Axial displacement "s" for NJ



Mounting dimensions for NJ



Mounting dimensions for NUP

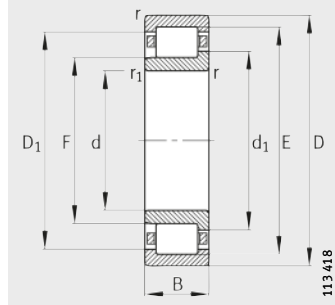
			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	d <sub>a</sub>		d <sub>c</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
			min. <sup>2)</sup>	max.								
-	-	-	69	71	80	101	1,5	111 000	102 000	16 800	6 300	5 400
6	10	-	69	-	80	101	1,5	111 000	102 000	16 800	6 300	5 400
-	-	4	69	-	80	101	1,5	111 000	102 000	16 800	6 300	5 400
-	-	-	69	71	80	101	1,5	151 000	152 000	26 500	6 300	4 400
6	10	-	69	-	80	101	1,5	151 000	152 000	26 500	6 300	4 400
-	-	4	69	-	80	101	1,5	151 000	152 000	26 500	6 300	4 400
-	-	-	72	75	86	118	2,1	177 000	157 000	26 500	5 000	5 300
9	14,5	-	72	-	86	118	2,1	177 000	157 000	26 500	5 000	5 300
-	-	5,5	72	-	86	118	2,1	177 000	157 000	26 500	5 000	5 300
-	-	-	72	75	86	118	2,1	265 000	260 000	47 000	5 000	4 300
9	16	-	72	-	86	118	2,1	265 000	260 000	47 000	5 000	4 300
-	-	7	72	-	86	118	2,1	265 000	260 000	47 000	5 000	4 300
-	-	-	74	82	94	136	2	211 000	184 000	30 500	7 500	-
10	16,5	-	74	-	94	136	2	211 000	184 000	30 500	7 500	-
-	-	-	74	77	87	111	1,5	127 000	119 000	19 800	6 000	5 000
6	10	-	74	-	87	111	1,5	127 000	119 000	19 800	6 000	5 000
-	-	4	74	-	87	111	1,5	127 000	119 000	19 800	6 000	5 000
-	-	-	74	77	87	111	1,5	176 000	181 000	32 000	5 600	4 150
6	10,5	-	74	-	87	111	1,5	176 000	181 000	32 000	5 600	4 150
-	-	4,5	74	-	87	111	1,5	176 000	181 000	32 000	5 600	4 150
-	-	-	77	81	93	128	2,1	214 000	191 000	32 000	4 800	4 900
10	15,5	-	77	-	93	128	2,1	214 000	191 000	32 000	4 800	4 900
-	-	5,5	77	-	93	128	2,1	214 000	191 000	32 000	4 800	4 900
-	-	-	77	81	93	128	2,1	295 000	285 000	50 000	4 800	4 050
10	18	-	77	-	93	128	2,1	295 000	285 000	50 000	4 800	4 050
-	-	8	77	-	93	128	2,1	295 000	285 000	50 000	4 800	4 050
-	-	-	79	88	100	146	2,1	230 000	203 000	33 000	7 000	-
11	18	-	79	-	100	146	2,1	230 000	203 000	33 000	7 000	-

<sup>2)</sup> If axial load is present, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

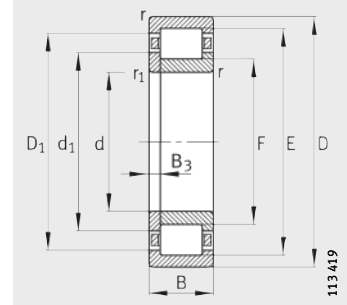


# Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



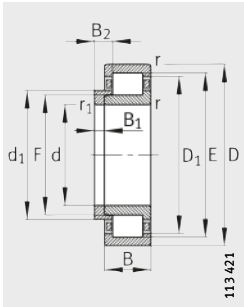
NJ  
Semi-locating bearings



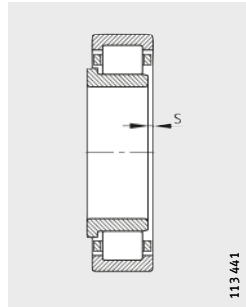
NUP  
Locating bearings

Dimension table (continued) · Dimensions in mm

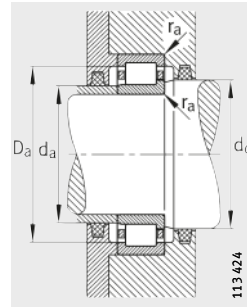
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing	L-section ring	d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
			≈ kg	≈ kg				min.	min.			≈	≈	
NJ214-E-TVP2	XL	–	1,18	–	70	125	24	1,5	1,5	1,6	113,5	83,5	109,4	89,4
NJ214-E-TVP2	XL	HJ214-E	1,18	0,155	70	125	24	1,5	1,5	–	113,5	83,5	109,4	89,4
NUP214-E-TVP2	XL	–	1,2	–	70	125	24	1,5	1,5	–	113,5	83,5	109,4	89,4
NJ2214-E-TVP2	XL	–	1,54	–	70	125	31	1,5	1,5	1,6	113,5	83,5	109,4	89,4
NJ2214-E-TVP2	XL	HJ2214-E	1,54	0,157	70	125	31	1,5	1,5	–	113,5	83,5	109,4	89,4
NUP2214-E-TVP2	XL	–	1,58	–	70	125	31	1,5	1,5	–	113,5	83,5	109,4	89,4
NJ314-E-TVP2	XL	–	2,84	–	70	150	35	2,1	2,1	1,7	133	89	126,8	97,4
NJ314-E-TVP2	XL	HJ314-E	2,84	0,328	70	150	35	2,1	2,1	–	133	89	126,8	97,4
NUP314-E-TVP2	XL	–	2,89	–	70	150	35	2,1	2,1	–	133	89	126,8	97,4
NJ2314-E-TVP2	XL	–	4,1	–	70	150	51	2,1	2,1	4,7	133	89	126,8	97,4
NJ2314-E-TVP2	XL	HJ2314-E	4,1	0,352	70	150	51	2,1	2,1	–	133	89	126,8	97,4
NUP2314-E-TVP2	XL	–	4,18	–	70	150	51	2,1	2,1	–	133	89	126,8	97,4
NJ414-M1	XL	–	6,07	–	70	180	42	3	3	4	152	100	142,7	110,3
NJ414-M1	XL	HJ414	6,07	0,63	70	180	42	3	3	–	152	100	142,7	110,3
NJ215-E-TVP2	XL	–	1,3	–	75	130	25	1,5	1,5	1,2	118,5	88,5	114,4	94,4
NJ215-E-TVP2	XL	HJ215-E	1,3	0,164	75	130	25	1,5	1,5	–	118,5	88,5	114,4	94,4
NUP215-E-TVP2	XL	–	1,33	–	75	130	25	1,5	1,5	–	118,5	88,5	114,4	94,4
NJ2215-E-TVP2	XL	–	1,64	–	75	130	31	1,5	1,5	1,6	118,5	88,5	114,4	94,4
NJ2215-E-TVP2	XL	HJ2215-E	1,64	0,165	75	130	31	1,5	1,5	–	118,5	88,5	114,4	94,4
NUP2215-E-TVP2	XL	–	1,67	–	75	130	31	1,5	1,5	–	118,5	88,5	114,4	94,4
NJ315-E-TVP2	XL	–	3,39	–	75	160	37	2,1	2,1	1,2	143	95	136,2	104,1
NJ315-E-TVP2	XL	HJ315-E	3,39	0,407	75	160	37	2,1	2,1	–	143	95	136,2	104,1
NUP315-E-TVP2	XL	–	3,45	–	75	160	37	2,1	2,1	–	143	95	136,2	104,1
NJ2315-E-TVP2	XL	–	5,04	–	75	160	55	2,1	2,1	4,2	143	95	136,2	104,1
NJ2315-E-TVP2	XL	HJ2315-E	5,04	0,436	75	160	55	2,1	2,1	–	143	95	136,2	104,1
NUP2315-E-TVP2	XL	–	5,14	–	75	160	55	2,1	2,1	–	143	95	136,2	104,1
NJ415-M1	XL	–	7,21	–	75	190	45	3	3	4,5	160,5	104,5	150,7	115,8
NJ415-M1	XL	HJ415	7,21	0,737	75	190	45	3	3	–	160,5	104,5	150,7	115,8



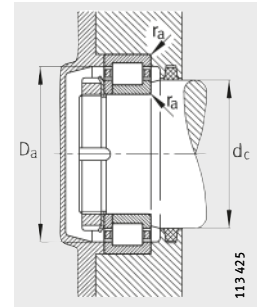
NJ and HJ  
Locating bearings



1) Axial  
displacement "s"  
for NJ



Mounting dimensions  
for NJ



Mounting dimensions  
for NUP

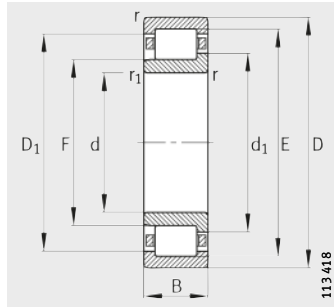
			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	d <sub>a</sub>		d <sub>c</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
			min. <sup>2)</sup>	max.								
-	-	-	79	82	92	116	1,5	140 000	137 000	23 100	5 300	4 750
7	11	-	79	-	92	116	1,5	140 000	137 000	23 100	5 300	4 750
-	-	4	79	-	92	116	1,5	140 000	137 000	23 100	5 300	4 750
-	-	-	79	82	92	116	1,5	184 000	194 000	34 000	5 300	3 900
7	11,5	-	79	-	92	116	1,5	184 000	194 000	34 000	5 300	3 900
-	-	4,5	79	-	92	116	1,5	184 000	194 000	34 000	5 300	3 900
-	-	-	82	87	100	138	2,1	242 000	222 000	37 000	4 500	4 550
10	15,5	-	82	-	100	138	2,1	242 000	222 000	37 000	4 500	4 550
-	-	5,5	82	-	100	138	2,1	242 000	222 000	37 000	4 500	4 550
-	-	-	82	87	100	138	2,1	325 000	325 000	56 000	4 500	3 850
10	18,5	-	82	-	100	138	2,1	325 000	325 000	56 000	4 500	3 850
-	-	8,5	82	-	100	138	2,1	325 000	325 000	56 000	4 500	3 850
-	-	-	86	99	112	164	2,5	285 000	255 000	42 000	6 300	-
12	20	-	86	-	112	164	2,5	285 000	255 000	42 000	6 300	-
-	-	-	84	87	96	121	1,5	154 000	156 000	26 500	5 300	4 500
7	11	-	84	-	96	121	1,5	154 000	156 000	26 500	5 300	4 500
-	-	4	84	-	96	121	1,5	154 000	156 000	26 500	5 300	4 500
-	-	-	84	87	96	121	1,5	191 000	207 000	36 000	5 300	3 700
7	11,5	-	84	-	96	121	1,5	191 000	207 000	36 000	5 300	3 700
-	-	4,5	84	-	96	121	1,5	191 000	207 000	36 000	5 300	3 700
-	-	-	87	93	106	148	2,1	285 000	265 000	43 000	4 000	4 200
11	16,5	-	87	-	106	148	2,1	285 000	265 000	43 000	4 000	4 200
-	-	5,5	87	-	106	148	2,1	285 000	265 000	43 000	4 000	4 200
-	-	-	87	93	106	148	2,1	390 000	395 000	67 000	4 000	3 600
11	19,5	-	87	-	106	148	2,1	390 000	395 000	67 000	4 000	3 600
-	-	8,5	87	-	106	148	2,1	390 000	395 000	67 000	4 000	3 600
-	-	-	91	103	118	174	2,5	325 000	295 000	46 500	6 000	-
13	21,5	-	91	-	118	174	2,5	325 000	295 000	46 500	6 000	-

<sup>2)</sup> If axial load is present, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

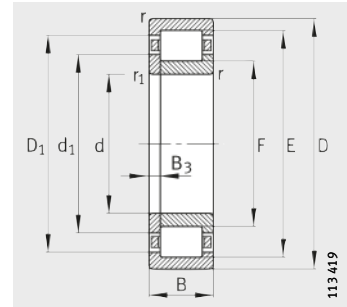


# Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



NJ  
Semi-locating bearings

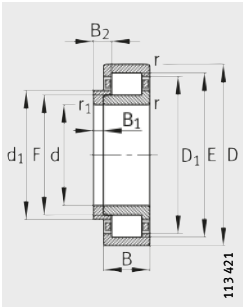


NUP  
Locating bearings

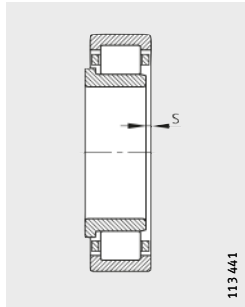
Dimension table (continued) · Dimensions in mm

Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing	L-section ring	d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
			≈ kg	≈ kg				min.	min.			≈	≈	
NJ216-E-TVP2	XL	–	1,58	–	80	140	26	2	2	1,3	127,3	95,3	122,9	101,5
NJ216-E-TVP2	XL	HJ216-E	1,58	0,22	80	140	26	2	2	–	127,3	95,3	122,9	101,5
NUP216-E-TVP2	XL	–	1,62	–	80	140	26	2	2	–	127,3	95,3	122,9	101,5
NJ2216-E-TVP2	XL	–	2,04	–	80	140	33	2	2	1,3	127,3	95,3	122,9	101,5
NJ2216-E-TVP2	XL	HJ216-E	2,04	0,22	80	140	33	2	2	–	127,3	95,3	122,9	101,5
NUP2216-E-TVP2	XL	–	2,08	–	80	140	33	2	2	–	127,3	95,3	122,9	101,5
NJ316-E-TVP2	XL	–	4,03	–	80	170	39	2,1	2,1	0,7	151	101	143,9	110,4
NJ316-E-TVP2	XL	HJ316-E	4,03	0,456	80	170	39	2,1	2,1	–	151	101	143,9	110,4
NUP316-E-TVP2	XL	–	4,11	–	80	170	39	2,1	2,1	–	151	101	143,9	110,4
NJ2316-E-TVP2	XL	–	6	–	80	170	58	2,1	2,1	3,7	151	101	143,9	110,4
NJ2316-E-TVP2	XL	HJ2316-E	6	0,488	80	170	58	2,1	2,1	–	151	101	143,9	110,4
NUP2316-E-TVP2	XL	–	6,11	–	80	170	58	2,1	2,1	–	151	101	143,9	110,4
NJ416-M1	XL	–	8,52	–	80	200	48	3	3	4,6	170	110	159,7	121,8
NJ416-M1	XL	HJ416	8,52	0,808	80	200	48	3	3	–	170	110	159,7	121,8
NJ217-E-TVP2	XL	–	1,95	–	85	150	28	2	2	0,8	136,5	100,5	131,5	107,5
NJ217-E-TVP2	XL	HJ217-E	1,95	0,247	85	150	28	2	2	–	136,5	100,5	131,5	107,5
NUP217-E-TVP2	XL	–	2,08	–	85	150	28	2	2	–	136,5	100,5	131,5	107,5
NJ2217-E-TVP2	XL	–	2,55	–	85	150	36	2	2	1,3	136,5	100,5	131,5	107,5
NJ2217-E-TVP2	XL	HJ2217-E	2,55	0,249	85	150	36	2	2	–	136,5	100,5	131,5	107,5
NUP2217-E-TVP2	XL	–	2,6	–	85	150	36	2	2	–	136,5	100,5	131,5	107,5
NJ317-E-TVP2	XL	–	4,71	–	85	180	41	3	3	1,3	160	108	152,7	117,8
NJ317-E-TVP2	XL	HJ317-E	4,71	0,566	85	180	41	3	3	–	160	108	152,7	117,8
NUP317-E-TVP2	XL	–	4,8	–	85	180	41	3	3	–	160	108	152,7	117,8
NJ2317-E-TVP2	XL	–	6,85	–	85	180	60	3	3	4,7	160	108	152,7	117,8
NJ2317-E-TVP2	XL	HJ2317-E	6,85	0,606	85	180	60	3	3	–	160	108	152,7	117,8
NUP2317-E-TVP2	XL	–	6,99	–	85	180	60	3	3	–	160	108	152,7	117,8
NJ417-M1	XL	–	10	–	85	210	52	4	4	5,2	177	113	165,7	125,8
NJ417-M1	XL	HJ417	10	0,901	85	210	52	4	4	–	177	113	165,7	125,8

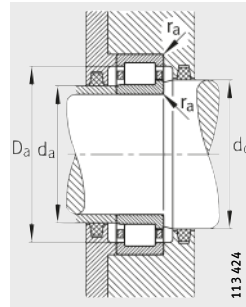




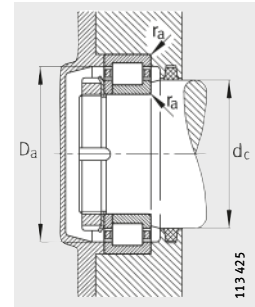
NJ and HJ  
Locating bearings



1) Axial  
displacement "s"  
for NJ



Mounting dimensions  
for NJ



Mounting dimensions  
for NUP

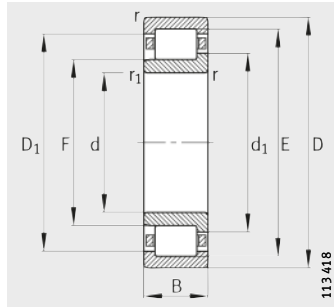
			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	d <sub>a</sub>		d <sub>c</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
			min. <sup>2)</sup>	max.	min.	max. <sup>2)</sup>	max.	N	N			
-	-	-	91	94	104	129	2	165 000	167 000	27 500	4 800	4 250
8	12,5	-	91	-	104	129	2	165 000	167 000	27 500	4 800	4 250
-	-	4,5	91	-	104	129	2	165 000	167 000	27 500	4 800	4 250
-	-	-	91	94	104	129	2	220 000	243 000	42 000	4 800	3 450
8	12,5	-	91	-	104	129	2	220 000	243 000	42 000	4 800	3 450
-	-	4,5	91	-	104	129	2	220 000	243 000	42 000	4 800	3 450
-	-	-	92	99	114	158	2,1	300 000	275 000	46 000	3 800	4 150
11	17	-	92	-	114	158	2,1	300 000	275 000	46 000	3 800	4 150
-	-	6	92	-	114	158	2,1	300 000	275 000	46 000	3 800	4 150
-	-	-	92	99	114	158	2,1	420 000	425 000	73 000	3 800	3 500
11	20	-	92	-	114	158	2,1	420 000	425 000	73 000	3 800	3 500
-	-	9	92	-	114	158	2,1	420 000	425 000	73 000	3 800	3 500
-	-	-	96	109	124	184	2,5	395 000	365 000	46 500	5 600	-
13	22	-	96	-	124	184	2,5	395 000	365 000	46 500	5 600	-
-	-	-	96	99	110	139	2	194 000	194 000	31 500	4 500	4 100
8	12,5	-	96	-	110	139	2	194 000	194 000	31 500	4 500	4 100
-	-	4,5	96	-	110	139	2	194 000	194 000	31 500	4 500	4 100
-	-	-	96	99	110	139	2	255 000	275 000	46 000	4 500	3 350
8	13	-	96	-	110	139	2	255 000	275 000	46 000	4 500	3 350
-	-	5	96	-	110	139	2	255 000	275 000	46 000	4 500	3 350
-	-	-	99	106	119	166	2,5	320 000	300 000	49 500	3 600	4 000
12	18,5	-	99	-	119	166	2,5	320 000	300 000	49 500	3 600	4 000
-	-	6,5	99	-	119	166	2,5	320 000	300 000	49 500	3 600	4 000
-	-	-	99	106	119	166	2,5	435 000	445 000	75 000	3 600	3 350
12	22	-	99	-	119	166	2,5	435 000	445 000	75 000	3 600	3 350
-	-	10	99	-	119	166	2,5	435 000	445 000	75 000	3 600	3 350
-	-	-	105	111	128	190	3	420 000	385 000	48 500	5 300	-
14	24	-	105	-	128	190	3	420 000	385 000	48 500	5 300	-

<sup>2)</sup> If axial load is present, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

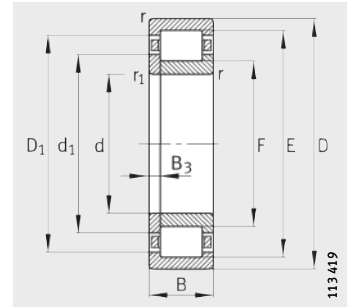


# Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



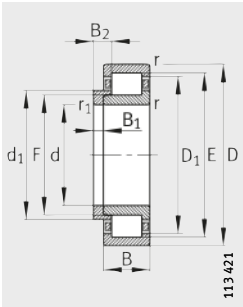
NJ  
Semi-locating bearings



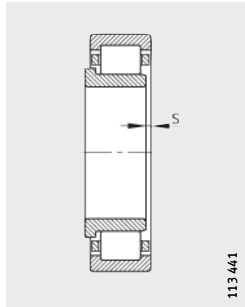
NUP  
Locating bearings

Dimension table (continued) · Dimensions in mm

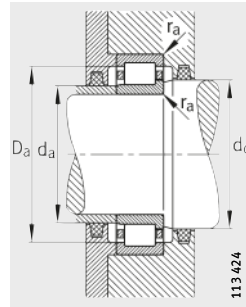
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
								min.	min.				≈	≈
NJ218-E-TVP2	XL	–	2,41	–	90	160	30	2	2	1,5	145	107	139,7	114,3
NJ218-E-TVP2	XL	HJ218-E	2,41	0,317	90	160	30	2	2	–	145	107	139,7	114,3
NUP218-E-TVP2	XL	–	2,46	–	90	160	30	2	2	–	145	107	139,7	114,3
NJ2218-E-TVP2	XL	–	3,23	–	90	160	40	2	2	2,5	145	107	139,7	114,3
NJ2218-E-TVP2	XL	HJ2218-E	3,23	0,323	90	160	40	2	2	–	145	107	139,7	114,3
NUP2218-E-TVP2	XL	–	3,29	–	90	160	40	2	2	–	145	107	139,7	114,3
NJ318-E-TVP2	XL	–	5,49	–	90	190	43	3	3	1,5	169,5	113,5	161,6	124
NJ318-E-TVP2	XL	HJ318-E	5,49	0,623	90	190	43	3	3	–	169,5	113,5	161,6	124
NUP318-E-TVP2	XL	–	5,59	–	90	190	43	3	3	–	169,5	113,5	161,6	124
NJ2318-E-TVP2	XL	–	8,19	–	90	190	64	3	3	5	169,5	113,5	161,6	124
NJ2318-E-TVP2	XL	HJ2318-E	8,19	0,669	90	190	64	3	3	–	169,5	113,5	161,6	124
NUP2318-E-TVP2	XL	–	8,35	–	90	190	64	3	3	–	169,5	113,5	161,6	124
NJ418-M1	XL	–	11,8	–	90	225	54	4	4	5	191,5	123,5	179,7	136,8
NJ418-M1	XL	HJ418	11,8	1,1	90	225	54	4	4	–	191,5	123,5	179,7	136,8
NJ219-E-TVP2	XL	–	2,94	–	95	170	32	2,1	2,1	0,7	154,5	112,5	148,6	120,5
NJ219-E-TVP2	XL	HJ219-E	2,94	0,352	95	170	32	2,1	2,1	–	154,5	112,5	148,6	120,5
NUP219-E-TVP2	XL	–	2,99	–	95	170	32	2,1	2,1	–	154,5	112,5	148,6	120,5
NJ2219-E-TVP2	XL	–	3,98	–	95	170	43	2,1	2,1	2,2	154,5	112,5	148,6	120,5
NJ2219-E-TVP2	XL	HJ2219-E	3,98	0,366	95	170	43	2,1	2,1	–	154,5	112,5	148,6	120,5
NUP2219-E-TVP2	XL	–	4,05	–	95	170	43	2,1	2,1	–	154,5	112,5	148,6	120,5
NJ319-E-TVP2	XL	–	6,44	–	95	200	45	3	3	1,4	177,5	121,5	169,6	132
NJ319-E-TVP2	XL	HJ319-E	6,44	0,777	95	200	45	3	3	–	177,5	121,5	169,6	132
NUP319-E-TVP2	XL	–	6,56	–	95	200	45	3	3	–	177,5	121,5	169,6	132
NJ2319-E-TVP2	XL	–	9,58	–	95	200	67	3	3	5,6	177,5	121,5	169,6	132
NJ2319-E-TVP2	XL	HJ2319-E	9,58	0,83	95	200	67	3	3	–	177,5	121,5	169,6	132
NUP2319-E-TVP2	XL	–	9,77	–	95	200	67	3	3	–	177,5	121,5	169,6	132
NJ419-M1	XL	–	14,1	–	95	240	55	4	4	5,2	201,5	133,5	189,7	146,8
NJ419-M1	XL	HJ419	14,1	1,36	95	240	55	4	4	–	201,5	133,5	189,7	146,8



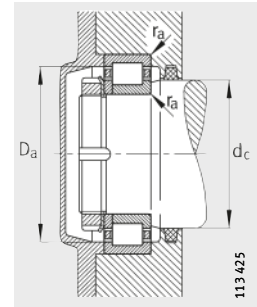
NJ and HJ  
Locating bearings



1) Axial  
displacement "s"  
for NJ



Mounting dimensions  
for NJ



Mounting dimensions  
for NUP

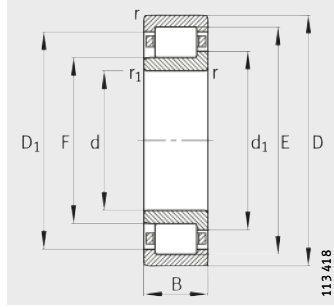
			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	d <sub>a</sub>		d <sub>c</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
			min. <sup>2)</sup>	max.								
-	-	-	101	105	116	149	2	215 000	217 000	35 000	4 300	3 950
9	14	-	101	-	116	149	2	215 000	217 000	35 000	4 300	3 950
-	-	5	101	-	116	149	2	215 000	217 000	35 000	4 300	3 950
-	-	-	101	105	116	149	2	285 000	315 000	52 000	4 300	3 300
9	15	-	101	-	116	149	2	285 000	315 000	52 000	4 300	3 300
-	-	6	101	-	116	149	2	285 000	315 000	52 000	4 300	3 300
-	-	-	104	111	127	176	2,5	370 000	350 000	55 000	3 400	3 750
12	18,5	-	104	-	127	176	2,5	370 000	350 000	55 000	3 400	3 750
-	-	6,5	104	-	127	176	2,5	370 000	350 000	55 000	3 400	3 750
-	-	-	104	111	127	176	2,5	510 000	530 000	86 000	3 400	3 050
12	22	-	104	-	127	176	2,5	510 000	530 000	86 000	3 400	3 050
-	-	10	104	-	127	176	2,5	510 000	530 000	86 000	3 400	3 050
-	-	-	110	122	139	205	3	465 000	425 000	54 000	5 000	-
14	24	-	110	-	139	205	3	465 000	425 000	54 000	5 000	-
-	-	-	107	111	123	158	2,1	260 000	265 000	41 500	3 800	3 700
9	14	-	107	-	123	158	2,1	260 000	265 000	41 500	3 800	3 700
-	-	5	107	-	123	158	2,1	260 000	265 000	41 500	3 800	3 700
-	-	-	107	111	123	158	2,1	340 000	370 000	60 000	3 800	3 100
9	15,5	-	107	-	123	158	2,1	340 000	370 000	60 000	3 800	3 100
-	-	6,5	107	-	123	158	2,1	340 000	370 000	60 000	3 800	3 100
-	-	-	109	119	134	186	2,5	390 000	380 000	59 000	3 400	3 600
13	20,5	-	109	-	134	186	2,5	390 000	380 000	59 000	3 400	3 600
-	-	7,5	109	-	134	186	2,5	390 000	380 000	59 000	3 400	3 600
-	-	-	109	119	134	186	2,5	540 000	580 000	92 000	3 400	2 850
13	24,5	-	109	-	134	186	2,5	540 000	580 000	92 000	3 400	2 850
-	-	11,5	109	-	134	186	2,5	540 000	580 000	92 000	3 400	2 850
-	-	-	115	132	149	220	3	495 000	470 000	58 000	4 800	-
15	25,5	-	115	-	149	220	3	495 000	470 000	58 000	4 800	-

<sup>2)</sup> If axial load is present, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

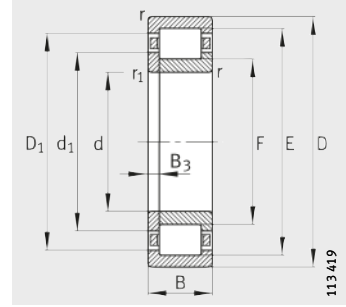


# Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



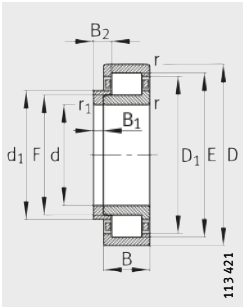
NJ  
Semi-locating bearings



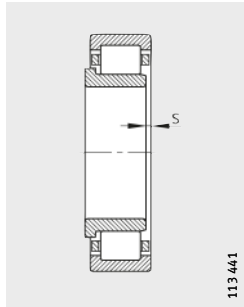
NUP  
Locating bearings

**Dimension table** (continued) · Dimensions in mm

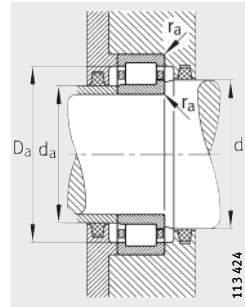
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing	L-section ring	d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
			≈kg	≈kg	min.	min.	≈	≈						
NJ220-E-TVP2	XL	–	3,55	–	100	180	34	2,1	2,1	1,5	163	119	156,9	127,3
NJ220-E-TVP2	XL	HJ220-E	3,55	0,436	100	180	34	2,1	2,1	–	163	119	156,9	127,3
NUP220-E-TVP2	XL	–	3,61	–	100	180	34	2,1	2,1	–	163	119	156,9	127,3
NJ2220-E-TVP2	XL	–	4,85	–	100	180	46	2,1	2,1	3	163	119	156,9	127,3
NJ2220-E-TVP2	XL	HJ2220-E	4,85	0,446	100	180	46	2,1	2,1	–	163	119	156,9	127,3
NUP2220-E-TVP2	XL	–	4,92	–	100	180	46	2,1	2,1	–	163	119	156,9	127,3
NJ320-E-TVP2	XL	–	7,82	–	100	215	47	3	3	1,2	191,5	127,5	182	139,4
NJ320-E-TVP2	XL	HJ320-E	7,82	0,883	100	215	47	3	3	–	191,5	127,5	182	139,4
NUP320-E-TVP2	XL	–	7,96	–	100	215	47	3	3	–	191,5	127,5	182	139,4
NJ320-E-TVP2	XL	–	12,3	–	100	215	73	3	3	4,2	191,5	127,5	182	139,4
NJ320-E-TVP2	XL	HJ2320-E	12,3	0,934	100	215	73	3	3	–	191,5	127,5	182	139,4
NUP320-E-TVP2	XL	–	12,5	–	100	215	73	3	3	–	191,5	127,5	182	139,4
NJ420-M1	XL	–	16,1	–	100	250	58	4	4	5,7	211	139	198,2	152,8
NJ420-M1	XL	HJ420	16,1	1,55	100	250	58	4	4	–	211	139	198,2	152,8
NJ221-E-TVP2	XL	–	4,17	–	105	190	36	2,1	2,1	1,3	171,5	125,5	165,1	134,5
NJ221-E-TVP2	XL	HJ221-E	4,17	0,51	105	190	36	2,1	2,1	–	171,5	125,5	165,1	134,5
NUP221-E-TVP2	XL	–	4,26	–	105	190	36	2,1	2,1	–	171,5	125,5	165,1	134,5
NJ421-M1	XL	–	18	–	105	260	60	4	4	5,7	220,5	144,5	207,4	158,8
NJ421-M1	XL	HJ421	18	1,65	105	260	60	4	4	–	220,5	144,5	207,4	158,8
NJ222-E-TVP2	XL	–	4,93	–	110	200	38	2,1	2,1	1,5	180,5	132,5	173,8	141,6
NJ222-E-TVP2	XL	HJ222-E	4,93	0,616	110	200	38	2,1	2,1	–	180,5	132,5	173,8	141,6
NUP222-E-TVP2	XL	–	5,02	–	110	200	38	2,1	2,1	–	180,5	132,5	173,8	141,6
NJ2222-E-TVP2	XL	–	6,89	–	110	200	53	2,1	2,1	4	180,5	132,5	173,8	141,6
NJ2222-E-TVP2	XL	HJ2222-E	6,89	0,647	110	200	53	2,1	2,1	–	180,5	132,5	173,8	141,6
NUP2222-E-TVP2	XL	–	7,02	–	110	200	53	2,1	2,1	–	180,5	132,5	173,8	141,6
NJ322-E-TVP2	XL	–	10,3	–	110	240	50	3	3	1,3	211	143	200,9	155,6
NJ322-E-TVP2	XL	HJ322-E	10,3	1,21	110	240	50	3	3	–	211	143	200,9	155,6
NUP322-E-TVP2	XL	–	10,7	–	110	240	50	3	3	–	211	143	200,9	155,6
NJ2322-E-TVP2	XL	–	16,9	–	110	240	80	3	3	5,8	211	143	200,9	155,6
NJ2322-E-TVP2	XL	HJ2322-E	16,9	1,3	110	240	80	3	3	–	211	143	200,9	155,6
NUP2322-E-TVP2	XL	–	17,2	–	110	240	80	3	3	–	211	143	200,9	155,6
NJ422-M1	XL	–	22,8	–	110	280	65	4	4	6,2	235	155	220,9	170,3
NJ422-M1	XL	HJ422	22,8	2,1	110	280	65	4	4	–	235	155	220,9	170,3



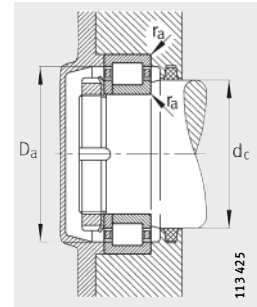
NJ and HJ  
Locating bearings



1) Axial  
displacement "s"  
for NJ



Mounting dimensions  
for NJ



Mounting dimensions  
for NUP

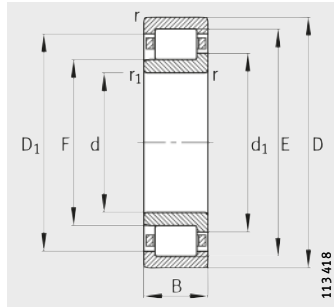
			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	d <sub>a</sub>		d <sub>c</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
			min. <sup>2)</sup>	max.								
-	-	-	112	117	130	168	2,1	295 000	305 000	47 500	3 800	3 500
10	15	-	112	-	130	168	2,1	295 000	305 000	47 500	3 800	3 500
-	-	5	112	-	130	168	2,1	295 000	305 000	47 500	3 800	3 500
-	-	-	112	117	130	168	2,1	395 000	445 000	72 000	3 800	2 900
10	16	-	112	-	130	168	2,1	395 000	445 000	72 000	3 800	2 900
-	-	6	112	-	130	168	2,1	395 000	445 000	72 000	3 800	2 900
-	-	-	114	125	143	201	2,5	450 000	425 000	65 000	3 200	3 400
13	20,5	-	114	-	143	201	2,5	450 000	425 000	65 000	3 200	3 400
-	-	7,5	114	-	143	201	2,5	450 000	425 000	65 000	3 200	3 400
-	-	-	114	125	143	201	2,5	680 000	720 000	114 000	3 200	2 550
13	23,5	-	114	-	143	201	2,5	680 000	720 000	114 000	3 200	2 550
-	-	10,5	114	-	143	201	2,5	680 000	720 000	114 000	3 200	2 550
-	-	-	120	137	156	230	3	550 000	530 000	63 000	4 800	-
16	27	-	120	-	156	230	3	550 000	530 000	63 000	4 800	-
-	-	-	117	123	137	178	2,1	310 000	320 000	49 000	3 600	3 450
10	16	-	117	-	137	178	2,1	310 000	320 000	49 000	3 600	3 450
-	-	6	117	-	137	178	2,1	310 000	320 000	49 000	3 600	3 450
-	-	-	125	143	162	240	3	610 000	590 000	87 000	4 500	-
16	27	-	125	-	162	240	3	610 000	590 000	87 000	4 500	-
-	-	-	122	130	144	188	2,1	345 000	365 000	55 000	3 400	3 300
11	17	-	122	-	144	188	2,1	345 000	365 000	55 000	3 400	3 300
-	-	6	122	-	144	188	2,1	345 000	365 000	56 000	3 400	3 300
-	-	-	122	130	144	188	2,1	455 000	520 000	81 000	3 400	2 800
11	19,5	-	122	-	144	188	2,1	455 000	520 000	81 000	3 400	2 800
-	-	8,5	122	-	144	188	2,1	455 000	520 000	81 000	3 400	2 800
-	-	-	124	140	158	226	2,5	495 000	475 000	73 000	3 000	3 100
14	22	-	124	-	158	226	2,5	495 000	475 000	73 000	3 000	3 100
-	-	8	124	-	158	226	2,5	495 000	475 000	72 000	3 000	3 100
-	-	-	124	140	158	226	2,5	750 000	800 000	126 000	2 800	2 320
14	26,5	-	124	-	158	226	2,5	750 000	800 000	126 000	2 800	2 320
-	-	12,5	124	-	158	226	2,5	750 000	800 000	126 000	2 800	2 320
-	-	-	130	153	173	260	3	680 000	660 000	77 000	4 500	-
17	29,5	-	130	-	173	260	3	680 000	660 000	77 000	4 500	-

<sup>2)</sup> If axial load is present, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

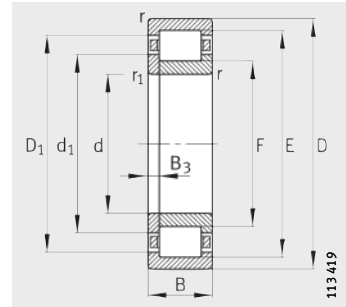


# Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



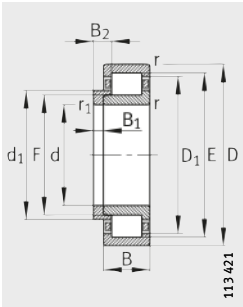
NJ Semi-locating bearings



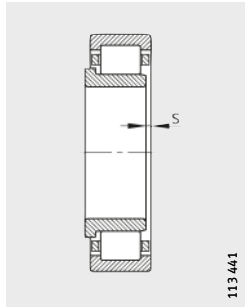
NUP Locating bearings

Dimension table (continued) · Dimensions in mm

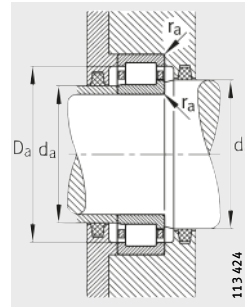
Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
								min.	min.				≈	≈
NJ224-E-TVP2	XL	–	5,91	–	120	215	40	2,1	2,1	1,4	195,5	143,5	187,8	153,2
NJ224-E-TVP2	XL	HJ224-E	5,91	0,707	120	215	40	2,1	2,1	–	195,5	143,5	187,8	153,2
NUP224-E-TVP2	XL	–	6,02	–	120	215	40	2,1	2,1	–	195,5	143,5	187,8	153,2
NJ2224-E-TVP2	XL	–	8,54	–	120	215	58	2,1	2,1	4,5	195,5	143,5	187,8	153,2
NJ2224-E-TVP2	XL	HJ2224-E	8,54	0,75	120	215	58	2,1	2,1	–	195,5	143,5	187,8	153,2
NUP2224-E-TVP2	XL	–	8,7	–	120	215	58	2,1	2,1	–	195,5	143,5	187,8	153,2
NJ324-E-TVP2	XL	–	13,5	–	120	260	55	3	3	3,5	230	154	218,7	168,1
NJ324-E-TVP2	XL	HJ324-E	13,5	1,41	120	260	55	3	3	–	230	154	218,7	168,1
NUP324-E-TVP2	XL	–	13,8	–	120	260	55	3	3	–	230	154	218,7	168,1
NJ2324-E-M1	XL	–	23,5	–	120	260	86	3	3	7,2	230	154	218,7	168,1
NJ2324-E-M1	XL	HJ2324-E	23,5	1,49	120	260	86	3	3	–	230	154	218,7	168,1
NUP2324-E-M1	XL	–	23,8	–	120	260	86	3	3	–	230	154	218,7	168,1
NJ424-M1	XL	–	31,3	–	120	310	72	5	5	6,9	260	170	243,9	187,3
NJ424-M1	XL	HJ424	31,3	2,61	120	310	72	5	5	–	260	170	243,9	187,3
NJ226-E-TVP2	XL	–	6,63	–	130	230	40	3	3	1,2	209,5	153,5	201,2	164
NJ226-E-TVP2	XL	HJ226-E	6,63	0,78	130	230	40	3	3	–	209,5	153,5	201,2	164
NUP226-E-TVP2	XL	–	6,74	–	130	230	40	3	3	–	209,5	153,5	201,2	164
NJ2226-E-TVP2	XL	–	10,6	–	130	230	64	3	3	5,2	209,5	153,5	201,2	164
NJ2226-E-TVP2	XL	HJ2226-E	10,6	0,849	130	230	64	3	3	–	209,5	153,5	201,2	164
NUP2226-E-TVP2	XL	–	10,8	–	130	230	64	3	3	–	209,5	153,5	201,2	164
NJ326-E-TVP2	XL	–	16,5	–	130	280	58	4	4	3,5	247	167	235,2	181,7
NJ326-E-TVP2	XL	HJ326-E	16,5	1,64	130	280	58	4	4	–	247	167	235,2	181,7
NUP326-E-TVP2	XL	–	16,7	–	130	280	58	4	4	–	247	167	235,2	181,7
NJ2326-E-M1	XL	–	29,2	–	130	280	93	4	4	8,1	247	167	235,2	181,7
NJ2326-E-M1	XL	HJ2326-E	29,2	1,77	130	280	93	4	4	–	247	167	235,2	181,7
NUP2326-E-M1	XL	–	29,7	–	130	280	93	4	4	–	247	167	235,2	181,7



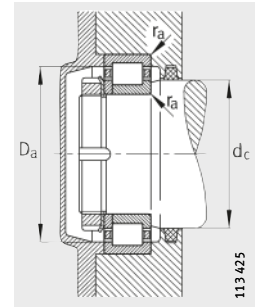
NJ and HJ  
Locating bearings



1) Axial displacement "s" for NJ



Mounting dimensions for NJ



Mounting dimensions for NUP

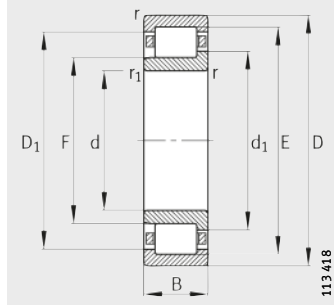
			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	d <sub>a</sub>		d <sub>c</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
			min. <sup>2)</sup>	max.	min.	max. <sup>2)</sup>	max.	N	N			
-	-	-	132	141	156	203	2,1	390 000	415 000	64 000	3 200	3 100
11	17	-	132	-	156	203	2,1	390 000	415 000	64 000	3 200	3 100
-	-	6	132	-	156	203	2,1	390 000	415 000	64 000	3 200	3 100
-	-	-	132	141	156	203	2,1	530 000	610 000	960 00	3 200	2 550
11	20	-	132	-	156	203	2,1	530 000	610 000	960 00	3 200	2 550
-	-	9	132	-	156	203	2,1	530 000	610 000	960 00	3 200	2 550
-	-	-	134	151	171	246	2,5	610 000	600 000	87 000	2 800	2 700
14	22,5	-	134	-	171	246	2,5	610 000	600 000	87 000	2 800	2 700
-	-	8,5	134	-	171	246	2,5	610 000	600 000	87 000	2 800	2 700
-	-	-	134	151	171	246	2,5	930 000	1 010 000	153 000	4 300	2 000
14	26	-	134	-	171	246	2,5	930 000	1 010 000	153 000	4 300	2 000
-	-	12	134	-	171	246	2,5	930 000	1 010 000	153 000	4 300	2 000
-	-	-	144	168	190	286	4	850 000	840 000	117 000	3 800	-
17	30,5	-	144	-	190	286	4	850 000	840 000	117 000	3 800	-
-	-	-	144	151	168	216	2,5	425 000	445 000	65 000	3 000	2 850
11	17	-	144	-	168	216	2,5	425 000	445 000	65 000	3 000	2 850
-	-	6	144	-	168	216	2,5	425 000	445 000	65 000	3 000	2 850
-	-	-	144	151	168	216	2,5	620 000	730 000	111 000	3 000	2 300
11	21	-	144	-	168	216	2,5	620 000	730 000	111 000	3 000	2 300
-	-	10	144	-	168	216	2,5	620 000	730 000	111 000	3 000	2 300
-	-	-	147	164	184	263	3	680 000	670 000	96 000	2 600	2 460
14	23	-	147	-	184	263	3	680 000	670 000	96 000	2 600	2 460
-	-	9	147	-	184	263	3	680 000	670 000	96 000	2 600	2 460
-	-	-	147	164	184	263	3	1 080 000	1 220 000	180 000	3 800	1 780
14	28	-	147	-	184	263	3	1 080 000	1 220 000	180 000	3 800	1 780
-	-	14	147	-	184	263	3	1 080 000	1 220 000	180 000	3 800	1 780

<sup>2)</sup> If axial load is present, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

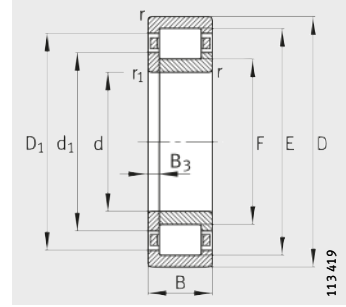


# Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



NJ  
Semi-locating bearings

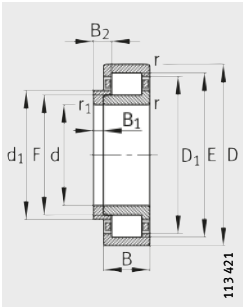


NUP  
Locating bearings

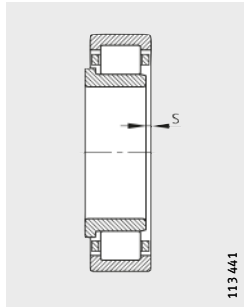
**Dimension table** (continued) · Dimensions in mm

Designation			Mass m		Dimensions									
Bearing	X-life	L-section ring	Bearing	L-section ring	d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
			≈kg	≈kg	min.	min.	≈	≈						
NJ228-E-M1	XL	–	9,46	–	140	250	42	3	3	2	225	169	216,7	179,4
NJ228-E-M1	XL	HJ228-E	9,46	0,986	140	250	42	3	3	–	225	169	216,7	179,4
NUP228-E-M1	XL	–	9,61	–	140	250	42	3	3	–	225	169	216,7	179,4
NJ2228-E-M1	XL	–	14,7	–	140	250	68	3	3	7	225	169	216,7	179,4
NJ2228-E-M1	XL	HJ2228-E	14,7	1,08	140	250	68	3	3	–	225	169	216,7	179,4
NUP2228-E-M1	XL	–	16,8	–	140	250	68	3	3	–	225	169	216,7	180
NJ328-E-TVP2	XL	–	20,5	–	140	300	62	4	4	5,2	264	180	251,7	195,4
NJ328-E-TVP2	XL	HJ328-E	20,5	2,03	140	300	62	4	4	–	264	180	251,7	195,4
NUP328-E-TVP2	XL	–	20,8	–	140	300	62	4	4	–	264	180	251,7	195,4
NJ2328-E-M1	XL	–	36,6	–	140	300	102	4	4	9,2	264	180	251,7	195,4
NJ2328-E-M1	XL	HJ2328-E	36,6	2,2	140	300	102	4	4	–	264	180	251,7	195,4
NUP2328-E-M1	XL	–	37,1	–	140	300	102	4	4	–	264	180	251,7	195,4
NJ230-E-M1	XL	–	11,9	–	150	270	45	3	3	4	242	182	233,2	193,1
NJ230-E-M1	XL	HJ230-E	11,9	1,26	150	270	45	3	3	–	242	182	233,2	193,1
NUP230-E-M1	XL	–	12,1	–	150	270	45	3	3	–	242	182	233,2	193,1
NJ2230-E-M1	XL	–	18,7	–	150	270	73	3	3	7,5	242	182	233,2	193,1
NJ2230-E-M1	XL	HJ2230-E	18,7	1,36	150	270	73	3	3	–	242	182	233,2	193,1
NUP2230-E-M1	XL	–	19,1	–	150	270	73	3	3	–	242	182	233,2	193,1
NJ330-E-M1	XL	–	27,2	–	150	320	65	4	4	5,5	283	193	269,8	209,5
NJ330-E-M1	XL	HJ330-E	27,2	2,33	150	320	65	4	4	–	283	193	269,8	209,5
NUP330-E-M1	XL	–	27,7	–	150	320	65	4	4	–	283	193	269,8	209,5
NJ2330-E-M1	XL	–	43,8	–	150	320	108	4	4	9,7	283	193	269,8	209,5
NJ2330-E-M1	XL	HJ2330-E	43,8	2,55	150	320	108	4	4	–	283	193	269,8	209,5
NUP2330-E-M1	XL	–	44,6	–	150	320	108	4	4	–	283	193	269,8	209,5

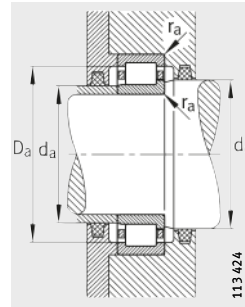




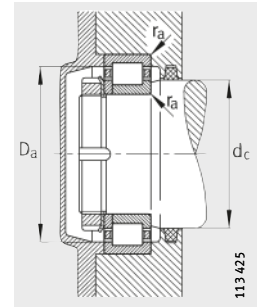
NJ and HJ  
Locating bearings



1) Axial  
displacement "s"  
for NJ



Mounting dimensions  
for NJ



Mounting dimensions  
for NUP

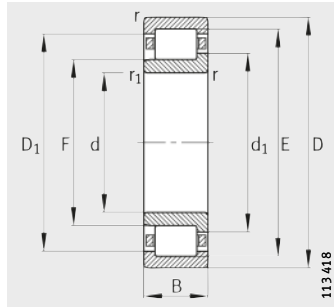
			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	d <sub>a</sub>		d <sub>c</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
			min. <sup>2)</sup>	max.	min.	max. <sup>2)</sup>	max.	N	N			
-	-	-	154	166	182	236	2,5	460 000	510 000	72 000	4 800	2 600
11	18	-	154	-	182	236	2,5	460 000	510 000	72 000	4 800	2 600
-	-	7	154	-	182	236	2,5	460 000	510 000	72 000	4 800	2 600
-	-	-	154	166	182	236	2,5	670 000	830 000	123 000	4 500	2 080
11	23	-	154	-	182	236	2,5	670 000	830 000	123 000	4 500	2 080
-	-	12	154	-	182	236	2,5	670 000	830 000	123 000	4 500	2 080
-	-	-	157	176	198	283	3	790 000	800 000	113 000	2 400	2 200
15	25	-	157	-	198	283	3	790 000	800 000	113 000	2 400	2 200
-	-	10	157	-	198	283	3	790 000	800 000	113 000	2 400	2 200
-	-	-	157	176	198	283	3	1 210 000	1 390 000	202 000	3 600	1 640
15	31	-	157	-	198	283	3	1 210 000	1 390 000	202 000	3 600	1 640
-	-	16	157	-	198	283	3	1 210 000	1 390 000	202 000	3 600	1 640
-	-	-	164	179	196	256	2,5	520 000	590 000	82 000	4 500	2 390
12	19,5	-	164	-	196	256	2,5	520 000	590 000	82 000	4 500	2 390
-	-	7,5	164	-	196	256	2,5	520 000	590 000	82 000	4 500	2 390
-	-	-	164	179	196	256	2,5	780 000	970 000	142 000	4 300	1 860
12	24,5	-	164	-	196	256	2,5	780 000	970 000	142 000	4 300	1 860
-	-	12,5	164	-	196	256	2,5	780 000	970 000	142 000	4 300	1 860
-	-	-	167	190	213	303	3	900 000	930 000	126 000	3 600	1 970
15	25	-	167	-	213	303	3	900 000	930 000	126 000	3 600	1 970
-	-	10	167	-	213	303	3	900 000	930 000	126 000	3 600	1 970
-	-	-	167	190	213	303	3	1 380 000	1 600 000	226 000	3 200	1 480
15	31,5	-	167	-	213	303	3	1 380 000	1 600 000	226 000	3 200	1 480
-	-	16,5	167	-	213	303	3	1 380 000	1 600 000	226 000	3 200	1 480

<sup>2)</sup> If axial load is present, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

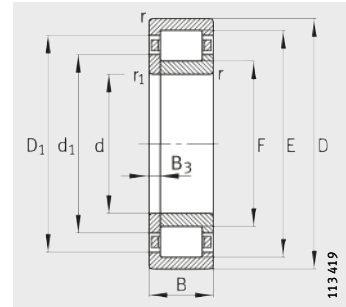


# Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



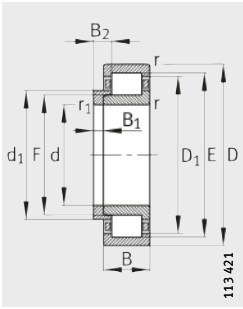
NJ  
Semi-locating bearings



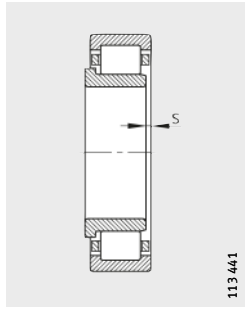
NUP  
Locating bearings

Dimension table (continued) · Dimensions in mm

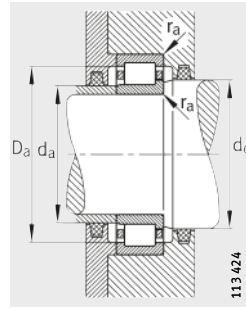
Designation		Mass m		Dimensions										
Bearing	X-life	L-section ring	Bearing	L-section ring	d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
			≈kg	≈kg	min.	min.	≈	≈						
NJ232-E-M1	XL	–	14,8	–	160	290	48	3	3	4,1	259	195	249,6	206,8
NJ232-E-M1	XL	HJ232-E	14,8	1,47	160	290	48	3	3	–	259	195	249,6	206,8
NUP232-E-M1	XL	–	15,1	–	160	290	48	3	3	–	259	195	249,6	206,8
NJ2232-E-M1	XL	–	23,9	–	160	290	80	3	3	7,2	261	193	251,1	205,5
NJ2232-E-M1	XL	HJ2232-E	23,9	1,56	160	290	80	3	3	–	261	193	251,1	205,5
NUP2232-E-M1	XL	–	24,3	–	160	290	80	3	3	–	261	193	251,1	205,5
NJ332-E-M1	–	–	32,3	–	160	340	68	4	4	5,6	300	204	286	221,6
NJ332-E-M1	–	HJ332-E	32,3	2,58	160	340	68	4	4	–	300	204	286	221,6
NJ2332-E-M1	–	–	52,3	–	160	340	114	4	4	9,9	300	204	286	221,6
NJ2332-E-M1	–	HJ2332-E	52,3	2,85	160	340	114	4	4	–	300	204	286	221,6
NJ234-E-M1	XL	–	18,4	–	170	310	52	4	4	4,3	279	207	268,5	218,4
NJ234-E-M1	XL	HJ234-E	18,4	1,58	170	310	52	4	4	–	279	207	268,5	218,4
NUP234-E-M1	XL	–	18,6	–	170	310	52	4	4	–	279	207	268,5	218,4
NJ2234-E-M1	XL	–	29,8	–	170	310	86	4	4	7,2	281	205	269,9	219
NJ2234-E-M1	XL	HJ2234-E	29,8	1,78	170	310	86	4	4	–	281	205	269,9	219
NUP2234-E-M1	XL	–	30,2	–	170	310	86	4	4	–	281	205	269,9	219
NJ334-E-M1	–	–	38,6	–	170	360	72	4	4	6	318	218	301,6	237
NJ334-E-M1	–	HJ334-E	38,6	3,21	170	360	72	4	4	–	318	218	301,6	237
NJ2334-EX-M1	–	–	62,3	–	170	360	120	4	4	10,2	320	216	303	235,7
NJ2334-EX-M1	–	HJ2334-EX	62,3	3,53	170	360	120	4	4	–	320	216	303	235,7
NJ236-E-M1	XL	–	19,2	–	180	320	52	4	4	4,7	289	217	278,6	230,2
NJ236-E-M1	XL	HJ236-E	19,2	1,76	180	320	52	4	4	–	289	217	278,6	230,2
NUP236-E-M1	XL	–	17,3	–	180	320	52	4	4	–	289	217	278,6	230,2
NJ2236-E-M1	XL	–	30,9	–	180	320	86	4	4	7,2	291	215	280	229
NJ2236-E-M1	XL	HJ2236-E	30,9	1,87	180	320	86	4	4	–	291	215	280	229
NUP2236-E-M1	XL	–	31,4	–	180	320	86	4	4	–	291	215	280	229
NJ336-E-M1	–	–	44,6	–	180	380	75	4	4	6,1	335	231	319,8	250,5
NJ336-E-M1	–	HJ336E	44,6	3,77	180	380	75	4	4	–	335	231	319,8	250,5
NJ2336-EX-M1	–	–	72,9	–	180	380	126	4	4	10,5	339	227	320,8	248
NJ2336-EX-M1	–	HJ2336-EX	72,9	4,05	180	380	126	4	4	–	339	227	320,8	248



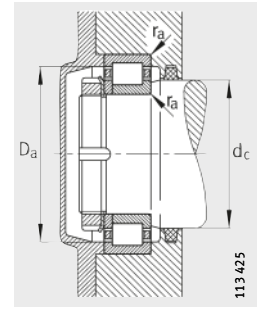
NJ and HJ  
Locating bearings



1) Axial  
displacement "s"  
for NJ



Mounting dimensions  
for NJ



Mounting dimensions  
for NUP

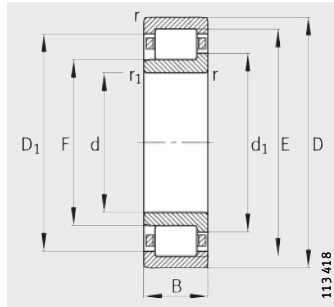
			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	d <sub>a</sub>		d <sub>c</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
			min. <sup>2)</sup>	max.				N	N			
-	-	-	174	192	210	276	2,5	590 000	670 000	93 000	4 300	2 190
12	20	-	174	-	210	276	2,5	590 000	670 000	93 000	4 300	2 190
-	-	8	174	-	210	276	2,5	590 000	670 000	93 000	4 300	2 190
-	-	-	174	192	210	276	2,5	940 000	1 170 000	171 000	3 800	1 670
12	24,5	-	174	-	210	276	2,5	940 000	1 170 000	171 000	3 800	1 670
-	-	12,5	174	-	210	276	2,5	940 000	1 170 000	171 000	3 800	1 670
-	-	-	177	200	228	323	3	865 000	1 060 000	114 000	3 000	1 790
15	25	-	177	-	228	323	3	865 000	1 060 000	114 000	3 000	1 790
-	-	-	177	200	228	323	3	1 320 000	1 830 000	204 000	3 000	1 350
15	32	-	177	-	228	323	3	1 320 000	1 830 000	204 000	3 000	1 350
-	-	-	187	204	223	293	3	700 000	780 000	107 000	3 600	2 010
12	20	-	187	-	223	293	3	700 000	780 000	107 000	3 600	2 010
-	-	8	187	-	223	293	3	700 000	780 000	107 000	3 600	2 010
-	-	-	187	204	223	293	3	1 130 000	1 400 000	198 000	3 200	1 500
12	24	-	187	-	223	293	3	1 130 000	1 400 000	198 000	3 200	1 500
-	-	12	187	-	223	293	3	1 130 000	1 400 000	197 000	3 200	1 500
-	-	-	187	215	240	343	3	965 000	1 220 000	132 000	3 000	1 630
16	27	-	187	-	240	343	3	965 000	1 220 000	132 000	3 000	1 630
-	-	-	187	214	238,3	343	3	1 500 000	2 080 000	230 000	2 800	1 230
16	33,5	-	187	-	238,3	343	3	1 500 000	2 080 000	230 000	2 800	1 230
-	-	-	197	214	233	303	3	730 000	830 000	112 000	3 600	1 880
12	20	-	197	-	233	303	3	730 000	830 000	112 000	3 600	1 880
-	-	8	197	-	233	303	3	730 000	830 000	112 000	3 600	1 880
-	-	-	197	214	233	303	3	1 180 000	1 490 000	208 000	3 200	1 390
12	24	-	197	-	233	303	3	1 180 000	1 490 000	208 000	3 200	1 390
-	-	12	197	-	233	303	3	1 180 000	1 490 000	208 000	3 200	1 390
-	-	-	197	228	254	363	3	1 040 000	1 320 000	141 000	2 800	1 520
17	28,5	-	197	-	254	363	3	1 040 000	1 320 000	141 000	2 800	1 520
-	-	-	197	225	250,6	363	3	1 660 000	2 320 000	260 000	2 800	1 130
17	35	-	197	-	250,6	363	3	1 660 000	2 320 000	260 000	2 800	1 130

<sup>2)</sup> If axial load is present, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.

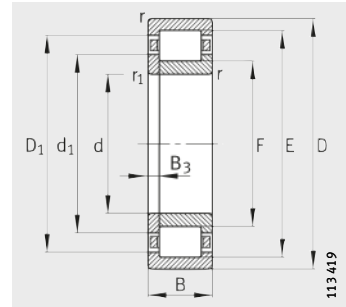


# Cylindrical roller bearings with cage

Semi-locating bearings, locating bearings



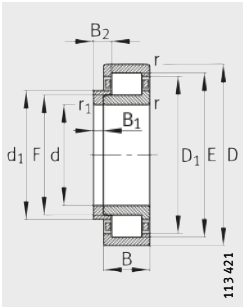
NJ  
Semi-locating bearings



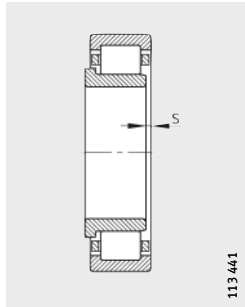
NUP  
Locating bearings

**Dimension table (continued)** · Dimensions in mm

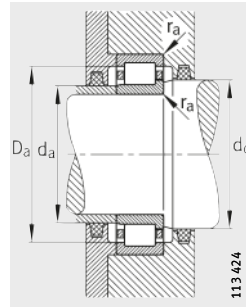
Designation		Mass m		Dimensions									
Bearing	L-section ring	Bearing ≈kg	L-section ring ≈kg	d	D	B	r	r <sub>1</sub>	s <sup>1)</sup>	E	F	D <sub>1</sub>	d <sub>1</sub>
							min.	min.				≈	≈
NJ238-E-M1	–	23,2	–	190	340	55	4	4	4,7	306	230	295	244
NJ238-E-M1	HJ238-E	23,2	2,17	190	340	55	4	4	–	306	230	295	244
NUP238-E-M1	–	23,5	–	190	340	55	4	4	–	306	230	295	244
NJ2238-E-M1	–	37,7	–	190	340	92	4	4	8	308	228	296,4	242,7
NJ2238-E-M1	HJ2238-E	37,7	2,31	190	340	92	4	4	–	308	228	296,4	242,7
NJ2338-EX-M1	–	84,4	–	190	400	132	5	5	11	360	240	340,5	262,5
NJ2338-EX-M1	HJ2338-EX	84,4	4,8	190	400	132	5	5	–	360	240	340,5	262,5
NJ240-E-M1	–	27,5	–	200	360	58	4	4	4,8	323	243	311,5	257,6
NJ240-E-M1	HJ240-E	27,5	2,62	200	360	58	4	4	–	323	243	311,5	257,6
NUP240-E-M1	–	28	–	200	360	58	4	4	–	323	243	311,5	257,6
NJ2240-E-M1	–	45,3	–	200	360	98	4	4	8,2	325	241	312,9	256,3
NJ2240-E-M1	HJ2240-E	45,3	2,78	200	360	98	4	4	–	325	241	312,9	256,3
NJ340-E-M1	–	58,1	–	200	420	80	5	5	6,3	370	258	351,8	279
NJ340-E-M1	HJ340-E	58,1	4,94	200	420	80	5	5	–	370	258	351,8	279
NJ2340-EX-M1	–	97,2	–	200	420	138	5	5	11,3	377	253	356,9	276,1
NJ2340-EX-M1	HJ2340-EX	97,2	5,28	200	420	138	5	5	–	377	253	356,9	276,1
NJ244-E-M1	–	38,7	–	220	400	65	4	4	5,5	358	268	344,9	285,2
NJ244-E-M1	HJ244-E	38,7	3,55	220	400	65	4	4	–	358	268	344,9	285,2
NUP244-E-M1	–	39,3	–	220	400	65	4	4	–	358	268	344,9	285,2
NUP2244-EX-M1	–	63,4	–	220	400	108	4	4	–	367	259	349,4	279,4
NUP2344-EX-M1	–	124	–	220	460	145	5	5	–	413	277	391,2	302,2
NJ248-E-M1	–	52,5	–	240	440	72	4	4	6	393	293	376,6	312
NJ248-E-M1	HJ248-E	52,5	4,6	240	440	72	4	4	–	393	293	376,6	312
NJ348-E-M1	–	97	–	240	500	95	5	5	7,4	442	306	421,2	331,3
NJ348-E-M1	HJ348-E	97	8,3	240	500	95	5	5	–	442	306	421,2	331,3
NJ252-E-M1	–	69,4	–	260	480	80	5	5	6,2	429	317	410,8	336,9
NJ252-E-M1	HJ252-E	69,4	5,92	260	480	80	5	5	–	429	317	410,8	336,9
NJ356-E-M1	–	149	–	280	580	108	6	6	8,7	512	362	488	389,8
NJ356-E-M1	HJ356-E	149	13,7	280	580	108	6	6	–	512	362	488	389,8



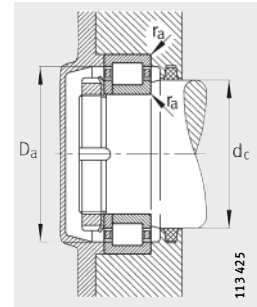
NJ and HJ  
Locating bearings



1) Axial  
displacement "s"  
for NJ



Mounting dimensions  
for NJ

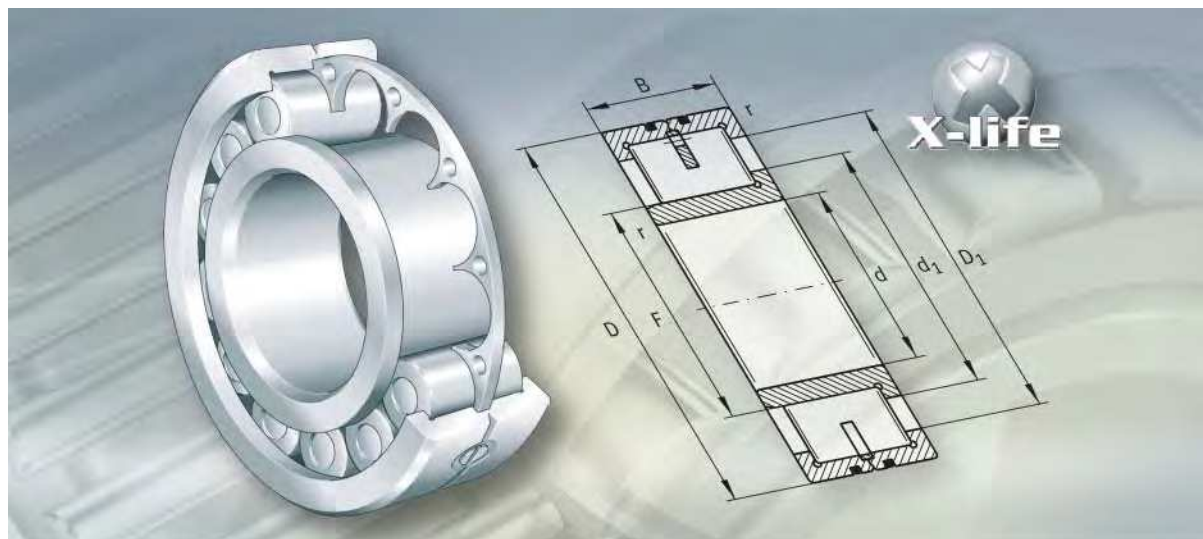


Mounting dimensions  
for NUP

			Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	d <sub>a</sub>		d <sub>c</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
			min. <sup>2)</sup>	max.				N	N			
-	-	-	207	227	247	323	3	680 000	930 000	100 000	3 200	1 750
13	21,5	-	207	-	247	323	3	680 000	930 000	100 000	3 200	1 750
-	-	8,5	207	-	247	323	3	680 000	930 000	100 000	3 200	1 750
-	-	-	207	227	247	323	3	1 100 000	1 660 000	184 000	3 000	1 300
13	26,5	-	207	-	247	323	3	1 100 000	1 660 000	184 000	3 000	1 300
-	-	-	210	237,8	265,3	380	4	1 900 000	2 650 000	285 000	2 600	1 030
18	36,5	-	210	-	265,3	380	4	1 900 000	2 650 000	285 000	2 600	1 030
-	-	-	217	240	261	343	3	750 000	1 040 000	110 000	3 000	1 620
14	23	-	217	-	261	343	3	750 000	1 040 000	110 000	3 000	1 620
-	-	9	217	-	261	343	3	750 000	1 040 000	110 000	3 000	1 620
-	-	-	217	240	261	343	3	1 220 000	1 860 000	206 000	2 800	1 210
14	28	-	217	-	261	343	3	1 220 000	1 860 000	206 000	2 800	1 210
-	-	-	220	255	282	400	4	1 180 000	1 530 000	161 000	2 600	1 340
18	30	-	220	-	282	400	4	1 180 000	1 530 000	161 000	2 600	1 340
-	-	-	220	250,7	279	400	4	2 040 000	2 900 000	310 000	2 400	960
18	37	-	220	-	279	400	4	2 040 000	2 900 000	310 000	2 400	960
-	-	-	237	265	288	383	3	950 000	1 320 000	134 000	2 800	1 400
15	25	-	237	-	288	383	3	950 000	1 320 000	134 000	2 800	1 400
-	-	10	237	-	288	383	3	950 000	1 320 000	135 000	2 800	1 400
-	-	14	237	-	282,3	383	3	1 630 000	2 360 000	250 000	2 600	1 020
-	-	20	240	-	305,1	440	4	2 360 000	3 350 000	340 000	2 200	840
-	-	-	257	290	315	423	3	1 140 000	1 600 000	163 000	2 600	1 240
16	27	-	257	-	315	423	3	1 140 000	1 600 000	163 000	2 600	1 240
-	-	-	260	303	335	480	4	1 730 000	2 280 000	221 000	2 200	1 010
22	35,5	-	260	-	335	480	4	1 730 000	2 280 000	221 000	2 200	1 010
-	-	-	280	314	341	460	4	1 340 000	1 900 000	191 000	2 400	1 120
18	30	-	280	-	341	460	4	1 340 000	1 900 000	191 000	2 400	1 120
-	-	-	306	359	393,4	554	5	2 160 000	3 050 000	285 000	1 900	810
26	42,5	-	306	-	393,4	554	5	2 160 000	3 050 000	285 000	1 900	810

<sup>2)</sup> If axial load is present, observe the dimensions D<sub>1</sub> and d<sub>1</sub>.





**Cylindrical roller bearings  
with disc cage or spacers**

# Cylindrical roller bearings with disc cage or spacers

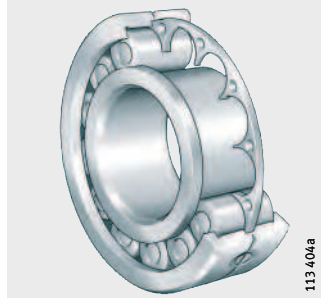
		Page
<b>Product overview</b>	Cylindrical roller bearings with disc cage or spacers.....	448
	<b>Features</b>	
	X-life .....	449
	Bearings of TB design .....	449
	Semi-locating bearings .....	450
	Operating temperature .....	451
	Suffixes .....	451
<b>Design and safety guidelines</b>	Permissible skewing.....	452
	Axial load carrying capacity.....	452
	Equivalent dynamic bearing load .....	454
	Equivalent static bearing load.....	454
	Minimum radial load .....	454
	Design of bearing arrangements .....	455
<b>Accuracy</b>	Radial internal clearance .....	455
<b>Dimension tables</b>	Cylindrical roller bearings with disc cage, semi-locating bearings .....	456
	Cylindrical roller bearings with spacers, semi-locating bearings .....	458



# Product overview    Cylindrical roller bearings with disc cage or spacers

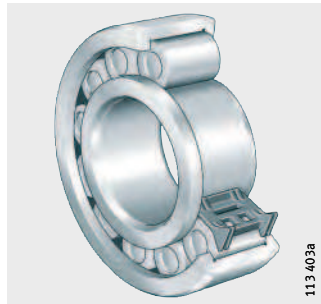
## Semi-locating bearings With disc cage

LSL1923



## With spacers

ZSL1923





# Cylindrical roller bearings with disc cage or spacers

**Features** Cylindrical roller bearings with a disc cage (series LSL) or with spacers (series ZSL) are of a single row, self-retaining design and correspond to dimension series 23. They have solid outer rings with two ribs, while the inner rings have one rib. The inner ring is removable and thus allows easier mounting of the bearings. The disc cages or spacers prevent the cylindrical rollers from coming into contact with each other during rolling.

Cylindrical roller bearings NJ23..-E and spherical roller bearings 223..-E1 have the same design envelope as LSL1923 and ZSL1923.

## X-life

Numerous sizes are supplied in the X-life grade. These bearings are indicated in the dimension tables.

Bearings of X-life quality have, for example, lower roughness  $R_a$  and higher geometrical accuracy of the raceways than comparable designs that are not X-life. As a result, they have higher load carrying capacity and longer life for the same dimensioning. In certain applications, this means that a smaller bearing arrangement can be designed.

## Bearings of TB design

In the case of bearings of TB design, the axial load carrying capacity of cylindrical roller bearings was significantly improved with the aid of new calculation and manufacturing methods.

Optimum contact conditions between the roller and rib are ensured by means of a special curvature of the roller end faces. As a result, the axial contact pressures on the rib are significantly minimised and a lubricant film capable of supporting higher loads is formed. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated.

In addition, axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.



# Cylindrical roller bearings with disc cage or spacers

<b>Semi-locating bearings</b>	<p>Cylindrical roller bearings LSL1923 and ZSL1923 are semi-locating bearings. Semi-locating bearings can support not only high radial forces but also axial forces in one direction and can therefore guide shafts axially in one direction. They act as non-locating bearings in the opposite direction.</p> <p>The bearings have two ribs on the outer ring and one rib on the inner ring.</p> <p>Due to the large number of rolling elements and their dimensions, LSL and ZSL bearings have very high radial load carrying capacity. They can also withstand high shock loads and vibrations.</p> <p>Due to the low frictional torque and the low level of heat generation, the bearings are characterised by high limiting speeds. In addition, the optimum heat dissipation ensures thermally stable conditions in the bearing.</p>
<b>With disc cage</b>	<p>In cylindrical roller bearings LSL1923, an externally-guided flat brass disc cage prevents the cylindrical rollers from coming into contact with each other during rolling.</p> <p>The cage has pockets to accommodate the rolling elements. The rolling elements are guided between the ribs on the outer ring. Due to its low mass, the cage is subjected to only minimal strain under acceleration.</p> <p>The outer ring is axially split and held together by fasteners.</p>
<b>With spacers</b>	<p>In cylindrical roller bearings ZSL1923, plastic spacers prevent the cylindrical rollers from coming into contact with each other during rolling.</p> <p>The spacers are designed such that the rolling element set is self-retaining, so the bearing and inner ring can be mounted separately. The spacers are guided axially between the two outer ring ribs.</p>
<b>Axial displacement</b>	<p>The outer and inner ring can be axially displaced relative to each other in one direction only by the dimension “s” stated in the dimension table.</p>
<b>Sealing</b>	<p>The cylindrical roller bearings are open on both sides.</p>
<b>Lubrication</b>	<p>They can be lubricated via the end faces with grease or oil.</p>
<b>Special design for vibratory machinery</b>	<p>In addition to high basic dynamic load ratings and thus long rating life values, bearings in vibratory machinery must also be able to compensate or support considerable shaft tilting due to load or misalignment. The bearings LSL and ZSL are therefore also available by agreement in the BIR design. In these bearings, the inner ring raceway is ground slightly spherical.</p>

**Operating temperature** Cylindrical roller bearings with disc cage or spacers are suitable for operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+120\text{ }^{\circ}\text{C}$ .

**Suffixes** Suffixes for available designs: see table.

**Available designs**

Suffix	Description	Design
BIR	Inner ring raceway ground slightly spherical	Available by agreement
BR	Black oxide coated	
C3	Radial internal clearance larger than normal	
C4	Radial internal clearance larger than C3	
C5	Radial internal clearance larger than C4	
TB	Bearing with increased axial load carrying capacity	Standard depending on bearing size, see dimension table

**Available bearings of TB design**

Series <sup>1)</sup>	From bore diameter d mm
LSL1923	90
ZSL1923	

<sup>1)</sup> Available by agreement.



# Cylindrical roller bearings with disc cage or spacers

## Design and safety guidelines Permissible skewing

There is no significant reduction in rating life if the misalignment of the inner ring relative to the outer ring does not exceed the following values:  
3' in bearings of series LSL1923, ZSL1923.

## Axial load carrying capacity

Radial cylindrical roller bearings of a semi-locating bearing design can support axial forces in one direction as well as radial forces.

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces
- tilting of the bearing.



Ribs subjected to load must be supported across their entire height.

The permissible axial load  $F_{a\ per}$  must not be exceeded, in order to avoid an unacceptable increase in temperature.

The axial limiting load  $F_{a\ max}$  according to the formula must not be exceeded, in order to avoid impermissible pressure at the contact surfaces.

The ratio  $F_a/F_r$  should not exceed 0,4.

In the case of bearings of TB design, the value 0,6 is permissible.

Continuous axial loading without simultaneous radial loading is not permissible.

## Permissible and maximum axial load

The axial load  $F_{a\ per}$  and the limiting load  $F_{a\ max}$  are calculated as follows:

### Bearings of standard design

$$F_{a\ per} = k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{0,6} \leq F_{a\ max}$$

### Bearings of TB design

$$F_{a\ per} = 1,5 \cdot k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{-0,6} \leq F_{a\ max}$$

### Bearings of standard and TB design

$$F_{a\ max} = 0,075 \cdot k_B \cdot d_M^{2,1}$$

$F_{a\ per}$  Permissible axial load N

$F_{a\ max}$  Axial limiting load N

$k_S$  Factor dependent on the lubrication method, see table, page 453

$k_B$  Bearing factor,  $k_B = 28$

$d_M$  Mean bearing diameter  $(d + D)/2$ , see dimension table

$n$  Operating speed.  $\text{min}^{-1}$

**Factor  $k_S$  for the lubrication method**

Lubrication method <sup>1)</sup>	$k_S$
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ( $\nu < 0,5 \cdot \nu_1$ )	7,5 to 10
Poor heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)	12 to 18
Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ( $\nu > 2 \cdot \nu_1$ )	16 to 24

<sup>1)</sup> Doped oils should be used, e.g. CLP (DIN 51 517) and HLP (DIN 51 524) of ISO-VG classes 32 to 460 as well as ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

**Misalignment of bearings**

Misalignment caused by shaft deflection for example, may lead to alternating stresses on the inner ring ribs. In this case, the axial load must be restricted to  $F_{as}$  for bearing tilting of up to max. 2 angular minutes.

$$F_{as} = 20 \cdot d_M^{1,42}$$

If even greater tilting is present, special strength analysis is required.



# Cylindrical roller bearings with disc cage or spacers

## Equivalent dynamic bearing load

### Non-locating bearings

For bearings under dynamic loading, the following applies:

$$P = F_r$$

### Semi-locating bearings

If an axial force  $F_a$  is present in addition to the radial force  $F_r$ , the load ratio must be taken into consideration.

## Load ratio and equivalent dynamic load

Load ratio	Equivalent dynamic bearing load
$\frac{F_a}{F_r} \leq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = 0,92 \cdot F_r + Y \cdot F_a$

$P$  N  
Equivalent dynamic bearing load for combined load  
 $F_a$  N  
Axial dynamic bearing load  
 $F_r$  N  
Radial dynamic bearing load  
 $e, Y$  –  
Factors: see table Factors e and Y.

## Factors e and Y

Series	Calculation factors	
	e	Y
LSL1923, ZSL1923	0,3	0,4

## Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

## Minimum radial load

In continuous operation, a minimum radial load of the order of  $F_{r \min} = C_{0r}/60$  is necessary.

If  $F_{r \min} < C_{0r}/60$ , please contact us.



## Design of bearing arrangements

### Shaft and housing tolerances

Recommended shaft tolerances for bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

### Axial location

In order to prevent lateral creep of the bearing rings, they must be located by force or physical locking means.

The abutment shoulders (shaft and housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating to the abutting shoulders must be designed with rounding to DIN 5 418 or an undercut to DIN 509. Observe the minimum values for the chamfer dimensions  $r$  in the dimension tables.

In the case of semi-locating bearings, the bearing rings only require support on one side, on the rib supporting the axial load.



Full support must be provided for ribs transmitting forces in axially loaded bearings.

### Accuracy

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620.

### Radial internal clearance

The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

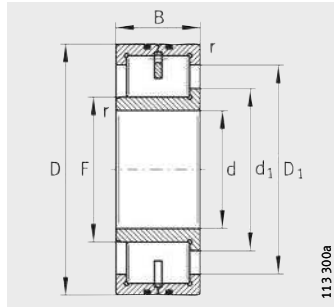
#### Radial internal clearance

Bore d mm		Radial internal clearance							
		CN μm		C3 μm		C4 μm		C5 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75	65	90
24	30	20	45	35	60	50	75	70	95
30	40	25	50	45	70	60	85	80	105
40	50	30	60	50	80	70	100	95	125
50	65	40	70	60	90	80	110	110	140
65	80	40	75	65	100	90	125	130	165
80	100	50	85	75	110	105	140	155	190
100	120	50	90	85	125	125	165	180	220
120	140	60	105	100	145	145	190	200	245
140	160	70	120	115	165	165	215	225	275
160	180	75	125	120	170	170	220	250	300
180	200	90	145	140	195	195	250	275	330
200	225	105	165	160	220	220	280	305	365
225	250	110	175	170	235	235	300	330	395
250	280	125	195	190	260	260	330	370	440
280	315	130	205	200	275	275	350	410	485

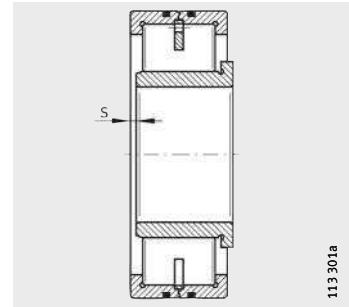


# Cylindrical roller bearings with disc cage

Semi-locating bearings



LSL1923



1) Axial displacement "s"

Dimension table - Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions					Mounting dimensions		
			d	D	B	r min.	s <sup>1)</sup>	F	d <sub>1</sub> ≈	D <sub>1</sub> ≈
LSL192316	XL	6,1	<b>80</b>	170	58	2,1	3,5	94	104,5	134,8
LSL192317	XL	7,3	<b>85</b>	180	60	3	4	100	111,3	143,9
LSL192318-TB	XL	8,6	<b>90</b>	190	64	3	4	105,26	117,2	152,5
LSL192319-TB	XL	10	<b>95</b>	200	67	3	4	114,66	126,6	161
LSL192320-TB	XL	12,8	<b>100</b>	215	73	3	4	119,3	132,7	172
LSL192322-TB	XL	17,3	<b>110</b>	240	80	3	5	135,5	150,7	193,1
LSL192324-TB	XL	22	<b>120</b>	260	86	3	5	147,39	164,2	213,1
LSL192326-TB	XL	27,2	<b>130</b>	280	93	4	5	157,9	176	227,9
LSL192328-TB	XL	34	<b>140</b>	300	102	4	7	168,45	187,5	243,2
LSL192330-TB	-	40,7	<b>150</b>	320	108	4	7	182,49	203,3	263,9
LSL192332-TB	-	48,1	<b>160</b>	340	114	4	7	196,38	219	284,8
LSL192334-TB	-	57,5	<b>170</b>	360	120	4	7	230,55	226,6	295,4
LSL192336-TB	-	67,4	<b>180</b>	380	126	4	7	221,56	245	313,3
LSL192338-TB	-	78,1	<b>190</b>	400	132	5	7	224,43	250	325,5
LSL192340-TB	-	89,3	<b>200</b>	420	138	5	7	238,45	265,7	345,9
LSL192344-TB	-	108	<b>220</b>	460	145	5	7	266,71	297	385,9
LSL192348-TB	-	138,6	<b>240</b>	500	155	5	10	280,55	312,5	406,1
LSL192352-TB	-	168	<b>260</b>	540	165	6	10	315,6	351,6	457,2
LSL192356-TB	-	206,6	<b>280</b>	580	175	6	12	333,1	371	485
LSL192360-TB	-	253	<b>300</b>	620	185	7,5	12	350,93	390,9	508,5

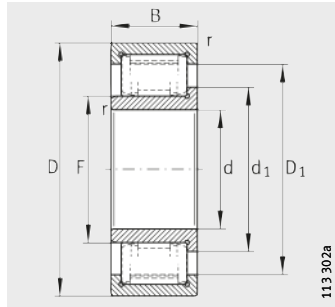




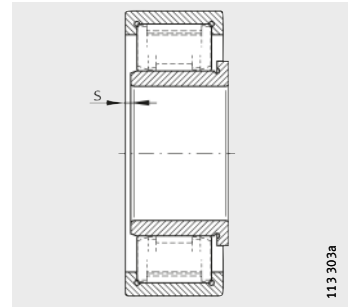
Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. $C_r$ N	stat. $C_{0r}$ N	$C_{ur}$ N	$n_G$ $\text{min}^{-1}$	$n_B$ $\text{min}^{-1}$
475 000	495 000	89 000	8 300	4 600
500 000	520 000	90 000	7 800	4 350
590 000	610 000	104 000	7 400	4 050
610 000	660 000	112 000	6 900	3 750
750 000	790 000	133 000	6 500	3 450
880 000	930 000	151 000	5 800	3 000
1 060 000	1 140 000	181 000	5 300	2 650
1 190 000	1 280 000	200 000	4 950	2 450
1 340 000	1 460 000	224 000	4 600	2 300
1 410 000	1 760 000	199 000	4 250	2 020
1 600 000	2 010 000	224 000	3 950	1 820
1 740 000	2 210 000	241 000	3 800	1 760
1 840 000	2 430 000	260 000	3 600	1 620
2 100 000	2 750 000	295 000	3 450	1 540
2 340 000	3 050 000	315 000	3 250	1 420
2 500 000	3 200 000	320 000	2 900	1 270
2 750 000	3 550 000	350 000	2 750	1 220
3 350 000	4 350 000	425 000	2 470	1 010
3 700 000	4 850 000	460 000	2 330	950
4 150 000	5 500 000	510 000	2 220	890

# Cylindrical roller bearings with spacers

Semi-locating bearings



ZSL1923



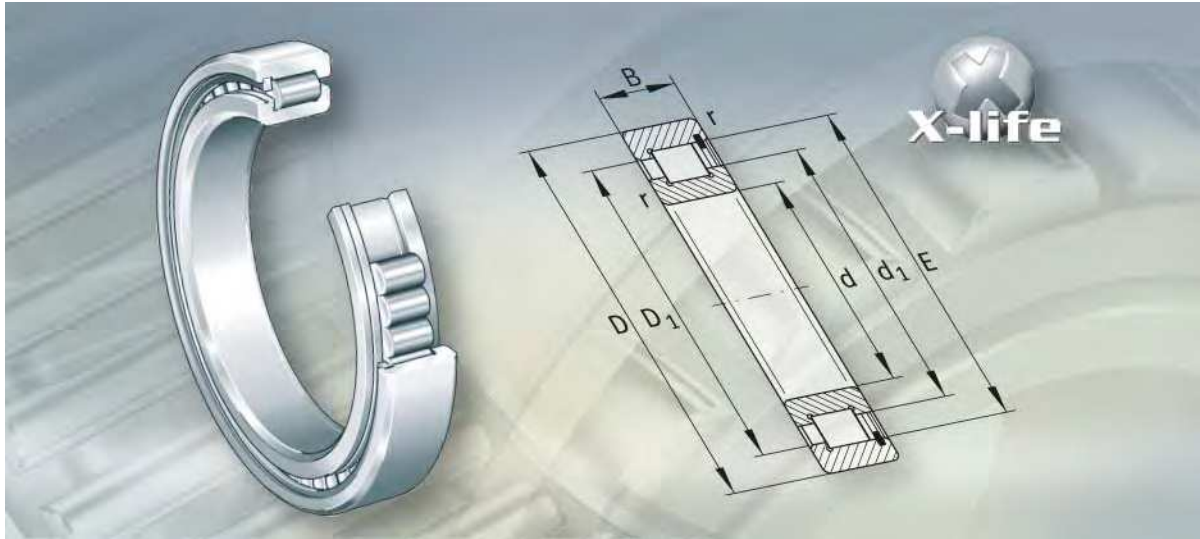
1) Axial displacement "s"

**Dimension table** - Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions					Mounting dimensions		
			d	D	B	r min.	s <sup>1)</sup>	F	d <sub>1</sub> ≈	D <sub>1</sub> ≈
ZSL192305	XL	0,36	25	62	24	1,1	2	31,72	36,7	47,5
ZSL192306	XL	0,55	30	72	27	1,1	2	38,3	43,5	56
ZSL192307	XL	0,72	35	80	31	1,5	2	44,68	50,7	65,8
ZSL192308	XL	1	40	90	33	1,5	2	51,12	57,5	75,2
ZSL192309	XL	1,34	45	100	36	1,5	3	56,1	62,5	80,3
ZSL192310	XL	1,76	50	110	40	2	3	60,72	68,3	89,7
ZSL192311	XL	2,22	55	120	43	2	3	67,11	75,5	99,3
ZSL192312	XL	2,82	60	130	46	2,1	3	73,62	82	105,8
ZSL192313	XL	3,44	65	140	48	2,1	3,5	80,69	90	116,5
ZSL192314	XL	4,27	70	150	51	2,1	3,5	84,14	93,5	121,6
ZSL192315	XL	5,2	75	160	55	2,1	3,5	91,22	101,6	131,9
ZSL192316	XL	6,2	80	170	58	2,1	3,5	98,24	109,5	142,1
ZSL192317	XL	7,23	85	180	60	3	4	107,01	118,2	150,9
ZSL192318-TB	XL	8,7	90	190	64	3	4	105,26	117,5	152,5
ZSL192319-TB	XL	10	95	200	67	3	4	114,65	126,6	161,9
ZSL192320-TB	XL	12,7	100	215	73	3	4	119,3	132,7	172,8
ZSL192322-TB	XL	16,5	110	240	80	3	5	134,27	151,1	199,9
ZSL192324-TB	XL	21,9	120	260	86	3	5	147,39	164,2	213,1



Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. $C_r$ N	stat. $C_{0r}$ N	$C_{ur}$ N	$n_G$ $\text{min}^{-1}$	$n_B$ $\text{min}^{-1}$
68 000	54 000	8 700	16 400	10 000
94 000	80 000	13 400	13 900	8 500
118 000	101 000	17 500	11 900	7 500
160 000	142 000	25 000	10 400	6 300
171 000	157 000	27 500	9 700	6 300
219 000	199 000	35 500	8 800	5 800
255 000	231 000	42 000	7 900	5 400
270 000	255 000	46 500	7 400	5 200
335 000	320 000	59 000	6 800	4 600
365 000	355 000	64 000	6 500	4 600
435 000	435 000	78 000	6 000	4 200
510 000	520 000	90 000	5 500	3 850
540 000	570 000	96 000	5 200	3 600
590 000	610 000	104 000	5 200	3 750
620 000	660 000	112 000	4 850	3 450
750 000	790 000	133 000	4 550	3 200
890 000	900 000	144 000	3 950	2 700
1 060 000	1 140 000	181 000	3 700	2 400



## Single row full complement cylindrical roller bearings

# Single row full complement cylindrical roller bearings

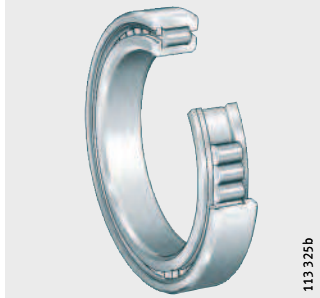
		Page
<b>Product overview</b>	Single row full complement cylindrical roller bearings .....	462
<b>Features</b>	<b>X-life</b> .....	463
	Bearings of TB design .....	463
	Semi-locating bearings .....	464
	Operating temperature .....	464
	Suffixes .....	464
<b>Design and safety guidelines</b>	Permissible skewing .....	465
	Axial load carrying capacity .....	465
	Equivalent dynamic bearing load .....	467
	Equivalent static bearing load .....	467
	Minimum radial load .....	467
	Design of bearing arrangements .....	467
<b>Accuracy</b>	Radial internal clearance .....	468
<b>Dimension tables</b>	Single row full complement cylindrical roller bearings, semi-locating bearings .....	470



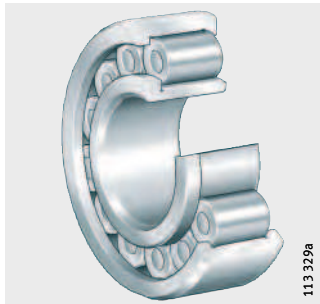
# Product overview **Single row full complement cylindrical roller bearings**

## **Semi-locating bearings** Single row

SL1818, SL1829, SL1830,  
SL1822



SL1923



# Single row full complement cylindrical roller bearings

**Features** Single row full complement cylindrical roller bearings have solid outer and inner rings together with rib-guided cylindrical rollers. Since these bearings have the largest possible number of rolling elements, they have extremely high radial load carrying capacity, high rigidity and are suitable for particularly compact designs. Due to the kinematic conditions, however, they do not achieve the high speeds that are possible when using cylindrical roller bearings with cage.

Single row full complement cylindrical roller bearings are in the form of semi-locating bearings.

**X-life** Numerous sizes are supplied in the X-life grade. These bearings are indicated in the dimension tables.

Bearings of X-life quality have, for example, lower roughness  $R_a$  and higher geometrical accuracy of the raceways than comparable designs that are not X-life. As a result, they have higher load carrying capacity and longer life for the same dimensioning.

In certain applications, this means that a smaller bearing arrangement can be designed.

## Bearings of TB design

In the case of bearings of TB design, the axial load carrying capacity of cylindrical roller bearings was significantly improved with the aid of new calculation and manufacturing methods.

Optimum contact conditions between the roller and rib are ensured by means of a special curvature of the roller end faces. As a result, axial surface pressures on the rib are significantly reduced and a lubricant film with improved load-carrying capabilities is achieved. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated.

In addition, axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.



# Single row full complement cylindrical roller bearings

## Semi-locating bearings

Semi-locating bearings are available in single row design as SL1818 (dimension series 18), SL1829 (dimension series 29), SL1830 (dimension series 30), SL1822 (dimension series 22) and SL1923 (dimension series 23).

They can support not only high radial forces but also axial forces in one direction and can therefore guide shafts axially in one direction. They act as non-locating bearings in the opposite direction.

Series SL1923 has only one rib on the inner ring and a self-retaining rolling element set. As a result, the inner ring can be removed from the bearing. This makes fitting and dismantling considerably easier.



The bearings SL1818, SL1829, SL1830 and SL1822 are held together in handling and transport by a transport and mounting retaining device on the outer ring. This retaining device remains in the bearing and must not be subjected to axial load.

### Axial displacement of inner ring

The inner ring can be axially displaced in one direction by the dimension “s” stated in the dimension table.

### Sealing

The cylindrical roller bearings are supplied in an open design.

### Lubrication

They are not supplied greased and can be lubricated with oil or grease via the end faces.

## Operating temperature

Full complement cylindrical roller bearings are suitable for operating temperatures from  $-30\text{ °C}$  to  $+120\text{ °C}$ .

### Suffixes

Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
BR	Black oxide coated	Available by agreement
C3	Radial internal clearance larger than normal	
C4	Radial internal clearance larger than C3	
C5	Radial internal clearance larger than C4	
E	Increased capacity design	Standard depending on series, see dimension table
TB	Bearing with increased axial load carrying capacity	Standard depending on bearing size, see dimension table

### Available bearings of TB design

Series <sup>1)</sup>	From bore diameter d mm
SL1818	460
SL1822	140
SL1829	300
SL1830	180
SL1923	90

<sup>1)</sup> Available by agreement.



## Design and safety guidelines

### Permissible skewing

There is no significant reduction in rating life if the misalignment of the inner ring relative to the outer ring does not exceed the following values:

4' in bearings of series SL1818

3' in bearings of series SL1923, SL1822, SL1829, SL1830.

### Axial load carrying capacity

Radial cylindrical roller bearings of a semi-locating bearing design can support axial forces in one direction as well as radial forces.

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces
- tilting of the bearing.



Ribs subjected to load must be supported across their entire height.

The permissible axial load  $F_{a\text{ per}}$  must not be exceeded, in order to avoid an unacceptable increase in temperature.

The axial limiting load  $F_{a\text{ max}}$  according to the formula must not be exceeded, in order to avoid impermissible pressure at the contact surfaces.

The ratio  $F_a/F_r$  should not exceed 0,4. In the case of bearings of TB design, the value 0,6 is permissible.

Continuous axial loading without simultaneous radial loading is not permissible.



### Permissible and maximum axial load

The axial load  $F_{a\text{ per}}$  and the limiting load  $F_{a\text{ max}}$  are calculated as follows:

#### Bearings of standard design

$$F_{a\text{ per}} = k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{0,6} \leq F_{a\text{ max}}$$

#### Bearings of TB design

$$F_{a\text{ per}} = 1,5 \cdot k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{-0,6} \leq F_{a\text{ max}}$$

#### Bearings of standard and TB design

$$F_{a\text{ max}} = 0,075 \cdot k_B \cdot d_M^{2,1}$$

$F_{a\text{ per}}$  N

Permissible axial load

$F_{a\text{ max}}$  N

Axial limiting load

$k_S$  –

Factor dependent on the lubrication method, see table, page 466

$k_B$  –

Bearing factor, see table, page 466

$d_M$  mm

Mean bearing diameter  $(d + D)/2$ , see dimension table

$n$   $\text{min}^{-1}$

Operating speed.

# Single row full complement cylindrical roller bearings

## Factor $k_S$ for the lubrication method

Lubrication method <sup>1)</sup>	$k_S$
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ( $\nu < 0,5 \cdot \nu_1$ )	7,5 to 10
Poor heat dissipation, oil sump lubrication oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)	12 to 18
Very good heat dissipation recirculating oil lubrication with oil cooling, high operating viscosity ( $\nu > 2 \cdot \nu_1$ )	16 to 24

<sup>1)</sup> Doped oils should be used, e.g. CLP (DIN 51 517) and HLP (DIN 51 524) of ISO-VG classes 32 to 460 as well as ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

## Bearing factor $k_B$

Series	$k_B$
SL1818	4,5
SL1829	11
SL1830	17
SL1822	20
SL1923	30

## Misalignment of bearings

Misalignment caused by shaft deflection for example, may lead to alternating stresses on the inner ring ribs. In this case, the axial load must be restricted to  $F_{as}$  for bearing tilting of up to max. 2 angular minutes.

$$F_{as} = 20 \cdot d_M^{1,42}$$

If even greater tilting is present, special strength analysis is required.

## Equivalent dynamic bearing load

### Semi-locating bearings

If an axial force  $F_a$  is present in addition to the radial force  $F_r$ , the load ratio must be taken into consideration.

### Load ratio and equivalent dynamic load

Load ratio	Equivalent dynamic bearing load
$\frac{F_a}{F_r} \leq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = 0,92 \cdot F_r + Y \cdot F_a$

P N  
Equivalent dynamic bearing load for combined load  
 $F_a$  N  
Axial dynamic bearing load  
 $F_r$  N  
Radial dynamic bearing load  
e, Y –  
Factors: see table Factors e and Y.

### Factors e and Y

Series	Calculation factors	
	e	Y
SL1818	0,2	0,6
SL1923, SL1822, SL1829, SL1830	0,3	0,4



## Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

### Minimum radial load

In continuous operation, a minimum radial load of the order of  $F_{r \min} = C_{0r}/60$  is necessary.

If  $F_{r \min} < C_{0r}/60$ , please contact us.



## Design of bearing arrangements

### Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 150.  
Recommended housing tolerances for radial bearings, see table, page 152.

### Axial location

In order to prevent lateral creep of the bearing rings, they must be located by force or physical locking means.

The abutment shoulders (shaft and housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating to the abutting shoulders must be designed with rounding to DIN 5 418 or an undercut to DIN 509. Note the minimum chamfer dimensions  $r$  as given in the dimension tables.

In the case of semi-locating bearings, the bearing rings only require support on one side, on the rib supporting the axial load.

Full support must be provided for ribs transmitting forces in axially loaded bearings.



# Single row full complement cylindrical roller bearings

## Accuracy

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620.

## Radial internal clearance

The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

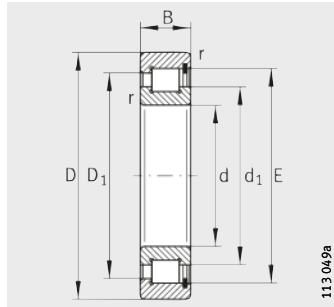
## Radial internal clearance

Bore		Radial internal clearance							
d mm		CN μm		C3 μm		C4 μm		C5 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75	65	90
24	30	20	45	35	60	50	75	70	95
30	40	25	50	45	70	60	85	80	105
40	50	30	60	50	80	70	100	95	125
50	65	40	70	60	90	80	110	110	140
65	80	40	75	65	100	90	125	130	165
80	100	50	85	75	110	105	140	155	190
100	120	50	90	85	125	125	165	180	220
120	140	60	105	100	145	145	190	200	245
140	160	70	120	115	165	165	215	225	275
160	180	75	125	120	170	170	220	250	300
180	200	90	145	140	195	195	250	275	330
200	225	105	165	160	220	220	280	305	365
225	250	110	175	170	235	235	300	330	395
250	280	125	195	190	260	260	330	370	440
280	315	130	205	200	275	275	350	410	485
315	355	145	225	225	305	305	385	455	535
355	400	190	280	280	370	370	460	510	600
400	450	210	310	310	410	410	510	565	665
450	500	220	330	330	440	440	550	625	735

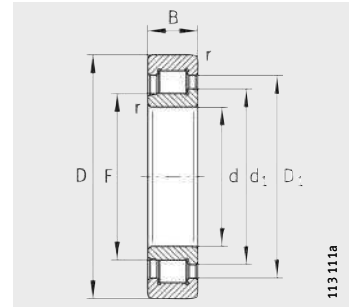


# Single row full complement cylindrical roller bearings

Semi-locating bearings



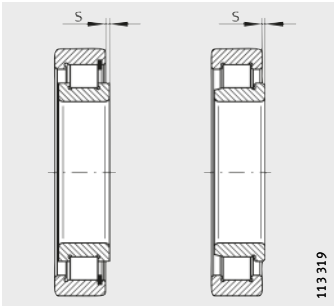
SL1829, SL1830, SL1822



SL1923

Dimension table - Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions					Mounting dimensions	
			d	D	B	r min.	s <sup>1)</sup>	F	d <sub>1</sub> ≈
SL183004	XL	0,11	20	42	16	0,6	1,5	-	28,8
SL182204	XL	0,16	20	47	18	1	1	-	30,3
SL183005	XL	0,12	25	47	16	0,6	1,5	-	34,6
SL182205	XL	0,18	25	52	18	1	1	-	35,3
SL192305	XL	0,37	25	62	24	1,1	2	31,72	36,7
SL183006	XL	0,2	30	55	19	1	2	-	40
SL182206	XL	0,3	30	62	20	1	1	-	42
SL192306	XL	0,56	30	72	27	1,1	2	38,3	43,5
SL183007	XL	0,26	35	62	20	1	2	-	44,9
SL182207	XL	0,44	35	72	23	1,1	1	-	47
SL192307	XL	0,74	35	80	31	1,5	2	44,68	50,7
SL183008	XL	0,31	40	68	21	1	2	-	50,5
SL182208	XL	0,55	40	80	23	1,1	1	-	54
SL192308	XL	1,01	40	90	33	1,5	2	51,12	57,5
SL183009	XL	0,4	45	75	23	1	2	-	55,3
SL182209	XL	0,59	45	85	23	1,1	1	-	57,5
SL192309	XL	1,37	45	100	36	1,5	3	56,1	62,5
SL183010	XL	0,43	50	80	23	1	2	-	59,1
SL182210	XL	0,64	50	90	23	1,1	1	-	64,4
SL192310	XL	1,81	50	110	40	2	3	60,72	68,3
SL183011	XL	0,64	55	90	26	1,1	2	-	68,5
SL182211	XL	0,87	55	100	25	1,5	1	-	70
SL192311	XL	2,28	55	120	43	2	3	67,11	75,5
SL182912	XL	0,29	60	85	16	1	1	-	69
SL183012	XL	0,69	60	95	26	1,1	2	-	71,7
SL182212	XL	1,18	60	110	28	1,5	1,5	-	76,8
SL192312	XL	2,88	60	130	46	2,1	3	73,62	82
SL182913	XL	0,31	65	90	16	1	1	-	75,7
SL183013	XL	0,73	65	100	26	1,1	2	-	78,1
SL182213	XL	1,57	65	120	31	1,5	1,5	-	82,3
SL192313	XL	3,52	65	140	48	2,1	3,5	80,69	90
SL182914	XL	0,49	70	100	19	1	1	-	81,2
SL183014	XL	1,02	70	110	30	1,1	3	-	81,5
SL182214	-	1,66	70	125	31	1,5	1,5	-	87
SL192314	XL	4,33	70	150	51	2,1	3,5	84,14	93,5



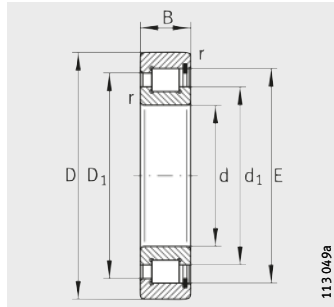
1) Axial displacement "s"

D <sub>1</sub>	E	Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
		dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	C <sub>ur</sub> N	n <sub>G</sub> min <sup>-1</sup>	n <sub>B</sub> min <sup>-1</sup>
≈ 32,8	36,81	30 500	26 000	4 450	10 500	7 500
36,9	41,47	45 500	37 000	6 100	9 700	6 500
38,5	42,51	35 000	32 000	5 500	8 900	6 000
41,9	46,52	51 000	44 500	7 400	8 400	5 500
47,5	–	73 000	60 000	9 400	7 600	4 800
45,4	49,6	45 000	42 000	7 500	7 600	5 600
50,6	55,19	70 000	64 000	10 200	7 000	4 550
56	–	100 000	88 000	14 500	6 400	4 050
51,3	55,52	55 000	53 000	9 400	6 700	4 950
59,3	63,97	88 000	78 000	12 700	6 100	4 250
65,8	–	126 000	112 000	19 000	5 500	3 600
57,1	61,74	66 000	67 000	11 200	6 000	4 350
66,3	70,94	97 000	91 000	14 900	5 400	3 650
75,2	–	170 000	156 000	27 000	4 850	3 050
62,2	66,85	70 000	74 000	12 500	5 500	4 200
69,8	74,43	101 000	98 000	16 000	5 100	3 450
80,3	–	181 000	165 000	28 500	4 450	3 000
67,7	72,33	88 000	94 000	15 100	5 100	3 700
76,7	81,4	109 000	111 000	18 100	4 600	3 000
89,7	–	232 000	219 000	38 500	4 050	2 800
78,8	83,54	120 000	136 000	22 600	4 400	3 100
84,1	88,81	140 000	148 000	25 000	4 200	2 700
99,3	–	270 000	255 000	45 500	3 700	2 550
74,4	78,55	63 000	76 000	13 700	4 550	2 900
82,1	86,74	123 000	143 000	23 700	4 200	3 000
93,9	99,17	169 000	176 000	31 000	3 800	2 550
105,8	–	285 000	280 000	50 000	3 400	2 480
81	85,24	67 000	84 000	15 100	4 150	2 550
88,4	93,09	130 000	157 000	26 000	3 900	2 700
100,7	106,25	198 000	210 000	37 000	3 550	2 480
116,5	–	350 000	355 000	63 000	3 100	2 180
87,8	92,31	88 000	111 000	18 800	3 850	2 550
95,6	100,28	153 000	174 000	29 500	3 650	2 800
105,2	111,45	181 000	223 000	32 000	3 350	2 340
121,6	–	385 000	390 000	69 000	3 000	2 170

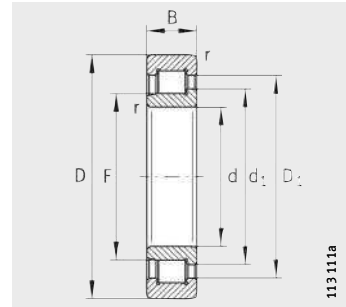


# Single row full complement cylindrical roller bearings

Semi-locating bearings



SL1829, SL1830, SL1822

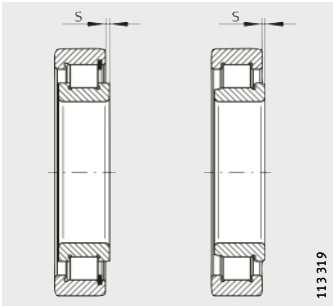


SL1923

Dimension table (continued) · Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions					Mounting dimensions		
			d	D	B	r min.	s <sup>1)</sup>	F	d <sub>1</sub> ≈	
SL182915	XL	0,52	75	105	19	1	1	–	86,3	
SL183015	XL	1,06	75	115	30	1,1	3	–	89	
SL182215	–	1,75	75	130	31	1,5	1,5	–	91,8	
SL192315	XL	5,3	75	160	55	2,1	3,5	91,22	101,6	
SL182916	XL	0,55	80	110	19	1	1	–	91,4	
SL183016	–	1,43	80	125	34	1,1	4	–	95	
SL182216	–	2,15	80	140	33	2	1,5	–	98,6	
SL192316	XL	6,32	80	170	58	2,1	3,5	98,24	109,5	
SL182917	XL	0,81	85	120	22	1,1	1	–	96,4	
SL183017	–	1,51	85	130	34	1,1	4	–	99,4	
SL182217	–	2,74	85	150	36	2	1,5	–	104,4	
SL192317	XL	7,34	85	180	60	3	4	107,01	118,2	
SL182918	XL	0,84	90	125	22	1,1	1	–	102	
SL183018	–	1,97	90	140	37	1,5	4	–	106,1	
SL182218	–	3,48	90	160	40	2	2,5	–	110,2	
SL192318-TB	XL	8,83	90	190	64	3	4	105,26	117,5	
SL182919	XL	0,86	95	130	22	1,1	1	–	106,7	
SL182219	–	4,17	95	170	43	2,1	2,5	–	122	
SL192319-TB	XL	10,2	95	200	67	3	4	114,65	126,6	
SL182920	XL	1,14	100	140	24	1,1	1,5	–	113,4	
SL183020	–	2,15	100	150	37	1,5	4	–	115,7	
SL182220	–	5,13	100	180	46	2,1	2,5	–	127,5	
SL192320-TB	XL	13	100	215	73	3	4	119,3	132,7	
SL182922	XL	1,23	110	150	24	1,1	1,5	–	124	
SL183022	–	3,5	110	170	45	2	5,5	–	127,3	
SL182222	–	7,24	110	200	53	2,1	4	–	137	
SL192322-TB	XL	17	110	240	80	3	5	134,27	151,1	
SL182924	XL	1,73	120	165	27	1,1	1,5	–	134,8	
SL183024	–	3,8	120	180	46	2	5,5	–	138,8	
SL182224	–	9,08	120	215	58	2,1	4	–	150,7	
SL192324-TB	XL	22,3	120	260	86	3	5	147,39	164,2	
SL182926	XL	2,33	130	180	30	1,5	2	–	146	
SL183026	–	5,65	130	200	52	2	5,5	–	148,6	
SL182226	–	11,25	130	230	64	3	5	–	162,3	
SL192326-TB	XL	27,95	130	280	93	4	5	157,9	176	





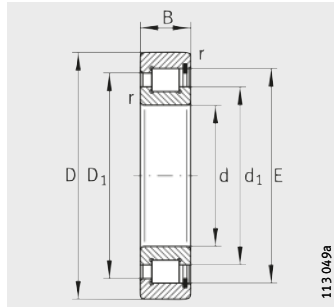
1) Axial displacement "s"

D <sub>1</sub>	E	Basic load ratings		Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>	Reference speed n <sub>B</sub> min <sup>-1</sup>
		dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N			
≈ 92,8	97,41	91 000	119 000	20 100	3 600	2 370
103,2	107,9	162 000	192 000	32 500	3 400	2 490
110	116,2	187 000	236 000	33 500	3 200	2 210
131,5	–	460 000	475 000	83 000	2 750	2 000
98	102,51	94 000	126 000	21 400	3 450	2 220
111,7	117,4	170 000	220 000	31 000	3 150	2 470
119,3	126,3	223 000	280 000	38 500	3 000	2 040
142,1	–	540 000	560 000	96 000	2 550	1 820
105	109,58	118 000	159 000	25 500	3 200	2 200
116,1	121,95	175 000	231 000	32 000	3 000	2 360
126,3	133,75	255 000	320 000	44 500	2 800	2 000
150,9	–	570 000	620 000	103 000	2 400	1 710
110,7	115,75	122 000	169 000	26 500	3 050	2 050
124,5	130,65	205 000	275 000	38 000	2 800	2 240
133,3	141,15	285 000	365 000	51 000	2 650	1 990
152,5	–	620 000	650 000	112 000	2 400	1 760
117	122,25	132 000	177 000	27 500	2 900	1 940
147,3	155,95	330 000	425 000	58 000	2 410	1 780
161,9	–	650 000	710 000	120 000	2 240	1 620
125,7	130,95	152 000	203 000	31 500	2 700	1 870
134	140,2	216 000	300 000	40 500	2 600	2 040
154,3	163,35	390 000	510 000	70 000	2 300	1 700
172,8	–	790 000	850 000	143 000	2 110	1 490
136,2	141,5	155 000	213 000	34 000	2 490	1 710
149,3	156,7	280 000	385 000	52 000	2 350	2 010
168	177,6	450 000	580 000	78 000	2 130	1 720
199,9	–	950 000	970 000	156 000	1 840	1 270
149	154,3	199 000	285 000	45 500	2 290	1 590
160,7	168,15	295 000	425 000	56 000	2 170	1 840
183	192,9	530 000	720 000	95 000	1 950	1 500
213,1	–	1 130 000	1 230 000	195 000	1 710	1 120
161,1	167,15	238 000	350 000	54 000	2 110	1 500
175,5	184,4	425 000	600 000	79 000	2 000	1 660
197	207,75	620 000	850 000	110 000	1 810	1 360
227,9	–	1 260 000	1 380 000	216 000	1 600	1 040

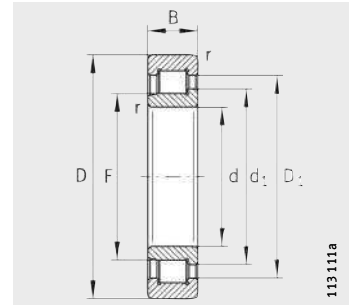


# Single row full complement cylindrical roller bearings

Semi-locating bearings



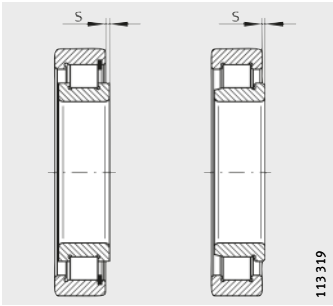
SL1818, SL1829, SL1830, SL1822



SL1923

Dimension table (continued) · Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions					Mounting dimensions		
			d	D	B	r	s <sup>1)</sup>	F	d <sub>1</sub>	D <sub>1</sub>
						min.			≈	≈
SL182928	XL	2,42	140	190	30	1,5	2	–	157	174
SL183028	–	6,04	140	210	53	2	5,5	–	162,2	189,5
SL182228	–	14,47	140	250	68	3	5	–	173,9	211,1
SL192328-TB	XL	34,9	140	300	102	4	7	168,45	187,8	243,4
SL182930	XL	3,77	150	210	36	2	2,5	–	169	189,6
SL183030	–	7,33	150	225	56	2,1	7	–	170	198
SL182230	–	18,43	150	270	73	3	6	–	185,5	225,2
SL192330-TB	–	42,1	150	320	108	4	7	182,49	203,3	263,5
SL182932	XL	4	160	220	36	2	2,5	–	179,7	200,5
SL183032	–	8,8	160	240	60	2,1	7	–	184,8	215,8
SL182232	–	23	160	290	80	3	6	–	208,7	253,4
SL192332-TB	–	49,7	160	340	114	4	7	196,38	219	284,4
SL182934	XL	4,3	170	230	36	2	2,5	–	190,6	211,3
SL183034	–	12,2	170	260	67	2,1	7	–	198,1	232,7
SL182234	–	28,65	170	310	86	4	7	–	220,3	267,4
SL192334-TB	–	59,2	170	360	120	4	7	203,55	226,6	295
SL182936	XL	6,2	180	250	42	2	3	–	200,7	224
SL183036	–	16,1	180	280	74	2,1	7	–	212,2	249,4
SL182236	–	29,8	180	320	86	4	7	–	232,4	279,5
SL192336-TB	–	69,1	180	380	126	4	7	221,56	245	312,9
SL182938	XL	6,5	190	260	42	2	2	–	211,5	238,5
SL183038	–	17	190	290	75	2,1	9	–	221,8	259
SL182238	–	35,65	190	340	92	4	9	–	243,5	295,5
SL192338-TB	–	80,3	190	400	132	5	7	224,43	250	326,8
SL181840	–	2,57	200	250	24	1,5	2	–	216,6	231,6
SL182940	XL	9,1	200	280	48	2,1	3	–	225,5	252,4
SL183040	–	21,8	200	310	82	2,1	9	–	236,6	276,2
SL182240	–	43,12	200	360	98	4	9	–	246,6	302,4
SL192340-TB	–	92,1	200	420	138	5	7	238,45	265,7	347,2
SL181844	–	2,8	220	270	24	1,5	2	–	237,3	252,3
SL182944	XL	9,9	220	300	48	2,1	3	–	246,3	273,2
SL183044	–	28,4	220	340	90	3	9	–	254,6	299,2
SL192344-TB	–	111,2	220	460	145	5	7	266,71	297	388,3
SL181848-E	–	4,29	240	300	28	2	2	–	260,5	281
SL182948	–	10,6	240	320	48	2,1	3	–	267,5	294,4
SL183048	–	30,9	240	360	92	3	11	–	277,5	322,1
SL192348-TB	–	142,3	240	500	155	5	10	280,55	312,5	408,5



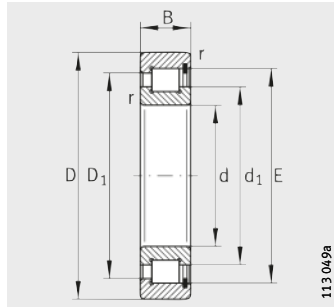
1) Axial displacement "s"

E	Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
	dyn. $C_r$ N	stat. $C_{or}$ N			
180	260 000	375 000	57 000	1 960	1 370
198,4	450 000	660 000	85 000	1 840	1 470
222,55	720 000	1 000 000	127 000	1 690	1 230
–	1 410 000	1 570 000	241 000	1 500	970
196,75	340 000	480 000	73 000	1 810	1 360
207,45	475 000	700 000	88 000	1 760	1 430
237,35	820 000	1 160 000	147 000	1 580	1 130
–	1 680 000	1 900 000	265 000	1 380	840
207,6	350 000	510 000	77 000	1 710	1 270
225,45	540 000	800 000	99 000	1 620	1 280
267,1	1 020 000	1 470 000	178 000	1 410	920
–	1 900 000	2 170 000	300 000	1 280	760
218,45	365 000	540 000	80 000	1 610	1 190
243,55	700 000	1 050 000	129 000	1 510	1 120
281,9	1 140 000	1 660 000	199 000	1 330	870
–	2 070 000	2 380 000	320 000	1 240	730
231,85	455 000	680 000	100 000	1 530	1 150
261	810 000	1 240 000	150 000	1 410	1 020
294	1 180 000	1 760 000	208 000	1 270	800
–	2 190 000	2 600 000	345 000	1 160	670
244,15	510 000	770 000	112 000	1 450	1 030
270,6	830 000	1 300 000	155 000	1 350	970
311,5	1 300 000	1 900 000	223 000	1 210	770
–	2 500 000	2 950 000	390 000	1 120	630
237,6	178 000	320 000	33 500	1 450	1 040
261,6	610 000	940 000	134 000	1 360	950
288,6	950 000	1 510 000	178 000	1 270	890
319,4	1 410 000	2 010 000	235 000	1 180	770
–	2 800 000	3 300 000	420 000	1 060	570
258,5	187 000	350 000	36 000	1 320	940
282,45	650 000	1 030 000	144 000	1 250	840
312	1 150 000	1 820 000	209 000	1 170	800
–	3 000 000	3 450 000	425 000	950	520
287,5	265 000	490 000	51 000	1 200	870
303,7	600 000	1 120 000	124 000	1 150	750
336	1 210 000	1 990 000	224 000	1 080	720
–	3 300 000	3 800 000	465 000	900	500

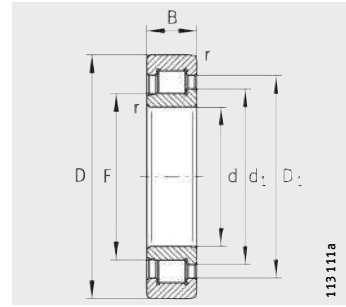


# Single row full complement cylindrical roller bearings

Semi-locating bearings



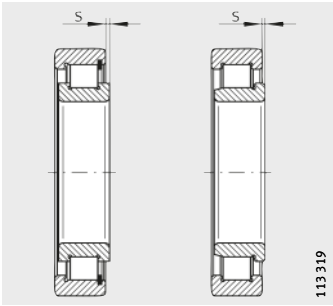
SL1818, SL1829, SL1830



SL1923

Dimension table (continued) · Dimensions in mm

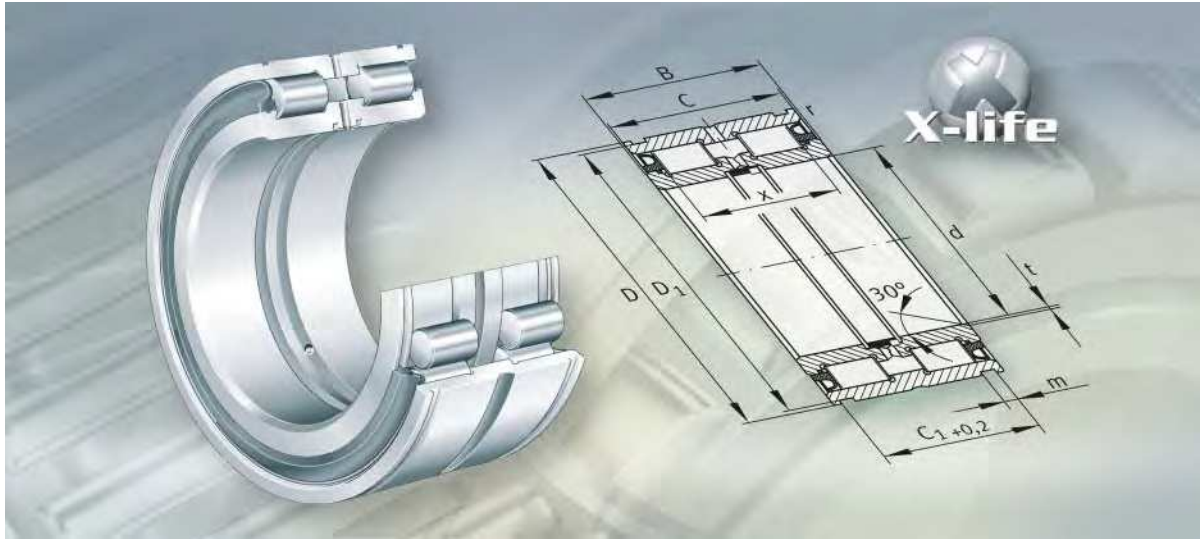
Designation	Mass m ≈kg	Dimensions					Mounting dimensions		
		d	D	B	r	s <sup>1)</sup>	F	d <sub>1</sub> ≈	D <sub>1</sub> ≈
SL181852-E	4,61	260	320	28	2	2	-	281	301,5
SL182952	18,5	260	360	60	2,1	5	-	291,5	323,4
SL183052	44,5	260	400	104	4	11	-	304	358,4
SL192352-TB	173,2	260	540	165	6	10	315,6	351,6	459,6
SL181856-E	6,89	280	350	33	2	2,5	-	304	327
SL182956	19,7	280	380	60	2,1	3,5	-	314	348,5
SL183056	48	280	420	106	4	11	-	319,5	372,9
SL181860-E	9,79	300	380	38	2,1	3	-	323,5	350,5
SL182960	31,2	300	420	72	3	5	-	338	376,9
SL183060-TB	66,6	300	460	118	4	14	-	353,6	415,6
SL181864-E	10,36	320	400	38	2,1	3	-	344,5	371,5
SL182964	32,9	320	440	72	3	5	-	358,5	397,4
SL183064-TB	71,7	320	480	121	4	14	-	369,5	430,1
SL181868-E	10,93	340	420	38	2,1	3	-	365,5	392,5
SL182968	34,7	340	460	72	3	5	-	379	418,7
SL183068-TB	95,8	340	520	133	5	16	-	396,1	463,9
SL181872-E	11,49	360	440	38	2,1	3	-	387	413,5
SL182972	36,4	360	480	72	3	5	-	399,5	438,6
SL183072-TB	101	360	540	134	5	16	-	414	481,6
SL181876-E	18,87	380	480	46	2,1	4	-	415,5	448
SL182976	52,1	380	520	82	4	5	-	426	472,1
SL183076-TB	106	380	560	135	5	16	-	431,7	499,5
SL181880-E	19,81	400	500	46	2,1	4	-	432	464,5
SL182980	54,3	400	540	82	4	5	-	450	496,1
SL183080-TB	140	400	600	148	5	18	-	462,5	535,1
SL181884-E	20,6	420	520	46	2,1	4	-	457	489,5
SL182984	56,9	420	560	82	4	5	-	462	509
SL181888-E	21,54	440	540	46	2,1	4	-	473,5	506
SL182988	78,1	440	600	95	4	7	-	490	544,6
SL181892-E	33,21	460	580	56	3	5	-	501,5	541
SL182992	81,1	460	620	95	4	7	-	504	559,6
SL181896-E	34,53	480	600	56	3	5	-	522	561
SL182996	94,7	480	650	100	5	7	-	538	596,6
SL1818/500-E	35,73	500	620	56	3	5	-	542	581,5
SL1829/500	98,3	500	670	100	5	7	-	553	612,7



1) Axial displacement "s"

E	Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
	dyn. $C_r$ N	stat. $C_{0r}$ N			
308	275 000	530 000	54 000	1 110	790
333,7	780 000	1 450 000	160 000	1 060	690
375,97	1 600 000	2 500 000	280 000	980	620
–	4 000 000	4 700 000	560 000	800	410
335	355 000	670 000	69 000	1 030	730
359,5	910 000	1 710 000	184 000	980	590
390,3	1 650 000	2 650 000	290 000	940	590
360	455 000	840 000	86 000	960	680
389,45	1 170 000	2 200 000	235 000	910	540
434,85	2 020 000	3 300 000	325 000	840	500
381	470 000	900 000	90 000	910	620
409,85	1 210 000	2 340 000	246 000	860	495
449,5	2 080 000	3 450 000	340 000	810	480
402,2	485 000	960 000	94 000	860	570
430,2	1 250 000	2 470 000	255 000	810	460
485,65	2 490 000	4 150 000	400 000	750	430
423,5	500 000	1 010 000	98 000	810	530
450,6	1 280 000	2 600 000	265 000	770	430
503,45	2 550 000	4 350 000	410 000	720	405
459	650 000	1 290 000	126 000	750	490
486,7	1 660 000	3 300 000	335 000	720	380
521,25	2 600 000	4 450 000	425 000	700	390
475,5	660 000	1 340 000	130 000	720	470
510,85	1 710 000	3 500 000	350 000	690	350
558,52	3 050 000	5 400 000	500 000	650	345
500	680 000	1 420 000	135 000	690	430
522,95	1 730 000	3 600 000	355 000	670	340
517	700 000	1 470 000	139 000	660	415
562	2 090 000	4 100 000	405 000	630	325
554	940 000	1 890 000	179 000	620	385
576,3	2 130 000	4 250 000	410 000	610	310
474,5	960 000	1 970 000	185 000	600	365
614,75	2 390 000	4 800 000	460 000	570	280
594,5	980 000	2 050 000	190 000	580	345
630	2 430 000	4 950 000	470 000	560	270





## Double row full complement cylindrical roller bearings

# Double row full complement cylindrical roller bearings

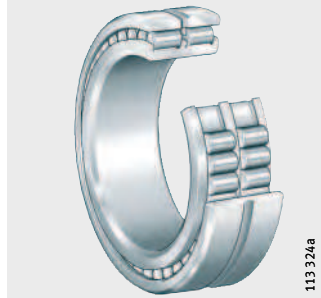
		Page
<b>Product overview</b>	Double row full complement cylindrical roller bearings .....	480
<b>Features</b>	<b>X-life</b> .....	481
	Bearings of TB design .....	481
	Non-locating bearings .....	481
	Semi-locating bearings .....	482
	Locating bearings .....	482
	Operating temperature .....	483
	Suffixes .....	483
<b>Design and safety guidelines</b>	Axial load carrying capacity.....	484
	Equivalent dynamic bearing load .....	485
	Equivalent static bearing load.....	486
	Minimum radial load .....	486
	Design of bearing arrangements .....	486
<b>Accuracy</b>	Radial internal clearance .....	487
<b>Dimension tables</b>	Double row full complement cylindrical roller bearings, semi-locating, locating and non-locating bearings.....	488
	Cable sheave bearings, cylindrical roller bearings with snap ring grooves, full complement, sealed, locating bearings .....	496



# Product overview Double row full complement cylindrical roller bearings

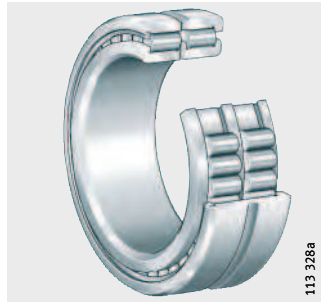
## Non-locating bearings

SL0248, SL0249



## Semi-locating bearings

SL1850



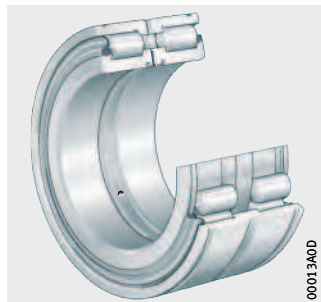
## Locating bearings

SL0148, SL0149



## Cable sheave bearings With snap ring grooves Sealed

SL0450..-PP, SL04..-PP





# Double row full complement cylindrical roller bearings

**Features** The bearings have solid outer and inner rings and rib-guided cylindrical rollers. Since these bearings have the largest possible number of rolling elements, they have extremely high radial load carrying capacity, high rigidity and are suitable for particularly compact designs. Due to the kinematic conditions, however, they do not achieve the high speeds that are possible when using cylindrical roller bearings with cage.

Double row full complement cylindrical roller bearings are available as non-locating, semi-locating and locating bearings. The bearings do not permit any skewing between the inner and outer ring.

**X-life** Numerous sizes are supplied in the X-life grade. These bearings are indicated in the dimension tables.

Bearings of X-life quality have, for example, lower roughness  $R_a$  and higher geometrical accuracy of the raceways than comparable designs that are not X-life. As a result, for example, they have higher load carrying capacity and longer life for the same dimensioning. In certain applications, this means that a smaller bearing arrangement can be designed.

## Bearings of TB design

In the case of bearings of TB design, the axial load carrying capacity was significantly improved through the use of new calculation and manufacturing methods.

Optimum contact conditions between the roller and rib are ensured by means of a special curvature of the roller end faces. As a result, the axial contact pressures on the rib are significantly minimised and a lubricant film capable of supporting higher loads is formed. Under normal operating conditions, wear and fatigue at the rib contact running and roller end faces is completely eliminated.

In addition, axial frictional torque is reduced by up to 50%. The bearing temperature during operation is therefore significantly lower.



## Available bearings

By agreement, series SL1850 is available starting from a bore diameter  $d = 180$  mm in the form of the TB design.

## Non-locating bearings

Bearings SL0248 (designation to DIN 5 412-9: NNCL 48..V) and SL0249 (designation to DIN 5 412-9: NNCL 49..V) are non-locating bearings and can support radial forces only.



The bearings are held together in handling and transport by a transport and mounting retaining device on the outer ring. This retaining device remains in the bearing and must not be subjected to axial load.

## Axial displacement

The outer ring without ribs can be axially displaced in both directions in relation to the inner ring. The inner ring has ribs on both sides.

## Sealing

The cylindrical roller bearings are of an open design.

## Lubrication

Oil or grease lubrication is possible. For lubrication, the outer ring has a lubrication groove and lubrication holes.

# Double row full complement cylindrical roller bearings

## Semi-locating bearings

The semi-locating bearings are available as SL1850 (dimension series 50). They can support not only high radial forces but also axial forces in one direction and can therefore guide shafts axially in one direction. They act as non-locating bearings in the opposite direction.



The bearings are held together in handling and transport by a transport and mounting retaining device on the outer ring. This retaining device remains in the bearing and must not be subjected to axial load.

## Axial displacement of inner ring

The inner ring can be axially displaced in one direction by the dimension “s” stated in the dimension table.

## Sealing

The cylindrical roller bearings are supplied in an open design.

## Lubrication

Oil or grease lubrication is possible. The bearings can be lubricated via the end faces as well as via a lubrication groove and lubrication holes in the outer ring.

## Locating bearings

Bearings SL0148 (designation to DIN 5 412-9: NNC 48..V) and SL0149 (designation to DIN 5 412-9: NNC 49..V) are locating bearings. These bearings can support axial forces from both directions as well as radial forces.



The outer ring has ribs on both sides, is axially split and held together by retaining rings. The inner ring has an additional central rib. The retaining rings must not be subjected to axial load.

## Cable sheave bearings

Cable sheave bearings (cylindrical roller bearings with snap ring grooves) are locating bearings. These bearings are very rigid and can support moderate axial forces in both directions as well as high radial forces. They consist of solid outer and inner rings with ribs, rib-guided cylindrical rollers and sealing rings.

The outer rings have snap ring grooves for retaining rings.

The inner rings are axially split, 1 mm wider than the outer rings and held together by a rolled-in steel strip.

Cylindrical roller bearings with snap ring grooves are available as a light series SL04..-PP and in the dimension series 50 as SL0450..-PP.

**Sealing** In the case of cable sheave bearings, the running system is protected against contamination and moisture by sealing rings on both sides.

**Lubrication** Open locating bearings can be lubricated with oil or grease. For lubrication, the outer ring has a lubrication groove and lubrication holes.

Cable sheave bearings are greased using a lithium complex soap grease to GA08 and can be lubricated via the outer or inner ring. Arcanol LOAD150 is suitable for relubrication.

**Operating temperature** Open full complement cylindrical roller bearings are suitable for operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+120\text{ }^{\circ}\text{C}$ .



Cylindrical roller bearings with snap ring grooves are suitable for operating temperatures from  $-20\text{ }^{\circ}\text{C}$  to  $+80\text{ }^{\circ}\text{C}$ , restricted by the grease and seal material.

**Suffixes** Suffixes for available designs: see table.

**Available designs of SL01, SL02, SL1850**

Suffix	Description	Design
BR	Black oxide coated	Available by agreement
C3	Radial internal clearance larger than normal	
C4	Radial internal clearance larger than C3	
C5	Radial internal clearance larger than C4	
TB	Bearing with increased axial load carrying capacity	



**Available designs of cable sheave bearings**

Suffix	Description	Design
C3	Radial internal clearance larger than normal	Available by agreement
C4	Radial internal clearance larger than C3	
C5	Radial internal clearance larger than C4	
RR	Corrosion-resistant design, with Corrotect <sup>®</sup> coating	
2NR	Cable sheave bearing supplied with two loose-packed retaining rings WRE	
-	Without seals	Standard
P	Seal on one side	
PP	Seals on both sides, for cable sheave bearings	

# Double row full complement cylindrical roller bearings

## Design and safety guidelines

### Axial load carrying capacity

Radial cylindrical roller bearings used as semi-locating and locating bearings can support axial forces in one or both directions in addition to radial forces.

The axial load carrying capacity is dependent on:

- the size of the sliding surfaces between the ribs and the end faces of the rolling elements
- the sliding velocity at the ribs
- the lubrication on the contact surfaces.



Ribs subjected to load must be supported across their entire height.

The permissible axial load  $F_{a\ per}$  must not be exceeded, in order to avoid an unacceptable increase in temperature.

The axial limiting load  $F_{a\ max}$  according to the formula must not be exceeded, in order to avoid impermissible pressure at the contact surfaces.

The ratio  $F_a/F_r$  should not exceed 0,4. In the case of bearings of TB design, the value 0,6 is permissible.

Continuous axial loading without simultaneous radial loading is not permissible.

### Permissible and maximum axial load

The axial load  $F_{a\ per}$  and the limiting load  $F_{a\ max}$  are calculated as follows:

#### Bearings of standard design

$$F_{a\ per} = k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{0,6} \leq F_{a\ max}$$

#### Bearings of TB design

$$F_{a\ per} = 1,5 \cdot k_S \cdot k_B \cdot d_M^{1,5} \cdot n^{-0,6} \leq F_{a\ max}$$

#### Bearings of standard and TB design

$$F_{a\ max} = 0,075 \cdot k_B \cdot d_M^{2,1}$$

$F_{a\ per}$   
Permissible axial load

N

$F_{a\ max}$   
Axial limiting load

N

$k_S$

–

Factor dependent on the lubrication method, see table, page 485

$k_B$

–

Bearing factor, see table, page 485

$d_M$

mm

Mean bearing diameter  $(d + D)/2$ , see dimension table

$n$

$\text{min}^{-1}$

Operating speed.

### Cable sheave bearings



In the case of cylindrical roller bearings with snap ring grooves, application engineering advice is necessary. The limit values and calculations for  $F_{a\ per}$  and  $F_{a\ max}$  are not therefore valid for these bearings.

**Factor  $k_S$   
for the lubrication method**

Lubrication method <sup>1)</sup>	Factor $k_S$
Minimal heat dissipation, drip feed oil lubrication, oil mist lubrication, low operating viscosity ( $\nu < 0,5 \cdot \nu_1$ )	7,5 to 10
Poor heat dissipation, oil sump lubrication, oil spray lubrication, low oil flow	10 to 15
Good heat dissipation, recirculating oil lubrication (pressurised oil lubrication)	12 to 18
Very good heat dissipation, recirculating oil lubrication with oil cooling, high operating viscosity ( $\nu > 2 \cdot \nu_1$ )	16 to 24

<sup>1)</sup> Doped oils should be used, e.g. CLP (DIN 51 517) and HLP (DIN 51 524) of ISO-VG classes 32 to 460 as well as ATF oils (DIN 51 502) and gearbox oils (DIN 51 512) of SAE viscosity classes 75 W to 140 W.

**Bearing factor  $k_B$**

Series	Factor $k_S$
SL0148	4,5
SL0149	11
SL1850	17



**Equivalent  
dynamic bearing load  
Non-locating bearings and  
cable sheave bearings**

For bearings under dynamic loading, the following applies:

$$P = F_r$$

**Semi-locating and  
locating bearings**

If an axial force  $F_a$  is present in addition to the radial force  $F_r$ , the load ratio must be taken into consideration.

**Load ratio and  
equivalent dynamic load**

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq e$	$P = F_r$
$\frac{F_a}{F_r} > e$	$P = 0,92 \cdot F_r + Y \cdot F_a$

$P$  N  
Equivalent dynamic bearing load for combined load  
 $F_a$  N  
Axial dynamic bearing load  
 $F_r$  N  
Radial dynamic bearing load  
 $e, Y$  –  
Factors: see table Factors  $e$  and  $Y$ .

**Factors  $e$  and  $Y$**

Series	Calculation factors	
	$e$	$Y$
SL1850	0,2	0,6
SL0148, SL0149	0,4	0,5

# Double row full complement cylindrical roller bearings

## Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

## Minimum radial load



In continuous operation, a minimum radial load of the order of  $F_{r \min} = C_{0r}/60$  is necessary.

If  $F_{r \min} < C_{0r}/60$ , please contact us.

## Design of bearing arrangements Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

## Cable sheave bearings

Cable sheave bearings normally have circumferential load on the outer ring and a press fit is therefore required on the outer ring.

## Axial location

In order to prevent lateral creep of the bearing rings, they must be located by force or physical locking means.

The abutment shoulders (shaft and housing) should be sufficiently high and perpendicular to the bearing axis.

The transition from the bearing seating point to the abutment shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. The minimum chamfer dimensions  $r$  in the dimension tables must be observed.

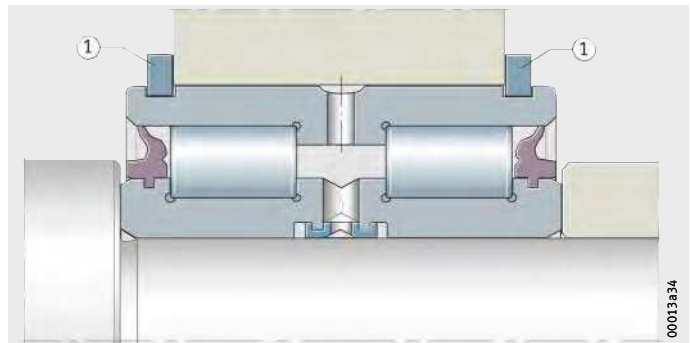
In the case of semi-locating bearings, the bearing rings only require support on one side, on the rib supporting the axial load.



In axially loaded bearings, full support must be provided for the ribs transmitting forces, *Figure 1*.

① Retaining ring

*Figure 1*  
Axial location of outer and inner ring, support of ribs



## Location of cable sheave bearings

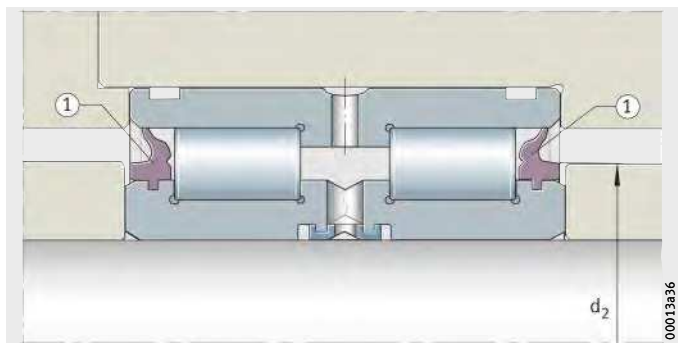
The grooves allow the outer rings to be axially located using retaining rings, *Figure 1*. Suitable fasteners are WRE rings or rings to DIN 471. Locating rings are not included in the delivery. The design 2NR is supplied with two retaining rings WRE packed loose.



The split inner ring must be axially secured, *Figure 1*. The fasteners must not be subjected to axial load.

### Support of sealing rings

The sealing rings must be supported to a sufficient height, so that they are not pressed out during lubrication of the bearings, *Figure 2*. The dimension  $d_2$  in the dimension table must be observed.



① Sealing ring

*Figure 2*  
Support of sealing rings

### Fitting and dismantling of cable sheave bearings



During fitting and dismantling of the bearings, the mounting forces must never be directed through the rolling elements, sealing rings or the fasteners on the split inner ring.



### Accuracy

The dimensional and geometrical tolerances of the bearings correspond to tolerance class PN to DIN 620.

### Radial internal clearance

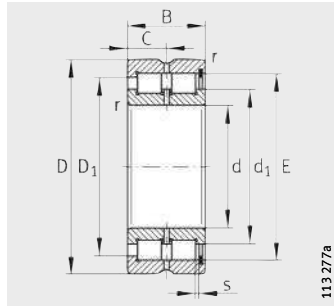
The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

#### Radial internal clearance

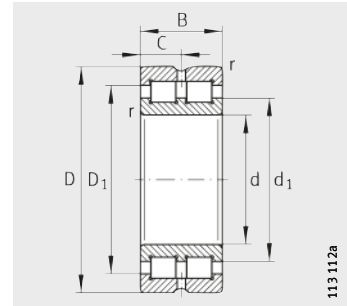
Bore d mm		Radial internal clearance							
		CN μm		C3 μm		C4 μm		C5 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	20	45	35	60	50	75	65	90
24	30	20	45	35	60	50	75	70	95
30	40	25	50	45	70	60	85	80	105
40	50	30	60	50	80	70	100	95	125
50	65	40	70	60	90	80	110	110	140
65	80	40	75	65	100	90	125	130	165
80	100	50	85	75	110	105	140	155	190
100	120	50	90	85	125	125	165	180	220
120	140	60	105	100	145	145	190	200	245
140	160	70	120	115	165	165	215	225	275
160	180	75	125	120	170	170	220	250	300
180	200	90	145	140	195	195	250	275	330
200	225	105	165	160	220	220	280	305	365
225	250	110	175	170	235	235	300	330	395
250	280	125	195	190	260	260	330	370	440
280	315	130	205	200	275	275	350	410	485
315	355	145	225	225	305	305	385	455	535
355	400	190	280	280	370	370	460	510	600

# Double row full complement cylindrical roller bearings

Semi-locating, locating and  
non-locating bearings



SL1850  
Semi-locating bearings

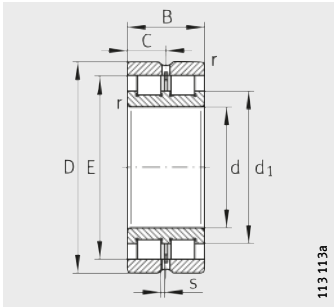


SL0148, SL0149  
Locating bearings

**Dimension table** - Dimensions in mm

Semi-locating bearings Designation	X-life	Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5 412	Mass m ≈kg	Dimensions				
						d	D	B	r min.	s
SL185004	XL	-	-	-	0,2	20	42	30	0,6	1
SL185005	XL	-	-	-	0,23	25	47	30	0,6	1
SL185006	XL	-	-	-	0,35	30	55	34	1	1,5
SL185007	XL	-	-	-	0,46	35	62	36	1	1,5
SL185008	XL	-	-	-	0,56	40	68	38	1	1,5
SL185009	XL	-	-	-	0,71	45	75	40	1	1,5
SL185010	XL	-	-	-	0,76	50	80	40	1	1,5
SL185011	XL	-	-	-	1,16	55	90	46	1,1	1,5
-	-	SL014912	-	NNC 4912 V	0,49	60	85	25	1	-
-	-	-	SL024912	NNCL 4912 V	0,47	60	85	25	1	1
SL185012	XL	-	-	-	1,24	60	95	46	1,1	1,5
SL185013	XL	-	-	-	1,32	65	100	46	1,1	1,5
-	-	SL014914	-	NNC 4914 V	0,78	70	100	30	1	-
-	-	-	SL024914	NNCL 4914 V	0,75	70	100	30	1	1
SL185014	XL	-	-	-	1,85	70	110	54	1,1	3
SL185015	XL	-	-	-	1,93	75	115	54	1,1	3
-	-	SL014916	-	NNC 4916 V	0,88	80	110	30	1	-
-	-	-	SL024916	NNCL 4916 V	0,85	80	110	30	1	1
SL185016	-	-	-	-	2,59	80	125	60	1,1	3,5
SL185017	-	-	-	-	2,72	85	130	60	1,1	3,5
-	-	SL014918	-	NNC 4918 V	1,35	90	125	35	1,1	-
-	-	-	SL024918	NNCL 4918 V	1,3	90	125	35	1,1	1,5
SL185018	-	-	-	-	3,62	90	140	67	1,5	4
-	-	SL014920	-	NNC 4920 V	1,95	100	140	40	1,1	-
-	-	-	SL024920	NNCL 4920 V	1,9	100	140	40	1,1	2
SL185020	-	-	-	-	3,94	100	150	67	1,5	4
-	-	SL014922	-	NNC 4922 V	2,15	110	150	40	1,1	-
-	-	-	SL024922	NNCL 4922 V	2,1	110	150	40	1,1	2
SL185022	-	-	-	-	6,32	110	170	80	2	5
-	-	SL014924	-	NNC 4924 V	2,95	120	165	45	1,1	-
-	-	-	SL024924	NNCL 4924 V	2,85	120	165	45	1,1	3
SL185024	-	-	-	-	6,77	120	180	80	2	5





113 113a

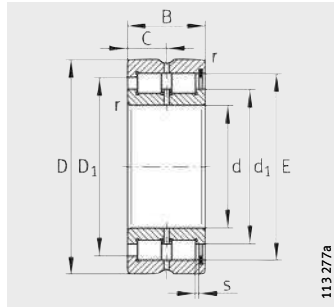
SL0248, SL0249  
Non-locating bearings

Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
C	$d_1$ $\approx$	$D_1$ $\approx$	E	dyn. $C_r$ N	stat. $C_{0r}$ N			
15	28,4	33,3	36,81	53 000	52 000	8 900	10 500	7 400
15	34,5	39	42,51	60 000	64 000	11 100	8 900	6 000
17	40	45,3	49,6	78 000	84 000	15 000	7 600	5 300
18	44,9	51,2	55,52	94 000	107 000	18 800	6 700	4 750
19	50,5	57,2	61,74	113 000	133 000	22 400	6 000	4 200
20	55,3	62,6	66,85	120 000	148 000	24 900	5 500	3 950
20	59,1	67,6	72,33	151 000	188 000	30 000	5 100	3 450
23	68,5	78,7	83,54	206 000	275 000	45 000	4 400	2 900
12,5	70,3	73,5	-	70 000	121 000	17 300	4 500	2 650
12,5	70,3	-	77,51	70 000	121 000	17 300	4 500	2 650
23	71,7	81,9	86,74	212 000	285 000	47 500	4 200	2 800
23	78,1	88,3	93,09	223 000	315 000	52 000	3 900	2 500
15	82,5	87,4	-	106 000	185 000	27 000	3 800	2 330
15	82,5	-	91,87	106 000	185 000	27 000	3 800	2 330
27	81,5	95,7	100,28	265 000	350 000	59 000	3 650	2 650
27	89	102,9	107,9	275 000	385 000	65 000	3 400	2 370
15	91,4	96,2	-	112 000	206 000	30 000	3 450	2 090
15	91,4	-	100,78	112 000	206 000	30 000	3 450	2 090
30	95	111,7	117,4	290 000	440 000	62 000	3 150	2 320
30	99	116,1	121,95	300 000	465 000	64 000	3 000	2 210
17,5	103,9	110,7	-	153 000	290 000	39 000	3 000	1 870
17,5	103	-	115,2	153 000	290 000	39 000	3 000	1 870
33,5	106,1	124,5	130,65	350 000	550 000	76 000	2 800	2 140
20	116,4	125	-	191 000	370 000	47 500	2 700	1 720
20	116,4	-	129,6	191 000	370 000	47 500	2 700	1 720
33,5	115,7	134	140,2	370 000	600 000	81 000	2 600	1 930
20	125	133,6	-	198 000	400 000	50 000	2 500	1 600
20	125	-	138,2	198 000	400 000	50 000	2 500	1 600
40	127,3	149,3	156,7	485 000	770 000	104 000	2 350	1 730
22,5	138,6	148,6	-	222 000	440 000	55 000	2 260	1 540
22,5	138,6	-	153,55	222 000	440 000	55 000	2 260	1 540
40	138,8	160,7	168,15	510 000	850 000	111 000	2 170	1 530

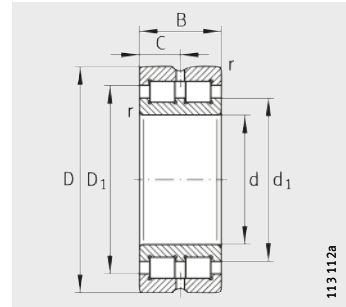


# Double row full complement cylindrical roller bearings

Semi-locating, locating and non-locating bearings



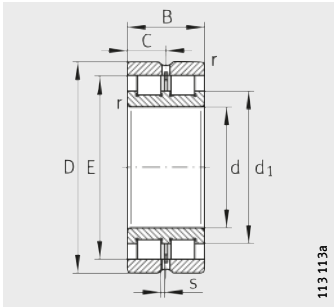
SL1850  
Semi-locating bearings



SL0148, SL0149  
Locating bearings

**Dimension table** (continued) · Dimensions in mm

Semi-locating bearings Designation	Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5 412	Mass m ≈kg	Dimensions				
					d	D	B	r min.	s
–	<b>SL014926</b>	–	NNC 4926 V	3,95	<b>130</b>	180	50	1,5	–
–	–	<b>SL024926</b>	NNCL 4926 V	3,8	<b>130</b>	180	50	1,5	4
<b>SL185026</b>	–	–	–	10,2	<b>130</b>	200	95	2	5
–	<b>SL014928</b>	–	NNC 4928 V	4,2	<b>140</b>	190	50	1,5	–
–	–	<b>SL024928</b>	NNCL 4928 V	4,1	<b>140</b>	190	50	1,5	4
<b>SL185028</b>	–	–	–	11,1	<b>140</b>	210	95	2	5
–	<b>SL014830</b>	–	NNC 4830 V	2,9	<b>150</b>	190	40	1,1	–
–	–	<b>SL024830</b>	NNCL 4830 V	2,8	<b>150</b>	190	40	1,1	2
–	<b>SL014930</b>	–	NNC 4930 V	6,65	<b>150</b>	210	60	2	–
–	–	<b>SL024930</b>	NNCL 4930 V	6,45	<b>150</b>	210	60	2	4
<b>SL185030</b>	–	–	–	13,3	<b>150</b>	225	100	2	6
–	<b>SL014832</b>	–	NNC 4832 V	3,1	<b>160</b>	200	40	1,1	–
–	–	<b>SL024832</b>	NNCL 4832 V	3	<b>160</b>	200	40	1,1	2
–	<b>SL014932</b>	–	NNC 4932 V	7	<b>160</b>	220	60	2	–
–	–	<b>SL024932</b>	NNCL 4932 V	6,8	<b>160</b>	220	60	2	4
<b>SL185032</b>	–	–	–	12,2	<b>160</b>	240	109	2,1	6
–	<b>SL014834</b>	–	NNC 4834 V	4,1	<b>170</b>	215	45	1,1	–
–	–	<b>SL024834</b>	NNCL 4834 V	3,95	<b>170</b>	215	45	1,1	3
–	<b>SL014934</b>	–	NNC 4934 V	7,35	<b>170</b>	230	60	2	–
–	–	<b>SL024934</b>	NNCL 4934 V	7,1	<b>170</b>	230	60	2	4
<b>SL185034</b>	–	–	–	22,5	<b>170</b>	260	122	2,1	6
–	<b>SL014836</b>	–	NNC 4836 V	4,3	<b>180</b>	225	45	1,1	–
–	–	<b>SL024836</b>	NNCL 4836 V	4,15	<b>180</b>	225	45	1,1	3
–	<b>SL014936</b>	–	NNC 4936 V	10,8	<b>180</b>	250	69	2	–
–	–	<b>SL024936</b>	NNCL 4936 V	10,5	<b>180</b>	250	69	2	4
<b>SL185036</b>	–	–	–	29,9	<b>180</b>	280	136	2,1	8
–	<b>SL014838</b>	–	NNC 4838 V	5,65	<b>190</b>	240	50	1,5	–
–	–	<b>SL024838</b>	NNCL 4838 V	5,45	<b>190</b>	240	50	1,5	4
–	<b>SL014938</b>	–	NNC 4938 V	11,2	<b>190</b>	260	69	2	–
–	–	<b>SL024938</b>	NNCL 4938 V	10,9	<b>190</b>	260	69	2	4
<b>SL185038</b>	–	–	–	31,3	<b>190</b>	290	136	2,1	8,2
–	<b>SL014840</b>	–	NNC 4840 V	5,9	<b>200</b>	250	50	1,5	–
–	–	<b>SL024840</b>	NNCL 4840 V	5,7	<b>200</b>	250	50	1,5	4
–	<b>SL014940</b>	–	NNC 4940 V	15,8	<b>200</b>	280	80	2,1	–
–	–	<b>SL024940</b>	NNCL 4940 V	15,3	<b>200</b>	280	80	2,1	5
<b>SL185040</b>	–	–	–	40,4	<b>200</b>	310	150	2,1	8,9



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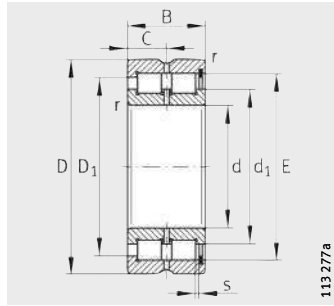
SL0248, SL0249  
Non-locating bearings

Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
C	d <sub>1</sub> ≈	D <sub>1</sub> ≈	E	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub> N	n <sub>G</sub> min <sup>-1</sup>	n <sub>B</sub> min <sup>-1</sup>
				N	N			
25	148,4	160	-	260 000	510 000	63 000	2 100	1 500
25	149,5	-	165,4	260 000	510 000	63 000	2 100	1 500
47,5	148,6	175,5	184,4	730 000	1 210 000	158 000	2 000	1 340
25	159	170,5	-	270 000	550 000	66 000	1 960	1 370
25	160	-	175,9	270 000	550 000	66 000	1 960	1 370
47,5	162,6	189,5	198,4	770 000	1 330 000	169 000	1 840	1 180
20	165,1	174,2	-	231 000	530 000	62 000	1 910	1 270
20	165,1	-	178,3	231 000	530 000	62 000	1 910	1 270
30	171,8	187,2	-	410 000	820 000	98 000	1 810	1 200
30	171,8	-	192,77	410 000	820 000	98 000	1 810	1 200
50	170	198	207,45	810 000	1 390 000	175 000	1 760	1 150
20	173,7	182,8	-	237 000	560 000	64 000	1 820	1 200
20	173,7	-	186,9	237 000	560 000	64 000	1 820	1 200
30	184,2	200,3	-	425 000	880 000	104 000	1 690	1 080
30	184,2	-	206,16	425 000	880 000	104 000	1 690	1 080
54,5	184,8	215,8	224,8	930 000	1 610 000	199 000	1 620	1 030
22,5	186,3	197	-	260 000	600 000	68 000	1 690	1 180
22,5	186,3	-	201,3	260 000	600 000	68 000	1 690	1 180
30	193,1	209,1	-	435 000	930 000	108 000	1 610	1 010
30	193,1	-	215,08	435 000	930 000	108 000	1 610	1 010
61	198	332,7	242,85	1 200 000	2 110 000	260 000	1 510	900
22,5	199,1	209,8	-	270 000	640 000	72 000	1 590	1 070
22,5	199,1	-	214,1	270 000	640 000	72 000	1 590	1 070
34,5	204,9	224,1	-	570 000	1 200 000	140 000	1 510	920
34,5	204,9	-	230,5	570 000	1 200 000	140 000	1 510	920
68	212,2	249,4	260,22	1 390 000	2 480 000	300 000	1 410	820
25	207,6	220,7	-	310 000	730 000	81 000	1 510	1 030
25	207,6	-	225	310 000	730 000	81 000	1 510	1 030
34,5	215	234,3	-	580 000	1 270 000	145 000	1 440	860
34,5	215	-	240,7	580 000	1 270 000	145 000	1 440	860
68	221,8	259	269,76	1 430 000	2 600 000	310 000	1 350	770
25	218,1	231,2	-	320 000	770 000	84 000	1 440	960
25	218,1	-	235,5	320 000	770 000	84 000	1 440	960
40	230,5	252,3	-	680 000	1 440 000	165 000	1 340	820
40	230,5	-	259,34	680 000	1 440 000	165 000	1 340	820
75	236,6	276,2	287,75	1 630 000	3 000 000	355 000	1 270	710

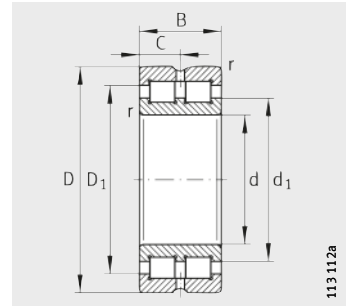


# Double row full complement cylindrical roller bearings

Semi-locating, locating and non-locating bearings



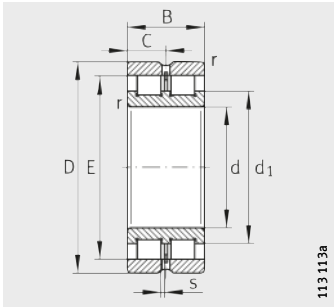
SL1850  
Semi-locating bearings



SL0148, SL0149  
Locating bearings

**Dimension table** (continued) · Dimensions in mm

Semi-locating bearings Designation	Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5 412	Mass m ≈kg	Dimensions				
					d	D	B	r min.	s
–	<b>SL014844</b>	–	NNC 4844 V	6,4	<b>220</b>	270	50	1,5	–
–	–	<b>SL024844</b>	NNCL 4844 V	6,2	<b>220</b>	270	50	1,5	4
–	<b>SL014944</b>	–	NNC 4944 V	17,2	<b>220</b>	300	80	2,1	–
–	–	<b>SL024944</b>	NNCL 4944 V	16,7	<b>220</b>	300	80	2,1	5
<b>SL185044</b>	–	–	–	51,6	<b>220</b>	340	160	3	9
–	<b>SL014848</b>	–	NNC 4848 V	10	<b>240</b>	300	60	2	–
–	–	<b>SL024848</b>	NNCL 4848 V	9,9	<b>240</b>	300	60	2	4
–	<b>SL014948</b>	–	NNC 4948 V	18,5	<b>240</b>	320	80	2,1	–
–	–	<b>SL024948</b>	NNCL 4948 V	17,9	<b>240</b>	320	80	2,1	5
<b>SL185048</b>	–	–	–	55,2	<b>240</b>	360	160	3	9
–	<b>SL014852</b>	–	NNC 4852 V	11	<b>260</b>	320	60	2	–
–	–	<b>SL024852</b>	NNCL 4852 V	10,6	<b>260</b>	320	60	2	4
–	<b>SL014952</b>	–	NNC 4952 V	32	<b>260</b>	360	100	2,1	–
–	–	<b>SL024952</b>	NNCL 4952 V	31,2	<b>260</b>	360	100	2,1	6
<b>SL185052</b>	–	–	–	82,6	<b>260</b>	400	190	4	11,3
–	<b>SL014856</b>	–	NNC 4856 V	16	<b>280</b>	350	69	2	–
–	–	<b>SL024856</b>	NNCL 4856 V	15,6	<b>280</b>	350	69	2	4
–	<b>SL014956</b>	–	NNC 4956 V	34	<b>280</b>	380	100	2,1	–
–	–	<b>SL024956</b>	NNCL 4956 V	33,1	<b>280</b>	380	100	2,1	6
<b>SL185056</b>	–	–	–	88	<b>280</b>	420	190	4	11,3
–	<b>SL014860</b>	–	NNC 4860 V	23	<b>300</b>	380	80	2,1	–
–	–	<b>SL024860</b>	NNCL 4860 V	22	<b>300</b>	380	80	2,1	6
–	<b>SL014960</b>	–	NNC 4960 V	53	<b>300</b>	420	118	3	–
–	–	<b>SL024960</b>	NNCL 4960 V	51,9	<b>300</b>	420	118	3	6
<b>SL185060-TB</b>	–	–	–	124	<b>300</b>	460	218	4	12,5
–	<b>SL014864</b>	–	NNC 4864 V	24	<b>320</b>	400	80	2,1	–
–	–	<b>SL024864</b>	NNCL 4864 V	23,5	<b>320</b>	400	80	2,1	6
–	<b>SL014964</b>	–	NNC 4964 V	56	<b>320</b>	440	118	3	–
–	–	<b>SL024964</b>	NNCL 4964 V	54,9	<b>320</b>	440	118	3	6
<b>SL185064-TB</b>	–	–	–	128,4	<b>320</b>	480	218	4	12,5
–	<b>SL014868</b>	–	NNC 4868 V	25,5	<b>340</b>	420	80	2,1	–
–	–	<b>SL024868</b>	NNCL 4868 V	25	<b>340</b>	420	80	2,1	6
–	<b>SL014968</b>	–	NNC 4968 V	59	<b>340</b>	460	118	3	–
–	–	<b>SL024968</b>	NNCL 4968 V	57,8	<b>340</b>	460	118	3	6
<b>SL185068-TB</b>	–	–	–	178	<b>340</b>	520	243	5	14,3



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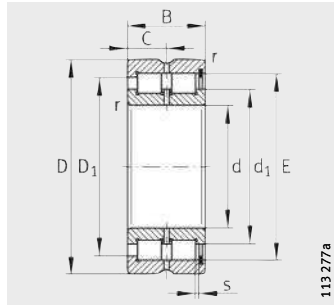
SL0248, SL0249  
Non-locating bearings

Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
C	$d_1$ $\approx$	$D_1$ $\approx$	E	dyn. $C_r$ N	stat. $C_{0r}$ N			
25	239,1	252,3	-	335 000	840 000	90 000	1 320	850
25	239,1	-	256,5	335 000	840 000	90 000	1 320	850
40	248	268,5	-	700 000	1 550 000	174 000	1 250	750
40	248	-	276,52	700 000	1 550 000	174 000	1 250	750
80	254,6	297,8	312,2	1 980 000	3 650 000	420 000	1 170	630
30	259,5	276,7	-	510 000	1 260 000	135 000	1 210	730
30	259,5	-	281,9	510 000	1 260 000	135 000	1 210	730
40	270,6	292,3	-	740 000	1 700 000	186 000	1 150	660
40	270,6	-	299,46	740 000	1 700 000	186 000	1 150	660
80	277,5	322,1	335,1	2 080 000	4 000 000	445 000	1 080	550
30	281,8	298,8	-	540 000	1 370 000	143 000	1 120	650
30	281,8	-	304,2	540 000	1 370 000	143 000	1 120	650
50	294,5	322,1	-	1 100 000	2 470 000	270 000	1 050	570
50	294,5	-	331,33	1 100 000	2 470 000	270 000	1 050	570
95	304	359,7	375,97	2 750 000	5 000 000	560 000	980	490
34,5	306,8	326,4	-	700 000	1 820 000	189 000	1 020	570
34,5	306,8	-	332,4	700 000	1 820 000	189 000	1 020	570
50	316,5	344,6	-	1 150 000	2 650 000	285 000	980	520
50	316,5	-	353,34	1 150 000	2 650 000	285 000	980	520
95	318,3	374,1	390,3	2 850 000	5 300 000	580 000	940	460
40	327,9	349,9	-	820 000	2 070 000	214 000	960	550
40	327,9	-	356,7	820 000	2 070 000	214 000	960	550
59	340,7	374,3	-	1 630 000	3 700 000	390 000	910	445
59	340,7	-	385,51	1 630 000	3 700 000	390 000	910	445
109	353,6	413,6	433,6	3 450 000	6 600 000	650 000	840	395
40	350,9	372,9	-	850 000	2 220 000	225 000	900	495
40	350,9	-	379,7	850 000	2 220 000	225 000	900	495
59	367,5	401,1	-	1 700 000	4 050 000	415 000	840	395
59	367,5	-	412,27	1 700 000	4 050 000	415 000	840	395
109	369,5	431,5	449,5	3 550 000	6 900 000	680 000	810	375
40	368,1	390,1	-	870 000	2 330 000	233 000	860	465
40	368,1	-	396,9	870 000	2 330 000	233 000	860	465
59	385,3	418,9	-	1 750 000	4 250 000	430 000	810	375
59	385,3	-	430,11	1 750 000	4 250 000	430 000	810	375
121,5	396	465,5	485,65	4 250 000	8 300 000	800 000	750	355

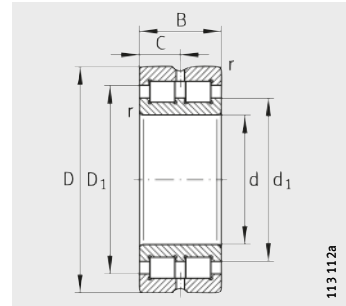


# Double row full complement cylindrical roller bearings

Semi-locating, locating and non-locating bearings



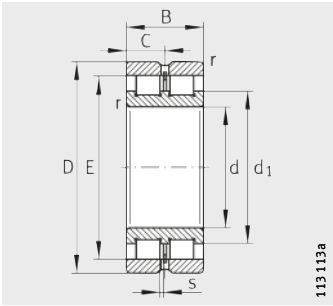
SL1850  
Semi-locating bearings



SL0148, SL0149  
Locating bearings

**Dimension table** (continued) · Dimensions in mm

Semi-locating bearings Designation	Locating bearings Designation	Non-locating bearings Designation	Designation to DIN 5 412	Mass m ≈kg	Dimensions				
					d	D	B	r min.	s
–	<b>SL014872</b>	–	NNC 4872 V	27	<b>360</b>	440	80	2,1	–
–	–	<b>SL024872</b>	NNCL 4872 V	26	<b>360</b>	440	80	2,1	6
–	<b>SL014972</b>	–	NNC 4972 V	62,1	<b>360</b>	480	118	3	–
–	–	<b>SL024972</b>	NNCL 4972 V	60,8	<b>360</b>	480	118	3	6
<b>SL185072-TB</b>	–	–	–	178	<b>360</b>	540	243	5	14
–	<b>SL014876</b>	–	NNC 4876 V	45,5	<b>380</b>	480	100	2,1	–
–	–	<b>SL024876</b>	NNCL 4876 V	44	<b>380</b>	480	100	2,1	6
–	<b>SL014976</b>	–	NNC 4976 V	92,4	<b>380</b>	520	140	4	–
–	–	<b>SL024976</b>	NNCL 4976 V	90,5	<b>380</b>	520	140	4	7
<b>SL185076-TB</b>	–	–	–	196,5	<b>380</b>	560	243	5	14,1
–	<b>SL014880</b>	–	NNC 4880 V	46,5	<b>400</b>	500	100	2,1	–
–	–	<b>SL024880</b>	NNCL 4880 V	45,8	<b>400</b>	500	100	2,1	6
–	<b>SL014980</b>	–	NNC 4980 V	96,5	<b>400</b>	540	140	4	–
–	–	<b>SL024980</b>	NNCL 4980 V	94,6	<b>400</b>	540	140	4	7



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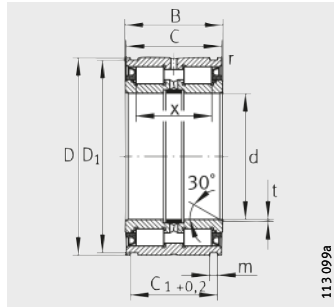
SL0248, SL0249  
Non-locating bearings

Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
C	d <sub>1</sub>	D <sub>1</sub>	E	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
	≈	≈		N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
40	391	413,2	–	900 000	2 480 000	244 000	810	430
40	391	–	419,8	900 000	2 480 000	244 000	810	430
59	404	436,8	–	1 790 000	4 450 000	445 000	770	350
59	404	–	447,95	1 790 000	4 450 000	445 000	770	350
121,5	413,8	481	503,45	4 400 000	8 700 000	820 000	720	320
50	419	447,2	–	1 320 000	3 500 000	345 000	750	375
50	419	–	455,8	1 320 000	3 500 000	345 000	750	375
70	430,2	468,7	–	2 250 000	5 500 000	560 000	720	325
70	430,2	–	481,35	2 250 000	5 500 000	560 000	720	325
121,5	432	499	521,25	4 450 000	8 900 000	850 000	700	305
50	433,8	462	–	1 350 000	3 650 000	355 000	720	360
50	433,8	–	470,59	1 350 000	3 650 000	355 000	720	360
70	450,5	489	–	2 310 000	5 800 000	580 000	690	300
70	450,5	–	501,74	2 310 000	5 800 000	580 000	690	300

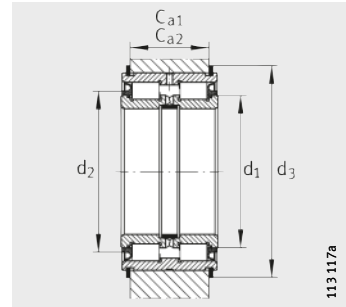


# Cable sheave bearings

Cylindrical roller bearings with snap ring grooves  
Full complement, sealed  
Locating bearings



SL0450..-PP  
SL04..-PP



Mounting dimensions

**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions									
		d	D	B	C	C <sub>1</sub> +0,2	D <sub>1</sub>	m	r min.	t	x
SL045004-PP	0,2	20	42	30	29	24,7	40,2	1,8	0,3	0,5	22,5
SL045005-PP	0,24	25	47	30	29	24,7	45,2	1,8	0,3	0,5	22,5
SL045006-PP	0,37	30	55	34	33	28,2	53	2,1	0,3	0,5	25,5
SL045007-PP	0,48	35	62	36	35	30,2	60	2,1	0,3	0,5	27,5
SL045008-PP	0,56	40	68	38	37	32,2	65,8	2,7	0,6	0,8	28,5
SL045009-PP	0,7	45	75	40	39	34,2	72,8	2,7	0,6	0,8	30,5
SL045010-PP	0,76	50	80	40	39	34,2	77,8	2,7	0,6	0,8	30,5
SL045011-PP	1,18	55	90	46	45	40,2	87,4	3,2	0,6	1	36
SL045012-PP	1,26	60	95	46	45	40,2	92,4	3,2	0,6	1	36
SL045013-PP	1,33	65	100	46	45	40,2	97,4	3,2	0,6	1	36
SL045014-PP	1,87	70	110	54	53	48,2	107,1	4,2	0,6	1	42
SL045015-PP	1,96	75	115	54	53	48,2	112,1	4,2	0,6	1	42
SL045016-PP	2,71	80	125	60	59	54,2	122,1	4,2	0,6	1,5	48
SL045017-PP	2,83	85	130	60	59	54,2	127,1	4,2	0,6	1,5	48
SL045018-PP	3,71	90	140	67	66	59,2	137	4,2	0,6	1,5	54
SL045019-PP	3,88	95	145	67	66	59,2	142	4,2	0,6	1,5	54
SL045020-PP	3,95	100	150	67	66	59,2	147	4,2	0,6	1,5	54
SL045022-PP	6,57	110	170	80	79	70,2	167	4,2	0,6	1,8	64
SL045024-PP	7,04	120	180	80	79	71,2	176	4,2	0,6	1,8	64
SL045026-PP	10,5	130	200	95	94	83,2	196	4,2	0,6	1,8	77
SL04130-PP	7,5	130	190	80	79	71,2	186	4,2	0,6	1,8	64
SL045028-PP	11,1	140	210	95	94	83,2	206	5,2	0,6	1,8	77
SL04140-PP	8	140	200	80	79	71,2	196	4,2	0,6	1,8	64
SL045030-PP	13,3	150	225	100	99	87,2	221	5,2	0,6	2	80
SL04150-PP	8,4	150	210	80	79	71,2	206	5,2	0,6	1,8	64
SL045032-PP	16,6	160	240	109	108	95,2	236	5,2	0,6	2	89
SL04160-PP	8,8	160	220	80	79	71,2	216	5,2	0,6	1,8	64

1) For snap rings WRE.

2) For retaining ring to DIN 471.

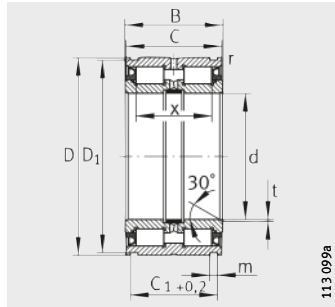


Mounting dimensions					Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ grease $\text{min}^{-1}$	Snap ring WRE	Retaining ring to DIN 471
$C_{a1}^{1)}$	$C_{a2}^{2)}$	$d_1$	$d_2$	$d_3^{1)}$	dyn. $C_r$ N	stat. $C_{0r}$ N				
-0,2	-0,2									
21,5	21	30,55	34	47	41 500	51 000	6 900	4 000	WRE42	42X1,75
21,5	21	35,35	39	52	46 000	60 000	8 100	3 600	WRE47	47X1,75
25	24	40,6	44	60	50 000	67 000	9 500	3 000	WRE55	55X2
27	26	46,1	50	67	63 000	88 000	12 400	2 600	WRE62	62X2
28	27	51,4	55	75	80 000	111 000	16 000	2 400	WRE68	68X2,5
30	29	57	61	82	97 000	139 000	19 900	2 200	WRE75	75X2,5
30	29	61,8	66	87	102 000	151 000	21 700	2 000	WRE80	80X2,5
35	34	68,6	73	99	120 000	186 000	25 500	1 800	WRE90	90X3
35	34	73,7	79	104	125 000	201 000	27 500	1 700	WRE95	95X3
35	34	78,8	84	109	130 000	215 000	29 500	1 600	WRE100	100X3
43	40	84,5	91	119	175 000	275 000	36 000	1 400	WRE110	110X4
43	40	89,95	97	124	201 000	315 000	42 000	1 400	WRE115	115X4
49	46	97,1	105	137	210 000	340 000	45 000	1 300	WRE125	125X4
49	46	103,9	112	142	219 000	365 000	47 500	1 200	WRE130	130X4
54	51	109,3	118	152	305 000	510 000	69 000	1 100	WRE140	140X4
54	51	113,35	122	157	315 000	530 000	71 000	1 100	WRE145	145X4
54	51	117,35	128	162	330 000	550 000	73 000	1 000	WRE150	150X4
65	62	131,55	143	182	395 000	680 000	89 000	900	WRE170	170X4
65	63	140,9	153	196	410 000	740 000	94 000	900	WRE180	180X4
77	75	156,75	170	216	540 000	960 000	122 000	800	WRE200	200X4
65	63	150,55	160	206	430 000	790 000	99 000	800	WRE190	190X4
77	73	165,4	181	226	610 000	1 100 000	139 000	750	WRE210	210X5
65	63	159,95	170	216	445 000	840 000	104 000	750	WRE200	200X4
81	77	175,7	192	245	710 000	1 260 000	156 000	700	WRE225	225X5
65	61	174,4	185	226	465 000	920 000	111 000	700	WRE210	210X5
89	85	189	207	260	740 000	1 360 000	165 000	650	WRE240	240X5
65	61	184,05	196	236	480 000	970 000	116 000	700	WRE220	220X5

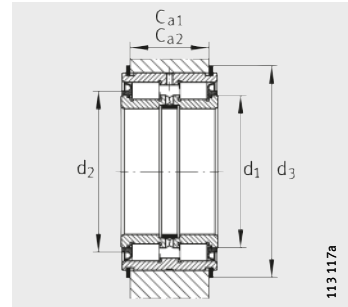


# Cable sheave bearings

Cylindrical roller bearings with snap ring grooves  
Full complement, sealed  
Locating bearings



SL0450..-PP  
SL04..-PP



Mounting dimensions

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions									
		d	D	B	C	C <sub>1</sub> +0,2	D <sub>1</sub>	m	r min.	t	x
<b>SL045034-PP</b>	22,6	<b>170</b>	260	122	121	107,2	254	5,2	0,6	2	100
<b>SL04170-PP</b>	9,3	<b>170</b>	230	80	79	71,2	226	5,2	0,6	1,8	64
<b>SL045036-PP</b>	30,1	<b>180</b>	280	136	135	118,2	274	5,2	0,6	2	112
<b>SL04180-PP</b>	9,8	<b>180</b>	240	80	79	71,2	236	5,2	0,6	1,8	64
<b>SL045038-PP</b>	31,5	<b>190</b>	290	136	135	118,2	284	5,2	0,6	2	112
<b>SL04190-PP</b>	12,7	<b>190</b>	260	80	79	73,2	254	5,2	0,6	1,8	64
<b>SL045040-PP</b>	40,8	<b>200</b>	310	150	149	128,2	304	6,3	0,6	2	126
<b>SL04200-PP</b>	13,2	<b>200</b>	270	80	79	73,2	264	5,2	0,6	1,8	64
<b>SL045044-PP</b>	52,5	<b>220</b>	340	160	159	138,2	334	6,3	1	2	132
<b>SL04220-PP</b>	19,5	<b>220</b>	300	95	94	83,2	294	5,2	1	2	72
<b>SL045048-PP</b>	56	<b>240</b>	360	160	159	138,2	354	6,3	1	2	132
<b>SL04240-PP</b>	21	<b>240</b>	320	95	94	83,2	314	6,3	1	2	72
<b>SL045052-PP</b>	84,5	<b>260</b>	400	190	189	162,2	394	6,3	1,1	3	150
<b>SL04260-PP</b>	22,5	<b>260</b>	340	95	94	83,2	334	6,3	1	3	75
<b>SL045056-PP</b>	90	<b>280</b>	420	190	189	163,2	413	7,3	1,1	3	150
<b>SL045060-PP</b>	126	<b>300</b>	460	218	216	185,2	453	7,3	1,1	3	170
<b>SL04300-PP</b>	25,5	<b>300</b>	380	95	94	83,2	374	6,3	1	3	75

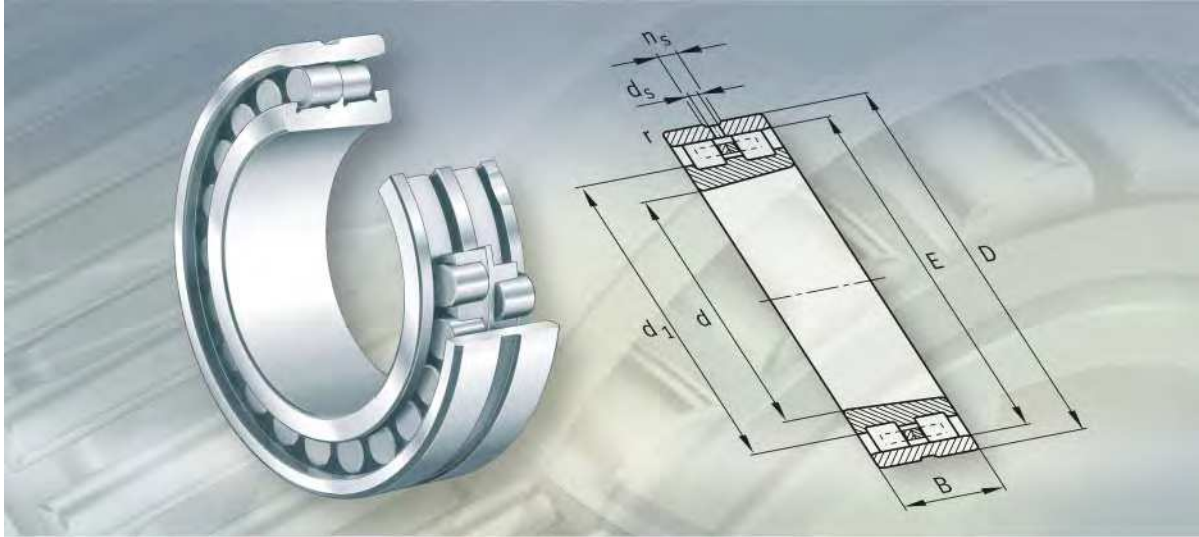
1) For snap rings WRE.

2) For retaining ring to DIN 471.

Mounting dimensions					Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ grease $\text{min}^{-1}$	Snap ring WRE	Retaining ring to DIN 471
$C_{a1}^{1)}$ -0,2	$C_{a2}^{2)}$ -0,2	$d_1$	$d_2$	$d_3^{1)}$	dyn. $C_r$ N	stat. $C_{0r}$ N				
99	97	200,7	220	282	960 000	1 750 000	212 000	600	WRE260	260X5
65	61	193,9	206	250	490 000	1 030 000	120 000	650	WRE230	230X5
110	108	217,8	239	302	1 140 000	2 130 000	255 000	550	WRE280	280X5
65	61	203,1	216	260	500 000	1 080 000	125 000	600	WRE240	240X5
110	108	225,65	248	312	1 160 000	2 210 000	260 000	550	WRE290	290X5
65	63	217,55	231	282	520 000	1 160 000	131 000	550	WRE260	260X5
120	116	243,05	267	336	1 350 000	2 600 000	300 000	500	WRE310	310X6
65	63	227,15	241	292	540 000	1 210 000	136 000	550	WRE270	270X5
130	126	259,85	286	366	1 570 000	3 050 000	350 000	480	WRE340	340X6
75	73	248,7	264	322	700 000	1 550 000	174 000	480	WRE300	300X5
130	126	279,25	305	386	1 630 000	3 300 000	370 000	440	WRE360	360X6
75	71	271,7	287	346	740 000	1 700 000	186 000	480	WRE320	320X6
154	150	304,95	336	426	2 380 000	4 700 000	520 000	400	WRE400	400X6
75	71	292,7	310	366	840 000	1 990 000	215 000	440	WRE340	340X6
154	149	320,95	354	453	2 600 000	5 200 000	570 000	380	WRE420	420X7
176	171	346,85	375	493	3 000 000	5 800 000	620 000	340	WRE460	460X7
75	71	328	346	406	900 000	2 250 000	234 000	380	WRE380	380X6



**FAG**



## High precision cylindrical roller bearings

Double row

# High precision cylindrical roller bearings

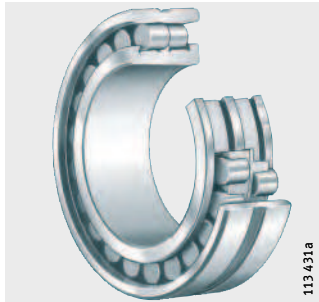
		Page
<b>Product overview</b>	High precision cylindrical roller bearings.....	502
<b>Features</b>	Non-locating bearings .....	503
	Operating temperature .....	503
	Cage .....	503
	Suffixes.....	503
<b>Design and safety guidelines</b>	Operating life of the bearings.....	504
	Equivalent static bearing load.....	504
	Static load safety factor .....	504
	Speeds.....	504
	Design of bearing arrangements .....	505
<b>Accuracy</b>	.....	508
	Radial internal clearance .....	509
<b>Dimension tables</b>	High precision cylindrical roller bearings, double row, non-locating bearings .....	510



# Product overview High precision cylindrical roller bearings

## Non-locating bearings

NN30..-AS-K-M-SP



113 431a

# High precision cylindrical roller bearings

**Features** Cylindrical roller bearings of this design are double row precision bearings for machine tools. They allow radially rigid, high precision bearing arrangements and are principally used to give radial support for main spindles.

The bearings comprise solid outer rings without ribs, solid inner rings with three ribs and cylindrical roller and cage assemblies with solid brass cages. For optimum setting of the radial internal clearance, the inner ring has a tapered bore with a bore taper 1:12. The cylindrical roller bearings are separable and are therefore easier to fit and dismantle. Both bearing rings can be given a tight fit by this process.

A detailed description of high precision cylindrical roller bearings (designs, calculation, lubrication, clearance adjustment) is given in Catalogue SP 1, Super Precision Bearings.

**Non-locating bearings** Cylindrical roller bearings NN30..-AS-K-M-SP are non-locating bearings and can support radial forces only. Axial forces are normally supported by double direction axial angular contact ball bearings.

**Axial displacement** The outer and inner ring can be axially displaced relative to each other from the central position by the values “s” stated in the dimension tables.

**Sealing** The bearings are supplied without seals.

**Lubrication** High precision cylindrical roller bearings can be lubricated from the end faces as well as through a lubrication groove and lubrication holes in the outer ring. The bearings can be lubricated with grease or oil.

**Operating temperature** Cylindrical roller bearings with special precision (SP) can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ .



For continuous operation above  $+120\text{ }^{\circ}\text{C}$ , please contact us.

**Cage** The cylindrical roller bearings have two roller-guided solid brass cages.

**Suffixes** Suffixes for available designs: see table.

**Available designs**

Suffix	Description	Design
A	Modified internal construction	Standard
K	Tapered bore, taper 1:12	
M	Solid brass cage, roller-guided	
S	Lubrication groove and lubrication holes in outer ring	
SP	Tolerance class SP	



# High precision cylindrical roller bearings

## Design and safety guidelines Operating life of the bearings

High precision bearings must guide machine parts with very high precision and must support forces at up to very high speeds. They are predominantly selected on the basis of accuracy, rigidity and running behaviour. In order that they can fulfil their tasks for as long as possible, the bearings must run without wear.

The precondition for this is the creation of a load-bearing hydrodynamic lubricant film at the contact points of the rolling contact partners. Under these conditions, they will achieve their fatigue life in a large number of applications. If the design is appropriate to the fatigue life, the operating life of the bearing is normally restricted by the lubricant operating life.

The decisive factors for the operating life from the perspective of load are the Hertzian pressures occurring at the contacts and the bearing kinematics. For high performance assemblies, individual design with the aid of special calculation programs is therefore advisable.

Since failure as a result of fatigue plays no part in practice, calculation of the rating life  $L_{10}$  in accordance with DIN ISO 281 is not appropriate as a means of determining the operating life.

## Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r}$$

## Static load safety factor

$$S_0 = \frac{C_{0r}}{P_0}$$

$S_0$  Static load safety factor  
 $C_{0r}$  Basic static load rating, see dimension tables  
 $P_0$  Equivalent static bearing load.



In order to achieve sufficiently smooth running, the static load safety factor should be  $S_0 > 3$ .

## Speeds



The speed depends on the radial internal clearance while warm from operation. For calculation, the values from the dimension table are multiplied by the correction factor in the table.

The limiting speeds  $n_G$  are valid for lubrication with grease or minimal quantity lubrication with oil and must not be exceeded.

## Correction factors

Clearance or preload in operation $\mu\text{m}$	Correction factor
0 to 5 (clearance)	1 to 1,1
-5 to 0 (preload)	0,8 to 1



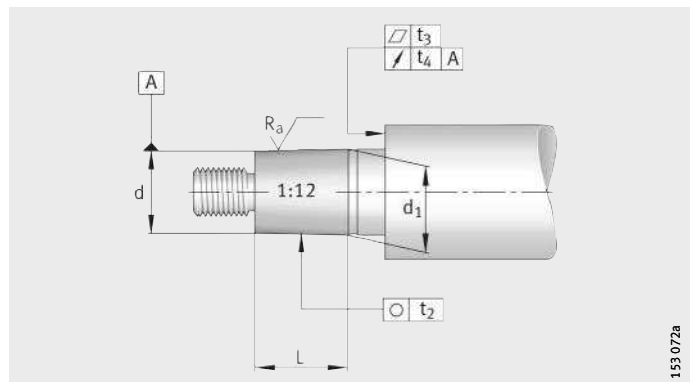
## Design of bearing arrangements

### Design of tapered shaft

Recommendations for machining of the tapered shaft, see table and *Figure 1*.

#### Tapered shaft

Shaft diameter				Roundness $t_2$ $\mu\text{m}$	Flatness $t_3$ $\mu\text{m}$	Axial runout $t_4$ $\mu\text{m}$	Mean roughness $R_a$ $\mu\text{m}$
d mm	Deviation of small taper diameter $\mu\text{m}$						
	over	incl.	upper	lower			
18	30	+73	+64	1	1	1,5	0,2
30	40	+91	+80	1	1	1,5	0,2
40	50	+108	+97	1	1	1,5	0,2
50	65	+135	+122	1,2	1,2	2	0,2
65	80	+159	+146	1,2	1,2	2	0,2
80	100	+193	+178	1,5	1,5	2,5	0,2
100	120	+225	+210	1,5	1,5	2,5	0,2
120	140	+266	+248	2	2	3,5	0,2
140	160	+298	+280	2	2	3,5	0,2
160	180	+328	+310	2	2	3,5	0,2
180	200	+370	+350	3	3	4,5	0,2
200	225	+405	+385	3	3	4,5	0,2
225	250	+445	+425	3	3	4,5	0,2
250	280	+498	+475	4	4	6	0,4
280	315	+548	+525	4	4	6	0,4
315	355	+615	+590	5	5	7	0,4
355	400	+685	+660	5	5	7	0,4
400	450	+767	+740	6	6	8	0,4
450	500	+847	+820	6	6	8	0,4



*Figure 1*  
Design of shaft

153 072a

# High precision cylindrical roller bearings

The deviation of the taper angle of the shaft seat for bearings of tolerance class SP is shown in the table.

## Deviation of taper angle

Taper length L mm		Taper angle tolerance AT <sub>D</sub> μm			
L <sub>U</sub> over	L <sub>O</sub> incl.	AT <sub>DU</sub>		AT <sub>DO</sub>	
16	25	+2	0	+3,2	0
25	40	+2,5	0	+4	0
40	63	+3,2	0	+5	0
63	100	+4	0	+6,3	0
100	160	+5	0	+8	0
160	250	+6,3	0	+10	0

The taper angle tolerance AT<sub>D</sub> applies vertical to the axis and is defined as the differential diameter.

If FAG taper gauges MGK132 are used, the AT<sub>D</sub> values listed should be halved (inclination angle tolerance).

For taper lengths with nominal dimensions between the values listed in the table, the taper angle tolerance AT<sub>D</sub> should be determined by means of interpolation.

## Calculation example

Taper length of shaft seat 50 mm, tolerance class SP.

$$AT_D = AT_{DU} + \frac{AT_{DO} - AT_{DU}}{L_O - L_U} \cdot (L - L_U)$$

$$AT_D = 3,2 + \frac{5 - 3,2}{63 - 40} \cdot (50 - 40) = 3,98 \mu\text{m}$$

Taper angle tolerance AT<sub>D</sub> = +4 μm.

## Design of housing



In order to allow fitting and dismantling of the bearings, the dimension  $D_{b \min}$  in the dimension tables must be observed. Recommendations for machining of housings, see table and Figure 2.

## Housing bore

Housing bore				Cylindricity $t_1$ $\mu\text{m}$	Flatness $t_3$ $\mu\text{m}$	Axial runout $t_4$ $\mu\text{m}$	Coaxiality $t_5$ $\mu\text{m}$	Mean roughness $R_a$ $\mu\text{m}$
D mm		Deviation $\mu\text{m}$						
		upper	lower					
over	incl.							
30	50	+2	-9	1,5	1,5	2,5	4	0,4
50	80	+3	-10	2	2	3	5	0,4
80	120	+2	-13	2,5	2,5	4	6	0,8
120	180	+3	-15	3,5	3,5	5	8	0,8
180	250	+2	-18	4,5	4,5	7	10	0,8
250	315	+3	-20	6	6	8	12	1,6
315	400	+3	-22	7	7	9	13	1,6
400	500	+2	-25	8	8	10	15	1,6
500	630	0	-29	9	9	11	16	1,6
630	800	0	-32	10	10	12	18	1,6

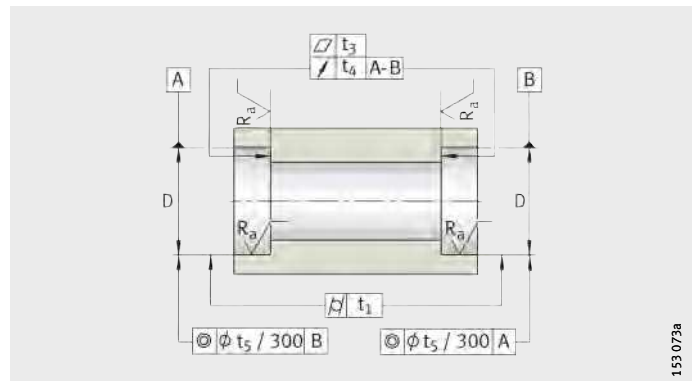


Figure 2  
Design of housing

## Mounting dimensions

The dimension tables give the maximum value of the radius  $r_a$  and the diameters of the abutment shoulders  $d_a$ ,  $D_a$  and  $D_b$ .

# High precision cylindrical roller bearings

## Accuracy

The bearings correspond to tolerance class SP. Bearings of the higher tolerance class UP are available by agreement.

## Width tolerances

Bore		Width deviation (in relation to bore)		Width variation
d mm		$\Delta_{Bs}$ $\mu\text{m}$		$V_{Bs}$ $\mu\text{m}$
over	incl.			
18	30	0	-120	2,5
30	50	0	-120	3
50	80	0	-150	4
80	120	0	-200	4
120	180	0	-250	5
180	250	0	-300	6
250	315	0	-350	8
315	400	0	-400	10
400	500	0	-450	12

## Tolerances of inner ring with tapered bore

Bore		Deviation				Variation	Radial runout	Axial runout	
d mm		$\Delta_{dmp}$ $\mu\text{m}$		$\Delta_{d1\text{ mp}} - \Delta_{dmp}$ $\mu\text{m}$		$V_{dp}$ $\mu\text{m}$	$K_{ia}$ $\mu\text{m}$	$S_d$ $\mu\text{m}$	$S_{ia}$ $\mu\text{m}$
over	incl.								
18	30	10	0	4	0	3	3	4	4
30	50	12	0	4	0	4	4	4	4
50	80	15	0	5	0	5	4	5	5
80	120	20	0	6	0	5	5	5	5
120	180	25	0	8	0	7	6	6	7
180	250	30	0	9	0	8	8	7	8
250	315	35	0	11	0	9	8	8	10
315	400	40	0	12	0	12	10	10	12
400	500	45	0	14	0	14	10	12	15

## Outer ring tolerances

Outside diameter		Outside diameter deviation		Variation	Radial runout	Axial runout	
D mm		$\Delta_{Ds}$ $\mu\text{m}$		$V_{Dp}$ $\mu\text{m}$	$K_{ea}$ $\mu\text{m}$	$S_D$ $\mu\text{m}$	$S_{ea}$ $\mu\text{m}$
over	incl.						
30	50	0	-7	4	5	4	5
50	80	0	-9	5	5	4	5
80	120	0	-10	5	6	5	6
120	150	0	-11	6	7	5	7
150	180	0	-13	7	8	5	8
180	250	0	-15	8	10	7	10
250	315	0	-18	9	11	8	10
315	400	0	-20	10	13	10	13
400	500	0	-23	12	15	11	15
500	630	0	-28	14	17	13	18
630	800	0	-35	18	20	15	22

## Radial internal clearance

The radial internal clearance smaller than normal internal clearance corresponds to internal clearance group C1NA for accuracy SP and UP. The internal clearance is not stated in the designation. The bearing rings are not interchangeable.

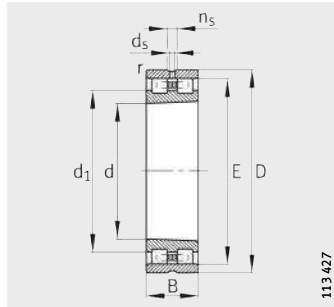
### Radial internal clearance of bearings with tapered bore (without measurement load)

Bore d mm		Radial internal clearance C1NA μm	
over	incl.	min.	max.
24	30	15	25
30	40	15	25
40	50	17	30
50	65	20	35
65	80	25	40
80	100	35	55
100	120	40	60
120	140	45	70
140	160	50	75
160	180	55	85
180	200	60	90
200	225	60	95
225	250	65	100
250	280	75	110
280	315	80	120
315	355	90	135
355	400	100	150
400	450	110	170
450	500	120	190

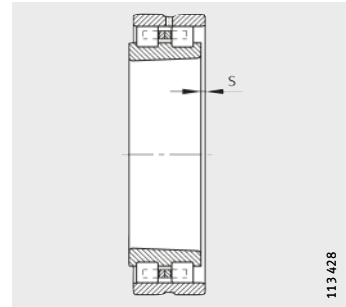


# High precision cylindrical roller bearings

Double row  
Non-locating bearings



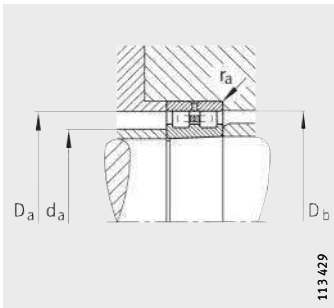
NN30...AS-K-M-SP  
Taper 1:12



1) Axial displacement "s"

**Dimension table** - Dimensions in mm

Designation	Mass m ≈ kg	Dimensions								
		d	D	B	r	s <sup>1)</sup>	E	d <sub>1</sub>	d <sub>s</sub>	n <sub>s</sub>
					min.			≈		
NN3006-AS-K-M-SP	0,191	30	55	19	1	1,4	48,5	39,7	3,2	4,8
NN3007-AS-K-M-SP	0,249	35	62	20	1	1,4	55	45,4	3,2	4,8
NN3008-AS-K-M-SP	0,303	40	68	21	1	1,4	61	50,6	3,2	4,8
NN3009-AS-K-M-SP	0,393	45	75	23	1	1,7	67,5	56,3	3,2	4,8
NN3010-AS-K-M-SP	0,426	50	80	23	1	1,7	72,5	61,3	3,2	4,8
NN3011-AS-K-M-SP	0,63	55	90	26	1,1	1,9	81	68,2	3,2	4,8
NN3012-AS-K-M-SP	0,674	60	95	26	1,1	1,9	86,1	73,3	3,2	4,8
NN3013-AS-K-M-SP	0,715	65	100	26	1,1	1,9	91	78,2	3,2	4,8
NN3014-AS-K-M-SP	1,04	70	110	30	1,1	2,3	100	85,6	3,2	6,5
NN3015-AS-K-M-SP	1,09	75	115	30	1,1	2,3	105	90,6	3,2	6,5
NN3016-AS-K-M-SP	1,51	80	125	34	1,1	2,5	113	97	3,2	6,5
NN3017-AS-K-M-SP	1,58	85	130	34	1,1	2,5	118	102	3,2	6,5
NN3018-AS-K-M-SP	2,05	90	140	37	1,5	2,5	127	109,4	3,2	6,5
NN3019-AS-K-M-SP	2,14	95	145	37	1,5	2,5	132	114,4	3,2	6,5
NN3020-AS-K-M-SP	2,23	100	150	37	1,5	2,5	137	119,4	3,2	6,5
NN3021-AS-K-M-SP	2,84	105	160	41	2	2,6	146	125,2	3,2	6,5
NN3022-AS-K-M-SP	3,61	110	170	45	2	2,9	155	132,6	3,2	6,5
NN3024-AS-K-M-SP	3,94	120	180	46	2	3,1	165	142,6	3,2	6,5
NN3026-AS-K-M-SP	5,79	130	200	52	2	3,4	182	156,4	4,8	9,5
NN3028-AS-K-M-SP	6,22	140	210	53	2	3,4	192	166,4	4,8	9,5
NN3030-AS-K-M-SP	7,58	150	225	56	2,1	3,7	206	178,8	4,8	9,5
NN3032-AS-K-M-SP	9,23	160	240	60	2,1	4,2	219	190,2	4,8	9,5
NN3034-AS-K-M-SP	12,5	170	260	67	2,1	4,5	236	204	4,8	9,5
NN3036-AS-K-M-SP	16,4	180	280	74	2,1	4,8	255	218,2	6,3	12,2
NN3038-AS-K-M-SP	17,3	190	290	75	2,1	4,8	265	228,2	6,3	12,2
NN3040-AS-K-M-SP	22,2	200	310	82	2,1	5,3	282	242	6,3	12,2
NN3044-AS-K-M-SP	29,1	220	340	90	3	4,5	310	265,2	8	15
NN3048-AS-K-M-SP	31,6	240	360	92	3	6	330	285,2	8	15
NN3052-AS-K-M-SP	46,2	260	400	104	4	6,5	364	312,8	8	15
NN3056-AS-K-M-SP	49,7	280	420	106	4	6,8	384	332,8	8	15
NN3060-AS-K-M-SP	68,8	300	460	118	4	7,5	418	360,4	9,5	17,7
NN3064-AS-K-M-SP	74,2	320	480	121	4	7,9	438	380,4	9,5	17,7
NN3068-AS-K-M-SP	99,3	340	520	133	5	8,7	473	409	9,5	17,7
NN3072-AS-K-M-SP	104	360	540	134	5	8,7	493	429	9,5	17,7



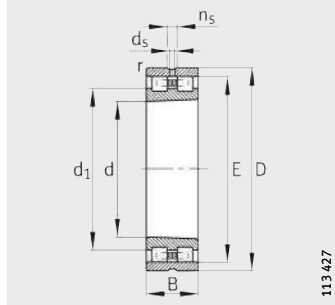
Mounting dimensions

Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speeds	
d <sub>a</sub>	D <sub>a</sub>	D <sub>b</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub> grease	n <sub>G</sub> oil
min.	max.	min.	max.	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
35	50	49	1	29 000	34 000	4 800	16 000	19 000
40	57	56	1	35 500	44 000	6 500	14 000	17 000
45	63	62	1	45 000	58 500	8 400	12 000	15 000
50	70	69	1	54 000	72 000	10 700	11 000	14 000
55	75	74	1	57 000	80 000	11 800	10 000	13 000
61	84	82	1	72 000	100 000	15 600	9 000	11 000
66	89	87	1	75 000	110 000	17 200	8 500	10 000
71	94	92	1	76 500	116 000	18 000	8 000	9 500
76	104	102	1	98 000	150 000	22 400	7 000	8 500
81	109	107	1	100 000	156 000	23 400	6 700	8 000
86	119	115	1	120 000	186 000	28 500	6 300	7 500
91	124	120	1	125 000	200 000	30 500	6 000	7 000
98	132	129	1,5	140 000	224 000	36 000	5 600	6 700
103	137	134	1,5	143 000	236 000	37 000	5 300	6 300
108	142	139	1,5	146 000	245 000	38 000	5 300	6 300
114	151	148	2	190 000	310 000	46 000	4 800	5 600
119	161	157	2	220 000	360 000	54 000	4 500	5 300
129	171	167	2	232 000	390 000	57 000	4 300	5 000
139	191	184	2	290 000	500 000	72 000	3 800	4 500
149	201	194	2	300 000	520 000	74 000	3 600	4 300
160	215	208	2,1	335 000	585 000	83 000	3 400	4 000
170	230	222	2,1	375 000	670 000	93 000	3 200	3 800
180	250	239	2,1	450 000	800 000	111 000	3 000	3 600
190	270	258	2,1	570 000	1 000 000	134 000	2 800	3 400
200	280	268	2,1	585 000	1 040 000	138 000	2 600	3 200
210	300	285	2,1	655 000	1 200 000	161 000	2 400	3 000
232	328	313	2,5	800 000	1 460 000	187 000	2 200	2 800
252	348	334	2,5	850 000	1 560 000	199 000	2 000	2 600
275	385	368	3	1 060 000	2 000 000	249 000	1 900	2 400
295	405	388	3	1 080 000	2 080 000	255 000	1 800	2 200
315	445	422	3	1 270 000	2 400 000	290 000	1 600	1 900
335	465	442	3	1 320 000	2 600 000	310 000	1 600	1 900
357	503	477	4	1 630 000	3 250 000	380 000	1 400	1 700
377	523	497	4	1 660 000	3 350 000	390 000	1 400	1 700

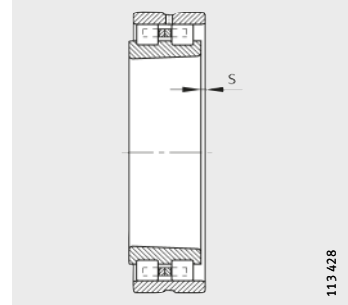


# High precision cylindrical roller bearings

Double row  
Non-locating bearings



NN30...AS-K-M-SP  
Taper 1:12

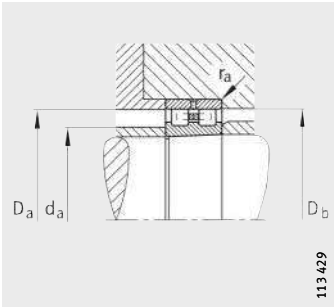


1) Axial displacement "s"

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions								
		d	D	B	r	s <sup>1)</sup>	E	d <sub>1</sub>	d <sub>s</sub>	n <sub>s</sub>
					min.			≈		
<b>NN3076-AS-K-M-SP</b>	110	<b>380</b>	560	135	5	9	513	449	9,5	17,7
<b>NN3080-AS-K-M-SP</b>	143	<b>400</b>	600	148	5	9,5	549	477	9,5	17,7
<b>NN3084-AS-K-M-SP</b>	150	<b>420</b>	620	150	5	10	569	497	9,5	17,7
<b>NN3088-AS-K-M-SP</b>	172	<b>440</b>	650	157	6	10,3	597	520,2	12,5	23,5
<b>NN3092-AS-K-M-SP</b>	197	<b>460</b>	680	163	6	10,5	624	544	12,5	23,5
<b>NN3096-AS-K-M-SP</b>	206	<b>480</b>	700	165	6	11	644	564	12,5	23,5
<b>NN30/500-AS-K-M-SP</b>	214	<b>500</b>	720	167	6	11,5	664	584	12,5	23,5



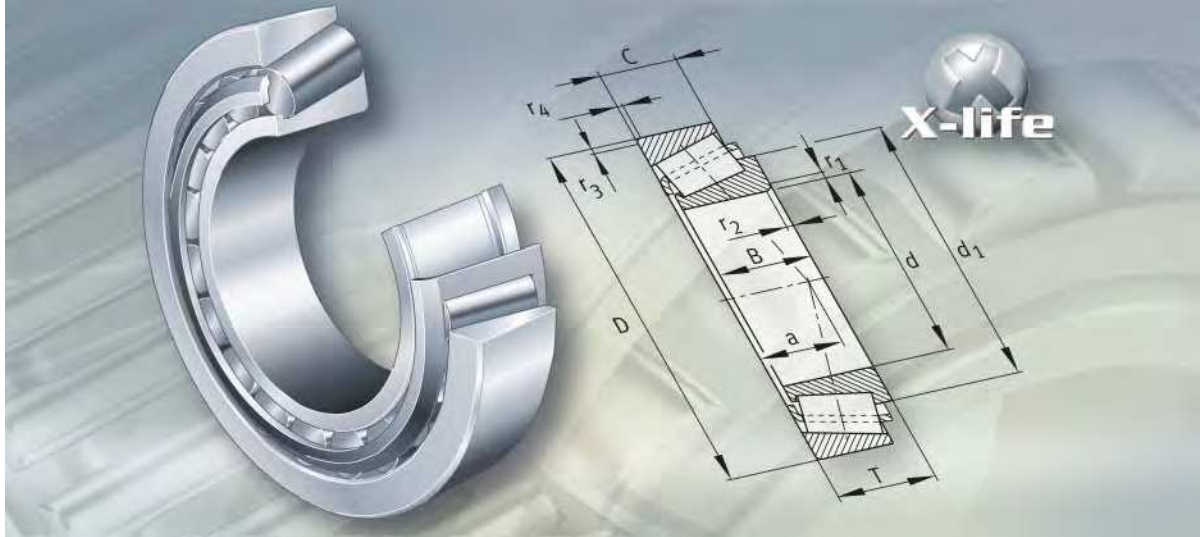


Mounting dimensions

Mounting dimensions				Basic load ratings		Fatigue limit load	Limiting speeds	
da	Da	Db	ra	dyn. Cr	stat. Cor	C <sub>ur</sub>	n <sub>G</sub> grease	n <sub>G</sub> oil
min.	max.	min.	max.	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
397	543	517	4	1 700 000	3 450 000	400 000	1 300	1 600
417	583	553	4	2 160 000	4 500 000	490 000	1 200	1 500
437	603	573	4	2 120 000	4 500 000	490 000	1 200	1 500
463	627	601	5	2 450 000	5 100 000	550 000	1 100	1 400
483	657	628	5	2 600 000	5 400 000	590 000	1 100	1 400
503	677	648	5	2 700 000	5 850 000	630 000	1 000	1 300
523	697	668	5	2 650 000	5 850 000	620 000	1 000	1 300



**FAG**



## Tapered roller bearings

# Tapered roller bearings

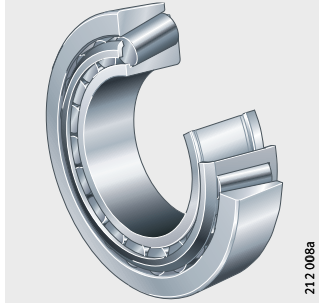
	Page
<b>Product overview</b>	Tapered roller bearings..... 516
<b>Features</b>	X-life ..... 517
	Radial and axial load capacity..... 517
	Compensation of angular misalignments ..... 518
	Matched bearings N11CA ..... 518
	Integral tapered roller bearings JK0S ..... 518
	Sealing..... 518
	Lubrication ..... 518
	Operating temperature ..... 519
	Cages..... 519
	Suffixes..... 519
<b>Design and safety guidelines</b>	Calculation of axial force ..... 520
	Equivalent dynamic bearing load ..... 522
	Equivalent static bearing load..... 523
	Basic load ratings and fatigue limit load for bearing pairs..... 524
	Minimum radial load ..... 524
	Speeds..... 524
	Design of bearing arrangements ..... 524
<b>Accuracy</b>	Bearings in metric sizes ..... 525
	Bearings in inch sizes ..... 528
	Axial internal clearance ..... 529
<b>Dimension tables</b>	Tapered roller bearings, single row ..... 530
	Tapered roller bearings, matched pairs ..... 546
	Tapered roller bearings, single row, inch sizes..... 550
	Integral tapered roller bearings, sealed on one side ..... 554



# Product overview Tapered roller bearings

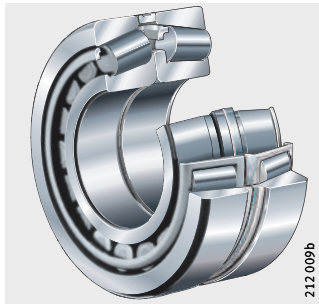
## Single row

302, 303, 313, 320, 322,  
323, 323..-A, 323..-B, 329,  
330, 331, 332, T, K



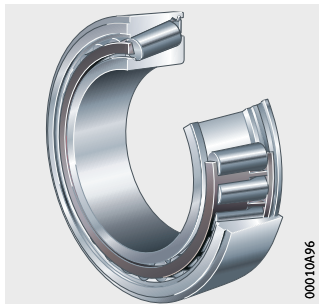
## Matched pairs

313..-N11CA, 320..-N11CA,  
322..-N11CA, 329..-N11CA



## Integral tapered roller bearings Sealed on one side

JK0S



# Tapered roller bearings

**Features** Tapered roller bearings comprise solid inner and outer rings with tapered raceways and tapered rollers in a window cage.

The bearings are in the form of:

- standard designs
- open variants matched in pairs
- integral designs sealed on one side, JK0S.

Open bearings are not self-retaining. As a result, the inner ring with the rollers and the cage can be fitted separately from the outer ring.

Metric and inch size bearings are available.

Designs with a K in the designation have inch dimensions.

For new designs, however, bearings in metric sizes should always be used in preference.

## X-life

Tapered roller bearings of series T7FC are supplied in X-life design. These bearings have improved surfaces, a higher performance combination of material and heat treatment as well as an optimised contact geometry. This improves the friction behaviour and increases the basic dynamic load rating. Under the same operating conditions, a significant increase in basic rating life is achieved. For certain applications, this means that a smaller bearing arrangement can be designed.

X-life bearings are indicated in the dimension tables.

## Radial and axial load capacity

Tapered roller bearings can support axial loads in one direction and high radial loads.

They must normally be axially adjusted against a second bearing fitted in a mirror image arrangement. This bearing combination is fitted in an O or X arrangement, *Figure 1* and *Figure 2*, page 520.

## Contact angle

The axial load carrying capacity is dependent on the contact angle; i. e. the larger the angle, the higher the load to which the bearing can be subjected.

The size of the contact angle and thus the load carrying capacity is indicated by the bearing-specific value  $e$  in the dimension tables. Bearings of series 313, 323...-B, T5ED and T7FC have a very high axial load carrying capacity due to their particularly large contact angle.



# Tapered roller bearings

## Compensation of angular misalignments

The modified line contact between the tapered rollers and the raceways ensures optimum stress distribution at the contact points, prevents edge stresses and allows the bearings to undergo angular adjustment.

At a load ratio  $P/C_r \leq 0,2$ , the tilting of the bearing rings relative to each other must not exceed a maximum of 4 angular minutes. For higher loads or tilting angles, please contact us.

## Matched bearings

Tapered roller bearings with the suffix N11CA are matched in pairs in an X arrangement and can therefore support high axial forces in both directions and moment loads.

The axial internal clearance of the bearing pair is defined by a ring between the two outer rings and is indicated in the suffix, see section Axial internal clearance, page 529.

We can also supply tapered roller bearings by agreement as matched pairs in an O arrangement (N11BA).

When ordering, the number of bearings must be stated, not the number of bearing pairs.

## Integral tapered roller bearings

Tapered roller bearings of series JK0S are ready-to-fit units sealed on one side and are predominantly fitted in pairs in an O arrangement. They are not separable and do not require regreasing.

## No setting of axial internal clearance required

There is no need to set the axial internal clearance of the bearing pair. It is the result of the very narrowly toleranced projection (dimension  $u$ ) between the inner and outer ring when the inner rings are clamped using a shaft nut or shaft end cover.

In order to achieve the correct axial internal clearance after fitting, the inner and outer rings have a tight fit.

In the case of integral tapered roller bearings fitted in pairs in an O arrangement, a suitable slot is formed on the outer ring for the snap ring BR. The snap ring must be ordered separately.

## Sealing

Tapered roller bearings of standard design and matched in pairs are not sealed.

Integral tapered roller bearings JK0S have a lip seal on one side.

## Lubrication

Tapered roller bearings of standard design and matched in pairs can be lubricated with oil or grease.

Integral tapered roller bearings JK0S are filled with a high quality grease.

**Operating temperature** Open tapered roller bearings can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+120\text{ }^{\circ}\text{C}$ .  
For continuous operating temperatures above  $+120\text{ }^{\circ}\text{C}$ , please contact us.

Bearings with a lip seal can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+110\text{ }^{\circ}\text{C}$ , restricted by the grease and sealing ring material.

**Cages** Open tapered roller bearings have sheet steel cages.  
Integral bearings JK0S have cages made from glass fibre reinforced polyamide 66.

**Suffixes** Suffixes for available designs: see table.

**Available designs**

Suffix	Description	Design
A	Modified internal construction	Standard
N11CA-A..	Two tapered roller bearings matched in an X arrangement, with an intermediate ring between the outer rings. Axial internal clearance in $\mu\text{m}$	
B	Increased contact angle	
X	External dimensions matched to international standards	
P5	Increased accuracy	Special design, available by agreement and in certain series only



# Tapered roller bearings

## Design and safety guidelines

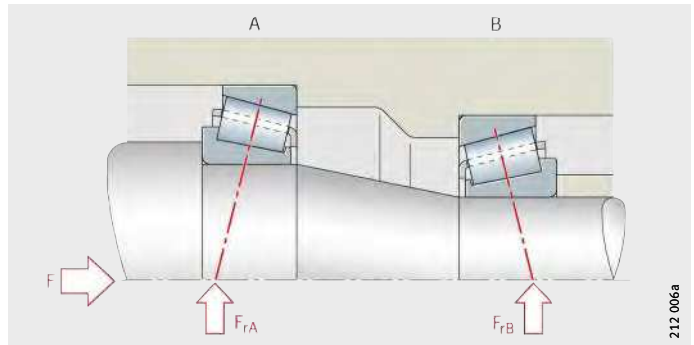
### Calculation of axial force

Under radial load, an internal axial force is induced in the bearing that must be supported by a second bearing and taken into consideration when calculating the equivalent bearing load.

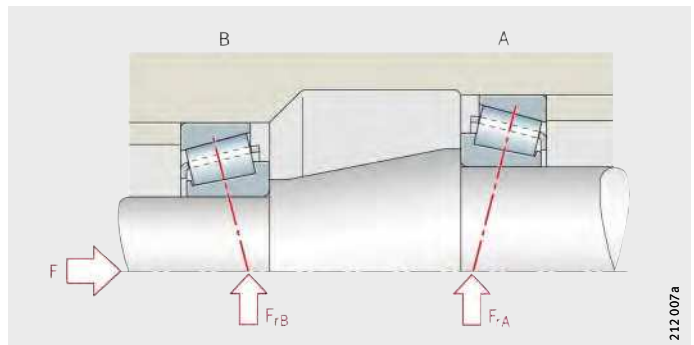
Depending on the bearing arrangement (O or X arrangement), the axial force must first be determined for bearings adjusted clearance-free without preload, *Figure 1*, *Figure 2* and table Load ratio and axial bearing load, page 521.

The following preconditions apply:

- The radial forces act at the central contact points and are positive
- Bearing A is subjected to a radial load  $F_{rA}$ , bearing B to a load  $F_{rB}$
- $F$  is an external axial force acting on bearing A.



*Figure 1*  
Bearings in O arrangement



*Figure 2*  
Bearings in X arrangement



### Load ratio and axial bearing load

Load ratio		Axial force $F_a^{1)}$	
Radial bearing load	External axial force	Bearing A	Bearing B
$\frac{F_{rA}}{Y_A} \leq \frac{F_{rB}}{Y_B}$	$F \cong 0$	$F_a = F + 0,5 \cdot \frac{F_{rB}}{Y_B}$	2)
$\frac{F_{rA}}{Y_A} > \frac{F_{rB}}{Y_B}$	$F > 0,5 \cdot \left( \frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B} \right)$	$F_a = F + 0,5 \cdot \frac{F_{rB}}{Y_B}$	2)
	$F \leq 0,5 \cdot \left( \frac{F_{rA}}{Y_A} - \frac{F_{rB}}{Y_B} \right)$	2)	$F_a = 0,5 \cdot \frac{F_{rA}}{Y_A} - F$

- 1) Axial force  $F_a$ , to be used in calculation of the equivalent dynamic bearing load.  
 2) If no formula is given, the axial force is not taken into consideration.

### Load ratio and axial bearing load for JKOS

Load ratio <sup>1)</sup> $Y = Y_A = Y_B$	Axial force $F_a^{2)}$	
	Bearing A	Bearing B
$F_{rA} \leq F_{rB}$	$F_a = F + 0,5 \cdot \frac{F_{rB}}{Y}$	—
$F_{rA} > F_{rB}$ $F > 0,5 \cdot \left( \frac{F_{rA}}{Y} - \frac{F_{rB}}{Y} \right)$	$F_a = F + 0,5 \cdot \frac{F_{rB}}{Y}$	—
$F_{rA} > F_{rB}$ $F \leq 0,5 \cdot \left( \frac{F_{rA}}{Y} - \frac{F_{rB}}{Y} \right)$	—	$F_a = 0,5 \cdot \frac{F_{rA}}{Y} - F$

- 1) Bearings arranged in pairs.  
 2) Axial force  $F_a$ , to be used in calculation of the equivalent dynamic bearing load.





## Equivalent static bearing load

### Single bearing under static load

For single bearings under static load (and also for integral tapered roller bearings JKOS), the following applies:

Load ratio	Equivalent static load
$\frac{F_{0a}}{F_{0r}} \leq \frac{1}{2 \cdot Y_0}$	$P_0 = F_{0r}$
$\frac{F_{0a}}{F_{0r}} > \frac{1}{2 \cdot Y_0}$	$P_0 = 0,5 \cdot F_{0r} + Y_0 \cdot F_{0a}$

$P_0$  N  
Equivalent static bearing load for combined load  
 $F_{0a}$  N  
Axial static bearing load  
 $F_{0r}$  N  
Radial static bearing load  
 $Y_0$  –  
Factor from dimension tables.

### Bearing pairs under static load

For bearing pairs under static load in an X or O arrangement, the following applies:

$$P_0 = F_{0r} + 2 \cdot Y_0 \cdot F_{0a}$$

$P_0$  N  
Equivalent static bearing load for combined load  
 $F_{0a}$  N  
Axial static bearing load of bearing pair  
 $F_{0r}$  N  
Radial static bearing load of bearing pair  
 $Y_0$  –  
Factor for single bearings from dimension tables.



### Matched bearing pairs under static load

For matched bearing pairs 313(320, 322, 329)...N11CA under static load, the following applies:

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

$P_0$  N  
Equivalent static bearing load for combined load  
 $F_{0a}$  N  
Axial static bearing load of bearing pair  
 $F_{0r}$  N  
Radial static bearing load of bearing pair  
 $Y_0$  –  
Factor for bearing pairs from dimension tables.

# Tapered roller bearings

## Basic load ratings and fatigue limit load for bearing pairs

If two bearings of the same size and design are fitted immediately adjacent to each other in an O or X arrangement, the basic dynamic load rating  $C_r$ , the basic static load rating  $C_{0r}$  and the fatigue limit load  $C_{ur}$  of the bearing pair are as follows:

- $C_r = 1,715 \cdot C_{r \text{ single bearing}}$
- $C_{0r} = 2 \cdot C_{0r \text{ single bearing}}$
- $C_{ur} = 2 \cdot C_{ur \text{ single bearing}}$

## Matched bearings

For matched bearing pairs 313..-N11CA, 320..-N11CA, 322..-N11CA and 329..-N11CA, the basic load ratings are given in the dimension tables.

## Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum load  $F_{r \min}$  in a radial direction. This applies particularly in the case of high speeds and high accelerations. In continuous operation, roller bearings with cage must have a minimum radial load of the order of  $P/C_r > 0,02$ .

## Speeds



The limiting speeds  $n_G$  in the dimension tables must not be exceeded.

## Matched bearings

The limiting speed  $n_G$  is possible if the less favourable thermal balance of the bearing pair is taken into consideration in the operating conditions.

## Design of bearing arrangements Shaft and housing tolerances

Recommended shaft tolerances for radial bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

Recommended shaft and housing tolerances for JKOS bearings, see table.

## Tolerances for JKOS bearings

Circumferential load	Tolerance	
	Shaft	Housing
on inner ring	m6	H7
outer ring	g6	M7

## Mounting dimensions

The dimension tables give the maximum dimensions of the radii  $r_a$  and  $r_b$  and the diameters of the abutment shoulders.

## Cage projection



In the open bearings, the cages project laterally to a certain extent. In order to prevent the cages grazing the adjacent construction, the lateral minimum distances  $C_a$  and  $C_b$  in the dimension tables must be taken into consideration in the design of the adjacent construction.

## Accuracy Metric bearings

The main dimensions conform to DIN ISO 355 and DIN 720, the dimensional and geometrical tolerances conform to DIN 620-2.

### Width tolerance to PN

Single row tapered roller bearings 303, 313, 322, 323..-A, 323..-B, T2EE, T4CB, T4DB, T5ED and T7FC as well as JK0S correspond to tolerance class PN.

Bearings 320, 329, 330, 331 and 332 for shaft diameters over 200 mm have width tolerances to tolerance class PN.

### Inner ring tolerances, Part 1

Bore mm		Bore deviation $\mu\text{m}$		Variation $\mu\text{m}$		Radial runout $\mu\text{m}$
d		$\Delta_{\text{dmp}}$		$V_{\text{dp}}$	$V_{\text{dmp}}$	$K_{\text{ia}}$
over	incl.	max.	min.	max.	max.	max.
10	18	0	-12	12	9	15
18	30	0	-12	12	9	18
30	50	0	-12	12	9	20
50	80	0	-15	15	11	25
80	120	0	-20	20	15	30
120	180	0	-25	25	19	35
180	250	0	-30	30	23	50
250	315	0	-35	35	26	60
315	400	0	-40	40	30	70

### Inner ring tolerances, Part 2

Bore mm		Width deviation $\mu\text{m}$		Width deviation $\mu\text{m}$					
d		$\Delta_{\text{Bs}}$		$\Delta_{\text{Ts}}$		$\Delta_{\text{T1s}}$		$\Delta_{\text{T2s}}$	
over	incl.	max.	min.	max.	min.	max.	min.	max.	min.
10	18	0	-120	+200	0	+100	0	+100	0
18	30	0	-120	+200	0	+100	0	+100	0
30	50	0	-120	+200	0	+100	0	+100	0
50	80	0	-150	+200	0	+100	0	+100	0
80	120	0	-200	+200	-200	+100	-100	+100	-100
120	180	0	-250	+350	-250	+150	-150	+200	-100
180	250	0	-300	+350	-250	+150	-150	+200	-100
250	315	0	-350	+350	-250	+150	-150	+200	-100
315	400	0	-400	+400	-400	+200	-200	+200	-200



# Tapered roller bearings

## Outer ring tolerances

Outside diameter mm D		Outside diameter deviation $\mu\text{m}$ $\Delta_{Dmp}$		Variation $\mu\text{m}$ $V_{Dp}$ max. $V_{Dmp}$ max.		Radial runout $\mu\text{m}$ $K_{ea}$ max.
over	incl.	max.	min.	max.	max.	max.
18	30	0	-12	12	9	18
30	50	0	-14	14	11	20
50	80	0	-16	16	12	25
80	120	0	-18	18	14	35
120	150	0	-20	20	15	40
150	180	0	-25	25	19	45
180	250	0	-30	30	23	50
250	315	0	-35	35	26	60
315	400	0	-40	40	30	70
400	500	0	-45	45	34	80

The width tolerance  $\Delta_{Cs}$  is identical to  $\Delta_{Bs}$  for the inner ring of the same bearing.

## Width tolerance to P6X

Tapered roller bearings 320, 329, 330, 331 and 332 for shaft diameters up to 200 mm have restricted width tolerances to tolerance class P6X.

## Inner ring tolerances, Part 1

Bore mm d		Bore deviation $\mu\text{m}$ $\Delta_{dmp}$		Variation $\mu\text{m}$ $V_{dp}$ max. $V_{dmp}$ max.		Radial runout $\mu\text{m}$ $K_{ia}$ max.
over	incl.	max.	min.	max.	max.	max.
10	18	0	-12	12	9	15
18	30	0	-12	12	9	18
30	50	0	-12	12	9	20
50	80	0	-15	15	11	25
80	120	0	-20	20	15	30
120	180	0	-25	25	19	35
180	200	0	-30	30	23	50

## Inner ring tolerances, Part 2

Bore mm d		Width deviation $\mu\text{m}$ $\Delta_{Bs}$		Width deviation $\mu\text{m}$ $\Delta_{Ts}$ $\Delta_{T1s}$ $\Delta_{T2s}$					
over	incl.	max.	min.	max.	min.	max.	min.	max.	min.
10	18	0	-50	+100	0	+50	0	+50	0
18	30	0	-50	+100	0	+50	0	+50	0
30	50	0	-50	+100	0	+50	0	+50	0
50	80	0	-50	+100	0	+50	0	+50	0
80	120	0	-50	+100	0	+50	0	+50	0
120	180	0	-50	+150	0	+50	0	+100	0
180	200	0	-50	+150	0	+50	0	+100	0

### Outer ring tolerances

Outside diameter mm		Outside diameter deviation $\mu\text{m}$		Variation $\mu\text{m}$		Radial runout $\mu\text{m}$	Width deviation $\mu\text{m}$	
D		$\Delta_{Dmp}$		$V_{Dp}$	$V_{Dmp}$	$K_{ea}$	$\Delta_{Cs}$	
over	incl.	max.	min.	max.	max.	max.	max.	min.
30	50	0	-14	14	11	20	0	-100
50	80	0	-16	16	12	25	0	-100
80	120	0	-18	18	14	35	0	-100
120	150	0	-20	20	15	40	0	-100
150	180	0	-25	25	19	45	0	-100
180	250	0	-30	30	23	50	0	-100
250	315	0	-35	35	26	60	0	-100

### Restricted tolerance P5

We can by agreement supply tapered roller bearings with restricted tolerances to tolerance class P5 to DIN 620-2.

### Inner ring tolerances, Part 1

Bore mm		Bore deviation $\mu\text{m}$		Variation $\mu\text{m}$		Radial runout $\mu\text{m}$
d		$\Delta_{dmp}$		$V_{dp}$	$V_{dmp}$	$K_{ia}$
over	incl.	max.	min.	max.	max.	max.
10	18	0	-7	5	5	5
18	30	0	-8	6	5	5
30	50	0	-10	8	5	6
50	80	0	-12	9	6	7
80	120	0	-15	11	8	8
120	180	0	-18	14	9	11
180	250	0	-22	17	11	13
250	315	0	-25	-	-	-
315	400	0	-30	-	-	-



### Inner ring tolerances, Part 2

Bore mm		Width deviation $\mu\text{m}$		Width deviation $\mu\text{m}$	
d		$\Delta_{Bs}$		$\Delta_{Ts}$	
over	incl.	max.	min.	max.	min.
10	18	0	-200	+200	-200
18	30	0	-200	+200	-200
30	50	0	-240	+200	-200
50	80	0	-300	+200	-200
80	120	0	-400	+200	-200
120	180	0	-500	+350	-250
180	250	0	-600	+350	-250
250	315	0	-	+350	-250
315	400	0	-	+400	-400

# Tapered roller bearings

## Outer ring tolerances

Outside diameter		Outside diameter deviation		Variation		Radial runout
mm		μm		μm		μm
D		$\Delta_{Dmp}$		$V_{Dp}$	$V_{Dmp}$	$K_{ea}$
over	incl.	max.	min.	max.	max.	max.
18	30	0	-8	6	5	6
30	50	0	-9	7	5	7
50	80	0	-11	8	6	8
80	120	0	-13	10	7	10
120	150	0	-15	11	8	11
150	180	0	-18	14	9	13
180	250	0	-20	15	10	15
250	315	0	-25	19	13	18
315	400	0	-28	22	14	20
400	500	0	-33	-	-	23

## Total width tolerance of matched bearings

The total width tolerance of bearing pairs 313..-N11CA, 320..-N11CA, 322..-N11CA and 329..-N11CA is determined from the axial internal clearance and the deviations of the width  $\Delta_{Ts}$  of the single bearings, see Inner ring tolerances, Part 2, page 525.

## Bearings in inch sizes

Tapered roller bearings of series K are manufactured as standard with normal tolerances to ANSI/ABMA. The width  $\Delta_{Bs}$  and radial runout correspond to tolerance class PN to DIN 620-2. The bore and outside diameters of bearings in inch sizes have plus tolerances.

## Inner ring tolerances, Part 1

Bore		Bore deviation		Width deviation	
mm		μm		μm	
d		$\Delta_{dmp}$		$\Delta_{Ts}$	
over	incl.	max.	min.	max.	min.
-	81	+13	0	+200	0
81	102	+25	0	+200	0

## Inner ring tolerances, Part 2

Bore		Width deviation (in relation to bore)		Radial runout
mm		μm		μm
d		$\Delta_{Bs}$		$K_{ia}$
over	incl.	max.	min.	
10	18	0	-120	15
18	30	0	-120	18
30	50	0	-120	20
50	80	0	-150	25
80	120	0	-200	30



### Outer ring tolerances

Outside diameter		Outside diameter deviation		Radial runout $\mu\text{m}$ $K_{ea}$
mm		$\mu\text{m}$		
D		$\Delta_{Dmp}$		
over	incl.	max.	min.	
18	30	+25	0	18
30	50	+25	0	20
50	80	+25	0	25
80	120	+25	0	35
120	150	+25	0	40

### Chamfer dimensions

The limit values for chamfer dimensions  $r$  are only valid for tapered roller bearings with inch dimensions. Values for metric tapered roller bearings, see Limit values for chamfer dimensions, page 138.

#### Limit values for chamfer dimensions $r_{\max}$ for the inner ring

Nominal bearing bore diameter		Chamfer dimension <sup>1)</sup>	
d mm		$r_1$ mm	$r_2$ mm
over	incl.		
–	50,8	+0,4	+0,9
50,8	101,6	+0,5	+1,25
101,6	254	+0,65	+1,8

<sup>1)</sup>  $r_{\min}$ : see dimension tables.

#### Limit values for chamfer dimensions $r_{\max}$ for the outer ring

Nominal outside diameter		Chamfer dimension <sup>1)</sup>	
D mm		$r_3$ mm	$r_4$ mm
over	incl.		
–	101,6	+0,6	+1,05
101,6	168,3	+0,65	+1,15
168,3	266,7	+0,85	+1,35
266,7	355,6	+1,7	+1,7

<sup>1)</sup>  $r_{\min}$ : see dimension tables.

### Axial internal clearance

In tapered roller bearings, the axial internal clearance is the result of mounting against a second bearing during installation.

#### Matched bearings

The axial internal clearance is defined here by an intermediate ring and is indicated in the suffix.

Example:

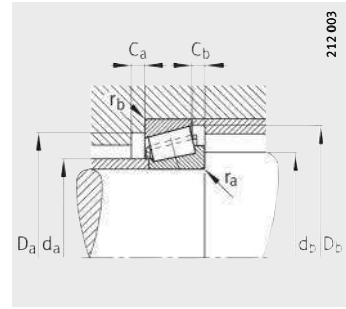
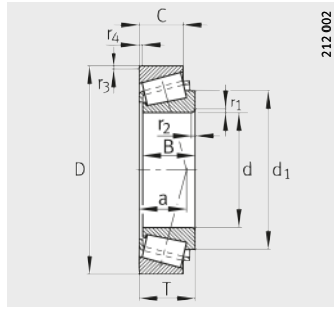
■ A80-120 indicates that the axial internal clearance of the bearing pair before fitting is between 80  $\mu\text{m}$  and 120  $\mu\text{m}$ .

Once bearing pairs are fitted, the preset axial internal clearance is reduced by the fit conditions and the axial clamping forces.



# Tapered roller bearings

Single row



Mounting dimensions

Dimension table - Dimensions in mm

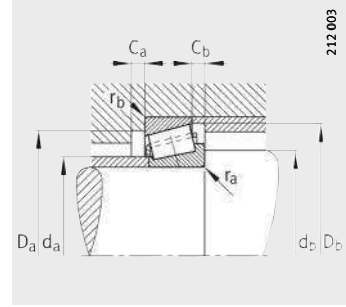
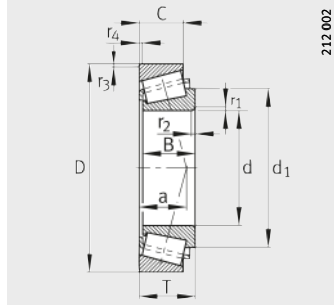
Designation	Interchange designation to ISO 355	Mass m ≈kg	Dimensions									Mounting dimensions		
			d	D	B	C	T	r <sub>1</sub> , r <sub>2</sub> min.	r <sub>3</sub> , r <sub>4</sub> min.	a ≈	d <sub>1</sub> ≈	d <sub>a</sub> max.	d <sub>b</sub> min.	D <sub>a</sub> min.
<b>30202-A</b>	–	0,054	<b>15</b>	35	11	10	11,75	0,6	0,6	8	26,4	20	19	29
<b>30302-A</b>	T2FB015	0,096	<b>15</b>	42	13	11	14,25	1	1	10	28,2	22	21	36
<b>30203-A</b>	T2DB017	0,056	<b>17</b>	40	12	11	13,25	1	1	10	29,1	23	23	34
<b>32203-A</b>	T2DD017	0,105	<b>17</b>	40	16	14	17,25	1	1	11	28,7	22	23	34
<b>30303-A</b>	T2FB017	0,129	<b>17</b>	47	14	12	15,25	1	1	11	31,6	25	23	40
<b>32303-A</b>	T2FD017	0,18	<b>17</b>	47	19	16	20,25	1	1	12	31,5	24	23	39
<b>32004-X</b>	T3CC020	0,108	<b>20</b>	42	15	12	15	0,6	0,6	10	33	25	25	36
<b>30204-A</b>	T2DB020	0,092	<b>20</b>	47	14	12	15,25	1	1	11	34,5	27	26	40
<b>30304-A</b>	T2FB020	0,188	<b>20</b>	52	15	13	16,25	1,5	1,5	11	36,1	28	27	44
<b>32304-A</b>	T2FD020	0,241	<b>20</b>	52	21	18	22,25	1,5	1,5	14	35,3	27	27	43
<b>32005-X</b>	T4CC025	0,12	<b>25</b>	47	15	11,5	15	0,6	0,6	12	38	30	30	40
<b>33005</b>	–	0,139	<b>25</b>	47	17	14	17	0,6	0,6	11	36,8	30	30	41
<b>30205-A</b>	T3CC025	0,155	<b>25</b>	52	15	13	16,25	1	1	13	38,5	31	31	44
<b>32205-A</b>	T2CD025	0,186	<b>25</b>	52	18	16	19,25	1	1	14	40,2	31	31	44
<b>33205</b>	T2DE025	0,214	<b>25</b>	52	22	18	22	1	1	14	39,6	30	31	43
<b>31305-A</b>	T7FB025	0,297	<b>25</b>	62	17	13	18,25	1,5	1,5	20	46,3	34	32	47
<b>30305-A</b>	T2FB025	0,289	<b>25</b>	62	17	15	18,25	1,5	1,5	13	42,3	34	32	54
<b>32305-A</b>	T2FD025	0,362	<b>25</b>	62	24	20	25,25	1,5	1,5	16	42,3	33	32	53
<b>320/28-X</b>	T4CC028	0,156	<b>28</b>	52	16	12	16	1	1	13	41	33	34	45
<b>32006-X</b>	T4CC030	0,195	<b>30</b>	55	17	13	17	1	1	14	44,1	35	36	48
<b>30206-A</b>	T3DB030	0,237	<b>30</b>	62	16	14	17,25	1	1	14	45,6	37	36	53
<b>32206-A</b>	T3DC030	0,274	<b>30</b>	62	20	17	21,25	1	1	16	45,9	37	36	52
<b>33206</b>	T2DE030	0,394	<b>30</b>	62	25	19,5	25	1	1	16	46,1	36	36	53
<b>31306-A</b>	T7FB030	0,441	<b>30</b>	72	19	14	20,75	1,5	1,5	24	54	40	37	55
<b>30306-A</b>	T2FB030	0,445	<b>30</b>	72	19	16	20,75	1,5	1,5	15	49,3	40	37	62
<b>32306-A</b>	T2FD030	0,587	<b>30</b>	72	27	23	28,75	1,5	1,5	18	49,3	39	37	59
<b>320/32-X</b>	T4CC032	0,188	<b>32</b>	58	17	13	17	1	1	14	46,5	38	38	50
<b>32007-X</b>	T4CC035	0,257	<b>35</b>	62	18	14	18	1	1	15	50	40	41	54
<b>30207-A</b>	T3DB035	0,334	<b>35</b>	72	17	15	18,25	1,5	1,5	15	52,7	44	42	62
<b>32207-A</b>	T3DC035	0,482	<b>35</b>	72	23	19	24,25	1,5	1,5	18	53,9	43	42	61
<b>33207</b>	T2DE035	0,585	<b>35</b>	72	28	22	28	1,5	1,5	18	53	42	42	61
<b>31307-A</b>	T7FB035	0,582	<b>35</b>	80	21	15	22,75	2	1,5	26	59,9	44	44	62
<b>30307-A</b>	T2FB035	0,573	<b>35</b>	80	21	18	22,75	2	1,5	16	55,2	45	44	70
<b>32307-B</b>	T5FE035	0,802	<b>35</b>	80	31	25	32,75	2	1,5	25	59,8	42	44	61
<b>32307-A</b>	T2FE035	0,741	<b>35</b>	80	31	25	32,75	2	1,5	20	55,2	44	44	66

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D <sub>a</sub>	D <sub>b</sub>	C <sub>a</sub>	C <sub>b</sub>	r <sub>a</sub>	r <sub>b</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	min.	min.	min.	max.	max.	N	N				N	min <sup>-1</sup>	min <sup>-1</sup>
29	32	2	1,5	0,6	0,6	14 700	14 100	0,35	1,73	0,95	1 320	23 800	13 500
36	38	2	3	1	1	23 000	20 500	0,29	2,11	1,16	2 110	21 000	12 500
34	37	2	2	1	1	18 500	17 800	0,35	1,74	0,96	1 890	21 000	12 100
34	37	3	3	1	1	28 500	29 000	0,31	1,92	1,06	3 000	21 000	10 800
41	42	2	3	1	1	27 500	24 500	0,29	2,11	1,16	2 600	18 200	12 400
41	43	3	4	1	1	36 000	35 000	0,29	2,11	1,16	4 050	18 200	11 500
37	39	3	3	0,6	0,6	24 000	28 500	0,37	1,6	0,88	3 000	18 200	10 900
41	43	2	3	1	1	27 000	27 000	0,35	1,74	0,96	2 900	16 800	10 500
45	47	2	3	1,5	1,5	34 000	32 500	0,3	2	1,1	3 600	15 400	9 800
45	47	3	4	1,5	1,5	46 000	47 500	0,3	2	1,1	5 600	15 400	9 300
42	44	3	3,5	0,6	0,6	26 500	33 500	0,43	1,39	0,77	3 600	15 400	9 200
42	44	3	3	0,6	0,6	33 000	41 500	0,29	2,07	1,14	4 650	15 400	9 400
46	48	2	3	1	1	32 500	35 000	0,37	1,6	0,88	3 900	14 000	9 100
46	48	3	3	1	1	40 000	44 500	0,36	1,67	0,92	5 100	14 000	8 100
46	49	4	4	1	1	48 500	58 000	0,35	1,71	0,94	6 900	14 000	8 200
55	59	3	5	1,5	1,5	37 000	38 500	0,83	0,73	0,4	4 400	11 900	7 200
55	57	2	3	1,5	1,5	47 000	45 500	0,3	2	1,1	5 100	12 600	8 200
55	57	3	5	1,5	1,5	62 000	66 000	0,3	2	1,1	7 800	12 600	7 900
46	49	3	4	1	1	34 000	40 500	0,43	1,39	0,77	4 550	13 300	8 300
49	52	3	4	1	1	38 500	46 500	0,43	1,39	0,77	5 300	12 600	7 900
56	57	2	3	1	1	43 500	48 000	0,37	1,6	0,88	5 500	11 900	7 400
56	59	3	4	1	1	53 000	62 000	0,37	1,6	0,88	7 400	11 900	6 700
56	59	5	5,5	1	1	65 000	77 000	0,34	1,76	0,97	9 400	11 200	7 100
65	68	3	6,5	1,5	1,5	45 000	46 500	0,83	0,73	0,4	5 300	9 800	6 500
65	66	3	4,5	1,5	1,5	60 000	61 000	0,31	1,9	1,05	6 900	10 500	7 200
65	66	4	5,5	1,5	1,5	80 000	89 000	0,31	1,9	1,05	10 800	10 500	6 900
52	55	3	4	1	1	39 000	48 500	0,45	1,32	0,73	5 600	11 900	7 500
56	59	4	4	1	1	45 500	57 000	0,45	1,32	0,73	6 700	11 200	6 900
65	67	3	3	1,5	1,5	54 000	59 000	0,37	1,6	0,88	6 800	9 800	6 400
65	67	3	5,5	1,5	1,5	71 000	84 000	0,37	1,6	0,88	10 200	9 800	6 000
65	68	5	6	1,5	1,5	86 000	105 000	0,35	1,7	0,93	12 800	9 800	6 200
71	76	4	7,5	2	1,5	60 000	64 000	0,83	0,73	0,4	7 500	8 800	5 800
71	74	3	4,5	2	1,5	73 000	75 000	0,31	1,9	1,05	8 600	9 400	6 600
71	76	4	7,5	2	1,5	95 000	116 000	0,55	1,1	0,6	14 300	8 800	6 300
71	74	4	7,5	2	1,5	100 000	113 000	0,31	1,9	1,05	13 500	9 400	6 400



# Tapered roller bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

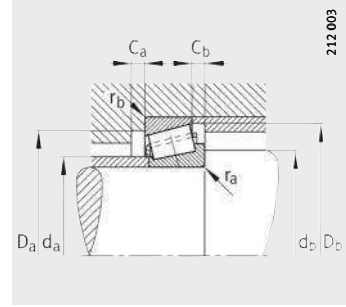
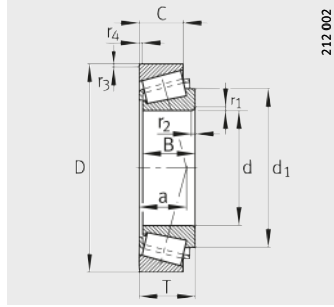
Designation	Interchange designation to ISO 355	X-life	Mass m ≈kg	Dimensions									Mounting dimensions		
				d	D	B	C	T	r <sub>1</sub> , r <sub>2</sub> min.	r <sub>3</sub> , r <sub>4</sub> min.	a ≈	d <sub>1</sub> ≈	d <sub>a</sub> max.	d <sub>b</sub> min.	D <sub>a</sub> min.
<b>32008-XA</b>	T3CD040	-	0,312	<b>40</b>	68	19	14,5	19	1	1	15	55	46	46	60
<b>33108</b>	T2CE040	-	0,541	<b>40</b>	75	26	20,5	26	1,5	1,5	18	58,7	47	47	65
<b>30208-A</b>	T3DB040	-	0,435	<b>40</b>	80	18	16	19,75	1,5	1,5	17	58,4	49	47	69
<b>32208-A</b>	T3DC040	-	0,551	<b>40</b>	80	23	19	24,75	1,5	1,5	19	59,2	48	47	68
<b>33208</b>	T2DE040	-	0,741	<b>40</b>	80	32	25	32	1,5	1,5	21	60,1	47	47	67
<b>T2EE040</b>	-	-	0,881	<b>40</b>	85	32,5	28	33	2,5	2	22	61,9	48	51	70
<b>31308-A</b>	T7FB040	-	0,727	<b>40</b>	90	23	17	25,25	2	1,5	30	68,2	51	49	71
<b>30308-A</b>	T2FB040	-	0,812	<b>40</b>	90	23	20	25,25	2	1,5	20	63,3	52	49	77
<b>32308-A</b>	T2FD040	-	1,06	<b>40</b>	90	33	27	35,25	2	1,5	23	63,3	50	49	73
<b>32308-B</b>	-	-	1,18	<b>40</b>	90	33	27	35,25	2	1,5	28	67	50	49	69
<b>32009-XA</b>	T3CC045	-	0,329	<b>45</b>	75	20	15,5	20	1	1	17	62	51	51	67
<b>33109</b>	T3CE045	-	0,597	<b>45</b>	80	26	20,5	26	1,5	1,5	19	63,8	52	52	69
<b>30209-A</b>	T3DB045	-	0,47	<b>45</b>	85	19	16	20,75	1,5	1,5	18	64	54	52	74
<b>32209-A</b>	T3DC045	-	0,57	<b>45</b>	85	23	19	24,75	1,5	1,5	20	64,8	53	52	73
<b>33209</b>	T3DE045	-	0,895	<b>45</b>	85	32	25	32	1,5	1,5	22	66,2	52	52	72
<b>T7FC045</b>	-	<b>XL</b>	0,92	<b>45</b>	95	26,5	20	29	2,5	2,5	33	73,6	53	59	71
<b>T2ED045</b>	-	-	1,2	<b>45</b>	95	35	30	36	2,5	2,5	24	68,8	54	56	80
<b>31309-A</b>	T7FB045	-	0,998	<b>45</b>	100	25	18	27,25	2	1,5	32	75,8	56	54	79
<b>30309-A</b>	T2FB045	-	1	<b>45</b>	100	25	22	27,25	2	1,5	21	70,7	59	54	86
<b>32309-BA</b>	T5FD045	-	1,48	<b>45</b>	100	36	30	38,25	2	1,5	30	74,2	55	54	76
<b>32309-A</b>	T2FD045	-	1,43	<b>45</b>	100	36	30	38,25	2	1,5	25	71,1	56	54	82
<b>32010-X</b>	T3CC050	-	0,384	<b>50</b>	80	20	15,5	20	1	1	18	67,5	56	56	72
<b>33010</b>	T2CE050	-	0,47	<b>50</b>	80	24	19	24	1	1	17	65,8	56	56	72
<b>33110</b>	T3CE050	-	0,604	<b>50</b>	85	26	20	26	1,5	1,5	20	69,1	56	57	74
<b>30210-A</b>	T3DB050	-	0,603	<b>50</b>	90	20	17	21,75	1,5	1,5	20	68,8	58	57	79
<b>32210-A</b>	T3DC050	-	0,602	<b>50</b>	90	23	19	24,75	1,5	1,5	21	70	58	57	78
<b>33210</b>	T3DE050	-	0,971	<b>50</b>	90	32	24,5	32	1,5	1,5	23	71,8	57	57	77
<b>T7FC050</b>	-	<b>XL</b>	1,24	<b>50</b>	105	29	22	32	3	3	36	80,9	59	65	78
<b>31310-A</b>	T7FB050	-	1,23	<b>50</b>	110	27	19	29,25	2,5	2	35	81,4	62	60	87
<b>30310-A</b>	T2FB050	-	1,27	<b>50</b>	110	27	23	29,25	2,5	2	23	77,6	65	60	95
<b>32310-A</b>	T2FD050	-	1,9	<b>50</b>	110	40	33	42,25	2,5	2	29	78,4	62	60	90

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D <sub>a</sub>	D <sub>b</sub>	C <sub>a</sub>	C <sub>b</sub>	r <sub>a</sub>	r <sub>b</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	min.	min.	min.	max.	max.	N	N				N	min <sup>-1</sup>	min <sup>-1</sup>
62	65	4	4,5	1	1	53 000	71 000	0,38	1,58	0,87	8 300	9 800	6 200
68	71	4	5,5	1,5	1,5	79 000	103 000	0,36	1,69	0,93	12 800	8 800	5 500
73	74	3	3,5	1,5	1,5	61 000	67 000	0,37	1,6	0,88	7 600	8 800	5 900
73	75	3	5,5	1,5	1,5	79 000	93 000	0,37	1,6	0,88	11 200	8 800	5 300
73	76	5	7	1,5	1,5	105 000	134 000	0,36	1,68	0,92	16 600	8 400	5 700
75	80	6	5	2,5	2	114 000	139 000	0,34	1,74	0,96	17 000	8 400	5 600
81	86	4	8	2	1,5	76 000	83 000	0,83	0,73	0,4	9 400	7 400	5 200
81	82	3	5	2	1,5	91 000	102 000	0,35	1,74	0,96	11 900	7 800	5 800
81	82	4	8	2	1,5	120 000	146 000	0,35	1,74	0,96	17 900	7 800	5 600
81	85	4	8	2	1,5	120 000	149 000	0,55	1,1	0,6	18 100	7 400	5 500
69	72	4	4,5	1	1	61 000	86 000	0,39	1,53	0,84	10 200	8 800	5 500
73	77	4	5,5	1,5	1,5	84 000	115 000	0,38	1,57	0,86	14 400	8 400	5 000
78	80	3	4,5	1,5	1,5	70 000	82 000	0,4	1,48	0,81	9 600	7 800	5 400
78	80	3	5,5	1,5	1,5	82 000	100 000	0,4	1,48	0,81	12 000	7 800	4 900
78	81	5	7	1,5	1,5	107 000	146 000	0,39	1,56	0,86	18 300	7 800	5 200
83	91	5	9	2,5	2,5	105 000	109 000	0,87	0,69	0,38	15 100	7 000	5 900
83	89	6	6	2,5	2,5	143 000	175 000	0,32	1,86	1,02	21 500	7 400	5 000
91	95	4	9	2	1,5	96 000	108 000	0,83	0,73	0,4	12 700	6 700	4 650
91	92	3	5	2	1,5	111 000	125 000	0,35	1,74	0,96	14 800	7 000	5 200
91	94	5	8	2	1,5	144 000	187 000	0,55	1,1	0,6	23 000	6 700	5 000
91	93	4	8	2	1,5	154 000	193 000	0,35	1,74	0,96	23 900	7 000	4 950
74	77	4	4,5	1	1	64 000	93 000	0,42	1,42	0,78	11 200	7 800	5 000
74	76	4	5	1	1	75 000	113 000	0,32	1,9	1,04	13 900	7 800	5 400
78	82	4	6	1,5	1,5	86 000	122 000	0,41	1,46	0,8	15 200	7 400	4 600
83	85	3	4,5	1,5	1,5	79 000	96 000	0,42	1,43	0,79	11 300	7 400	5 000
83	85	3	5,5	1,5	1,5	88 000	109 000	0,42	1,43	0,79	13 200	7 400	4 750
83	87	5	7,5	1,5	1,5	115 000	163 000	0,41	1,45	0,8	20 400	7 000	4 700
91	100	5	10	3	3	127 000	135 000	0,87	0,69	0,38	18 900	6 300	5 500
100	104	4	10	2,5	2	111 000	125 000	0,83	0,73	0,4	14 700	6 300	4 300
100	102	4	6	2,5	2	130 000	148 000	0,35	1,74	0,96	17 600	6 300	4 800
100	102	5	9	2,5	2	187 000	237 000	0,35	1,74	0,96	29 500	6 300	4 550



# Tapered roller bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

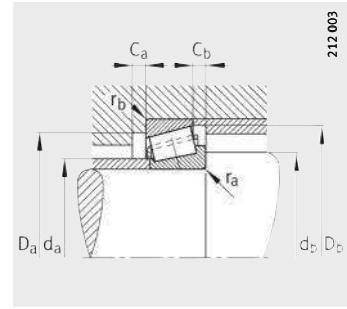
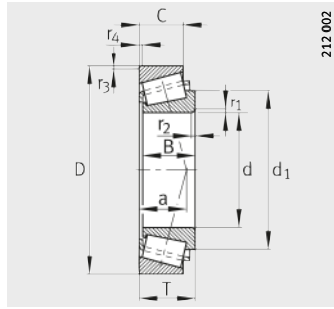
Designation	Interchange designation to ISO 355	X-life	Mass m ≈ kg	Dimensions									Mounting dimensions		
				d	D	B	C	T	r <sub>1</sub> , r <sub>2</sub> min.	r <sub>3</sub> , r <sub>4</sub> min.	a ≈	d <sub>1</sub> ≈	d <sub>a</sub> max.	d <sub>b</sub> min.	D <sub>a</sub> min.
<b>32011-X</b>	T3CC055	-	0,64	<b>55</b>	90	23	17,5	23	1,5	1,5	20	75,8	63	62	81
<b>33011</b>	T2CE055	-	0,673	<b>55</b>	90	27	21	27	1,5	1,5	19	74,2	63	62	81
<b>33111</b>	T3CE055	-	0,894	<b>55</b>	95	30	23	30	1,5	1,5	22	76,2	62	62	83
<b>30211-A</b>	T3DB055	-	0,92	<b>55</b>	100	21	18	22,75	2	1,5	21	76,5	64	64	88
<b>32211-A</b>	T3DC055	-	0,87	<b>55</b>	100	25	21	26,75	2	1,5	23	76,2	63	64	87
<b>33211</b>	T3DE055	-	1,17	<b>55</b>	100	35	27	35	2	1,5	26	78,8	62	64	85
<b>T7FC055</b>	-	<b>XL</b>	1,64	<b>55</b>	115	31	23,5	34	3	3	40	88,6	65	72	86
<b>31311-A</b>	T7FB055	-	1,57	<b>55</b>	120	29	21	31,5	2,5	2	39	88	68	65	94
<b>30311-A</b>	T2FB055	-	1,8	<b>55</b>	120	29	25	31,5	2,5	2	25	84,7	71	65	104
<b>32311-B</b>	T5FD055	-	2,47	<b>55</b>	120	43	35	45,5	2,5	2	36	89,6	65	65	91
<b>32311-A</b>	T2FD055	-	2,4	<b>55</b>	120	43	35	45,5	2,5	2	30	85	68	65	99
<b>32012-X</b>	T4CC060	-	0,614	<b>60</b>	95	23	17,5	23	1,5	1,5	21	80	67	67	85
<b>33012</b>	T2CE060	-	0,714	<b>60</b>	95	27	21	27	1,5	1,5	20	78,6	67	67	85
<b>33112</b>	T3CE060	-	1,01	<b>60</b>	100	30	23	30	1,5	1,5	23	81,3	67	67	88
<b>30212-A</b>	T3EB060	-	0,919	<b>60</b>	110	22	19	23,75	2	1,5	22	82,3	70	69	96
<b>32212-A</b>	T3EC060	-	1,18	<b>60</b>	110	28	24	29,75	2	1,5	24	82,8	69	69	95
<b>33212</b>	T3EE060	-	1,55	<b>60</b>	110	38	29	38	2	1,5	28	86,2	69	69	93
<b>T5ED060</b>	-	-	1,82	<b>60</b>	115	38	31	39	4	2,5	33	90,9	69	76	91
<b>T7FC060</b>	-	<b>XL</b>	2,03	<b>60</b>	125	33,5	26	37	3	3	42	96,5	71	78	94
<b>31312-A</b>	T7FB060	-	1,94	<b>60</b>	130	31	22	33,5	3	2,5	41	95,6	73	72	103
<b>30312-A</b>	T2FB060	-	2,02	<b>60</b>	130	31	26	33,5	3	2,5	26	92,1	77	72	112
<b>32312-BA</b>	T5FD060	-	3,15	<b>60</b>	130	46	37	48,5	3	2,5	39	97	71	72	100
<b>32312-A</b>	T2FD060	-	3,19	<b>60</b>	130	46	37	48,5	3	2,5	32	92,1	74	72	107
<b>32013-X</b>	T4CC065	-	0,62	<b>65</b>	100	23	17,5	23	1,5	1,5	23	85,2	72	72	90
<b>33013</b>	T2CE065	-	0,766	<b>65</b>	100	27	21	27	1,5	1,5	21	84,6	72	72	89
<b>33113</b>	T3DE065	-	1,31	<b>65</b>	110	34	26,5	34	1,5	1,5	26	89,6	73	72	96
<b>30213-A</b>	T3EB065	-	1,27	<b>65</b>	120	23	20	24,75	2	1,5	23	90	77	74	106
<b>32213-A</b>	T3EC065	-	1,49	<b>65</b>	120	31	27	32,75	2	1,5	27	91	76	74	104
<b>T5ED065</b>	-	-	1,91	<b>65</b>	120	38	31	39	4	2,5	35	95,9	74	80	95
<b>33213</b>	T3EE065	-	2,02	<b>65</b>	120	41	32	41	2	1,5	30	92,5	74	74	102
<b>T7FC065</b>	-	<b>XL</b>	2,23	<b>65</b>	130	33,5	26	37	3	3	44,5	100,9	75	83	98
<b>31313-A</b>	T7GB065	-	2,36	<b>65</b>	140	33	23	36	3	2,5	44	102,6	79	77	111
<b>30313-A</b>	T2GB065	-	2,4	<b>65</b>	140	33	28	36	3	2,5	28	99,6	83	77	122
<b>32313-BA</b>	T5GD065	-	3,7	<b>65</b>	140	48	39	51	3	2,5	42	104,3	77	77	109
<b>32313-A</b>	T2GD065	-	3,61	<b>65</b>	140	48	39	51	3	2,5	34	99,6	80	77	117

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D <sub>a</sub>	D <sub>b</sub>	C <sub>a</sub>	C <sub>b</sub>	r <sub>a</sub>	r <sub>b</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	min.	min.	min.	max.	max.	N	N				N	min <sup>-1</sup>	min <sup>-1</sup>
83	86	4	5,5	1,5	1,5	81 000	118 000	0,41	1,48	0,81	14 600	7 000	4 700
83	86	5	6	1,5	1,5	94 000	142 000	0,31	1,92	1,06	18 000	7 000	4 950
88	91	5	7	1,5	1,5	113 000	163 000	0,37	1,6	0,88	20 400	6 700	4 250
91	94	4	4,5	2	1,5	91 000	107 000	0,4	1,48	0,81	12 400	6 700	4 600
91	95	4	5,5	2	1,5	109 000	135 000	0,4	1,48	0,81	16 200	6 700	4 050
91	96	6	8	2	1,5	138 000	194 000	0,4	1,5	0,83	24 400	6 700	4 400
101	109	5	10,5	3	3	152 000	165 000	0,87	0,69	0,38	23 400	5 600	4 950
110	113	4	10,5	2,5	2	123 000	139 000	0,83	0,73	0,4	16 400	5 600	4 100
110	111	4	6,5	2,5	2	151 000	173 000	0,35	1,74	0,96	20 600	6 000	4 500
110	112	5	10,5	2,5	2	194 000	265 000	0,55	1,1	0,6	33 000	5 600	4 350
110	111	5	10,5	2,5	2	211 000	270 000	0,35	1,74	0,96	33 500	6 000	4 300
88	91	4	5,5	1,5	1,5	82 000	123 000	0,43	1,39	0,77	15 200	6 700	4 400
88	90	5	6	1,5	1,5	95 000	148 000	0,33	1,83	1,01	18 800	6 700	4 650
93	96	5	7	1,5	1,5	116 000	171 000	0,4	1,51	0,83	21 500	6 300	4 000
101	103	4	4,5	2	1,5	102 000	121 000	0,4	1,48	0,81	14 000	6 300	4 250
101	104	4	5,5	2	1,5	133 000	169 000	0,4	1,48	0,81	20 600	6 000	3 800
101	105	6	9	2	1,5	169 000	237 000	0,4	1,48	0,82	29 500	6 000	4 050
103	110	6	8	4	2,5	156 000	223 000	0,53	1,13	0,62	28 000	5 600	4 100
111	119	6	11	3	3	181 000	200 000	0,82	0,73	0,4	28 500	5 300	4 600
118	123	5	11,5	3	2,5	146 000	169 000	0,83	0,73	0,4	20 100	5 300	3 750
118	120	5	7,5	3	2,5	174 000	202 000	0,35	1,74	0,96	24 200	5 300	4 300
118	122	6	11,5	3	2,5	220 000	300 000	0,55	1,1	0,6	38 000	5 300	4 050
118	120	6	11,5	3	2,5	242 000	310 000	0,35	1,74	0,96	38 500	5 300	4 000
93	97	4	5,5	1,5	1,5	82 000	125 000	0,46	1,31	0,72	15 800	6 300	4 200
93	96	5	6	1,5	1,5	100 000	161 000	0,35	1,72	0,95	20 300	6 300	4 300
103	106	6	7,5	1,5	1,5	149 000	225 000	0,39	1,55	0,85	28 500	6 000	3 700
111	113	4	4,5	2	1,5	119 000	142 000	0,4	1,48	0,81	16 600	5 600	3 850
111	115	4	5,5	2	1,5	156 000	200 000	0,4	1,48	0,81	24 500	5 600	3 600
108	115	6	8	4	2,5	161 000	235 000	0,56	1,07	0,59	29 500	5 300	3 850
111	115	6	9	2	1,5	203 000	285 000	0,39	1,54	0,85	35 500	5 600	3 750
116	124	5	11	3	3	186 000	211 000	0,87	0,69	0,38	30 500	5 000	4 350
128	132	5	13	3	2,5	163 000	188 000	0,83	0,73	0,4	22 200	5 000	3 600
128	130	5	8	3	2,5	196 000	228 000	0,35	1,74	0,96	27 000	5 000	3 950
128	133	6	12	3	2,5	248 000	340 000	0,55	1,1	0,6	43 000	5 000	3 800
128	130	6	12	3	2,5	270 000	345 000	0,35	1,74	0,96	43 500	5 000	3 800



# Tapered roller bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

Designation	Interchange designation to ISO 355	X-life	Mass m ≈kg	Dimensions									Mounting dimensions		
				d	D	B	C	T	r <sub>1</sub> , r <sub>2</sub> min.	r <sub>3</sub> , r <sub>4</sub> min.	a ≈	d <sub>1</sub> ≈	d <sub>a</sub> max.	d <sub>b</sub> min.	D <sub>a</sub> min.
32914	T2BC070	-	0,494	70	100	20	16	20	1	1	18	85,9	76	76	93
32014-X	T4CC070	-	0,967	70	110	25	19	25	1,5	1,5	24	92	78	77	98
33014	T2CE070	-	1,14	70	110	31	25,5	31	1,5	1,5	22	91	78	77	99
33114	T3DE070	-	1,71	70	120	37	29	37	2	1,5	28	96	79	79	104
30214-A	T3EB070	-	1,31	70	125	24	21	26,25	2	1,5	25	95,4	81	79	110
32214-A	T3EC070	-	1,82	70	125	31	27	33,25	2	1,5	28	96	80	79	108
33214	T3EE070	-	2,06	70	125	41	32	41	2	1,5	31	97,9	79	79	107
T7FC070	-	XL	2,62	70	140	35,5	27	39	3	3	47	108,6	81	90	106
31314-A	T7GB070	-	2,9	70	150	35	25	38	3	2,5	47	109	84	82	118
30314-A	T2GB070	-	3,02	70	150	35	30	38	3	2,5	30	106,6	89	82	130
32314-BA	T5GD070	-	4,52	70	150	51	42	54	3	2,5	44	112	83	82	117
32314-A	T2GD070	-	4,27	70	150	51	42	54	3	2,5	37	106,6	86	82	125
32915	T2BC075	-	0,519	75	105	20	16	20	1	1	19	90,5	81	81	98
32015-X	T4CC075	-	0,922	75	115	25	19	25	1,5	1,5	25	97,3	83	82	103
33015	T2CE075	-	1,16	75	115	31	25,5	31	1,5	1,5	23	96,4	83	82	104
33115	T3DE075	-	1,79	75	125	37	29	37	2	1,5	30	101,4	84	84	109
30215-A	T4DB075	-	1,55	75	130	25	22	27,25	2	1,5	27	100,1	86	84	115
32215-A	T4DC075	-	1,93	75	130	31	27	33,25	2	1,5	29	101,6	85	84	115
33215	T3EE075	-	2,47	75	130	41	31	41	2	1,5	32	104,5	83	84	111
T7FC075	-	XL	3,34	75	150	38	29	42	3	3	51	116,2	87	96	114
31315	T7GB075	-	3,79	75	160	37	26	40	3	2,5	50	115,8	91	87	127
30315-A	T2GB075	-	3,64	75	160	37	31	40	3	2,5	32	114	95	87	139
32315-B	T5GD075	-	5,7	75	160	55	45	58	3	2,5	47	120,4	90	87	124
32315-A	T2GD075	-	5,37	75	160	55	45	58	3	2,5	39	114	91	87	133
32016-X	T3CC080	-	1,29	80	125	29	22	29	1,5	1,5	27	103,6	89	87	112
33016	T2CE080	-	1,67	80	125	36	29,5	36	1,5	1,5	26	102,6	90	87	112
33116	T3DE080	-	1,9	80	130	37	29	37	2	1,5	31	106,6	89	89	114
30216-A	T3EB080	-	1,68	80	140	26	22	28,25	2,5	2	28	106,9	91	90	124
32216-A	T3EC080	-	2,36	80	140	33	28	35,25	2,5	2	31	107,5	90	90	122
33216	T3EE080	-	2,93	80	140	46	35	46	2,5	2	35	111,8	89	90	119
T7FC080	-	XL	3,95	80	160	41	31	45	3	3	54	123,6	93	103	121
31316	T7GB080	-	4,19	80	170	39	27	42,5	3	2,5	53	122,4	97	92	134
30316-A	T2GB080	-	4,34	80	170	39	33	42,5	3	2,5	34	121,7	102	92	148
32316-B	T5GD080	-	7,02	80	170	58	48	61,5	3	2,5	49	126,9	96	92	130
32316-A	T2GD080	-	6,57	80	170	58	48	61,5	3	2,5	42	122	98	92	142

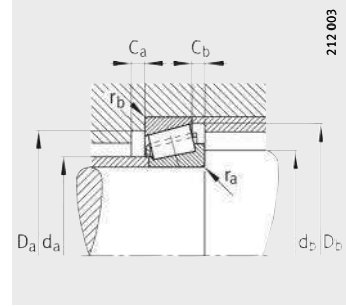
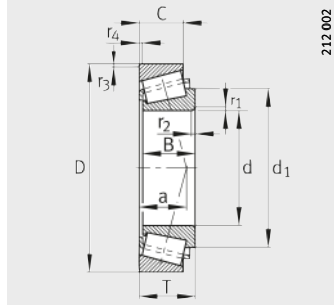


						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D <sub>a</sub>	D <sub>b</sub>	C <sub>a</sub>	C <sub>b</sub>	r <sub>a</sub>	r <sub>b</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	min.	min.	min.	max.	max.	N	N				N	min <sup>-1</sup>	min <sup>-1</sup>
94	96	4	4	1	1	71 000	116 000	0,32	1,9	1,05	14 000	6 300	3 800
103	105	5	6	1,5	1,5	104 000	159 000	0,43	1,38	0,76	20 100	5 600	3 800
103	105	5	5,5	1,5	1,5	136 000	223 000	0,28	2,11	1,16	28 500	5 600	3 900
111	115	6	8	2	1,5	174 000	260 000	0,38	1,58	0,87	33 000	5 300	3 500
116	118	4	5	2	1,5	130 000	160 000	0,42	1,43	0,79	19 000	5 300	3 700
116	119	4	6	2	1,5	163 000	214 000	0,42	1,43	0,79	26 500	5 300	3 400
116	120	7	9	2	1,5	210 000	300 000	0,41	1,47	0,81	38 000	5 300	3 500
126	133	6	12	3	3	208 000	237 000	0,87	0,69	0,38	34 000	4 750	4 100
138	141	5	13	3	2,5	187 000	219 000	0,83	0,73	0,4	26 000	4 750	3 400
138	140	5	8	3	2,5	223 000	260 000	0,35	1,74	0,96	30 500	4 750	3 750
138	143	7	12	3	2,5	285 000	395 000	0,55	1,1	0,6	48 500	4 750	3 550
138	140	6	12	3	2,5	310 000	405 000	0,35	1,74	0,96	49 500	4 750	3 500
99	101	4	4	1	1	74 000	124 000	0,33	1,8	0,99	15 000	6 000	3 550
108	110	5	6	1,5	1,5	105 000	165 000	0,46	1,31	0,72	20 900	5 600	3 600
108	110	6	5,5	1,5	1,5	139 000	232 000	0,3	2,01	1,11	30 000	5 600	3 700
116	120	6	8	2	1,5	178 000	275 000	0,4	1,51	0,83	34 500	5 300	3 300
115	124	4	5	2	1,5	135 000	169 000	0,44	1,38	0,76	20 200	5 300	3 600
121	124	4	6	2	1,5	170 000	227 000	0,44	1,38	0,76	28 000	5 000	3 200
121	125	7	10	2	1,5	206 000	310 000	0,43	1,4	0,77	39 000	5 000	3 350
136	143	6	13	3	3	238 000	275 000	0,87	0,69	0,38	38 500	4 750	3 850
148	151	6	14	3	2,5	203 000	236 000	0,83	0,73	0,4	27 500	4 500	3 250
148	149	5	9	3	2,5	250 000	295 000	0,35	1,74	0,96	34 500	4 500	3 600
148	151	7	14	3	2,5	330 000	470 000	0,55	1,1	0,6	57 000	4 500	3 350
148	149	7	13	3	2,5	360 000	475 000	0,35	1,74	0,96	57 000	4 500	3 300
117	120	6	7	1,5	1,5	137 000	211 000	0,42	1,42	0,78	26 000	5 000	3 500
117	119	6	6,5	1,5	1,5	175 000	290 000	0,28	2,16	1,19	37 000	5 000	3 600
121	126	6	8	2	1,5	188 000	300 000	0,42	1,44	0,79	37 000	5 000	3 100
130	132	4	6	2,5	2	154 000	190 000	0,42	1,43	0,79	21 900	5 000	3 350
130	134	5	7	2,5	2	197 000	260 000	0,42	1,43	0,79	31 000	5 000	3 050
130	135	7	11	2,5	2	250 000	380 000	0,43	1,41	0,78	47 000	4 750	3 200
146	152	7	14	3	3	270 000	315 000	0,87	0,69	0,38	44 000	4 500	3 700
158	159	6	15,5	3	2,5	227 000	270 000	0,83	0,73	0,4	30 500	4 500	3 100
158	159	5	9,5	3	2,5	285 000	345 000	0,35	1,74	0,96	39 500	4 500	3 300
158	160	7	13,5	3	2,5	355 000	510 000	0,55	1,1	0,6	61 000	4 200	3 250
158	159	7	13,5	3	2,5	400 000	530 000	0,35	1,74	0,96	63 000	4 500	3 200



# Tapered roller bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

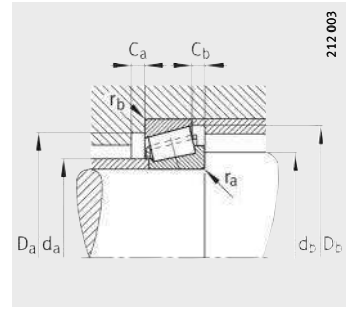
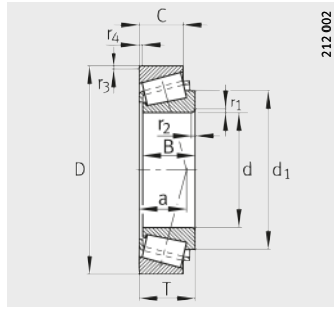
Designation	Interchange designation to ISO 355	X-life	Mass m ≈ kg	Dimensions								Mounting dimensions			
				d	D	B	C	T	r <sub>1</sub> , r <sub>2</sub> min.	r <sub>3</sub> , r <sub>4</sub> min.	a ≈	d <sub>1</sub> ≈	d <sub>a</sub> max.	d <sub>b</sub> min.	D <sub>a</sub> min.
<b>32017-X</b>	T4CC085	–	1,36	<b>85</b>	130	29	22	29	1,5	1,5	29	109,5	94	92	117
<b>33017</b>	T2CE085	–	1,75	<b>85</b>	130	36	29,5	36	1,5	1,5	26	108,5	94	92	118
<b>33117</b>	T3DE085	–	2,38	<b>85</b>	140	41	32	41	2,5	2	33	114,2	95	95	122
<b>30217-A</b>	T3EB085	–	2,29	<b>85</b>	150	28	24	30,5	2,5	2	30	114,4	97	95	132
<b>32217-A</b>	T3EC085	–	2,72	<b>85</b>	150	36	30	38,5	2,5	2	34	114,6	96	95	130
<b>33217</b>	T3EE085	–	3,58	<b>85</b>	150	49	37	49	2,5	2	37	117,8	95	95	128
<b>T7FC085</b>	–	<b>XL</b>	4,92	<b>85</b>	170	45	33	48	4	4	55	131,1	100	110	131
<b>31317</b>	T7GB085	–	4,88	<b>85</b>	180	41	28	44,5	4	3	55	129,3	103	99	143
<b>30317-A</b>	T2GB085	–	4,83	<b>85</b>	180	41	34	44,5	3	3	36	127,6	107	99	156
<b>32317-B</b>	T5GD085	–	7,86	<b>85</b>	180	60	49	63,5	4	3	51	133,9	102	99	138
<b>32317-A</b>	T2GD085	–	7,5	<b>85</b>	180	60	49	63,5	4	3	44	128	103	99	150
<b>32018-XA</b>	T3CC090	–	1,76	<b>90</b>	140	32	24	32	2	1,5	30	115,3	100	99	125
<b>33018</b>	T2CE090	–	2,48	<b>90</b>	140	39	32,5	39	2	1,5	28	116	100	99	127
<b>33118</b>	T3DE090	–	3,19	<b>90</b>	150	45	35	45	2,5	2	36	121,5	100	100	130
<b>30218-A</b>	T3FB090	–	2,64	<b>90</b>	160	30	26	32,5	2,5	2	32	121,3	103	100	140
<b>32218-A</b>	T3FC090	–	3,78	<b>90</b>	160	40	34	42,5	2,5	2	36	122	102	100	138
<b>31318</b>	T7GB090	–	5,5	<b>90</b>	190	43	30	46,5	4	3	58	135,9	109	104	151
<b>30318-A</b>	T2GB090	–	5,83	<b>90</b>	190	43	36	46,5	4	3	37	135	113	104	165
<b>32318-A</b>	T2GD090	–	8,51	<b>90</b>	190	64	53	67,5	4	3	47	137,4	108	104	157
<b>32919</b>	T2BC095	–	0,825	<b>95</b>	130	23	18	23	1,5	1,5	23	113	102	102	121
<b>32019-XA</b>	T4CC095	–	1,86	<b>95</b>	145	32	24	32	2	1,5	32	121	105	104	130
<b>33019</b>	T2CE095	–	2,33	<b>95</b>	145	39	32,5	39	2	1,5	29	120,2	104	104	131
<b>30219-A</b>	T3FB095	–	3,13	<b>95</b>	170	32	27	34,5	3	2,5	34	128	110	107	149
<b>32219-A</b>	T3FC095	–	4,24	<b>95</b>	170	43	37	45,5	3	2,5	39	129,6	108	107	145
<b>T7FC095</b>	–	<b>XL</b>	5,23	<b>95</b>	180	45	33	49	4	4	61	141,5	108	119	138
<b>31319-A</b>	T7GB095	–	7,08	<b>95</b>	200	45	32	49,5	4	3	61	142,5	114	109	157
<b>30319-A</b>	T2GB095	–	6,77	<b>95</b>	200	45	38	49,5	4	3	40	139	118	109	172
<b>32319-A</b>	T2GD095	–	10,3	<b>95</b>	200	67	55	71,5	4	3	49	141	115	109	166

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D <sub>a</sub>	D <sub>b</sub>	C <sub>a</sub>	C <sub>b</sub>	r <sub>a</sub>	r <sub>b</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	min.	min.	min.	max.	max.	N	N				N	min <sup>-1</sup>	min <sup>-1</sup>
122	125	6	7	1,5	1,5	141 000	224 000	0,44	1,36	0,75	28 000	5 000	3 300
122	125	6	6,5	1,5	1,5	184 000	315 000	0,29	2,06	1,13	39 500	5 000	3 350
130	135	7	9	2,5	2	221 000	350 000	0,41	1,48	0,81	43 000	4 750	3 000
140	141	5	6,5	2,5	2	178 000	224 000	0,42	1,43	0,79	25 500	4 750	3 200
140	142	5	8,5	2,5	2	226 000	305 000	0,42	1,43	0,79	36 000	4 750	2 900
140	144	7	12	2,5	2	295 000	435 000	0,42	1,43	0,79	53 000	4 500	3 050
153	161	7	15	4	4	310 000	365 000	0,8	0,75	0,41	50 000	4 200	3 500
166	169	6	16,5	4	3	255 000	300 000	0,83	0,73	0,4	34 000	4 200	2 950
166	167	6	10,5	3	3	310 000	375 000	0,35	1,74	0,96	42 000	4 200	3 150
166	169	7	14,5	4	3	405 000	590 000	0,55	1,1	0,6	69 000	4 200	2 950
166	167	8	14,5	4	3	435 000	580 000	0,35	1,74	0,96	67 000	4 200	2 950
131	134	6	8	2	1,5	164 000	255 000	0,42	1,42	0,78	30 500	4 750	3 200
131	135	7	6,5	2	1,5	216 000	365 000	0,27	2,23	1,23	45 000	4 750	3 150
140	144	7	10	2,5	2	265 000	420 000	0,4	1,51	0,83	51 000	4 500	2 850
150	150	5	6,5	2,5	2	201 000	255 000	0,42	1,43	0,79	29 000	4 500	3 050
150	152	5	8,5	2,5	2	260 000	355 000	0,42	1,43	0,79	42 000	4 500	2 800
176	179	6	16,5	4	3	275 000	325 000	0,83	0,73	0,4	35 500	3 900	2 850
176	176	6	10,5	4	3	330 000	395 000	0,35	1,74	0,96	43 500	3 900	3 100
176	177	8	14,5	4	3	485 000	660 000	0,35	1,74	0,96	75 000	3 900	2 750
123	125	5	5	1,5	1,5	102 000	181 000	0,36	1,68	0,92	22 000	4 750	2 900
136	140	6	8	2	1,5	170 000	275 000	0,44	1,36	0,75	32 500	4 500	3 000
136	139	7	6,5	2	1,5	221 000	380 000	0,28	2,16	1,19	46 500	4 500	3 050
158	159	5	7,5	3	2,5	222 000	285 000	0,42	1,43	0,79	31 500	4 200	2 900
158	161	5	8,5	3	2,5	300 000	415 000	0,42	1,43	0,79	48 500	4 200	2 750
164	172	7	16	4	4	325 000	400 000	0,87	0,69	0,38	54 000	3 900	3 250
186	187	6	17,5	4	3	305 000	370 000	0,83	0,73	0,4	39 500	3 650	2 750
186	184	6	11,5	4	3	360 000	440 000	0,35	1,74	0,96	47 500	3 650	3 000
186	186	8	16,5	4	3	530 000	710 000	0,35	1,74	0,96	80 000	3 650	2 600



# Tapered roller bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

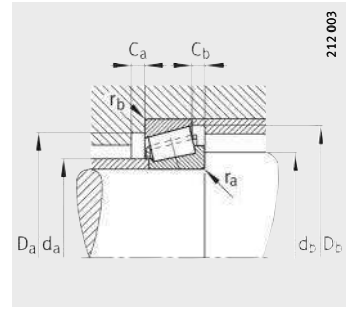
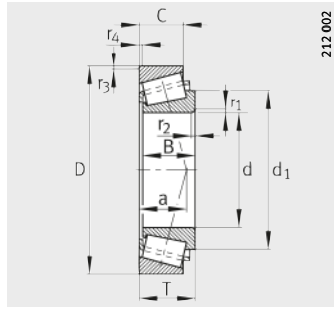
Designation	Interchange designation to ISO 355	Mass m ≈kg	Dimensions									Mounting dimensions		
			d	D	B	C	T	r <sub>1</sub> , r <sub>2</sub> min.	r <sub>3</sub> , r <sub>4</sub> min.	a ≈	d <sub>1</sub> ≈	d <sub>a</sub> max.	d <sub>b</sub> min.	D <sub>a</sub> min.
<b>32020-X</b>	T4CC100	1,94	<b>100</b>	150	32	24	32	2	1,5	33	126,6	109	109	134
<b>33020</b>	T2CE100	2,42	<b>100</b>	150	39	32,5	39	2	1,5	29	124,7	108	109	135
<b>T2EE100</b>	–	4,25	<b>100</b>	165	46	39	47	3	3	36	131,3	112	116	145
<b>30220-A</b>	T3FB100	3,75	<b>100</b>	180	34	29	37	3	2,5	36	135	116	112	157
<b>32220-A</b>	T3FC100	5,15	<b>100</b>	180	46	39	49	3	2,5	42	138,5	114	112	154
<b>33220</b>	T3FE100	6,77	<b>100</b>	180	63	48	63	3	2,5	46	140	112	112	151
<b>30320-A</b>	T2GB100	8,3	<b>100</b>	215	47	39	51,5	4	3	42	151	127	114	184
<b>31320-X</b>	T7GB100	8,81	<b>100</b>	215	51	35	56,5	4	3	68	159,5	121	114	168
<b>32320-A</b>	T2GD100	12,9	<b>100</b>	215	73	60	77,5	4	3	53	152	123	114	177
<b>32921</b>	T2CC105	1,15	<b>105</b>	145	25	20	25	1,5	1,5	25	125	114	112	135
<b>32021-X</b>	T4DC105	2,33	<b>105</b>	160	35	26	35	2,5	2	35	133	116	115	143
<b>33021</b>	T2DE105	3,34	<b>105</b>	160	43	34	43	2,5	2	31	131,5	116	115	145
<b>32221-A</b>	T3FC105	6,07	<b>105</b>	190	50	43	53	3	2,5	44	144,6	120	117	161
<b>32321-A</b>	T2GD105	15,1	<b>105</b>	225	77	63	81,5	4	3	56	160,9	128	119	185
<b>32922</b>	T2CC110	1,26	<b>110</b>	150	25	20	25	1,5	1,5	26	130,9	118	117	140
<b>32022-X</b>	T4DC110	3,35	<b>110</b>	170	38	29	38	2,5	2	37	141	122	120	152
<b>33022</b>	T2DE110	4,16	<b>110</b>	170	47	37	47	2,5	2	33	139,2	123	120	152
<b>33122</b>	T2EE110	5,54	<b>110</b>	180	56	43	56	2,5	2	44	147,5	121	120	155
<b>30222-A</b>	T3FB110	5,23	<b>110</b>	200	38	32	41	3	2,5	39	148,7	129	122	174
<b>32222-A</b>	T3FC110	7,35	<b>110</b>	200	53	46	56	3	2,5	46	153,5	126	122	170
<b>30322-A</b>	T2GB110	11	<b>110</b>	240	50	42	54,5	4	3	45	169,2	141	124	206
<b>31322-X</b>	T7GB110	12,3	<b>110</b>	240	57	38	63	4	3	75	178	135	124	188
<b>32322-A</b>	T2GD110	19	<b>110</b>	240	80	65	84,5	4	3	58	171,5	137	124	198
<b>32924</b>	T2CC120	1,82	<b>120</b>	165	29	23	29	1,5	1,5	29	141	128	127	154
<b>T4CB120</b>	–	1,97	<b>120</b>	170	25	19,5	27	3	3	35	144,7	130	132	157
<b>32024-X</b>	T4DC120	3,29	<b>120</b>	180	38	29	38	2,5	2	40	151	131	130	161
<b>33024</b>	T2DE120	4,55	<b>120</b>	180	48	38	48	2,5	2	36	148,5	132	130	160
<b>30224-A</b>	T4FB120	6,25	<b>120</b>	215	40	34	43,5	3	2,5	44	163	140	132	187
<b>32224-A</b>	T4FD120	9,28	<b>120</b>	215	58	50	61,5	3	2,5	51	165,2	136	132	181
<b>30324-A</b>	T2GB120	14,3	<b>120</b>	260	55	46	59,5	4	3	48	183,5	152	134	221
<b>31324-X</b>	T7GB120	15,4	<b>120</b>	260	62	42	68	4	3	82	192	145	134	203
<b>32324</b>	–	21,1	<b>120</b>	260	86	69	90,5	4	3	66	187	148	134	213

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D <sub>a</sub>	D <sub>b</sub>	C <sub>a</sub>	C <sub>b</sub>	r <sub>a</sub>	r <sub>b</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	min.	min.	min.	max.	max.	N	N				N	min <sup>-1</sup>	min <sup>-1</sup>
141	144	6	8	2	1,5	173 000	285 000	0,46	1,31	0,72	33 500	4 500	2 900
141	143	7	6,5	2	1,5	225 000	395 000	0,29	2,09	1,15	47 500	4 500	2 900
151	157	8	8	3	3	300 000	470 000	0,32	1,88	1,04	56 000	4 200	2 600
168	168	5	8	3	2,5	250 000	325 000	0,42	1,43	0,79	35 500	4 200	2 800
168	171	5	10	3	2,5	335 000	475 000	0,42	1,43	0,79	54 000	3 900	2 600
168	172	10	15	3	2,5	430 000	660 000	0,4	1,48	0,82	77 000	3 900	2 650
201	197	6	12,5	4	3	410 000	500 000	0,35	1,74	0,96	54 000	3 350	2 750
201	202	7	21,5	4	3	385 000	480 000	0,83	0,73	0,4	51 000	3 100	2 550
201	200	8	17,5	4	3	610 000	840 000	0,35	1,74	0,96	94 000	3 350	2 370
136	140	5	5	1,5	1,5	128 000	217 000	0,34	1,75	0,96	25 500	4 500	2 650
150	154	6	9	2,5	2	202 000	330 000	0,44	1,35	0,74	38 000	4 200	2 800
150	153	7	9	2,5	2	265 000	450 000	0,28	2,12	1,17	53 000	4 200	2 850
178	180	5	10	3	2,5	385 000	550 000	0,42	1,43	0,79	63 000	3 650	2 490
211	209	9	18,5	4	3	670 000	930 000	0,35	1,74	0,96	102 000	3 100	2 220
141	145	5	5	1,5	1,5	133 000	231 000	0,36	1,69	0,93	27 000	4 500	2 500
160	163	7	9	2,5	2	242 000	395 000	0,43	1,39	0,77	45 000	3 900	2 650
160	161	7	10	2,5	2	295 000	520 000	0,29	2,09	1,15	61 000	4 200	2 750
170	174	9	13	2,5	2	370 000	630 000	0,42	1,43	0,79	73 000	3 650	2 470
188	187	6	9	3	2,5	315 000	415 000	0,42	1,43	0,79	45 500	3 650	2 550
188	190	6	10	3	2,5	410 000	590 000	0,42	1,43	0,79	66 000	3 350	2 380
226	220	8	12,5	4	3	480 000	590 000	0,35	1,74	0,96	71 000	2 800	2 410
226	224	7	25	4	3	465 000	590 000	0,83	0,73	0,4	70 000	2 800	2 240
226	222	9	19,5	4	3	740 000	1 020 000	0,35	1,74	0,96	126 000	2 800	2 050
158	160	6	6	1,5	1,5	176 000	305 000	0,35	1,72	0,95	34 500	3 900	2 370
157	164	5	7,5	3	3	153 000	238 000	0,47	1,27	0,7	26 000	3 900	2 420
170	173	7	9	2,5	2	250 000	420 000	0,46	1,31	0,72	47 500	3 650	2 460
170	171	6	10	2,5	2	310 000	560 000	0,31	1,97	1,08	65 000	3 650	2 600
203	201	6	9,5	3	2,5	330 000	445 000	0,44	1,38	0,76	48 000	3 100	2 460
203	204	7	11,5	3	2,5	485 000	730 000	0,44	1,38	0,76	81 000	3 100	2 120
246	237	10	13,5	4	3	560 000	700 000	0,35	1,74	0,96	83 000	2 650	2 160
246	244	9	26	4	3	540 000	700 000	0,83	0,73	0,4	82 000	2 500	2 010
246	239	9	21,5	4	3	670 000	970 000	0,39	1,53	0,84	118 000	2 650	2 020



# Tapered roller bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

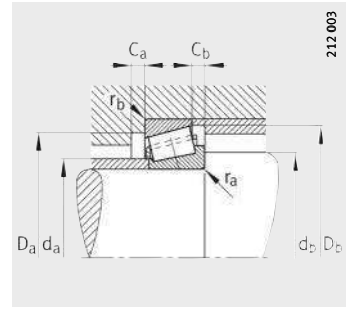
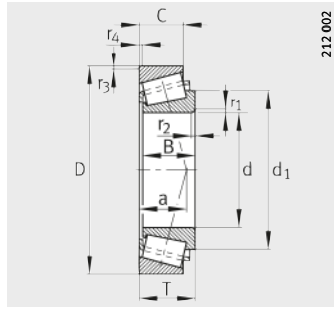
Designation	Interchange designation to ISO 355	Mass m ≈kg	Dimensions								Mounting dimensions			
			d	D	B	C	T	r <sub>1</sub> , r <sub>2</sub> min.	r <sub>3</sub> , r <sub>4</sub> min.	a ≈	d <sub>1</sub> ≈	d <sub>a</sub> max.	d <sub>b</sub> min.	D <sub>a</sub> min.
<b>32926</b>	T2CC130	2,4	<b>130</b>	180	32	25	32	2	1,5	32	154,7	141	139	167
<b>T4CB130</b>	–	2,53	<b>130</b>	185	27	21	29	3	3	38	156,3	140	143	171
<b>32026-X</b>	T4EC130	5,02	<b>130</b>	200	45	34	45	2,5	2	44	166,2	144	140	178
<b>30226-A</b>	T4FB130	7,08	<b>130</b>	230	40	34	43,75	4	3	46	177,1	152	144	203
<b>32226-A</b>	T4FD130	11,7	<b>130</b>	230	64	54	67,75	4	3	56	178	146	144	193
<b>30326</b>	–	17,2	<b>130</b>	280	58	49	63,75	5	4	53	194	164	148	239
<b>31326-X</b>	T7GB130	19,1	<b>130</b>	280	66	44	72	5	4	87	206	157	148	218
<b>32326</b>	–	26,7	<b>130</b>	280	93	78	98,75	5	4	68	197,3	160	147	230
<b>32928</b>	T2CC140	2,6	<b>140</b>	190	32	25	32	2	1,5	34	164,8	150	149	177
<b>32028-X</b>	T4DC140	5,39	<b>140</b>	210	45	34	45	2,5	2	46	175,8	153	150	187
<b>30228-A</b>	T4FB140	8,81	<b>140</b>	250	42	36	45,75	4	3	48	187	163	154	219
<b>32228-A</b>	T4FD140	14	<b>140</b>	250	68	58	71,75	4	3	60	193,5	159	154	210
<b>31328-X</b>	T7GB140	23,1	<b>140</b>	300	70	47	77	5	4	94	223	169	158	235
<b>32328-A</b>	–	37,8	<b>140</b>	300	102	85	107,75	5	4	74	215	170	157	247
<b>32030-X</b>	T4EC150	6,47	<b>150</b>	225	48	36	48	3	2,5	50	188	164	162	200
<b>33030</b>	T2EE150	8,23	<b>150</b>	225	59	46	59	3	2,5	48	190	164	162	200
<b>30230-A</b>	T4GB150	11,1	<b>150</b>	270	45	38	49	4	3	52	201	175	164	234
<b>32230-A</b>	T4GD150	18,5	<b>150</b>	270	73	60	77	4	3	64	206,7	171	164	226
<b>31330-X</b>	T7GB150	28	<b>150</b>	320	75	50	82	5	4	100	237	181	168	251
<b>32330-A</b>	–	46,1	<b>150</b>	320	108	90	114	5	4	79	230	184	167	264
<b>32932</b>	T2DC160	4,13	<b>160</b>	220	38	30	38	2,5	2	38	188	173	170	204
<b>32032-X</b>	T4EC160	7,81	<b>160</b>	240	51	38	51	3	2,5	53	201	175	172	213
<b>30232</b>	–	13,8	<b>160</b>	290	48	40	52	4	3	51	216,5	189	174	252
<b>32232-A</b>	T4GD160	23,4	<b>160</b>	290	80	67	84	4	3	69	223	183	174	242
<b>30332-A</b>	T2GB160	29,9	<b>160</b>	340	68	58	75	5	4	63	237	201	178	290

						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D <sub>a</sub>	D <sub>b</sub>	C <sub>a</sub>	C <sub>b</sub>	r <sub>a</sub>	r <sub>b</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	min.	min.	min.	max.	max.	N	N				N	min <sup>-1</sup>	min <sup>-1</sup>
171	173	6	7	2	1,5	208 000	370 000	0,34	1,77	0,97	41 500	3 650	2 220
171	178	6	8	3	3	179 000	275 000	0,47	1,27	0,7	29 500	3 350	2 270
190	192	8	11	2,5	2	325 000	550 000	0,43	1,38	0,76	61 000	3 100	2 330
216	217	7	9,5	4	3	355 000	470 000	0,44	1,38	0,76	49 000	2 800	2 300
216	219	7	13,5	4	3	560 000	850 000	0,44	1,38	0,76	93 000	2 800	1 950
262	255	8	14,5	5	4	600 000	740 000	0,35	1,73	0,95	86 000	2 500	2 030
262	261	9	28	5	4	610 000	790 000	0,83	0,73	0,4	92 000	2 380	1 830
262	260	10	20,5	5	4	830 000	1 120 000	0,34	1,75	0,96	133 000	2 500	1 850
181	184	6	7	2	1,5	214 000	395 000	0,36	1,67	0,92	43 000	3 350	2 070
200	202	8	11	2,5	2	340 000	590 000	0,46	1,31	0,72	65 000	2 800	2 170
236	234	9	9,5	4	3	415 000	560 000	0,44	1,38	0,76	66 000	2 650	2 030
236	238	8	13,5	4	3	640 000	990 000	0,44	1,38	0,76	120 000	2 500	1 740
282	280	9	30	5	4	700 000	910 000	0,83	0,73	0,4	102 000	2 380	1 670
282	280	10	22,5	5	4	1 170 000	1 710 000	0,35	1,74	0,96	198 000	2 380	1 460
213	216	8	12	3	2,5	385 000	680 000	0,46	1,31	0,72	73 000	2 650	1 980
213	217	8	13	3	2,5	465 000	880 000	0,36	1,65	0,9	96 000	2 650	1 930
256	250	9	11	4	3	465 000	630 000	0,44	1,38	0,76	74 000	2 500	1 870
256	254	8	17	4	3	740 000	1 150 000	0,44	1,38	0,76	137 000	2 500	1 570
302	300	9	32	5	4	790 000	1 040 000	0,83	0,73	0,4	115 000	2 240	1 530
302	299	12	24	5	4	1 330 000	1 950 000	0,35	1,74	0,96	221 000	2 240	1 320
210	212	7	8	2,5	2	295 000	530 000	0,35	1,73	0,95	56 000	2 650	1 890
228	231	8	13	3	2,5	420 000	740 000	0,46	1,31	0,72	90 000	2 500	1 850
276	269	9	12	4	3	405 000	570 000	0,37	1,61	0,89	65 000	2 380	1 870
276	274	10	17	4	3	870 000	1 380 000	0,44	1,38	0,76	162 000	2 380	1 410
322	310	9	17	5	4	890 000	1 140 000	0,35	1,74	0,96	123 000	2 240	1 510



# Tapered roller bearings

Single row



Mounting dimensions

Dimension table (continued) · Dimensions in mm

Designation	Interchange designation to ISO 355	Mass m ≈kg	Dimensions									Mounting dimensions		
			d	D	B	C	T	r <sub>1</sub> , r <sub>2</sub> min.	r <sub>3</sub> , r <sub>4</sub> min.	a ≈	d <sub>1</sub> ≈	d <sub>a</sub> max.	d <sub>b</sub> min.	D <sub>a</sub> min.
<b>32934</b>	T3DC170	4,42	<b>170</b>	230	38	30	38	2,5	2	42	199	183	180	213
<b>32034-X</b>	T4EC170	11,4	<b>170</b>	260	57	43	57	3	2,5	57	216	187	182	230
<b>30234-A</b>	T4GB170	19,2	<b>170</b>	310	52	43	57	5	4	60	233	203	188	269
<b>32234-A</b>	T4GD170	28,6	<b>170</b>	310	86	71	91	5	4	74	238	196	188	259
<b>32936</b>	T4DC180	7,08	<b>180</b>	250	45	34	45	2,5	2	54	217	193	190	225
<b>32036-X</b>	T3FD180	14,2	<b>180</b>	280	64	48	64	3	2,5	60	230	199	192	247
<b>30236-A</b>	T4GB180	17,9	<b>180</b>	320	52	43	57	5	4	62	242	211	198	278
<b>32236-A</b>	T4GD180	32,5	<b>180</b>	320	86	71	91	5	4	77	249,5	204	198	267
<b>32938</b>	T4DC190	7,55	<b>190</b>	260	45	34	45	2,5	2	55	226	204	200	235
<b>32038-X</b>	T4FD190	14,8	<b>190</b>	290	64	48	64	3	2,5	63	241	209	202	257
<b>32238-A</b>	T4GD190	39,1	<b>190</b>	340	92	75	97	5	4	81	263	216	207	286
<b>32940-A</b>	T3EC200	8,97	<b>200</b>	280	51	39	51	3	2,5	54	239	216	212	257
<b>32040-X</b>	T4FD200	19	<b>200</b>	310	70	53	70	3	2,5	67	256	221	212	273
<b>30240-A</b>	T4GB200	25,5	<b>200</b>	360	58	48	64	5	4	69	272	237	217	315
<b>32240-A</b>	T3GD200	43	<b>200</b>	360	98	82	104	5	4	83	274,5	226	217	302
<b>32944</b>	T3EC220	10,3	<b>220</b>	300	51	39	51	3	2,5	59	260	234	232	275
<b>32044-X</b>	T4FD220	24,3	<b>220</b>	340	76	57	76	4	3	73	280	243	234	300
<b>32244-A</b>	–	59,5	<b>220</b>	400	108	90	114	5	4	95	310,5	258	237	336
<b>32948</b>	T4EC240	11	<b>240</b>	320	51	39	51	3	2,5	65	281	254	252	294
<b>32048-X</b>	T4FD240	28,2	<b>240</b>	360	76	57	76	4	3	79	300	261	254	318
<b>32248-A</b>	–	80,5	<b>240</b>	440	120	100	127	5	4	105	332	286	257	372
<b>32952</b>	T3EC260	18,6	<b>260</b>	360	63,5	48	63,5	3	2,5	70	309	279	272	328
<b>32052-X</b>	T4FC260	41,1	<b>260</b>	400	87	65	87	5	4	86	331,5	287	278	352
<b>32956</b>	T4EC280	19,9	<b>280</b>	380	63,5	48	63,5	3	2,5	75	330	298	292	348
<b>32056-X</b>	T4FC280	40,5	<b>280</b>	420	87	65	87	5	4	91	349	305	298	370
<b>32960</b>	T3FD300	31,2	<b>300</b>	420	76	57	76	4	3	80	362	324	314	383
<b>32064-X</b>	T4GD320	60,5	<b>320</b>	480	100	74	100	5	4	104	397,5	350	338	424
<b>32264</b>	–	170	<b>320</b>	580	150	125	159	6	5	136	439	372	340	486
<b>32968</b>	T4FD340	35,5	<b>340</b>	460	76	57	76	4	3	91	404	361	354	421
<b>32972</b>	T4FD360	37,1	<b>360</b>	480	76	57	76	4	3	97	423	380	374	439

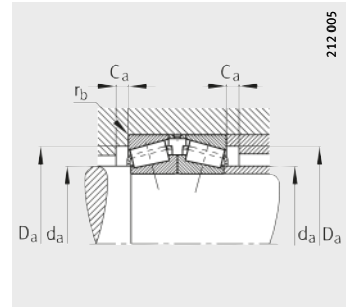
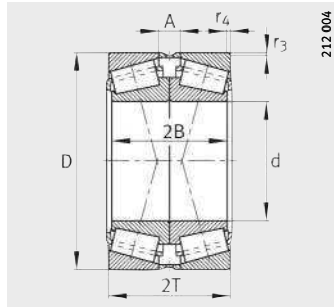


						Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed	Reference speed
D <sub>a</sub>	D <sub>b</sub>	C <sub>a</sub>	C <sub>b</sub>	r <sub>a</sub>	r <sub>b</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	min.	min.	min.	max.	max.	N	N				N	min <sup>-1</sup>	min <sup>-1</sup>
220	222	7	8	2,5	2	295 000	560 000	0,38	1,57	0,86	59 000	2 650	1 780
248	249	10	14	3	2,5	500 000	880 000	0,44	1,35	0,74	106 000	2 380	1 690
292	288	8	14	5	4	590 000	810 000	0,44	1,38	0,76	89 000	2 240	1 590
292	294	10	20	5	4	980 000	1 560 000	0,44	1,38	0,76	179 000	2 240	1 310
240	241	8	11	2,5	2	360 000	710 000	0,48	1,25	0,69	84 000	2 380	1 660
268	267	10	16	3	2,5	620 000	1 090 000	0,42	1,42	0,78	128 000	2 240	1 520
302	297	9	14	5	4	610 000	850 000	0,45	1,33	0,73	93 000	2 240	1 500
302	303	10	20	5	4	1 010 000	1 640 000	0,45	1,33	0,73	187 000	2 100	1 230
249	251	8	11	2,5	2	370 000	750 000	0,48	1,26	0,69	89 000	2 380	1 550
278	279	10	16	3	2,5	630 000	1 120 000	0,44	1,36	0,75	130 000	2 240	1 450
322	323	10	22	5	4	1 140 000	1 820 000	0,44	1,38	0,76	203 000	1 960	1 150
268	271	9	12	3	2,5	495 000	930 000	0,39	1,52	0,84	107 000	2 240	1 410
298	297	11	17	3	2,5	760 000	1 370 000	0,43	1,39	0,77	154 000	2 100	1 290
342	336	9	16	5	4	760 000	1 060 000	0,44	1,38	0,76	113 000	1 960	1 300
342	340	11	22	5	4	1 320 000	2 080 000	0,41	1,48	0,81	225 000	1 960	1 060
288	290	9	12	3	2,5	495 000	980 000	0,43	1,41	0,78	110 000	2 100	1 280
326	326	12	19	4	3	890 000	1 630 000	0,43	1,39	0,77	179 000	1 820	1 130
382	380	12	24	5	4	1 540 000	2 550 000	0,44	1,38	0,76	270 000	1 540	910
308	311	9	12	3	2,5	510 000	1 050 000	0,46	1,31	0,72	116 000	1 960	1 160
346	346	12	19	4	3	900 000	1 680 000	0,46	1,31	0,72	181 000	1 680	1 060
422	415	14	27	5	4	1 850 000	3 100 000	0,44	1,38	0,76	320 000	1 400	800
348	347	11	15,5	3	2,5	750 000	1 500 000	0,41	1,48	0,81	161 000	1 680	990
382	383	14	22	5	4	1 150 000	2 140 000	0,43	1,38	0,76	225 000	1 540	920
368	368	11	15,5	3	2,5	740 000	1 520 000	0,43	1,39	0,76	162 000	1 540	940
402	402	14	22	5	4	1 200 000	2 300 000	0,46	1,31	0,72	238 000	1 400	840
406	405	12	19	4	3	990 000	2 030 000	0,39	1,52	0,84	208 000	1 330	820
462	461	15	26	5	4	1 560 000	3 050 000	0,46	1,31	0,72	305 000	1 190	690
560	555	16	34	6	6	3 000 000	5 200 000	0,44	1,38	0,76	490 000	1 050	530
446	446	12	19	4	3	1 080 000	2 370 000	0,44	1,37	0,75	236 000	1 190	690
466	466	14	19	4	3	1 060 000	2 370 000	0,46	1,31	0,72	233 000	1 120	660



# Tapered roller bearings

Matched pairs



Mounting dimensions

Dimension table - Dimensions in mm

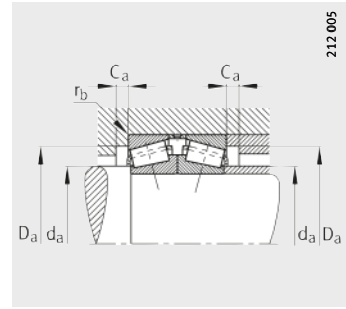
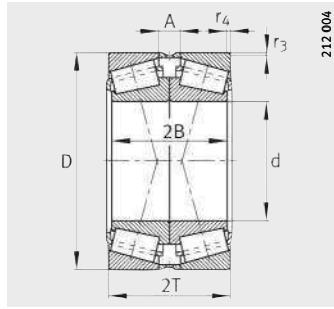
Designation	Mass for bearing pair m ≈kg	Dimensions						Mounting dimensions	
		d	D	2B	2T	r <sub>3</sub> , r <sub>4</sub> min.	A	d <sub>a</sub> max.	D <sub>a</sub> min.
31306-A-N11CA-A50-90	0,85	30	72	38	41,5	1,5	13,5	40	55
31307-A-N11CA-A40-70	1,13	35	80	42	45,5	1,5	15,5	44	62
31308-A-N11CA-A50-90	1,52	40	90	46	50,5	1,5	16,5	51	71
31309-A-N11CA-A60-100	2,1	45	100	50	54,5	1,5	18,5	56	79
31310-A-N11CA-A60-100	2,9	50	110	54	58,5	2	20,5	62	87
31311-A-N11CA-A80-120	3,4	55	120	58	63	2	21	68	94
31312-A-N11CA-A80-120	4,2	60	130	62	67	2,5	23	73	103
31313-A-N11CA-A80-120	5,05	65	140	66	72	2,5	26	79	111
31314-A-N11CA-A100-140	6,2	70	150	70	76	2,5	26	84	118
31315-N11CA-A100-140	7,2	75	160	74	80	2,5	28	91	127
32016-X-N11CA-A150-200	2,58	80	125	58	58	2	14	89	112
31316-N11CA-A100-140	8,9	80	170	78	85	2,5	31	97	134
31317-N11CA-A120-160	10,4	85	180	82	89	3	33	103	143
31318-N11CA-A120-160	11,8	90	190	86	93	3	33	109	151
31318-N11CA-A160-200	11,8	90	190	86	93	3	33	109	151
31319-A-N11CA-A120-160	14	95	200	90	99	3	35	114	157
32020-X-N11CA-A200-230	4	100	150	64	64	1,5	16	109	134
31320-X-N11CA-A120-160	19	100	215	102	113	3	43	121	168
32222-A-N11CA-A250-280	14,9	110	200	106	112	2,5	20	126	170
31322-X-N11CA-A140-180	26,2	110	240	114	126	3	50	135	188
32224-A-N11CA-A230-280	19,1	120	215	116	123	2,5	23	136	181
31324-X-N11CA-A140-180	33,7	120	260	124	136	3	52	145	203
32026-X-N11CA-A200-250	10,3	130	200	90	90	2	22	144	178
31326-X-N11CA-A160-200	40,9	130	280	132	144	4	56	157	218

			Basic load ratings for bearing pair		Calculation factors				Fatigue limit load	Limiting speed Bearing pair	Reference speed Bearing pair
D <sub>a</sub>	C <sub>a</sub>	r <sub>b</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	min.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
65	3	1,5	77 000	93 000	0,83	0,82	1,22	0,8	10 600	9 800	5 200
71	4	1,5	103 000	128 000	0,83	0,82	1,22	0,8	14 900	8 800	4 600
81	4	1,5	130 000	165 000	0,83	0,82	1,22	0,8	18 900	7 400	4 150
91	4	1,5	165 000	217 000	0,83	0,82	1,22	0,8	25 500	6 700	3 750
100	4	2	189 000	250 000	0,83	0,82	1,22	0,8	29 500	6 300	3 450
110	4	2	210 000	275 000	0,83	0,82	1,22	0,8	32 500	5 600	3 250
118	5	2,5	250 000	335 000	0,83	0,82	1,22	0,8	40 000	5 300	3 000
128	5	2,5	280 000	375 000	0,83	0,82	1,22	0,8	44 500	5 000	2 900
138	5	2,5	320 000	435 000	0,83	0,82	1,22	0,8	52 000	4 750	3 200
148	6	2,5	350 000	475 000	0,83	0,82	1,22	0,8	55 000	4 500	2 600
117	6	2	235 000	420 000	0,42	1,6	2,38	1,56	52 000	5 000	2 800
158	6	2,5	390 000	540 000	0,83	0,82	1,22	0,8	61 000	4 500	2 470
166	6	3	435 000	600 000	0,83	0,82	1,22	0,8	68 000	4 200	2 360
176	6	3	470 000	650 000	0,83	0,82	1,22	0,8	71 000	3 900	2 270
176	6	3	470 000	650 000	0,83	0,82	1,22	0,8	71 000	3 900	2 270
186	6	3	520 000	740 000	0,83	0,82	1,22	0,8	79 000	3 650	2 180
141	6	1,5	295 000	570 000	0,46	1,47	2,19	1,44	67 000	4 500	2 300
201	7	3	660 000	960 000	0,83	0,82	1,22	0,8	102 000	3 100	2 040
188	5	2,5	710 000	1 180 000	0,42	1,61	2,39	1,57	133 000	3 350	1 910
226	7	3	790 000	1 170 000	0,83	0,82	1,22	0,8	141 000	2 800	1 790
203	7	2,5	830 000	1 450 000	0,44	1,55	2,31	1,52	162 000	3 100	1 700
246	9	3	930 000	1 400 000	0,83	0,82	1,22	0,8	165 000	2 500	1 610
190	8	2	560 000	1 100 000	0,43	1,55	2,31	1,52	122 000	3 100	1 870
262	9	4	1 050 000	1 590 000	0,83	0,82	1,22	0,8	184 000	2 380	1 460



# Tapered roller bearings

Matched pairs



Mounting dimensions

Dimension table (continued) · Dimensions in mm

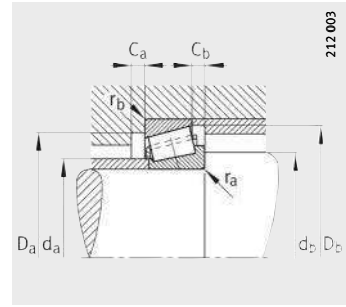
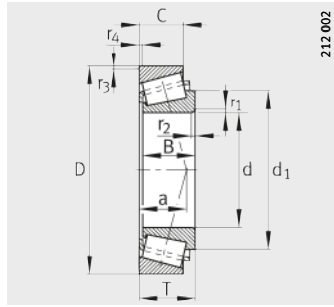
Designation	Mass for bearing pair m ≈kg	Dimensions						Mounting dimensions	
		d	D	2B	2T	r <sub>3</sub> , r <sub>4</sub> min.	A	d <sub>a</sub> max.	D <sub>a</sub> min.
<b>32228-A-N11CA-A250-300</b>	29,5	<b>140</b>	250	136	143,5	3	27,5	159	210
<b>31328-X-N11CA-A160-200</b>	45,6	<b>140</b>	300	140	154	4	60	165	242
<b>32030-X-N11CA-A280-330</b>	13,1	<b>150</b>	225	96	96	2,5	24	164	200
<b>31330-X-N11CA-A180-230</b>	57,7	<b>150</b>	320	150	164	4	64	177	260
<b>32234-A-N11CA-A300-380</b>	59,4	<b>170</b>	310	172	182	4	40	196	259
<b>32038-X-N11CA-A350-400</b>	29,6	<b>190</b>	290	128	128	2,5	32	209	257
<b>32040-X-N11CA-A350-400</b>	39,1	<b>200</b>	310	140	140	2,5	34	221	273
<b>32944-N11CA-A420-470</b>	20,3	<b>220</b>	300	102	102	2,5	24	235	275
<b>32244-A-N11CA-A400-450</b>	123	<b>220</b>	400	216	228	4	48	258	336
<b>32048-X-N11CA-A450-500</b>	58,3	<b>240</b>	360	228	152	3	38	261	318
<b>32960-N11CA-A650-700</b>	63,6	<b>300</b>	420	152	152	3	38	324	383
<b>32964-N11CA-A600-650</b>	67,2	<b>320</b>	440	152	152	3	38	344	402
<b>32968-N11CA-A550-600</b>	73,1	<b>340</b>	460	152	152	3	38	361	421

			Basic load ratings for bearing pair		Calculation factors				Fatigue limit load $C_{ur}$ N	Limiting speed Bearing pair $n_G$ $\text{min}^{-1}$	Reference speed Bearing pair $n_B$ $\text{min}^{-1}$
$D_a$ max.	$C_a$ min.	$r_b$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	e	$Y_1$	$Y_2$	$Y_0$			
236	8	3	1 100 000	1 980 000	0,44	1,55	2,31	1,52	241 000	2 500	1 390
282	14	4	1 200 000	1 810 000	0,83	0,82	1,22	0,8	204 000	2 380	1 340
213	8	2,5	660 000	1 350 000	0,46	1,47	2,19	1,44	167 000	2 650	1 580
302	14	4	1 360 000	2 090 000	0,83	0,82	1,22	0,8	230 000	2 240	1 220
292	10	4	1 680 000	3 100 000	0,44	1,55	2,31	1,52	360 000	2 240	1 050
278	10	2,5	1 080 000	2 250 000	0,44	1,53	2,27	1,49	260 000	2 240	1 160
298	11	2,5	1 300 000	2 750 000	0,43	1,57	2,34	1,53	310 000	2 100	1 030
288	10	2,5	850 000	1 960 000	0,43	1,59	2,36	1,55	221 000	2 100	1 020
382	12	4	2 650 000	5 100 000	0,44	1,55	2,31	1,52	540 000	1 540	730
346	12	3	1 540 000	3 350 000	0,46	1,47	2,19	1,44	360 000	1 680	850
406	12	3	1 760 000	4 300 000	0,39	1,71	2,54	1,67	440 000	1 330	660
426	12	3	1 810 000	4 550 000	0,42	1,62	2,42	1,59	460 000	1 260	360
446	12	3	1 850 000	4 750 000	0,44	1,54	2,3	1,51	475 000	1 260	550



# Tapered roller bearings

Single row  
Inch sizes



Mounting dimensions

Dimension table - Dimensions in mm

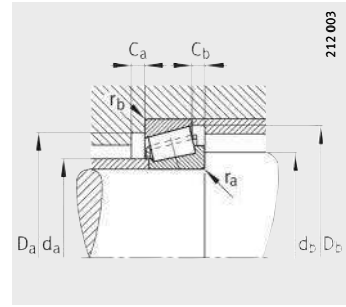
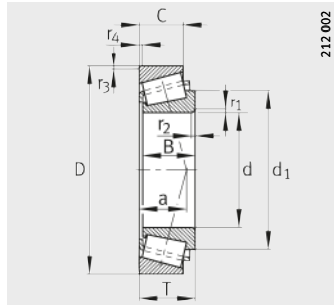
Designation	Mass m ≈kg	Dimensions								
		d	D	B	C	T	r <sub>1</sub> , r <sub>2</sub> min.	r <sub>3</sub> , r <sub>4</sub> min.	a ≈	d <sub>1</sub> ≈
KLM11749-LM11710	0,086	<b>17,462</b>	39,878	14,605	10,668	13,843	1,3	1,3	9	29,6
KM12649-M12610	0,163	<b>21,43</b>	50,005	18,288	13,97	17,526	1,3	1,3	11	34,5
KLM12749-LM12710	0,12	<b>21,986</b>	45,237	16,637	12,065	15,494	1,3	1,3	10	34,8
K15578-15520	0,217	<b>25,4</b>	57,15	17,462	13,495	17,462	1,3	1,5	12	42,8
KL44649-L44610	0,137	<b>26,988</b>	50,292	14,732	10,668	14,224	3,5	1,3	11	40,1
KM86647-M86610	0,353	<b>28,575</b>	64,292	21,432	16,67	21,433	1,5	1,5	18	50,3
KM86649-M86610	0,375	<b>30,162</b>	64,292	21,433	16,67	21,433	1,5	1,5	18	50,7
KLM48548-LM48510	0,273	<b>34,925</b>	65,088	18,288	13,97	18,034	3,5	1,3	14	49,7
KHM88649-HM88610	0,5	<b>34,925</b>	72,233	25,4	19,842	25,4	2,3	2,3	21	56,8
KL68149-L68111	0,179	<b>34,988</b>	59,974	16,764	11,938	15,875	3,5	1,3	13	48,8
KJL69349-JL69310	0,217	<b>38</b>	63	17	13,5	17	3,5	1,3	15	51,8
K3382-3320	0,651	<b>39,688</b>	80,167	30,391	23,812	29,37	3,5	3,3	19	57
KLM300849-LM300811	0,255	<b>40,987</b>	67,975	18	13,5	17,5	3,5	1,5	14	55,8
KLM501349-LM501310	0,365	<b>41,275</b>	73,431	19,812	14,732	19,558	3,5	0,8	16	57,2
KLM501349-LM501314	0,385	<b>41,275</b>	73,431	19,812	16,604	21,43	3,5	0,8	18	57,2
KM802048-M802011	0,661	<b>41,275</b>	82,55	25,654	20,193	26,543	3,5	3,3	23	64,15
K3585-3525	0,857	<b>41,275</b>	87,313	30,886	23,812	30,163	1,5	3,3	20	64,5
K25577-25523	0,715	<b>42,875</b>	82,931	25,4	22,225	26,988	3,5	2,3	21	64,1
K3782-3720	0,976	<b>44,45</b>	93,264	30,302	23,812	30,162	3,5	3,3	22	72,3
K53178-53377	0,95	<b>44,45</b>	95,25	28,3	20,638	30,958	2	2,3	31	70,65
K527-522	1,29	<b>44,45</b>	101,6	36,068	26,988	34,925	3,5	3,3	22	73,8
K17887-17831	0,421	<b>45,23</b>	79,985	20,638	15,08	19,842	2	1,3	16	63
K45284-45220	1,25	<b>50,8</b>	104,775	30,958	23,813	30,162	6,4	3,3	22	79,6
K4580-4535	1,7	<b>50,8</b>	104,775	40,157	33,338	39,688	3,5	3,3	28	81,5
K72200-72487	2,181	<b>50,8</b>	123,825	32,791	25,4	36,512	3,5	3,3	38	89,6
KLM806649-LM806610	0,445	<b>53,975</b>	88,9	19,05	13,492	19,05	2,3	2	21	72,3
KL507949-L507910	0,4	<b>57,15</b>	87,312	18,258	14,288	18,258	1,5	1,5	17	73,3
K387-A-382-A	0,593	<b>57,15</b>	96,838	21,946	15,875	21	3,5	0,8	19	76,6
K39580-39520	1,44	<b>57,15</b>	112,712	30,162	23,812	30,162	3,5	3,3	23	89,95
K39581-39520	1,44	<b>57,15</b>	112,712	30,162	23,812	30,162	7,9	3,3	23	89,6
K555-S-552-A	2,44	<b>57,15</b>	123,825	36,678	30,163	38,1	3,5	3,3	30	92,8
K28985-28921	0,77	<b>60,325</b>	100	25,4	19,845	25,4	3,5	3,3	23	82,9
K3982-3920	1,3	<b>63,5</b>	112,712	30,048	23,812	30,162	3,5	3,3	27	89
K559-552-A	2,07	<b>63,5</b>	123,825	36,678	30,163	38,1	3,5	3,3	30	92,8



Mounting dimensions								Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed
d <sub>a</sub>	d <sub>b</sub>	D <sub>a</sub>	D <sub>b</sub>	C <sub>a</sub>	C <sub>b</sub>	r <sub>a</sub>	r <sub>b</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>
max.	min.	min.	min.	min.	min.	max.	max.	N	N				N	min <sup>-1</sup>
21,5	23	34	37	3	3	1,3	1,3	21 200	20 800	0,29	2,1	1,15	2 190	21 000
25,5	27,5	44	46	4	3,5	1,3	1,3	37 500	39 000	0,28	2,16	1,19	4 400	16 800
26	27,5	39,5	42	3	3	1,3	1,3	28 500	32 000	0,31	1,96	1,08	3 550	16 800
30,5	32,5	51	53	2	4	1,3	1,5	38 500	44 000	0,35	1,73	0,95	4 950	12 600
31	37,5	44,5	47	2,5	3,5	3,5	1,3	26 000	29 500	0,37	1,6	0,88	3 150	14 000
38	40	54	61	4	4,5	1,5	1,5	52 000	67 000	0,55	1,1	0,6	8 000	11 200
38,2	41	54	61	3	4,5	1,5	1,5	52 000	67 000	0,55	1,1	0,6	8 000	11 200
40	46	58	61	3	4	3,5	1,3	46 500	56 000	0,38	1,59	0,88	6 400	10 500
42,5	48,5	60	69	3	5	2,3	2,3	68 000	91 000	0,55	1,1	0,6	11 300	9 400
39	45,5	53	56	3	4	3,5	1,3	34 000	44 500	0,42	1,44	0,79	5 000	11 200
42,5	49	56	60	3	4	3,5	1,3	39 500	53 000	0,42	1,44	0,79	6 100	10 500
45,5	52	71	74,8	2	5	3,5	3,3	94 000	109 000	0,27	2,2	1,21	13 400	8 800
45	52	61	65	3	4	3,5	1,5	46 000	63 000	0,35	1,72	0,95	7 300	9 800
46,5	53	67	70	4	4,5	3,5	0,8	55 000	68 000	0,4	1,5	0,83	8 100	9 400
46,5	53	66	70	1,5	4,5	3,5	0,8	55 000	68 000	0,4	1,5	0,83	8 100	9 400
51	57	70	79	3	5,5	3,5	3,3	83 000	111 000	0,55	1,1	0,6	13 800	7 800
48	50	75	81	3,5	6	1,5	3,3	97 000	121 000	0,31	1,96	1,08	14 900	7 800
49	55	72	77	6	15	3,5	2,3	81 000	105 000	0,33	1,79	0,99	12 900	8 400
52	58	82	88	3	5	3,5	3,3	104 000	137 000	0,34	1,77	0,97	17 000	7 000
53	60	80	89	2	7	2	2,3	89 000	98 000	0,74	0,81	0,45	11 500	7 400
53	59	89	95	4	8	3,5	3,3	127 000	152 000	0,28	2,12	1,17	18 800	7 000
52	56	70	74	3	4,5	2	1,3	60 000	77 000	0,37	1,64	0,9	9 200	8 400
59	71	93	99	4	6	6,4	3,3	126 000	162 000	0,33	1,81	0,99	20 000	6 300
61	67	90	99	4	6	3,5	3,3	159 000	226 000	0,34	1,79	0,98	28 500	6 300
67	79	102	116	3,5	8,5	3,5	3,3	135 000	150 000	0,74	0,81	0,45	17 900	5 600
60	63	80	85	4	5,5	2,3	2	59 000	78 000	0,55	1,1	0,6	9 500	7 400
62	65	79	83	2	3,5	1,5	1,5	56 000	88 000	0,39	1,54	0,85	10 400	7 400
62	69	89	92	4	5	3,5	0,8	76 000	95 000	0,35	1,69	0,93	11 200	6 700
66	72	101	107	6	6	3,5	3,3	137 000	192 000	0,34	1,77	0,97	23 800	5 600
66	81	101	107	6	6	7,9	3,3	137 000	192 000	0,34	1,77	0,97	23 800	5 600
67	73	109	116	2,5	7,5	3,5	3,3	169 000	236 000	0,35	1,73	0,95	29 500	5 600
67	73	89	96	3	5,5	3,5	3,3	91 000	135 000	0,43	1,41	0,78	16 700	6 300
71	77	99	106	4	6	3,5	3,3	119 000	176 000	0,4	1,49	0,82	21 900	6 000
72	78	108	116	4	7,5	3,5	3,3	169 000	236 000	0,35	1,73	0,95	29 500	5 600

# Tapered roller bearings

Single row  
Inch sizes



Mounting dimensions

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions								
		d	D	B	C	T	r <sub>1</sub> , r <sub>2</sub> min.	r <sub>3</sub> , r <sub>4</sub> min.	a ≈	d <sub>1</sub> ≈
<b>K3984-3920</b>	1,31	<b>66,675</b>	112,712	30,048	23,812	30,162	3,5	3,3	27	89
<b>KHM212049-HM212011</b>	1,93	<b>66,675</b>	122,238	38,354	29,718	38,1	3,5	3,3	27	91,5
<b>KH414242-H414210</b>	2,77	<b>66,675</b>	136,525	41,275	31,75	41,275	3,5	3,3	30	100,9
<b>KH715341-H715311</b>	3,42	<b>66,675</b>	136,525	46,038	36,512	46,038	3,5	3,3	38	111,1
<b>K47490-47420</b>	1,61	<b>71,438</b>	120	32,545	26,195	32,545	3,5	3,3	27	95,2
<b>K33287-33462</b>	1,21	<b>73,025</b>	117,475	30,162	23,812	30,162	3,5	3,3	28	95,2
<b>AK47686-47620</b>	1,94	<b>82,55</b>	133,35	33,338	26,195	33,338	3,5	3,3	30	108,2
<b>K580-572</b>	2,21	<b>82,55</b>	139,992	36,098	28,575	36,512	3,5	3,3	31	110,7
<b>K663-653</b>	2,71	<b>82,55</b>	146,05	41,275	31,75	41,275	3,5	3,3	33	114
<b>K498-492-A</b>	1,69	<b>84,138</b>	133,35	29,769	22,225	30,163	3,5	3,3	30	110,6
<b>K497-492-A</b>	1,63	<b>85,725</b>	133,35	29,769	22,225	30,162	3,5	3,3	30	110,6
<b>KHM218248-HM218210</b>	2,57	<b>89,975</b>	146,975	40	32,5	40	7,1	3,5	32	119
<b>K598-A-593-X</b>	2,37	<b>92,075</b>	150	36,322	27	35,992	6,4	3	33	121,5
<b>K594-592-A</b>	2,55	<b>95,25</b>	152,4	36,322	30,162	39,688	3,5	3,3	37	122,7
<b>K594-A-592-A</b>	2,75	<b>95,25</b>	152,4	36,322	30,162	39,688	5,1	3,3	37	121,5
<b>K683-672</b>	4,03	<b>95,25</b>	168,275	41,275	30,162	41,275	3,5	3,3	38	133,2
<b>K42381-42584</b>	1,92	<b>96,838</b>	148,43	28,971	21,433	28,575	3,5	3	32	123,3
<b>K90381-90744</b>	5,69	<b>96,838</b>	188,912	46,038	31,75	50,8	3,5	3,3	64	142,9
<b>KJM720249-JM720210</b>	2,38	<b>100</b>	155	35	28	36	3	2,5	36	127,5
<b>KJM822049-JM822010</b>	2,51	<b>110</b>	165	35	26,5	35	3	2,5	38	139
<b>KJHM522649-JHM522610</b>	4,7	<b>110</b>	180	46	38	47	3	2,5	41	145
<b>K64450-64700</b>	3,55	<b>114,3</b>	177,8	41,275	30,162	41,275	3,5	3,3	43	147,2
<b>KHH231649-HH231615</b>	24,1	<b>139,7</b>	295,275	87,312	57,15	82,55	9,7	6,4	56	199,1
<b>K107060-107105</b>	16,7	<b>152,4</b>	268,288	74,612	57,15	74,612	6,4	6,4	60	204
<b>K36990-36920</b>	3,18	<b>177,8</b>	227,012	30,162	23,02	30,162	1,5	1,5	43	203,8
<b>KLL352149-LL352110</b>	2,6	<b>279,4</b>	317,5	24,384	18,288	24,384	1,5	1,5	45	299
<b>KLL481448-LL481411</b>	52,7	<b>673,1</b>	793,75	61,912	49,212	66,675	6,4	6,4	117	725

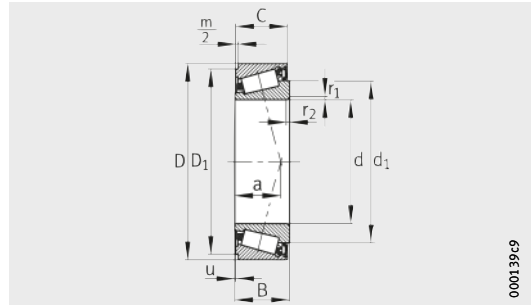




Mounting dimensions								Basic load ratings		Calculation factors			Fatigue limit load	Limiting speed
d <sub>a</sub>	d <sub>b</sub>	D <sub>a</sub>	D <sub>b</sub>	C <sub>a</sub>	C <sub>b</sub>	r <sub>a</sub>	r <sub>b</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>
max.	min.	min.	min.	min.	min.	max.	max.	N	N				N	min <sup>-1</sup>
74	80	99	106	4	6	3,5	3,3	119 000	176 000	0,4	1,49	0,82	21 900	6 000
75,5	82	108	116	4	8	3,5	3,3	193 000	255 000	0,34	1,78	0,98	32 000	5 600
81	85	121	129	6	9	3,5	3,3	225 000	290 000	0,36	1,67	0,92	36 000	5 000
83	89	118	132	8	9,5	3,5	3,3	230 000	370 000	0,47	1,27	0,7	46 500	4 750
79	86	107	114	4	6	3,5	3,3	152 000	224 000	0,36	1,67	0,92	28 000	5 300
79	87	104	112	4	6	3,5	3,3	124 000	189 000	0,44	1,38	0,76	23 900	5 600
90	97	119	128	5	7	3,5	3,3	153 000	235 000	0,4	1,48	0,82	29 000	5 000
91	98	125	133	5	7,5	3,5	3,3	177 000	265 000	0,4	1,49	0,82	32 000	4 750
92	99	131	139	5	8	3,5	3,3	211 000	305 000	0,41	1,47	0,81	37 000	4 750
91	98	120	128	4	7,5	3,5	3,3	134 000	200 000	0,44	1,35	0,74	24 100	5 000
93	99	120	128	4	7,5	3,5	3,3	134 000	200 000	0,44	1,35	0,74	24 100	5 000
99	112	133	141	5,5	7,5	7,1	3,5	233 000	355 000	0,33	1,8	0,99	43 000	4 750
101	113	135	144	4	9	6,4	3	182 000	285 000	0,44	1,36	0,75	34 000	4 500
104	110	135	144	1	8	3,5	3,3	182 000	285 000	0,44	1,36	0,75	34 000	4 500
104	113	135	144	4	9	5,1	3,3	182 000	285 000	0,44	1,36	0,75	34 000	4 500
106	113	149	160	5	9	3,5	3,3	226 000	350 000	0,47	1,28	0,7	41 000	4 200
104	110	134	142	4	6,5	3,5	3	139 000	216 000	0,49	1,22	0,67	25 500	4 500
113	125	161	179	2,5	12	3,5	3,3	270 000	340 000	0,87	0,69	0,38	38 000	3 650
109	115	140	149	4	6,5	3	2,5	187 000	305 000	0,47	1,27	0,7	36 000	4 500
119	124	149	159	4,5	8	3	2,5	188 000	305 000	0,5	1,21	0,66	35 500	4 200
122	127	162	172	5	7	3	2,5	320 000	510 000	0,41	1,48	0,81	58 000	3 900
125	131	160	172	5	9	3,5	3,3	241 000	395 000	0,52	1,16	0,64	45 000	3 650
161	177	258	264	9	19	9,7	6,4	830 000	1 120 000	0,32	1,88	1,04	130 000	2 380
171	181	237	249	8	13,5	6,4	6,4	670 000	1 070 000	0,39	1,55	0,85	127 000	2 500
186	188	214	221	4	7	1,5	1,5	187 000	395 000	0,44	1,36	0,75	41 500	2 500
286	288	309	312	4	4,5	1,5	1,5	162 000	440 000	0,35	1,73	0,95	28 500	1 820
690	702	765	771	7	14	6,4	6,4	1 170 000	3 300 000	0,36	1,67	0,92	270 000	630

# Integral tapered roller bearings

Sealed on one side



**Dimension table** - Dimensions in mm

Designation		Mass Bearing <sup>1)</sup> m ≈kg	Dimensions											Mounting dimensions		
Bearing	Snap ring		d	D	B	C	r <sub>1</sub> , r <sub>2</sub> min.	D <sub>1</sub>	m/2	a	u	Δ <sub>u</sub> Deviation	d <sub>1</sub>	d <sub>a</sub> max.	d <sub>b</sub> min.	r <sub>a</sub> max.
JK0S030	BR55	0,19	30	55	19	18,5	1	51,4	0,75	15	0,02	+0,05	43,6	35	36	1
JK0S040 <sup>3)</sup>	BR68	0,3	40	68	21	20,5	1	64,4	0,75	16	0,03	+0,05	53,8	46	46	1
JK0S050	BR80	0,41	50	80	22	21,5	1	75,7	1	19	0,02	+0,05	66,4	56	56	1
JK0S060	BR95	0,67	60	95	26	25	1,5	89,3	1,25	23	0,03	+0,05	79,5	67	67	1,5
JK0S070-A	BR110	0,93	70	110	27	26,5	1,5	104,8	1,25	25	0,03	+0,05	91,5	78	77	1,5
JK0S080-A	BR125	1,32	80	125	30	29,5	1,5	119,8	1,25	28	0,03	+0,05	104,2	89	87	1,5

Other sizes and designs are also available; please contact us.

### Ordering note

FAG integral tapered roller bearings are interchangeable with each other.

When ordering, please always state the number of individual bearings, not the number of bearing pairs.

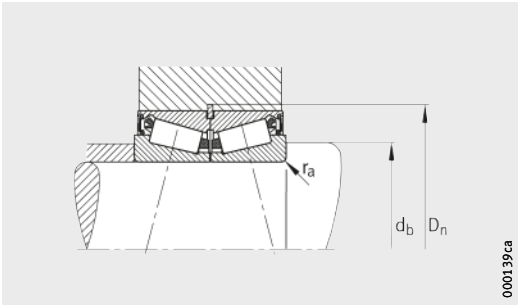
The snap ring must be ordered separately, for example

2 tapered roller bearings JK0S080-A  
1 snap ring BR125

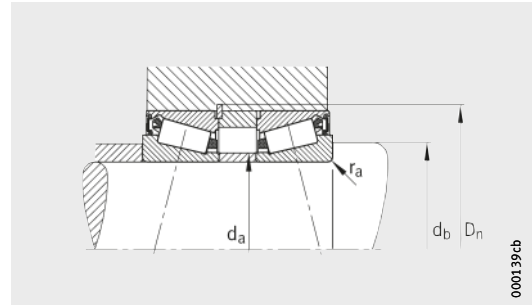
<sup>1)</sup> Ungreased.

<sup>2)</sup> For snap ring connection located against a sharp edge.

<sup>3)</sup> Also available with 95% grease filling; designation: JK0S040-J14.



Mounting dimensions

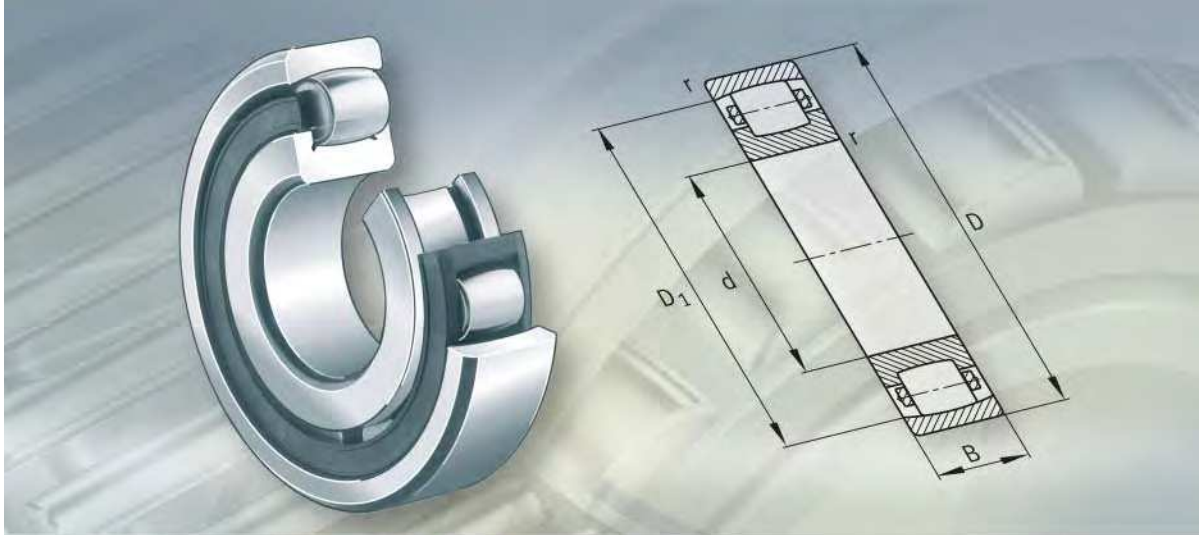


Mounting dimensions

Slot		Basic load ratings		Calculation factors			Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ grease $\text{min}^{-1}$	Load carrying capacity $F_{BR}^{2)}$ N	Max. axial assembly clamping force  Bearing pair N
$D_n$ Nominal dimension	$\Delta_{D_n}$ Deviation	dyn. $C_r$ N	stat. $C_{0r}$ N	e	Y	$Y_0$				
56,5	+0,19	38 500	46 500	0,43	1,4	0,77	5 300	5 700	15 700	7 700
69,5	+0,19	53 000	71 000	0,37	1,6	0,88	8 300	4 550	12 900	10 600
81,8	+0,22	64 000	93 000	0,42	1,43	0,79	11 200	3 700	31 400	12 800
97	+0,22	82 000	123 000	0,43	1,4	0,77	15 200	3 050	59 300	16 400
112,3	+0,22	104 000	159 000	0,43	1,38	0,76	20 100	2 600	49 000	20 800
127,3	+0,25	137 000	211 000	0,42	1,42	0,78	26 000	2 280	40 200	27 400



**FAG**



**Barrel roller bearings**

# Barrel roller bearings

	Page
<b>Product overview</b>	Barrel roller bearings ..... 558
<b>Features</b>	Compensation of angular misalignments ..... 559
	Operating temperature ..... 559
	Cages ..... 560
	Suffixes ..... 560
<b>Design and safety guidelines</b>	Equivalent dynamic bearing load ..... 561
	Equivalent static bearing load ..... 561
	Minimum radial load ..... 561
	Speeds ..... 561
	Design of bearing arrangements ..... 562
<b>Accuracy</b>	Radial internal clearance of bearings with cylindrical bore ..... 563
	Radial internal clearance of bearings with tapered bore ..... 563
<b>Dimension tables</b>	Barrel roller bearings, cylindrical or tapered bore ..... 564
	Barrel roller bearings with adapter sleeve ..... 570



## Product overview    Barrel roller bearings

### Cylindrical bore

202, 203



### Tapered bore

202..-K, 203..-K




### With adapter sleeve

202..-K + H, 203..-K + H



# Barrel roller bearings

<b>Features</b>	<p>Barrel roller bearings are single row, self-aligning roller bearings. They comprise solid outer rings with a concave raceway, solid inner rings with two ribs and a cylindrical or tapered bore as well as barrel rollers with cages. The bearings cannot be dismantled.</p> <p>Barrel roller bearings are particularly suitable where high radial shock type loads occur and misalignments must be compensated, see Compensation of angular misalignments. They have only a low axial load carrying capacity.</p>
<b>With tapered bore and with adapter sleeve</b>	<p>Bearings with a tapered bore have a bore taper 1:12 and the suffix K.</p> <p>These bearings are also available with an adapter sleeve for locating purposes. The adapter sleeves are included in the dimension tables and must be specified in addition when ordering.</p>
<b>Sealing</b>	<p>Barrel roller bearings are not sealed.</p>
<b>Lubrication</b>	<p>The bearings can be lubricated from the end faces using oil or grease.</p>
<b>Compensation of angular misalignments</b>	<p>Under normal operating conditions and with a rotating inner ring, barrel roller bearings can swivel approx. 4° about their central position. As a result, they permit skewing between the inner and outer ring and can thus compensate misalignments, shaft deflections and housing deformations.</p> <p>If the outer ring rotates or the inner ring undergoes tumbling motion, the angular adjustment facility is smaller. In this case, please contact us.</p>
<b>Operating temperature</b>	<p>Barrel roller bearings with brass cages can be used at operating temperatures from -30 °C to +150 °C.</p> <p>Bearing with an outside diameter over 120 mm are dimensionally stable up to +200 °C.</p> <p> Bearings with cages made from glass fibre reinforced polyamide are suitable for operating temperatures up to +120 °C.</p>



# Barrel roller bearings

**Cages** The standard cages for barrel roller bearings are shown in the table Cage and bore code.

Barrel roller bearings with solid brass cages have the suffix MB. The cages are guided on the inner ring.

Solid window cages made from glass fibre reinforced polyamide are indicated by the suffix TVP.



Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

The oil change intervals must be observed.

## Cage and bore code

Series	Solid window cage made from polyamide <sup>1)</sup> Bore code	Solid brass cage <sup>1)</sup>
202	up to 16	from 17
203	up to 12	from 13

<sup>1)</sup> Other cage designs (for example brass cages instead of polyamide cages) are available by agreement. In such cages, suitability for high speeds and temperatures as well as the basic load ratings may differ from the values for bearings with standard cages.

## Suffixes

Suffixes for available designs: see table.

## Available designs

Suffix	Description	Design
C3	Radial internal clearance larger than normal	Standard for tapered bore
K	Tapered bore	
MB	Solid brass cage	
TVP	Solid window cage made from glass fibre reinforced polyamide	



**Design and  
safety guidelines**  
**Equivalent  
dynamic bearing load**

For bearings under dynamic loading, the following applies:

$$P = F_r + 9,5 \cdot F_a$$

P N  
Equivalent dynamic bearing load for combined load  
F<sub>a</sub> N  
Axial dynamic bearing load  
F<sub>r</sub> N  
Radial dynamic bearing load.

**Equivalent  
static bearing load**

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + 5 \cdot F_{0a}$$

P<sub>0</sub> N  
Equivalent static bearing load for combined load  
F<sub>0a</sub> N  
Axial static bearing load  
F<sub>0r</sub> N  
Radial static bearing load.

**Minimum radial load**

In order to ensure slippage-free operation, the bearings must be subjected to a minimum radial load. This applies particularly in the case of high speeds and high accelerations. In continuous operation, a minimum radial load of the order of  $P/C_r > 0,02$  is necessary for roller bearings with cage.

**Speeds**

ISO 15 312 does not give thermal reference speeds for barrel roller bearings.



The dimension tables therefore only state limiting speeds  $n_G$ . These values are for oil lubrication and must not be exceeded.



# Barrel roller bearings

## Design of bearing arrangements

### Shaft and housing tolerances

Recommended shaft tolerances for bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

### Mounting dimensions

The dimension tables give the maximum dimensions of the radii  $r_a$  and the diameters of the abutment shoulders  $D_a$  and  $d_a$ .

Bearings with a tapered inner ring bore are:

- located either directly on tapered shaft seats or
- located on a cylindrical shaft seat using an adapter sleeve, locknut and tab washer.

If high axial forces are present, a support ring can be used.

For fitting, attention must be paid to the dimensions of the support ring according to the dimension tables.

## Accuracy

The main dimensions of the bearings conform to DIN 635-1.

The dimensional and geometrical tolerances correspond to tolerance class PN in accordance with DIN 620-2.

## Radial internal clearance of bearings with cylindrical bore

The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

### Radial internal clearance

Bore d mm		Radial internal clearance							
		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	30	2	9	9	17	17	28	28	40
30	40	3	10	10	20	20	30	30	45
40	50	3	13	13	23	23	35	35	50
50	65	4	15	15	27	27	40	40	55
65	80	5	20	20	35	35	55	55	75
80	100	7	25	25	45	45	65	65	90
100	120	10	30	30	50	50	70	70	95
120	140	15	35	35	55	55	80	80	110
140	160	20	40	40	65	65	95	95	125
160	180	25	45	45	70	70	100	100	130
180	225	30	50	50	75	75	105	105	135
225	250	35	55	55	80	80	110	110	140
250	280	40	60	60	85	85	115	115	145

## Radial internal clearance of bearings with tapered bore

Bearings with a tapered bore have the internal clearance group C3 to DIN 620-4.

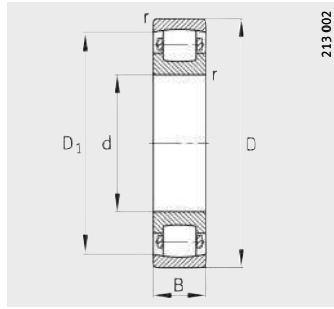


### Radial internal clearance

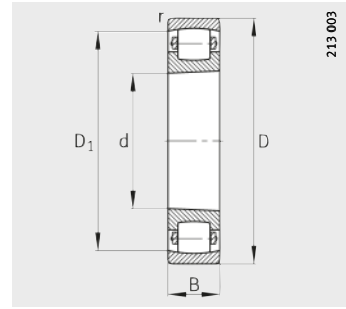
Bore d mm		Radial internal clearance							
		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	30	9	17	17	28	28	40	40	55
30	40	10	20	20	30	30	45	45	60
40	50	13	23	23	35	35	50	50	65
50	65	15	27	27	40	40	55	55	75
65	80	20	35	35	55	55	75	75	95
80	100	25	45	45	65	65	90	90	120
100	120	30	50	50	70	70	95	95	125
120	140	35	55	55	80	80	110	110	140
140	160	40	65	65	95	95	125	125	155
160	180	45	70	70	100	100	130	130	160
180	225	50	75	75	105	105	135	135	165
225	250	55	80	80	110	110	140	140	170
250	280	60	85	85	115	115	145	145	175

# Barrel roller bearings

Cylindrical or tapered bore



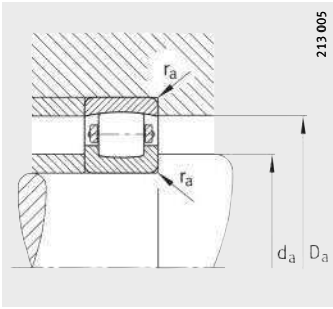
Cylindrical bore



Tapered bore  
K = taper 1:12

**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions				
		d	D	B	r min.	D <sub>1</sub> ≈
20204-TVP	0,114	20	47	14	1	39
20304-TVP	0,152	20	52	15	1,1	43,5
20205-K-TVP-C3	0,132	25	52	15	1	43,9
20205-TVP	0,134	25	52	15	1	43,9
20305-TVP	0,243	25	62	17	1,1	51,9
20206-K-TVP-C3	0,203	30	62	16	1	53
20206-TVP	0,207	30	62	16	1	53
20306-TVP	0,37	30	72	19	1,1	60,7
20207-K-TVP-C3	0,296	35	72	17	1,1	62,3
20207-TVP	0,301	35	72	17	1,1	62,3
20307-TVP	0,493	35	80	21	2,5	67,4
20208-K-TVP-C3	0,38	40	80	18	1,1	70,1
20208-TVP	0,386	40	80	18	1,1	70,1
20308-TVP	0,671	40	90	23	1,5	76,8
20209-K-TVP-C3	0,433	45	85	19	1,1	74,6
20209-TVP	0,441	45	85	19	1,1	74,6
20309-TVP	0,914	45	100	25	1,5	85,2
20210-K-TVP-C3	0,489	50	90	20	1,1	79,5
20210-TVP	0,499	50	90	20	1,1	79,5
20310-TVP	1,17	50	110	27	2	94,4
20211-K-TVP-C3	0,642	55	100	21	1,5	89,2
20211-TVP	0,653	55	100	21	1,5	89,2
20311-K-TVP-C3	1,49	55	120	29	2	101,7
20311-TVP	1,53	55	120	29	2	101,7
20212-K-TVP-C3	0,822	60	110	22	1,5	97,8
20212-TVP	0,836	60	110	22	1,5	97,8
20312-K-TVP-C3	1,89	60	130	31	2,1	111,2
20312-TVP	1,92	60	130	31	2,1	111,2
20213-K-TVP-C3	1,07	65	120	23	1,5	105,1
20213-TVP	1,08	65	120	23	1,5	105,1
20313-K-MB-C3	2,14	65	140	33	1,5	120,6
20313-MB	2,18	65	140	33	1,5	120,6



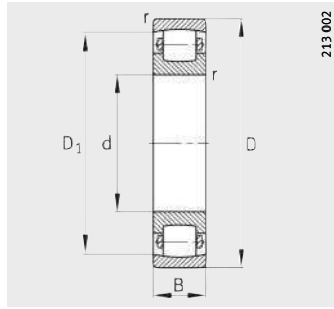
Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load $C_{Ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		
25,6	41,4	1	20 400	19 300	1 700	7 500
27	45	1	27 000	24 500	2 300	7 000
30,6	46,4	1	24 000	25 000	2 190	6 700
30,6	46,4	1	24 000	25 000	2 190	6 700
32	55	1	36 000	34 500	3 000	6 000
35,6	56,4	1	27 500	28 500	2 850	5 600
35,6	56,4	1	27 500	28 500	2 850	5 600
37	65	1	49 000	49 000	4 250	5 000
42	65	1	40 500	43 000	4 900	4 800
42	65	1	40 500	43 000	4 900	4 800
44	71	1,5	58 500	61 000	5 400	4 500
47	73	1	49 000	53 000	5 400	4 300
47	73	1	49 000	53 000	5 400	4 300
49	81	1,5	76 500	81 500	7 200	4 000
52	78	1	52 000	57 000	5 900	4 000
52	78	1	52 000	57 000	5 900	4 000
54	91	1,5	86 500	95 000	8 500	3 600
57	83	1	58 500	68 000	7 000	3 600
57	83	1	58 500	68 000	7 000	3 600
61	99	2	108 000	118 000	10 600	3 400
64	91	1,5	73 500	85 000	9 300	3 400
64	91	1,5	73 500	85 000	9 300	3 400
66	109	2	120 000	137 000	12 400	3 000
66	109	2	120 000	137 000	12 400	3 000
69	101	1,5	85 000	100 000	10 900	3 200
69	101	1,5	85 000	100 000	10 900	3 200
72	118	2,1	146 000	170 000	15 200	2 800
72	118	2,1	146 000	170 000	15 200	2 800
74	111	1,5	95 000	116 000	12 700	3 000
74	111	1,5	95 000	116 000	12 700	3 000
77	128	2,1	170 000	196 000	17 900	2 800
77	128	2,1	170 000	196 000	17 900	2 800

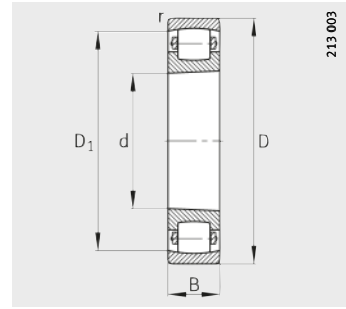


# Barrel roller bearings

Cylindrical or tapered bore



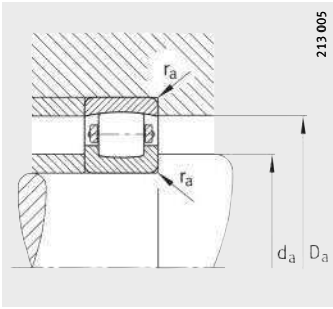
Cylindrical bore



Tapered bore  
K = taper 1:12

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions				
		d	D	B	r min.	D <sub>1</sub> ≈
20214-TVP	1,17	<b>70</b>	125	24	1,5	111
20314-MB	3,15	<b>70</b>	150	35	2,1	128,7
20215-K-TVP-C3	1,25	<b>75</b>	130	25	1,5	115,9
20215-TVP	1,28	<b>75</b>	130	25	1,5	115,9
20315-MB	3,76	<b>75</b>	160	37	2,1	138,1
20216-K-TVP-C3	1,56	<b>80</b>	140	26	2	124,5
20216-TVP	1,58	<b>80</b>	140	26	2	124,5
20316-MB	4,58	<b>80</b>	170	39	2,1	147,5
20217-K-MB-C3	2,19	<b>85</b>	150	28	2	133,9
20217-MB	2,22	<b>85</b>	150	28	2	133,9
20317-MB	5,25	<b>85</b>	180	41	3	156,9
20218-K-MB-C3	2,68	<b>90</b>	160	30	2	143,8
20218-MB	2,72	<b>90</b>	160	30	2	143,8
20318-K-MB-C3	6,17	<b>90</b>	190	43	3	165,1
20318-MB	6,25	<b>90</b>	190	43	3	165,1
20219-MB	3,19	<b>95</b>	170	32	2,1	152,7
20319-MB	7,29	<b>95</b>	200	45	3	174,5
20220-K-MB-C3	3,9	<b>100</b>	180	34	2,1	160,8
20220-MB	3,96	<b>100</b>	180	34	2,1	160,8
20320-K-MB-C3	8,58	<b>100</b>	215	47	3	186,6
20320-MB	8,69	<b>100</b>	215	47	3	186,6
20221-MB	4,74	<b>105</b>	190	36	2,1	169,2
20222-K-MB-C3	5,45	<b>110</b>	200	38	2,1	178,6
20222-MB	5,53	<b>110</b>	200	38	2,1	178,6
20322-MB	11,6	<b>110</b>	240	50	3	208,1
20224-K-MB-C3	6,51	<b>120</b>	215	40	2,1	191,1
20224-MB	6,6	<b>120</b>	215	40	2,1	191,1
20324-MB	15,2	<b>120</b>	260	55	3	222,3
20226-K-MB-C3	7,21	<b>130</b>	230	40	3	205,7
20226-MB	7,31	<b>130</b>	230	40	3	205,7
20326-MB	18,4	<b>130</b>	280	58	4	240,3
20228-K-MB-C3	8,98	<b>140</b>	250	42	3	223,9
20228-MB	9,09	<b>140</b>	250	42	3	223,9
20328-MB	22,5	<b>140</b>	300	62	4	257,9



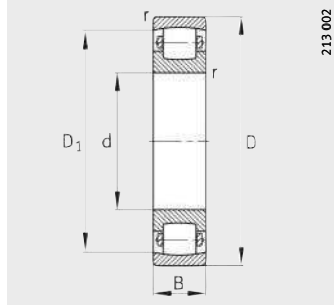
Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load $C_{Ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		
79	116	1,5	106 000	134 000	14 100	2 800
82	138	2,1	183 000	216 000	19 600	2 600
84	121	1,5	112 000	143 000	16 100	2 800
84	121	1,5	112 000	143 000	16 100	2 800
87	148	2,1	216 000	255 000	22 400	2 200
91	129	2	125 000	163 000	17 100	2 600
91	129	2	125 000	163 000	17 100	2 600
92	158	2,1	245 000	285 000	25 500	2 000
96	139	2	156 000	200 000	20 400	2 400
96	139	2	156 000	200 000	20 400	2 400
99	166	2,5	270 000	320 000	28 500	1 900
101	149	2	173 000	220 000	22 000	2 000
101	149	2	173 000	220 000	22 000	2 000
104	176	2,5	300 000	360 000	30 500	1 900
104	176	2,5	300 000	360 000	30 500	1 900
107	158	2,1	208 000	265 000	26 000	1 900
109	186	2,5	335 000	400 000	34 000	1 800
112	168	2,1	224 000	290 000	28 000	1 900
112	168	2,1	224 000	290 000	28 000	1 900
114	201	2,5	365 000	440 000	38 000	1 700
114	201	2,5	365 000	440 000	38 000	1 700
117	178	2,1	245 000	315 000	30 500	1 800
122	188	2,1	285 000	375 000	34 500	1 700
122	188	2,1	285 000	375 000	34 500	1 700
124	226	2,5	430 000	520 000	45 500	1 500
132	203	2,1	305 000	415 000	38 000	1 600
132	203	2,1	305 000	415 000	38 000	1 600
134	246	2,5	490 000	630 000	52 000	1 400
144	216	2,5	335 000	450 000	42 500	1 500
144	216	2,5	335 000	450 000	42 500	1 500
147	263	3	550 000	720 000	59 000	1 400
154	236	2,5	390 000	530 000	50 000	1 400
154	236	2,5	390 000	530 000	50 000	1 400
157	283	3	640 000	850 000	66 000	1 300

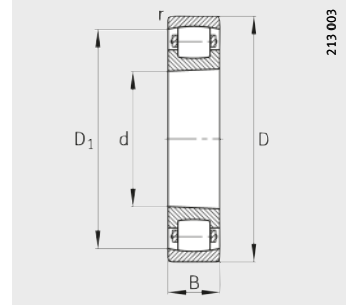


# Barrel roller bearings

Cylindrical or tapered bore



Cylindrical bore

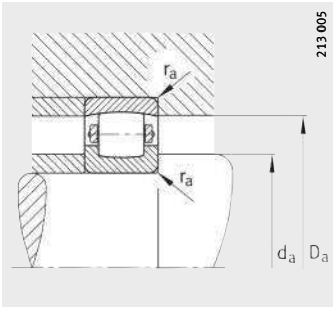


Tapered bore  
K = taper 1:12

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions				
		d	D	B	r min.	D <sub>1</sub> ≈
<b>20230-K-MB-C3</b>	11,6	<b>150</b>	270	45	3	238,6
<b>20230-MB</b>	11,7	<b>150</b>	270	45	3	238,6
<b>20330-MB</b>	26,9	<b>150</b>	320	65	4	275,8
<b>20232-K-MB-C3</b>	14,4	<b>160</b>	290	48	3	256,5
<b>20232-MB</b>	14,5	<b>160</b>	290	48	3	256,5
<b>20234-MB</b>	17,9	<b>170</b>	310	52	4	273,1
<b>20236-MB</b>	18,4	<b>180</b>	320	52	4	284,3
<b>20238-MB</b>	22,5	<b>190</b>	340	55	4	301,2
<b>20240-MB</b>	26,7	<b>200</b>	360	58	4	319
<b>20244-MB</b>	37,4	<b>220</b>	400	65	4	353,5
<b>20248-MB</b>	50,5	<b>240</b>	440	72	4	388
<b>20252-MB</b>	68,2	<b>260</b>	480	80	5	421,3





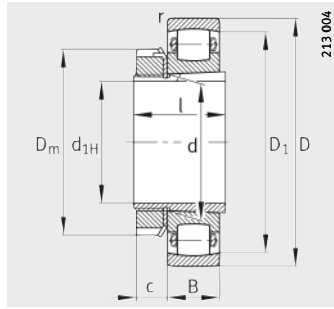
Mounting dimensions

Mounting dimensions			Basic load ratings		Fatigue limit load $C_{Ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{Or}$ N		
164	256	2,5	430 000	610 000	55 000	1 300
164	256	2,5	430 000	610 000	55 000	1 300
167	303	3	720 000	950 000	74 000	1 200
174	276	2,5	500 000	720 000	64 000	1 200
174	276	2,5	500 000	720 000	64 000	1 200
187	293	3	570 000	830 000	70 000	1 100
197	303	3	585 000	850 000	74 000	1 000
207	323	3	640 000	950 000	81 000	950
217	343	3	735 000	1 080 000	91 000	950
237	383	3	880 000	1 320 000	109 000	850
257	423	3	1 060 000	1 600 000	129 000	750
280	460	4	1 270 000	1 930 000	148 000	700

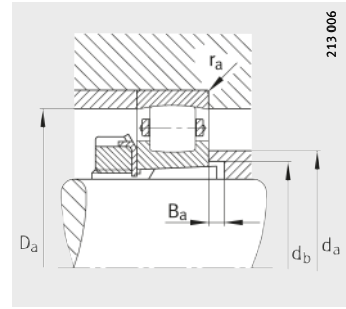


# Barrel roller bearings

With adapter sleeve



With adapter sleeve



Mounting dimensions

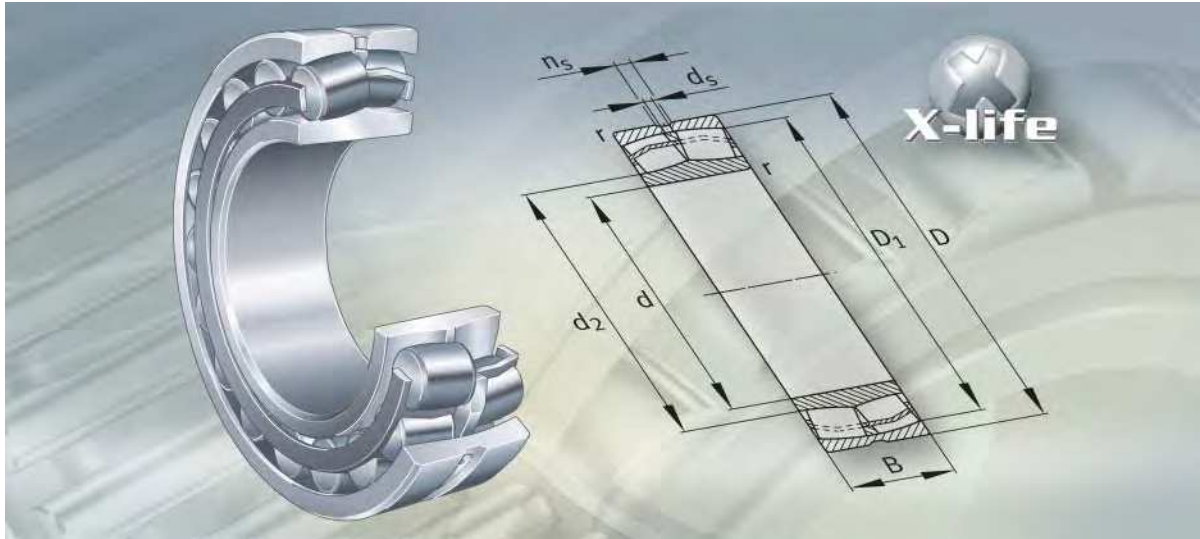
**Dimension table** - Dimensions in mm

Designation		Mass m		Dimensions						
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d <sub>1H</sub>	d	D	B	r min.	D <sub>1</sub> ≈	D <sub>m</sub> ≈
20205-K-TVP-C3	H205	0,132	0,069	20	25	52	15	1	43,9	38
20206-K-TVP-C3	H206	0,203	0,091	25	30	62	16	1	53	45
20207-K-TVP-C3	H207	0,296	0,129	30	35	72	17	1,1	62,3	57
20208-K-TVP-C3	H208	0,38	0,17	35	40	80	18	1,1	70,1	58
20209-K-TVP-C3	H209	0,433	0,216	40	45	85	19	1,1	74,6	65
20210-K-TVP-C3	H210	0,489	0,264	45	50	90	20	1,1	79,5	70
20211-K-TVP-C3	H211	0,642	0,292	50	55	100	21	1,5	89,2	75
20311-K-TVP-C3	H311	1,49	0,35	50	55	120	29	2	101,7	75
20212-K-TVP-C3	H212	0,822	0,325	55	60	110	22	1,5	97,8	80
20312-K-TVP-C3	H312	1,89	0,373	55	60	130	31	2,1	111,2	80
20213-K-TVP-C3	H213	1,07	0,393	60	65	120	23	1,5	105,1	92
20313-K-MB-C3	H313	2,14	0,452	60	65	140	33	1,5	120,6	92
20215-K-TVP-C3	H215	1,25	0,693	65	75	130	25	1,5	115,9	98
20216-K-TVP-C3	H216	1,56	0,876	70	80	140	26	2	124,5	105
20217-K-MB-C3	H217	2,19	0,995	75	85	150	28	2	133,9	110
20218-K-MB-C3	H218	2,68	1,17	80	90	160	30	2	143,8	126
20318-K-MB-C3	H318	6,17	1,36	80	90	190	43	3	165,1	126
20220-K-MB-C3	H220	3,9	1,48	90	100	180	34	2,1	160,8	130
20320-K-MB-C3	H320	8,58	1,69	90	100	215	47	3	186,6	130
20222-K-MB-C3	H222	5,45	1,9	100	110	200	38	2,1	178,6	145
20224-K-MB-C3	H3024	6,51	1,95	110	120	215	40	2,1	191,1	145
20226-K-MB-C3	H3026	7,21	2,9	115	130	230	40	3	205,7	155
20228-K-MB-C3	H3028	8,98	3,25	125	140	250	42	3	223,9	165
20230-K-MB-C3	H3030	11,6	3,98	135	150	270	45	3	238,6	180
20232-K-MB-C3	H3032	14,4	5,33	140	160	290	48	3	256,5	190

		Mounting dimensions					Basic load ratings			Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>
l	c ≈	d <sub>a</sub> max.	D <sub>a</sub> max.	d <sub>b</sub> min.	B <sub>a</sub> min.	r <sub>a</sub> max.	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N			
26	9	33	46,4	28	6	1	24 000	25 000	2 190	6 700	
27	9	39	56,4	33	5	1	27 500	28 500	2 850	5 600	
29	10	45	65	38	5	1	40 500	43 000	4 900	4 800	
31	11	51	73	43	5	1	49 000	53 000	5 400	4 300	
33	12	56	78	48	5	1	52 000	57 000	5 900	4 000	
35	13	61	83	53	5	1	58 500	68 000	7 000	3 600	
37	13	68	91	60	6	1,5	73 500	85 000	9 300	3 400	
45	13	72	109	60	6	2	120 000	137 000	12 400	3 000	
38	13	73	101	64	6	1,5	85 000	100 000	10 900	3 200	
47	13	78	118	65	5	2,1	146 000	170 000	15 200	2 800	
40	14	80	111	70	5	1,5	95 000	116 000	12 700	3 000	
50	14	84	128	70	5	2,1	170 000	196 000	17 900	2 800	
43	15	90	121	80	5	1,5	112 000	143 000	16 100	2 800	
46	17	96	129	85	5	2	125 000	163 000	17 100	2 600	
50	18	102	139	90	6	2	156 000	200 000	20 400	2 400	
52	18	108	149	95	6	2	173 000	220 000	22 000	2 000	
65	18	113	176	96	6	2,5	300 000	360 000	30 500	1 900	
58	20	120	168	106	7	2,1	224 000	290 000	28 000	1 900	
71	20	127	201	108	7	2,5	365 000	440 000	38 000	1 700	
63	21	132	188	116	7	2,1	285 000	375 000	34 500	1 700	
72	22	143	203	127	13	2,1	305 000	415 000	38 000	1 600	
80	23	154	216	137	20	2,5	335 000	450 000	42 500	1 500	
82	24	166	236	147	19	2,5	390 000	530 000	50 000	1 400	
87	26	181	256	158	19	2,5	430 000	610 000	55 000	1 300	
93	28	193	276	168	20	2,5	500 000	720 000	64 000	1 200	



**FAG**



## Spherical roller bearings

# Spherical roller bearings

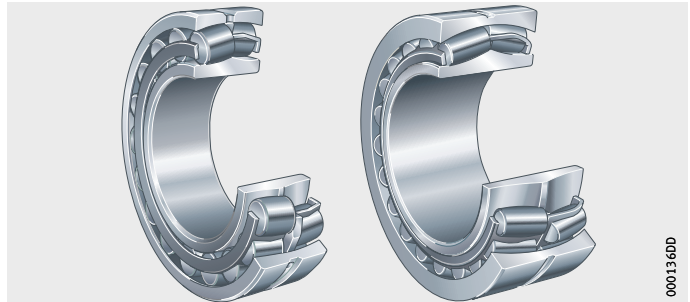
	Page
<b>Product overview</b>	Spherical roller bearings..... 574
<b>Features</b>	<b>X-life</b> ..... 576
	Radial and axial load capacity..... 576
	Compensation of angular misalignments ..... 576
	Bearings with cylindrical bore ..... 577
	Bearings with tapered bore ..... 577
	Sealing..... 577
	Lubrication ..... 577
	Operating temperature ..... 577
	Cages ..... 578
	Suffixes..... 581
<b>Design and safety guidelines</b>	Equivalent dynamic bearing load ..... 581
	Equivalent static bearing load..... 582
	Minimum radial load ..... 582
	Axial load carrying capacity..... 582
	Speeds..... 582
	Design of bearing arrangements ..... 582
<b>Accuracy</b>	Tolerances for bearings to specification T41A and T41D ..... 585
	Radial internal clearance of bearings with cylindrical bore..... 586
	Radial internal clearance of bearings with tapered bore..... 587
<b>Dimension tables</b>	Spherical roller bearings, cylindrical or tapered bore..... 588
	Spherical roller bearings with adapter sleeve ..... 632
	Spherical roller bearings with withdrawal sleeve ..... 646



# Product overview Spherical roller bearings

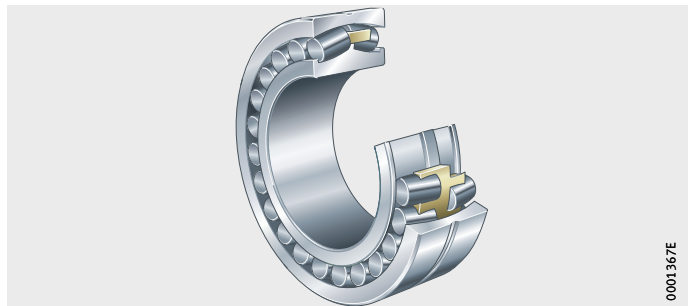
**Cylindrical bore**  
E1 design

213..-E1, 222..-E1, 223..-E1, 230..-E1, 230..-E1A, 231..-E1, 231..-E1A, 232..-E1, 232..-E1A, 240..-E1, 241..-E1



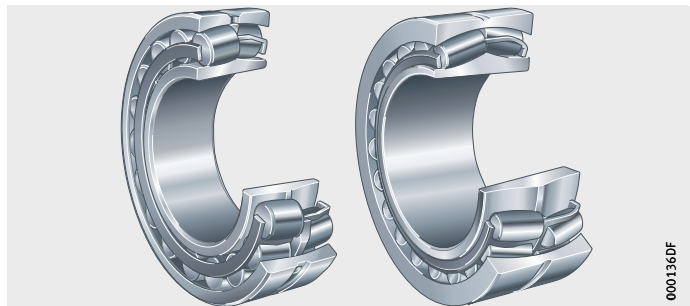
Rigid central rib

222, 223, 230, 231, 232, 233..-A, 239, 240, 241



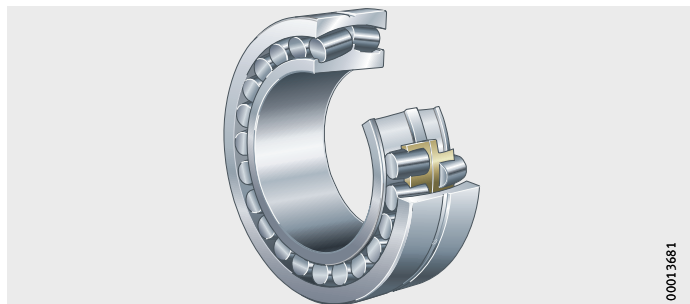
**Tapered bore**  
E1 design

213..-E1-K, 222..-E1-K, 223..-E1-K, 230..-E1(A)-K, 231..-E1(A)-K, 232..-E1(A)-K, 240..-E1-K30, 241..-E1-K30



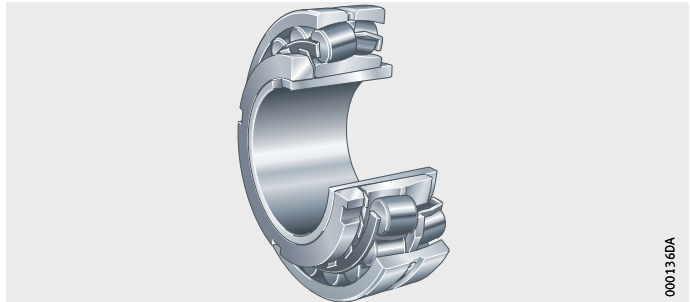
Rigid central rib

222..-K, 223..-K, 230..-K, 231..-K, 232..-K, 239..-K, 240..-K30, 241..-K30



**With adapter sleeve**  
E1 design

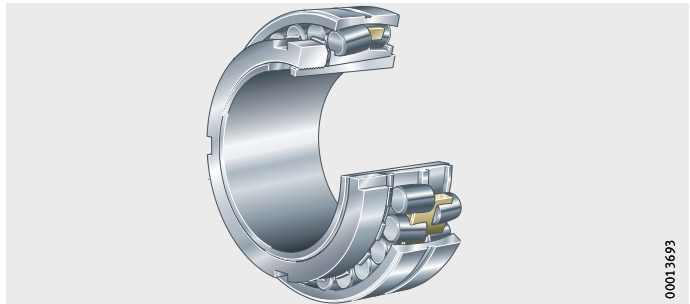
213..-E1-K + H, 222..-E1-K + H, 223..-E1-K + H,  
230..-E1(A)-K + H, 231..-E1(A)-K + H, 232..-E1(A)-K + H



000136DA

**Rigid central rib**

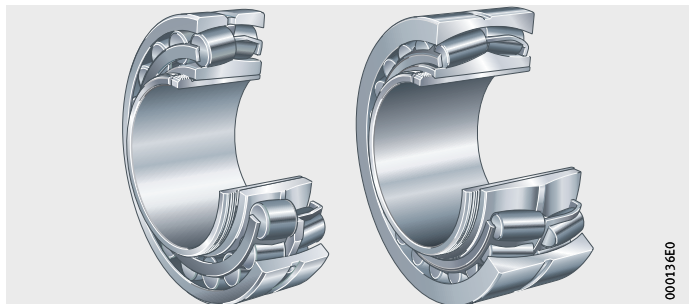
222..-K + H, 223..-K + H, 230..-K + H, 231..-K + H,  
232..-K + H, 239..-K + H



00013693

**With withdrawal sleeve**  
E1 design

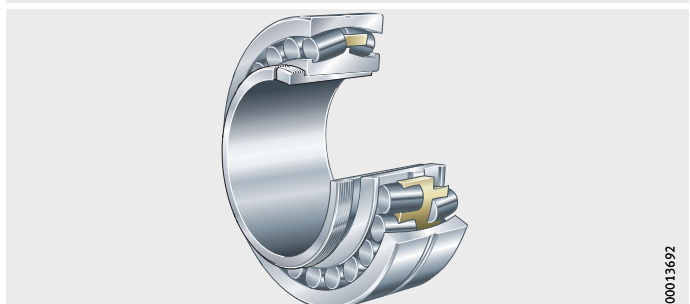
213..-E1-K + AH, 222..-E1-K + AH, 223..-E1-K + AH,  
230..-E1(A)-K + AH, 231..-E1(A)-K + AH, 232..-E1(A)-K + AH,  
240..-E1-K30 + AH, 241..-E1-K30 + AH



000136E0

**Rigid central rib**

222..-K + AH, 223..-K + AH, 230..-K + AH, 231..-K + AH,  
232..-K + AH, 239..-K + AH, 240..-K30 + AH, 241..-K30 + AH



00013692

# Spherical roller bearings

## Features

Spherical roller bearings are double row, self-retaining units comprising solid outer rings with a concave raceway, solid inner rings and barrel rollers with cages. The inner rings have cylindrical or tapered bores.

The symmetrical barrel rollers orient themselves freely on the concave outer ring raceway. As a result, shaft flexing and misalignment of the bearing seats are compensated, see Compensation of angular misalignments.

## X-life

Many sizes of spherical roller bearings are of an X-life design. These bearings have improved kinematics and optimised surfaces, are made from higher performance materials and do not have a rigid central rib. As a result, the basic dynamic load rating and, under identical operating conditions, the basic rating life of the bearings is significantly improved. In certain applications, this means that a smaller bearing arrangement can be designed.

X-life spherical roller bearings have the suffix E1 and are indicated in the dimension tables.

## Radial and axial load capacity

Spherical roller bearings can support axial forces in both directions and high radial forces. They are designed for very high load carrying capacity and, since they have the maximum possible number of large and particularly long barrel rollers, are also suitable for the heaviest loads.

Due to the narrow osculation between the rollers and raceways, uniform stress distribution is achieved in the bearing.

## Compensation of angular misalignments

Spherical roller bearings compensate for angular misalignments. The permissible adjustment angle is stated for loads  $P < 0,1 \cdot C_r$ , see table.

These adjustment angles are permissible if:

- the angular deviation is constant (static angular misalignment)
- the rotating component is the inner ring.

## Reduced adjustment angle

If the rotating component is the outer ring, the inner ring undergoes tumbling motion or the adjustment angles are larger than stated in the table, the angular adjustment facility is smaller.

If such applications are present, please contact us.

## Adjustment angle

Series	Adjustment angle for $P < 0,1 \cdot C_r$ °
213..-E1, 222, 222..-E1 230, 230..-E1(E1A), 239, 240, 240..-E1, 241..-E1	1,5
223, 223..-E1, 231, 231..-E1(E1A), 232, 232..-E1(E1A), 233..-A, 241	2



**Bearings with cylindrical bore** Spherical roller bearings of all series are available with inner rings having a cylindrical bore.

**Bearings with tapered bore** Spherical roller bearings are also available, with the exception of series 233..-A, with inner rings having a tapered bore.  
Bearings with the suffix K have a bore taper 1:12, bearings of series 240 and 241 have a bore taper 1:30 and the suffix K30.

**Bearings with adapter sleeve or withdrawal sleeve** Bearings with a tapered bore are also available with an adapter sleeve, locknut and tab washer or with a withdrawal sleeve.  
Adapter and withdrawal sleeves must be ordered in addition to the bearing.

**Sealing** We can by agreement supply sealed and greased bearings.

**Lubrication** Open spherical roller bearings can be lubricated with oil or grease. Most spherical roller bearings have a circumferential groove and three lubrication holes in the outer ring for lubrication.  
In bearings of series 239 with an outside diameter < 320 mm, this is indicated by the suffix S.  
Bearings of series 213 with a bore diameter up to 35 mm do not have a lubrication groove and lubrication hole.



If shafts with a vertical axis are supported using spherical roller bearings, particular attention must be paid to ensuring the reliable provision of lubricant. In such cases, oil lubrication should be used.

**Operating temperature** Spherical roller bearings are dimensionally stable up to +200 °C. Bearings with metal cages can be used at operating temperatures from -30 °C to +200 °C.



Bearings with cages made from glass fibre reinforced polyamide are suitable up to +120 °C.



# Spherical roller bearings

## Cages

The standard cages for spherical roller bearings are shown in the table Cage and bore code, page 579 and page 580.

Spherical roller bearings with a rigid central rib on the inner ring (design without suffix E1) have solid cages or sheet metal cages made from brass. Bearings with sheet metal cages do not have a cage suffix.

In bearings with the suffix MB, the solid brass cages are guided on the inner ring while, in bearings with the suffix MA, they are guided on the outer ring, *Figure 2*, page 580.

Bearings with the suffix M have a roller-guided solid brass cage, *Figure 2*, page 580.

## X-life bearings

Bearings of series 213..-E1, 222..-E1, 223..-E1, 240..-E1 and 241..-E1 without a cage suffix have sheet steel cages.

The two cage halves are retained by a guidance ring in the outer or inner ring, *Figure 1*, page 579.

In bearings of series 223..-E1, 240..-E1 and 241..-E1, all sheet steel cages have special protection against wear by means of surface hardening or coating.

The other bearings of E1 design have solid cages made from glass fibre reinforced polyamide 66 or solid brass cages (suffix TVPB or M), *Figure 2*, page 580.



Check the chemical resistance of polyamide to synthetic greases and lubricants with EP additives.

Aged oil and additives in the oil can impair the operating life of plastic cages at high temperatures.

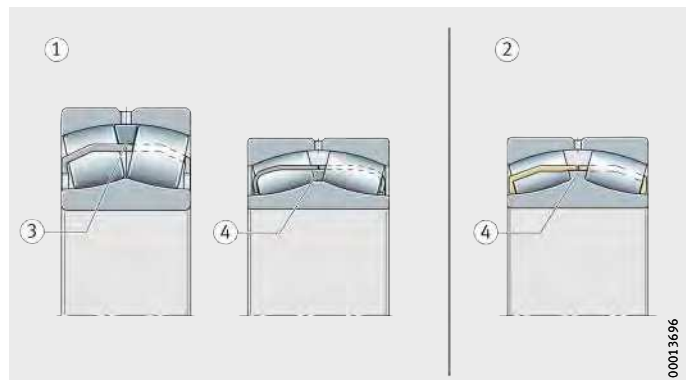
The oil change intervals must be observed.

## Cage and bore code

Series	Sheet metal cage made from		
	Steel		Brass
	Guidance on		
	outer ring	inner ring	inner ring
	Bore code		
213..-E1	08 to 18	–	–
222	–	–	–
222..-E1	up to 36	–	–
223	–	–	–
223..-A (T41A)	–	–	–
223..-E1	up to 30	–	–
223..-E1 (T41A, T41D)	up to 30	–	–
230	–	–	–
230..-E1	–	–	–
230..-E1A	–	–	–
231	–	–	–
231..-E1	–	–	–
231..-E1A	–	–	–
232	–	–	–
232..-E1	–	–	–
232..-E1A	–	–	–
233..-A (T41A)	–	–	–
239	–	–	–
240	–	–	–
240..-E1	–	up to 40	–
241	–	–	40 to 88
241..-E1	–	up to 38	–

- ① Sheet steel cages
- ② Sheet brass cage
- ③ Cage guidance on outer ring
- ④ Cage guidance on inner ring

*Figure 1*  
Sheet metal cages  
made from steel or brass



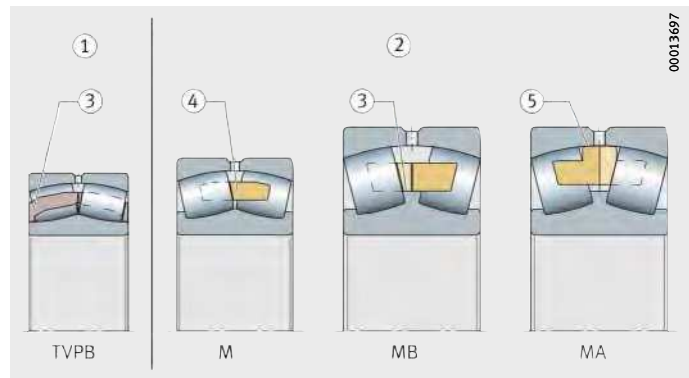
# Spherical roller bearings

## Cage and bore code continued

Series	Solid cage made from			
	Polyamide	Brass		
	Guidance on inner ring TVPB Bore code	Guidance by rollers M	Guidance on	
			inner ring MB	outer ring MA
213..-E1	04 to 07 19 to 22	–	–	–
222	–	–	from 38	–
222..-E1	–	–	–	–
223	–	–	from 32	–
223..-A (T41A)	–	–	–	from 32
223..-E1	–	–	–	–
223..-E1 (T41A, T41D)	–	–	–	–
230	–	–	from 44	–
230..-E1	up to 40	–	–	–
230..-E1A	–	up to 40	–	–
231	–	–	from 40	–
231..-E1	up to 38	–	–	–
231..-E1A	–	up to 38	–	–
232	–	–	from 38	–
232..-E1	up to 36	–	–	–
232..-E1A	–	up to 36	–	–
233..-A (T41A)	–	–	–	from 20
239	–	–	from 36	–
240	–	–	from 44	–
240..-E1	–	–	–	–
241	–	–	from 92	–
241..-E1	–	–	–	–

- ① Solid polyamide cage
- ② Solid brass cages
- ③ Cage guidance on inner ring
- ④ Cage guided by rollers
- ⑤ Cage guidance on outer ring

*Figure 2*  
Solid cages  
made from polyamide or brass



## Suffixes

Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
A	Modified internal construction	Standard
B	Modified internal construction	
E1	Increased capacity design	
K	Tapered bore, taper 1:12	
K30	Tapered bore, taper 1:30	
M	Solid brass cage, guided by rollers	
MA	Solid brass cage, guidance on outer ring	
MB	Solid brass cage, guidance on inner ring	
S	Lubrication groove and lubrication holes in outer ring	
T41A	For oscillating load with restricted diameter tolerances, radial internal clearance C4	
T41D	For oscillating load with restricted diameter tolerances, radial internal clearance C4, bore with thin layer chromium coating	
TVPB	Solid window cage made from glass fibre reinforced polyamide, guidance on inner ring	

## Design and safety guidelines

### Equivalent dynamic bearing load

For bearings under dynamic loading, the following applies:

Load ratio	Equivalent dynamic load
$\frac{F_a}{F_r} \leq e$	$P = F_r + Y_1 \cdot F_a$
$\frac{F_a}{F_r} > e$	$P = 0,67 \cdot F_r + Y_2 \cdot F_a$

P N  
Equivalent dynamic bearing load for combined load

$F_a$  N  
Axial dynamic bearing load

$F_r$  N  
Radial dynamic bearing load

$e, Y_1, Y_2$  –  
Factors from dimension tables.



# Spherical roller bearings

## Equivalent static bearing load

For bearings under static loading, the following applies:

$$P_0 = F_{0r} + Y_0 \cdot F_{0a}$$

$P_0$	N
Equivalent static bearing load for combined load	
$F_{0a}$	N
Axial static bearing load	
$F_{0r}$	N
Radial static bearing load	
$Y_0$	-
Factor from dimension tables.	

## Minimum radial load

The minimum radial load on the spherical roller bearings should be:

- $P = 0,02 \cdot C_r$
- $P = 0,015 \cdot C_r$  for bearings of E1 design.

## Axial load carrying capacity

Spherical roller bearings are suitable for axial loads. If very high loads occur in combination with very high speeds, the increased friction and bearing temperature must be taken into consideration.

## Speeds



The limiting speeds  $n_G$  given in the dimension tables must not be exceeded.

## Design of bearing arrangements Shaft and housing tolerances

Recommended shaft tolerances for bearings with cylindrical bore, see table, page 150.

Recommended housing tolerances for radial bearings, see table, page 152.

## Mounting dimensions

The dimension tables give the maximum dimensions of the radii  $r_a$  and the diameters of the abutment shoulders  $D_a, d_a$ . In order to achieve acceptable running of the spherical roller bearings, the abutment shoulders must be no smaller than  $D_1$  and no larger than  $d_2$  according to the dimension tables.

## Reduced radial internal clearance in fitting

When bearings with a tapered bore are fitted, there is a reduction in the radial internal clearance.

The values given in the tables will ensure secure seating on the shaft, see tables page 583 and page 584.

**Reduction in radial internal clearance and displacement distance on taper 1:12**

Nominal bearing bore diameter d mm		Reduction in radial internal clearance mm		Displacement distance on taper 1:12				Control value for minimum radial internal clearance after fitting		
				Shaft mm		Sleeve mm		CN mm	C3 mm	C4 mm
over	incl.	min.	max.	min.	max.	min.	max.	min.	min.	min.
24	30	0,015	0,02	0,3	0,35	0,3	0,4	0,015	0,02	0,035
30	40	0,02	0,025	0,35	0,4	0,35	0,45	0,015	0,025	0,04
40	50	0,025	0,03	0,4	0,45	0,45	0,5	0,02	0,03	0,05
50	65	0,03	0,04	0,45	0,6	0,5	0,7	0,025	0,035	0,055
65	80	0,04	0,05	0,6	0,75	0,7	0,85	0,025	0,04	0,07
80	100	0,045	0,06	0,7	0,9	0,75	1	0,035	0,05	0,08
100	120	0,05	0,07	0,7	1,1	0,8	1,2	0,05	0,065	0,1
120	140	0,065	0,09	1,1	1,4	1,2	1,5	0,055	0,08	0,11
140	160	0,075	0,1	1,2	1,6	1,3	1,7	0,055	0,09	0,13
160	180	0,08	0,11	1,3	1,7	1,4	1,9	0,06	0,1	0,15
180	200	0,09	0,13	1,4	2	1,5	2,2	0,07	0,1	0,16
200	225	0,1	0,14	1,6	2,2	1,7	2,4	0,08	0,12	0,18
225	250	0,11	0,15	1,7	2,4	1,8	2,6	0,09	0,13	0,2
250	280	0,12	0,17	1,9	2,6	2	2,9	0,1	0,14	0,22
280	315	0,13	0,19	2	3	2,2	3,2	0,11	0,15	0,24
315	355	0,15	0,21	2,4	3,4	2,6	3,6	0,12	0,17	0,26
355	400	0,17	0,23	2,6	3,6	2,9	3,9	0,13	0,19	0,29
400	450	0,2	0,26	3,1	4,1	3,4	4,4	0,13	0,2	0,31
450	500	0,21	0,28	3,3	4,4	3,6	4,8	0,16	0,23	0,35
500	560	0,24	0,32	3,7	5	4,1	5,4	0,17	0,25	0,36
560	630	0,26	0,35	4	5,4	4,4	5,9	0,2	0,29	0,41
630	710	0,3	0,4	4,6	6,2	5,1	6,8	0,21	0,31	0,45
710	800	0,34	0,45	5,3	7	5,8	7,6	0,23	0,35	0,51
800	900	0,37	0,5	5,7	7,8	6,3	8,5	0,27	0,39	0,57



# Spherical roller bearings

Reduction in radial internal clearance and displacement distance on taper 1:30

Nominal bearing bore diameter d mm		Reduction in radial internal clearance mm		Displacement distance on taper 1:30				Control value for minimum radial internal clearance after fitting		
				Shaft mm		Sleeve mm		CN mm	C3 mm	C4 mm
over	incl.	min.	max.	min.	max.	min.	max.	min.	min.	min.
24	30	0,015	0,02	–	–	–	–	0,015	0,02	0,035
30	40	0,02	0,025	–	–	–	–	0,015	0,025	0,04
40	50	0,025	0,03	–	–	–	–	0,02	0,03	0,05
50	65	0,03	0,04	–	–	–	–	0,025	0,035	0,055
65	80	0,04	0,05	–	–	–	–	0,025	0,04	0,07
80	100	0,045	0,06	1,7	2,2	1,8	2,4	0,035	0,05	0,08
100	120	0,05	0,07	1,9	2,7	2	2,8	0,05	0,065	0,1
120	140	0,065	0,09	2,7	3,5	2,8	3,6	0,055	0,08	0,11
140	160	0,075	0,1	3	4	3,1	4,2	0,055	0,09	0,13
160	180	0,08	0,11	3,2	4,2	3,3	4,6	0,06	0,1	0,15
180	200	0,09	0,13	3,5	4,5	3,6	5	0,07	0,1	0,16
200	225	0,1	0,14	4	5,5	4,2	5,7	0,08	0,12	0,18
225	250	0,11	0,15	4,2	6	4,6	6,2	0,09	0,13	0,2
250	280	0,12	0,17	4,7	6,7	4,8	6,9	0,1	0,14	0,22
280	315	0,13	0,19	5	7,5	5,2	7,7	0,11	0,15	0,24
315	355	0,15	0,21	6	8,2	6,2	8,4	0,12	0,17	0,26
355	400	0,17	0,23	6,5	9	6,8	9,2	0,13	0,19	0,29
400	450	0,2	0,26	7,7	10	8	10,4	0,13	0,2	0,31
450	500	0,21	0,28	8,2	11	8,4	11,2	0,16	0,23	0,35
500	560	0,24	0,32	9,2	12,5	9,6	12,8	0,17	0,25	0,36
560	630	0,26	0,35	10	13,5	10,4	14	0,2	0,29	0,41
630	710	0,3	0,4	11,5	15,5	12	16	0,21	0,31	0,45
710	800	0,34	0,45	13,3	17,5	13,6	18	0,23	0,35	0,51
800	900	0,37	0,5	14,3	19,5	14,8	20	0,27	0,39	0,57



**Accuracy** The main dimensions of the bearings conform to DIN 635-2, the dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620-2.

**Tolerances for bearings to specification T41A and T41D** Bearings to specification T41A (D) have restricted tolerances, see table. In bearings with a tapered bore, the reduced tolerance range applies to the outside diameter only.

**Tolerances**

Inner ring			Outer ring			
Nominal bearing bore diameter		Deviation $\Delta_{dmp}$ Tolerances in $\mu\text{m}$	Nominal outside diameter		Deviation $\Delta_{Dmp}$ Tolerances in $\mu\text{m}$	
Dimensions in mm			Dimensions in mm			
over	incl.		over	incl.		
30	50	0 -7	80	150	-5 -13	
50	80	0 -9	150	180	-5 -18	
80	120	0 -12	180	315	-10 -23	
120	180	0 -15	315	400	-13 -28	
180	250	0 -18	400	500	-13 -30	
250	315	0 -21	500	630	-15 -35	



# Spherical roller bearings

## Radial internal clearance of bearings with cylindrical bore

The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

### Radial internal clearance

Bore		Radial internal clearance							
d mm		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
18	24	10	20	20	35	35	45	45	60
24	30	15	25	25	40	40	55	55	75
30	40	15	30	30	45	45	60	60	80
40	50	20	35	35	55	55	75	75	100
50	65	20	40	40	65	65	90	90	120
65	80	30	50	50	80	80	110	110	145
80	100	35	60	60	100	100	135	135	180
100	120	40	75	75	120	120	160	160	210
120	140	50	95	95	145	145	190	190	240
140	160	60	110	110	170	170	220	220	280
160	180	65	120	120	180	180	240	240	310
180	200	70	130	130	200	200	260	260	340
200	225	80	140	140	220	220	290	290	380
225	250	90	150	150	240	240	320	320	420
250	280	100	170	170	260	260	350	350	460
280	315	110	190	190	280	280	370	370	500
315	355	120	200	200	310	310	410	410	550
355	400	130	220	220	340	340	450	450	600
400	450	140	240	240	370	370	500	500	660
450	500	140	260	260	410	410	550	550	720
500	560	150	280	280	440	440	600	600	780
560	630	170	310	310	480	480	650	650	850
630	710	190	350	350	530	530	700	700	920
710	800	210	390	390	580	580	770	770	1 010
800	900	230	430	430	650	650	860	860	1 120

## Radial internal clearance of bearings with tapered bore

The radial internal clearance corresponds to internal clearance group CN to DIN 620-4.

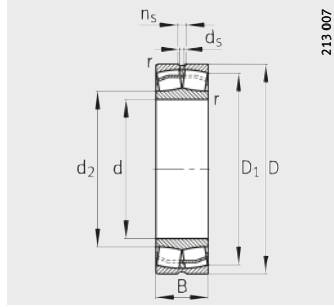
### Radial internal clearance

Bore		Radial internal clearance							
d mm		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
18	24	15	25	25	35	35	45	45	60
24	30	20	30	30	40	40	55	55	75
30	40	25	35	35	50	50	65	65	85
40	50	30	45	45	60	60	80	80	100
50	65	40	55	55	75	75	95	95	120
65	80	50	70	70	95	95	120	120	150
80	100	55	80	80	110	110	140	140	180
100	120	65	100	100	135	135	170	170	220
120	140	80	120	120	160	160	200	200	260
140	160	90	130	130	180	180	230	230	300
160	180	100	140	140	200	200	260	260	340
180	200	110	160	160	220	220	290	290	370
200	225	120	180	180	250	250	320	320	410
225	250	140	200	200	270	270	350	350	450
250	280	150	220	220	300	300	390	390	490
280	315	170	240	240	330	330	430	430	540
315	355	190	270	270	360	360	470	470	590
355	400	210	300	300	400	400	520	520	650
400	450	230	330	330	440	440	570	570	720
450	500	260	370	370	490	490	630	630	790
500	560	290	410	410	540	540	680	680	870
560	630	320	460	460	600	600	760	760	980
630	710	350	510	510	670	670	850	850	1 090
710	800	390	570	570	750	750	960	960	1 220
800	900	440	640	640	840	840	1 070	1 070	1 370

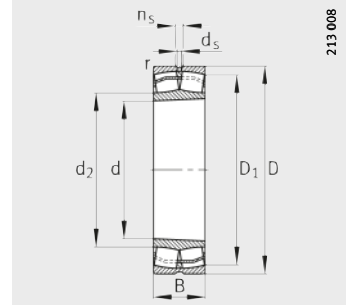


# Spherical roller bearings

Cylindrical or tapered bore



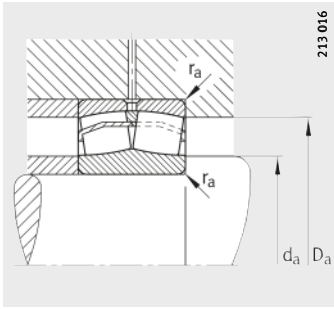
E1 design  
Cylindrical bore



Tapered bore  
K = taper 1:12

**Dimension table** - Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D <sub>1</sub> ≈	d <sub>2</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
21304-E1-TVPB	XL	0,16	20	52	15	1,1	43	28,9	–	–
22205-E1-K	XL	0,175	25	52	18	1	44,5	31,3	3,2	4,8
22205-E1	XL	0,18	25	52	18	1	44,5	31,3	3,2	4,8
21305-E1-TVPB	XL	0,254	25	62	17	1,1	51	35,2	–	–
22206-E1-K	XL	0,269	30	62	20	1	53,7	37,9	3,2	4,8
22206-E1	XL	0,275	30	62	20	1	53,7	37,9	3,2	4,8
21306-E1-TVPB	XL	0,386	30	72	19	1,1	59,9	41,5	–	–
22207-E1-K	XL	0,425	35	72	23	1,1	62,5	43,8	3,2	4,8
22207-E1	XL	0,434	35	72	23	1,1	62,5	43,8	3,2	4,8
21307-E1-K-TVPB	XL	0,496	35	80	21	1,5	66,6	47,4	–	–
21307-E1-TVPB	XL	0,503	35	80	21	1,5	66,6	47,4	–	–
22208-E1-K	XL	0,517	40	80	23	1,1	70,4	48,6	3,2	4,8
22208-E1	XL	0,528	40	80	23	1,1	70,4	48,6	3,2	4,8
21308-E1	XL	0,701	40	90	23	1,5	80,8	59,7	3,2	4,8
21308-E1-K	XL	0,702	40	90	23	1,5	80,8	59,7	3,2	4,8
22308-E1-K	XL	1,03	40	90	33	1,5	76	52,4	3,2	4,8
22308-E1	XL	1,05	40	90	33	1,5	76	52,4	3,2	4,8
22308-E1-T41A	XL	1,05	40	90	33	1,5	76	52,4	3,2	4,8
22209-E1-K	XL	0,577	45	85	23	1,1	75,6	54,8	3,2	4,8
22209-E1	XL	0,589	45	85	23	1,1	75,6	54,8	3,2	4,8
21309-E1-K	XL	0,845	45	100	25	1,5	89,8	67,6	3,2	4,8
21309-E1	XL	0,845	45	100	25	1,5	89,8	67,6	3,2	4,8
22309-E1-K	XL	1,36	45	100	36	1,5	84,7	58,9	3,2	6,5
22309-E1	XL	1,39	45	100	36	1,5	84,7	58,9	3,2	6,5
22309-E1-T41A	XL	1,39	45	100	36	1,5	84,7	58,9	3,2	6,5
22210-E1-K	XL	0,608	50	90	23	1,1	80,8	59,7	3,2	4,8
22210-E1	XL	0,622	50	90	23	1,1	80,8	59,7	3,2	4,8
21310-E1-K	XL	1,28	50	110	27	2	89,8	67,3	3,2	4,8
21310-E1	XL	1,28	50	110	27	2	89,8	67,3	3,2	4,8
22310-E1-K	XL	1,86	50	110	40	2	92,6	63	3,2	6,5
22310-E1	XL	1,9	50	110	40	2	92,6	63	3,2	6,5
22310-E1-T41A	XL	1,9	50	110	40	2	92,6	63	3,2	6,5



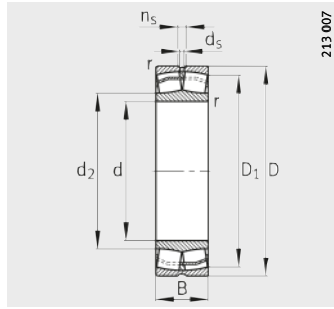
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{0r}$	$e$	$Y_1$	$Y_2$	$Y_0$	$C_{ur}$	$n_G$	$n_B$
min.	max.	max.	N	N					N	$\text{min}^{-1}$	$\text{min}^{-1}$
27	45	1	41 000	33 000	0,3	2,25	3,34	2,2	3 700	15 000	9 700
30,6	46,4	1	48 000	42 500	0,34	1,98	2,94	1,93	4 800	17 000	9 200
30,6	46,4	1	48 000	42 500	0,34	1,98	2,94	1,93	4 800	17 000	9 200
32	55	1	52 000	43 500	0,28	2,43	3,61	2,37	4 750	13 000	8 400
35,6	54,6	1	64 000	57 000	0,31	2,15	3,2	2,1	6 900	13 000	7 800
35,6	56,4	1	64 000	57 000	0,31	2,15	3,2	2,1	6 900	13 000	7 800
37	65	1	72 000	63 000	0,27	2,49	3,71	2,43	7 000	11 000	7 300
42	65	1	88 000	81 500	0,31	2,16	3,22	2,12	9 400	11 000	7 000
42	65	1	88 000	81 500	0,31	2,16	3,22	2,12	9 400	11 000	7 000
44	71	1,5	83 000	74 000	0,26	2,55	3,8	2,5	8 100	9 500	6 800
44	71	1,5	83 000	74 000	0,26	2,55	3,8	2,5	8 100	9 500	6 800
47	73	1	101 000	91 000	0,28	2,41	3,59	2,35	11 800	10 000	6 200
47	73	1	101 000	91 000	0,28	2,41	3,59	2,35	11 800	10 000	6 200
49	81	1,5	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 200
49	81	1,5	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 200
49	81	1,5	156 000	149 000	0,36	1,86	2,77	1,82	13 100	7 500	5 500
49	81	1,5	156 000	149 000	0,36	1,86	2,77	1,82	13 100	7 500	5 500
49	81	1,5	156 000	149 000	0,36	1,86	2,77	1,82	13 100	7 500	5 500
52	78	1	104 000	99 000	0,26	2,62	3,9	2,56	12 700	10 000	5 600
52	78	1	104 000	99 000	0,26	2,62	3,9	2,56	12 700	10 000	5 600
54	91	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 500
54	91	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 500
54	91	1,5	187 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 000
54	91	1,5	187 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 000
54	91	1,5	187 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 000
57	83	1	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 100
57	83	1	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 100
61	99	2	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 400
61	99	2	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 300
61	99	2	229 000	223 000	0,36	1,86	2,77	1,82	20 300	6 000	4 800
61	99	2	229 000	223 000	0,36	1,86	2,77	1,82	20 300	6 000	4 800
61	99	2	229 000	223 000	0,36	1,86	2,77	1,82	20 300	6 000	4 800

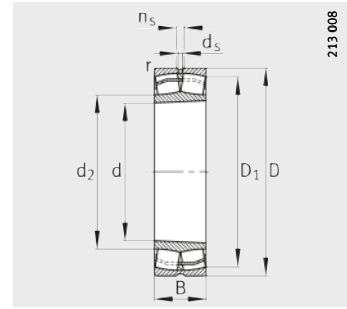


# Spherical roller bearings

Cylindrical or tapered bore



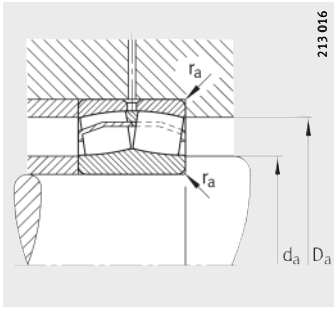
E1 design  
Cylindrical bore



Tapered bore  
K = taper 1:12

Dimension table (continued) · Dimensions in mm

Designation	X-life	Mass m ≈kg	Dimensions							
			d	D	B	r min.	D <sub>1</sub> ≈	d <sub>2</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
22211-E1-K	XL	0,825	55	100	25	1,5	89,8	67,3	3,2	4,8
22211-E1	XL	0,851	55	100	25	1,5	89,8	67,3	3,2	4,8
21311-E1-K	XL	1,19	55	120	29	2	98,3	71,4	3,2	6,5
21311-E1	XL	1,19	55	120	29	2	98,3	71,4	3,2	6,5
22311-E1-K	XL	2,22	55	120	43	2	101,4	68,9	3,2	6,5
22311-E1-K-T41A	XL	2,22	55	120	43	2	101,4	68,9	3,2	6,5
22311-E1	XL	2,27	55	120	43	2	101,4	68,9	3,2	6,5
22311-E1-T41A	XL	2,27	55	120	43	2	101,4	68,9	3,2	6,5
22212-E1-K	XL	1,09	60	110	28	1,5	98,7	71,4	3,2	6,5
22212-E1	XL	1,12	60	110	28	1,5	98,7	71,4	3,2	6,5
21312-E1-K	XL	1,78	60	130	31	2,1	112,5	84,4	3,2	6,5
21312-E1	XL	1,78	60	130	31	2,1	112,5	84,4	3,2	6,5
22312-E1-K	XL	2,83	60	130	46	2,1	110,1	74,8	3,2	6,5
22312-E1-K-T41A	XL	2,83	60	130	46	2,1	110,1	74,8	3,2	6,5
22312-E1	XL	2,89	60	130	46	2,1	110,1	74,8	3,2	6,5
22312-E1-T41A	XL	2,89	60	130	46	2,1	110,1	74,8	3,2	6,5
22213-E1-K	XL	1,52	65	120	31	1,5	107,3	79,1	3,2	6,5
22213-E1	XL	1,55	65	120	31	1,5	107,3	79,1	3,2	6,5
21313-E1-K	XL	2,42	65	140	33	2,1	126,8	94,9	3,2	6,5
21313-E1	XL	2,42	65	140	33	2,1	126,8	94,9	3,2	6,5
22313-E1-K	XL	3,49	65	140	48	2,1	119,3	83,2	4,8	9,5
22313-E1-K-T41A	XL	3,49	65	140	48	2,1	119,3	83,2	4,8	9,5
22313-E1	XL	3,57	65	140	48	2,1	119,3	83,2	4,8	9,5
22313-E1-T41A	XL	3,57	65	140	48	2,1	119,3	83,2	4,8	9,5
22214-E1-K	XL	1,61	70	125	31	1,5	112,5	84,4	3,2	6,5
22214-E1	XL	1,65	70	125	31	1,5	112,5	84,4	3,2	6,5
21314-E1-K	XL	3	70	150	35	2,1	126,2	94,9	3,2	6,5
21314-E1	XL	3	70	150	35	2,1	126,2	94,9	3,2	6,5
22314-E1-K	XL	4,12	70	150	51	2,1	128	86,7	4,8	9,5
22314-E1-K-T41A	XL	4,12	70	150	51	2,1	128	86,7	4,8	9,5
22314-E1	XL	4,21	70	150	51	2,1	128	86,7	4,8	9,5
22314-E1-T41A	XL	4,21	70	150	51	2,1	128	86,7	4,8	9,5



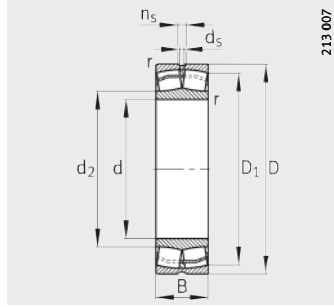
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	$e$	$Y_1$	$Y_2$	$Y_0$			
64	91	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	4 650
64	91	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	4 650
66	109	2	160 000	155 000	0,24	2,84	4,23	2,78	20 200	6 300	5 100
66	109	2	160 000	155 000	0,24	2,84	4,23	2,78	20 200	6 300	5 100
66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
69	101	1,5	160 000	155 000	0,24	2,84	4,23	2,78	20 200	7 500	4 550
69	101	1,5	160 000	155 000	0,24	2,84	4,23	2,78	20 200	7 500	4 550
72	118	2,1	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	4 100
72	118	2,1	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	4 100
72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
74	111	1,5	202 000	210 000	0,24	2,81	4,19	2,75	25 500	6 700	4 200
74	111	1,5	202 000	210 000	0,24	2,81	4,19	2,75	25 500	6 700	4 200
77	128	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 600
77	128	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 600
77	128	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
77	128	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
77	128	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
77	128	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
79	116	1,5	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	3 950
79	116	1,5	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	3 950
82	138	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 950
82	138	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 950
82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700

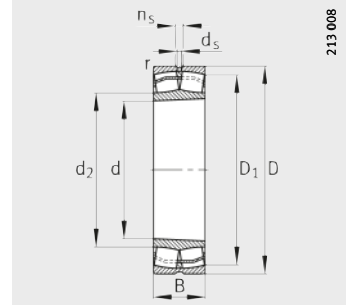


# Spherical roller bearings

Cylindrical or tapered bore



E1 design  
Cylindrical bore

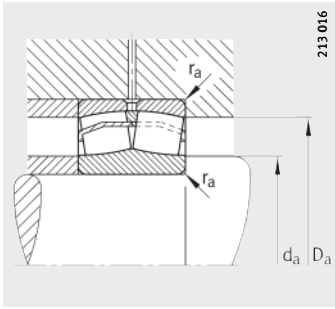


Tapered bore  
K = taper 1:12

**Dimension table (continued)** · Dimensions in mm

Designation	X-life	Mass m ≈kg	Dimensions							
			d	D	B	r min.	D <sub>1</sub> ≈	d <sub>2</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
22215-E1-K	XL	1,68	75	130	31	1,5	117,7	89,8	3,2	6,5
22215-E1	XL	1,72	75	130	31	1,5	117,7	89,8	3,2	6,5
21315-E1-K	XL	2,86	75	160	37	2,1	135,2	99,7	3,2	6,5
21315-E1	XL	2,86	75	160	37	2,1	135,2	99,7	3,2	6,5
22315-E1-K	XL	5,06	75	160	55	2,1	136,3	92,4	4,8	9,5
22315-E1-K-T41A	XL	5,06	75	160	55	2,1	136,3	92,4	4,8	9,5
22315-E1	XL	5,18	75	160	55	2,1	136,3	92,4	4,8	9,5
22315-E1-T41A	XL	5,18	75	160	55	2,1	136,3	92,4	4,8	9,5
22216-E1-K	XL	2,08	80	140	33	2	126,8	94,9	3,2	6,5
22216-E1	XL	2,13	80	140	33	2	126,8	94,9	3,2	6,5
21316-E1-K	XL	2,65	80	170	39	2,1	135,4	99,8	3,2	6,5
21316-E1	XL	2,65	80	170	39	2,1	135,4	99,7	3,2	6,5
22316-E1-K	XL	6,05	80	170	58	2,1	145,1	98,3	4,8	9,5
22316-E1-K-T41A	XL	6,05	80	170	58	2,1	145,1	98,3	4,8	9,5
22316-E1	XL	6,27	80	170	58	2,1	145,1	98,3	4,8	9,5
22316-E1-T41A	XL	6,27	80	170	58	2,1	145,1	98,3	4,8	9,5
22217-E1-K	XL	2,59	85	150	36	2	135,4	99,7	3,2	6,5
22217-E1	XL	2,65	85	150	36	2	135,4	99,7	3,2	6,5
21317-E1-K	XL	5,37	85	180	41	3	143,9	106,1	4,8	9,5
21317-E1	XL	5,37	85	180	41	3	143,9	106,1	4,8	9,5
22317-E1	XL	7,06	85	180	60	3	154,2	104,4	4,8	9,5
22317-E1-T41D	XL	7,06	85	180	60	3	154,2	104,4	4,8	9,5
22317-E1-K	XL	7,06	85	180	60	3	154,2	104,4	4,8	9,5
22317-E1-K-T41A	XL	7,06	85	180	60	3	154,2	104,4	4,8	9,5
22218-E1-K	XL	3,35	90	160	40	2	143,9	106,1	3,2	6,5
22218-E1	XL	3,43	90	160	40	2	143,9	106,1	3,2	6,5
23218-E1-K-TVPB	XL	4,08	90	160	52,4	2	140	104,1	3,2	6,5
23218-E1-TVPB	XL	4,27	90	160	52,4	2	140	104,1	3,2	6,5
23218-E1A-K-M	XL	4,34	90	160	52,4	2	140	-	3,2	6,5
21318-E1-K	XL	6,26	90	190	43	3	152,7	112,6	4,8	9,5
21318-E1	XL	6,26	90	190	43	3	152,7	112,6	4,8	9,5
22318-E1-K	XL	8,33	90	190	64	3	162,5	110,2	6,3	12,2
22318-E1-K-T41A	XL	8,33	90	190	64	3	162,5	110,2	6,3	12,2
22318-E1	XL	8,51	90	190	64	3	162,5	110,2	6,3	12,2
22318-E1-T41D	XL	8,51	90	190	64	3	162,5	110,2	6,3	12,2





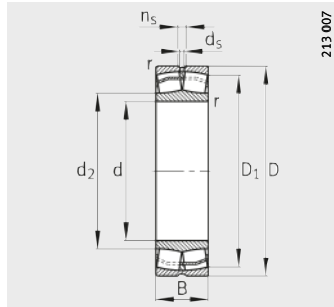
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load $C_{Ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	$e$	$Y_1$	$Y_2$	$Y_0$			
84	121	1,5	216 000	236 000	0,22	3,1	4,62	3,03	29 500	6 300	3 700
84	121	1,5	216 000	236 000	0,22	3,1	4,62	3,03	29 500	6 300	3 700
87	148	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 750
87	148	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 750
87	148	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
87	148	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
87	148	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
87	148	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
91	129	2	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 600	3 550
91	129	2	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 600	3 550
92	158	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	4 050
92	158	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	4 050
92	158	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
92	158	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
92	158	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
92	158	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
96	139	2	305 000	325 000	0,22	3,04	4,53	2,97	38 500	5 300	3 450
96	139	2	305 000	325 000	0,22	3,04	4,53	2,97	38 500	5 300	3 450
99	166	2,5	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 800
99	166	2,5	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 800
99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
101	149	2	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 400
101	149	2	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 400
101	149	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
101	149	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
101	149	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
101	149	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
104	176	2,5	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 600
104	176	2,5	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 600
104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000

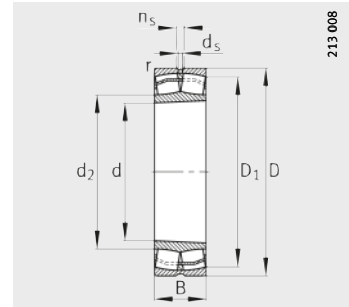


# Spherical roller bearings

Cylindrical or tapered bore



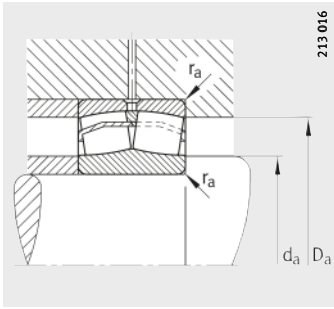
E1 design  
Cylindrical bore



Tapered bore  
K = taper 1:12

Dimension table (continued) · Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D <sub>1</sub> ≈	d <sub>2</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
22219-E1-K	XL	4,04	95	170	43	2,1	152,7	112,6	4,8	9,5
22219-E1	XL	4,13	95	170	43	2,1	152,7	112,6	4,8	9,5
21319-E1-K-TVPB	XL	6,53	95	200	45	3	169,4	124,3	4,8	9,5
21319-E1-TVPB	XL	6,63	95	200	45	3	169,4	124,3	4,8	9,5
22319-E1-K	XL	9,46	95	200	67	3	171,2	116	6,3	12,2
22319-E1-K-T41A	XL	9,46	95	200	67	3	171,2	116	6,3	12,2
22319-E1	XL	9,69	95	200	67	3	171,2	116	6,3	12,2
22319-E1-T41D	XL	9,69	95	200	67	3	171,2	116	6,3	12,2
23120-E1-K-TVPB	XL	4,06	100	165	52	2	146,3	113,9	3,2	6,5
23120-E1-TVPB	XL	4,22	100	165	52	2	146,3	113,9	3,2	6,5
23120-E1A-K-M	XL	4,23	100	165	52	2	146,3	–	3,2	6,5
23120-E1A-M	XL	4,37	100	165	52	2	146,3	–	3,2	6,5
22220-E1-K	XL	4,91	100	180	46	2,1	161,4	119	4,8	9,5
22220-E1	XL	4,96	100	180	46	2,1	161,4	119	4,8	9,5
23220-E1-K-TVPB	XL	6,13	100	180	60,3	2,1	156,7	116,7	4,8	9,5
23220-E1-TVPB	XL	6,32	100	180	60,3	2,1	156,7	116,7	4,8	9,5
23220-E1A-K-M	XL	6,33	100	180	60,3	2,1	156,7	–	4,8	9,5
23220-E1A-M	XL	6,45	100	180	60,3	2,1	156,7	–	4,8	9,5
21320-E1-K-TVPB	XL	8,08	100	215	47	3	182	132	4,8	9,5
21320-E1-TVPB	XL	8,19	100	215	47	3	182	132	4,8	9,5
22320-E1	XL	13,1	100	215	73	3	184,7	130,2	6,3	12,2
22320-E1-T41D	XL	13,1	100	215	73	3	184,7	130,2	6,3	12,2
22320-E1-K	XL	13,1	100	215	73	3	184,7	130,2	6,3	12,2
22320-E1-K-T41A	XL	13,1	100	215	73	3	184,7	130,2	6,3	12,2
23320-AS-MA-T41A	–	15,5	100	215	82,6	3	179,5	–	4,8	9,5



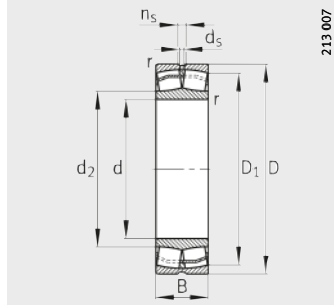
Mounting dimensions  
E1 design

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	$e$	$Y_1$	$Y_2$	$Y_0$			
107	158	2,1	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 300
107	158	2,1	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 300
109	186	2,5	430 000	460 000	0,22	3,04	4,53	2,97	47 500	4 000	3 200
109	186	2,5	430 000	460 000	0,22	3,04	4,53	2,97	47 500	4 000	3 200
109	186	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
109	186	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
109	186	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
109	186	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
112	168	2,1	430 000	475 000	0,24	2,84	4,23	2,78	52 000	4 300	3 150
112	168	2,1	430 000	475 000	0,24	2,84	4,23	2,78	52 000	4 300	3 150
112	168	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
112	168	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
112	168	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
112	168	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
114	201	2,5	495 000	530 000	0,22	3,14	4,67	3,07	61 000	3 600	3 050
114	201	2,5	495 000	530 000	0,22	3,14	4,67	3,07	61 000	3 600	3 050
114	201	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
114	201	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
114	201	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
114	201	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
114	201	2,5	680 000	900 000	0,43	1,57	2,34	1,53	69 000	2 800	-

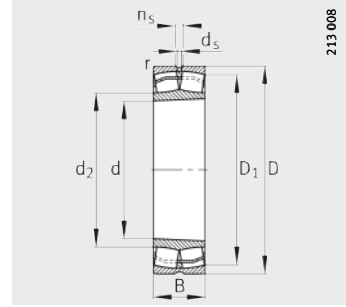


# Spherical roller bearings

Cylindrical or tapered bore



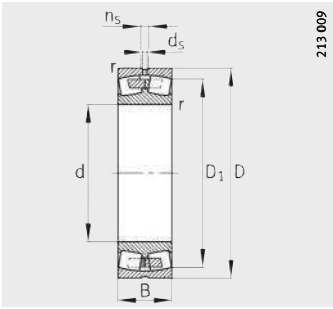
E1 design  
Cylindrical bore



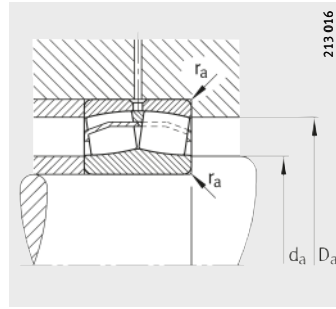
Tapered bore  
K = taper 1:12, K30 = taper 1:30

**Dimension table (continued)** · Dimensions in mm

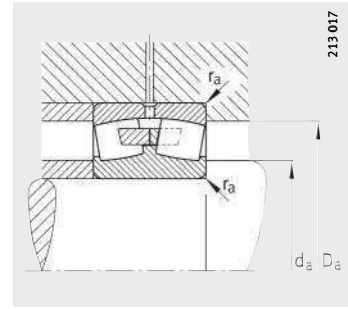
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D <sub>1</sub> ≈	d <sub>2</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
23022-E1-TVPB	XL	3,55	110	170	45	2	154,6	123,7	3,2	6,5
23022-E1A-M	XL	3,67	110	170	45	2	154,6	–	3,2	6,5
23122-E1-K-TVPB	XL	4,95	110	180	56	2	160	124,6	4,8	9,5
23122-E1A-K-M	XL	5,1	110	180	56	2	160	–	4,8	9,5
23122-E1-TVPB	XL	5,31	110	180	56	2	160	124,6	4,8	9,5
23122-E1A-M	XL	5,51	110	180	56	2	160	–	4,8	9,5
24122-E1-K30	XL	6,76	110	180	69	2	155,3	125,6	3,2	6,5
24122-E1	XL	6,92	110	180	69	2	155,3	125,6	3,2	6,5
22222-E1-K	XL	6,82	110	200	53	2,1	178,7	129,4	4,8	9,5
22222-E1	XL	6,99	110	200	53	2,1	178,7	129,4	4,8	9,5
23222-E1-K-TVPB	XL	8,82	110	200	69,8	2,1	172,7	129,1	4,8	9,5
23222-E1-TVPB	XL	9,18	110	200	69,8	2,1	172,7	129,1	4,8	9,5
23222-E1A-K-M	XL	9,32	110	200	69,8	2,1	172,7	–	4,8	9,5
23222-E1A-M	XL	9,54	110	200	69,8	2,1	172,7	–	4,8	9,5
21322-E1-K-TVPB	XL	10,9	110	240	50	3	202,5	146,4	6,3	12,2
21322-E1-TVPB	XL	11,1	110	240	50	3	202,5	146,4	6,3	12,2
22322-E1-K	XL	17,4	110	240	80	3	204,9	143,1	8	15
22322-E1-K-T41A	XL	17,4	110	240	80	3	204,9	143,1	8	15
22322-E1	XL	17,7	110	240	80	3	204,9	143,1	8	15
22322-E1-T41D	XL	17,7	110	240	80	3	204,9	143,1	8	15
23322-AS-MA-T41A	–	21,3	110	240	92,1	3	199,6	–	6,3	12,2



With central rib  
Cylindrical bore



Mounting dimensions  
E1 design



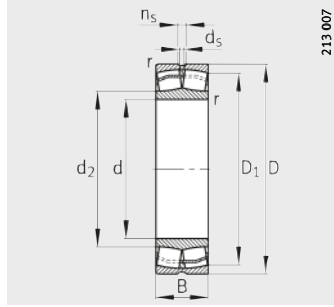
Mounting dimensions  
With central rib

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N	e	$Y_1$	$Y_2$	$Y_0$			
118,8	161,2	2	400 000	530 000	0,23	2,9	4,31	2,83	52 000	4 300	3 000
118,8	161,2	2	400 000	530 000	0,23	2,9	4,31	2,83	52 000	4 300	3 000
121	169	2	530 000	680 000	0,28	2,39	3,56	2,34	61 000	4 000	2 550
121	169	2	530 000	680 000	0,28	2,41	3,59	2,35	61 000	4 000	2 550
121	169	2	530 000	680 000	0,28	2,39	3,56	2,34	61 000	4 000	2 550
121	169	2	530 000	680 000	0,28	2,41	3,59	2,35	61 000	4 000	2 550
121	169	2	530 000	750 000	0,32	1,96	2,92	1,92	84 000	2 800	1 960
121	169	2	530 000	750 000	0,32	1,96	2,92	1,92	84 000	2 800	1 960
122	188	2,1	550 000	600 000	0,25	2,71	4,04	2,65	62 000	4 000	3 000
122	188	2,1	550 000	600 000	0,25	2,71	4,04	2,65	62 000	4 000	3 000
122	188	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
122	188	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
122	188	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
122	188	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
124	226	2,5	600 000	640 000	0,21	3,24	4,82	3,16	69 000	3 000	2 700
124	226	2,5	600 000	640 000	0,21	3,24	4,82	3,16	69 000	3 000	2 700
124	226	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130
124	226	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130
124	226	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130
124	226	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130
124	226	2,5	830 000	1 080 000	0,43	1,57	2,34	1,53	86 000	2 600	–

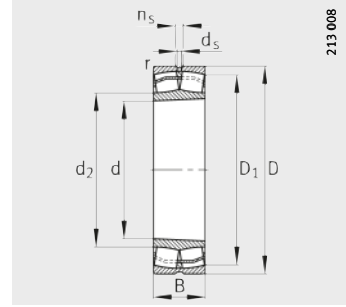


# Spherical roller bearings

Cylindrical or tapered bore



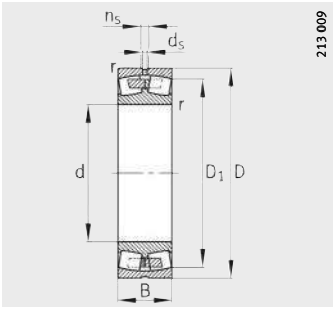
E1 design  
Cylindrical bore



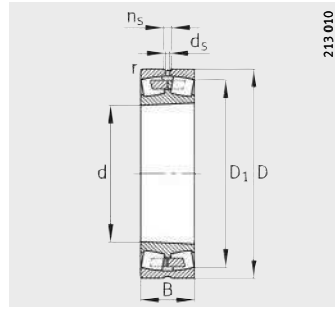
Tapered bore  
K = taper 1:12, K30 = taper 1:30

**Dimension table** (continued) · Dimensions in mm

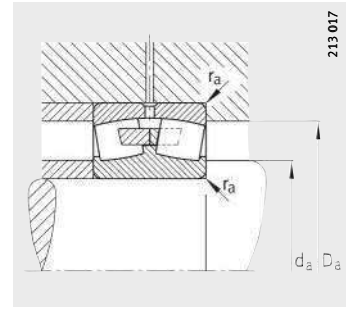
Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D <sub>1</sub> ≈	d <sub>2</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
23024-E1-K-TVPB	XL	3,67	120	180	46	2	164,7	133	3,2	6,5
23024-E1-TVPB	XL	3,86	120	180	46	2	164,7	133	3,2	6,5
23024-E1A-K-M	XL	4,09	120	180	46	2	164,7	–	3,2	6,5
23024-E1A-M	XL	4,17	120	180	46	2	164,7	–	3,2	6,5
24024-E1-K30	XL	5,32	120	180	60	2	159,8	134,4	3,2	6,5
24024-E1	XL	5,43	120	180	60	2	159,8	134,4	3,2	6,5
23124-E1-K-TVPB	XL	7,06	120	200	62	2	177,4	136,2	4,8	9,5
23124-E1-TVPB	XL	7,39	120	200	62	2	177,4	136,2	4,8	9,5
23124-E1A-K-M	XL	7,57	120	200	62	2	177,4	–	4,8	9,5
23124-E1A-M	XL	7,7	120	200	62	2	177,4	–	4,8	9,5
24124-E1-K30	XL	10	120	200	80	2	170,7	136,7	3,2	6,5
24124-E1	XL	10,1	120	200	80	2	170,7	136,7	3,2	6,5
22224-E1	XL	8,84	120	215	58	2,1	192	141,8	6,3	12,2
22224-E1-K	XL	8,84	120	215	58	2,1	192	141,8	6,3	12,2
23224-E1-K-TVPB	XL	11,1	120	215	76	2,1	185,5	139	4,8	9,5
23224-E1A-K-M	XL	11,4	120	215	76	2,1	185,5	–	4,8	9,5
23224-E1-TVPB	XL	11,5	120	215	76	2,1	185,5	139	4,8	9,5
23224-E1A-M	XL	12,1	120	215	76	2,1	185,5	–	4,8	9,5
22324-E1-K	XL	22,1	120	260	86	3	222,4	150,7	8	15
22324-E1-K-T41A	XL	22,1	120	260	86	3	222,4	150,7	8	15
22324-E1	XL	22,5	120	260	86	3	222,4	150,8	8	15
22324-E1-T41D	XL	22,5	120	260	86	3	222,4	150,8	8	15
23324-AS-MA-T41A	–	29,1	120	260	106	3	213,9	–	6,3	12,2



With central rib  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30



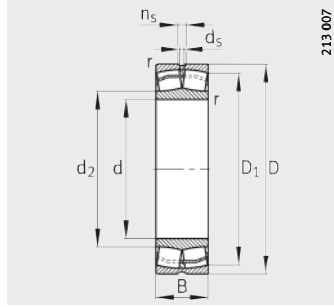
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. C0r	e	Y1	Y2	Y0	Cur	nG	nB
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
128,8	171,2	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
128,8	171,2	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
128,8	171,2	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
128,8	171,2	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
128,8	171,2	2	450 000	690 000	0,27	2,33	3,47	2,28	84 000	4 000	2 400
128,8	171,2	2	450 000	690 000	0,27	2,33	3,47	2,28	84 000	4 000	2 400
131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
131	189	2	680 000	950 000	0,34	1,84	2,74	1,8	101 000	2 600	1 760
131	189	2	680 000	950 000	0,34	1,84	2,74	1,8	101 000	2 600	1 760
132	203	2,1	640 000	740 000	0,25	2,71	4,04	2,65	71 000	3 400	2 700
132	203	2,1	640 000	740 000	0,25	2,71	4,04	2,65	71 000	3 400	2 700
132	203	2	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
132	203	2	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
132	203	2	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
132	203	2	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
134	246	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
134	246	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
134	246	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
134	246	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
134	246	2,5	1 020 000	1 430 000	0,45	1,5	2,23	1,46	103 000	2 400	–

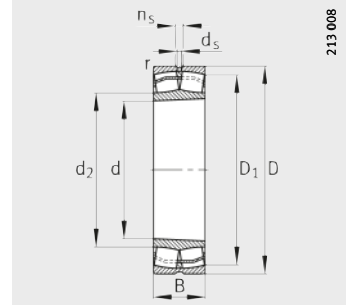


# Spherical roller bearings

Cylindrical or tapered bore



E1 design  
Cylindrical bore

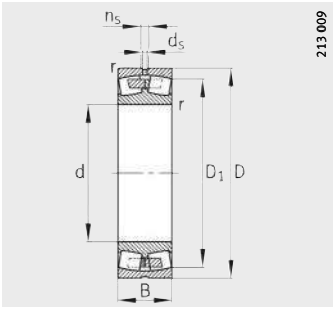


Tapered bore  
K = taper 1:12, K30 = taper 1:30

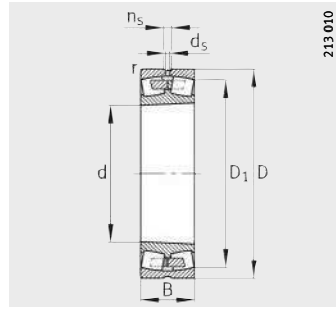
**Dimension table (continued)** · Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r	D <sub>1</sub>	d <sub>2</sub>	d <sub>s</sub>	n <sub>s</sub>
						min.	≈	≈		
23026-E1-K-TVPB	XL	5,42	130	200	52	2	182,3	145,9	4,8	9,5
23026-E1-TVPB	XL	5,61	130	200	52	2	182,3	145,9	4,8	9,5
23026-E1A-K-M	XL	5,7	130	200	52	2	182,3	–	4,8	9,5
23026-E1A-M	XL	5,96	130	200	52	2	182,3	–	4,8	9,5
24026-E1-K30	XL	7,83	130	200	69	2	176,1	146,2	3,2	6,5
24026-E1	XL	7,98	130	200	69	2	176,1	146,2	3,2	6,5
23126-E1-K-TVPB	XL	7,82	130	210	64	2	187,3	146	4,8	9,5
23126-E1A-K-M	XL	8,1	130	210	64	2	187,3	–	4,8	9,5
23126-E1-TVPB	XL	8,11	130	210	64	2	187,3	146	4,8	9,5
23126-E1A-M	XL	8,45	130	210	64	2	187,3	–	4,8	9,5
24126-E1-K30	XL	10,3	130	210	80	2	181,5	148,4	3,2	6,5
24126-E1	XL	10,8	130	210	80	2	181,5	148,4	3,2	6,5
22226-E1-K	XL	10,9	130	230	64	3	205	151,7	6,3	12,2
22226-E1	XL	11,3	130	230	64	3	205	151,7	6,3	12,2
23226-E1-K-TVPB	XL	12,6	130	230	80	3	199,3	150	4,8	9,5
23226-E1-TVPB	XL	13,4	130	230	80	3	199,3	150	4,8	9,5
23226-E1A-K-M	XL	13,6	130	230	80	3	199,3	–	4,8	9,5
23226-E1A-M	XL	14	130	230	80	3	199,3	–	4,8	9,5
22326-E1-K	XL	27,4	130	280	93	4	239,5	162,2	9,5	17,7
22326-E1-K-T41A	XL	27,4	130	280	93	4	239,5	162,2	9,5	17,7
22326-E1	XL	28	130	280	93	4	239,5	162,2	9,5	17,7
22326-E1-T41D	XL	28	130	280	93	4	239,5	162,2	9,5	17,7
23326-AS-MA-T41A	–	35,2	130	280	112	4	232,1	–	6,3	12,2

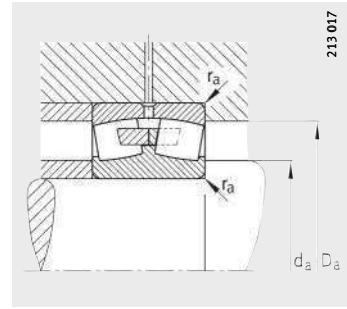




With central rib  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30



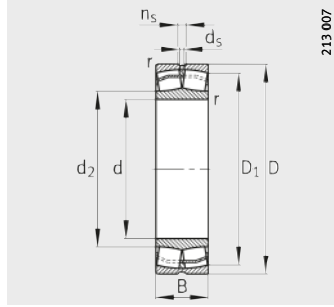
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
138,8	191,2	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
138,8	191,2	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
138,8	191,2	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
138,8	191,2	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
138,8	191,2	2	570 000	860 000	0,28	2,21	3,29	2,16	101 000	3 000	2 130
138,8	191,2	2	570 000	860 000	0,28	2,21	3,29	2,16	101 000	3 000	2 130
141	199	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
141	199	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
141	199	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
141	199	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
141	199	2	710 000	1 050 000	0,32	1,98	2,94	1,93	110 000	2 600	1 590
141	199	2	710 000	1 050 000	0,32	1,98	2,94	1,93	110 000	2 600	1 590
144	216	2,5	760 000	890 000	0,26	2,62	3,9	2,56	79 000	3 000	2 500
144	216	2,5	760 000	890 000	0,26	2,62	3,9	2,56	79 000	3 000	2 500
144	216	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
144	216	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
144	216	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
144	216	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
147	263	3	1 160 000	1 600 000	0,45	1,51	2,25	1,48	108 000	2 200	–

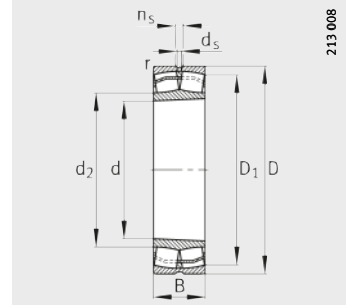


# Spherical roller bearings

Cylindrical or tapered bore



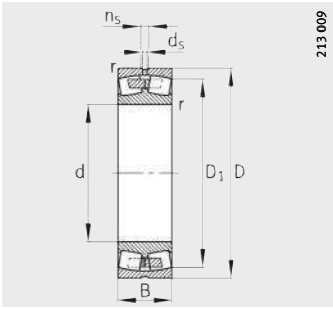
E1 design  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30

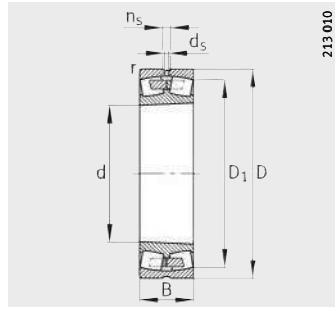
**Dimension table** (continued) · Dimensions in mm

Designation	X-life	Mass m ≈ kg	Dimensions							
			d	D	B	r min.	D <sub>1</sub> ≈	d <sub>2</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
23028-E1-K-TVPB	XL	5,81	140	210	53	2	192,3	155,4	4,8	9,5
23028-E1A-K-M	XL	6	140	210	53	2	192,3	–	4,8	9,5
23028-E1-TVPB	XL	6,04	140	210	53	2	192,3	155,4	4,8	9,5
23028-E1A-M	XL	6,45	140	210	53	2	192,3	–	4,8	9,5
24028-E1-K30	XL	8,29	140	210	69	2	186,8	157,1	3,2	6,5
24028-E1	XL	8,48	140	210	69	2	186,8	157,1	3,2	6,5
23128-E1A-K-M	XL	7,78	140	225	68	2,1	201	–	4,8	9,5
23128-E1-K-TVPB	XL	9,46	140	225	68	2,1	201	157,1	4,8	9,5
23128-E1-TVPB	XL	9,81	140	225	68	2,1	201	157,1	4,8	9,5
23128-E1A-M	XL	10,4	140	225	68	2,1	201	–	4,8	9,5
24128-E1-K30	XL	12,1	140	225	85	2,1	194,8	158,9	4,8	9,5
24128-E1	XL	13,1	140	225	85	2,1	194,8	158,9	4,8	9,5
22228-E1-K	XL	13,7	140	250	68	3	223,4	164,9	6,3	12,2
22228-E1	XL	14,2	140	250	68	3	223,4	164,9	6,3	12,2
23228-E1-K-TVPB	XL	17,1	140	250	88	3	216	162	6,3	12,2
23228-E1A-K-M	XL	17,6	140	250	88	3	216	–	6,3	12,2
23228-E1-TVPB	XL	17,7	140	250	88	3	216	162	6,3	12,2
23228-E1A-M	XL	18,3	140	250	88	3	216	–	6,3	12,2
22328-E1-K	XL	34,4	140	300	102	4	255,7	173,5	9,5	17,7
22328-E1-K-T41A	XL	34,4	140	300	102	4	255,7	173,5	9,5	17,7
22328-E1	XL	35,1	140	300	102	4	255,7	173,5	9,5	17,7
22328-E1-T41D	XL	35,1	140	300	102	4	255,7	173,5	9,5	17,7
23328-AS-MA-T41A	–	40,9	140	300	118	4	249,2	–	6,3	12,2



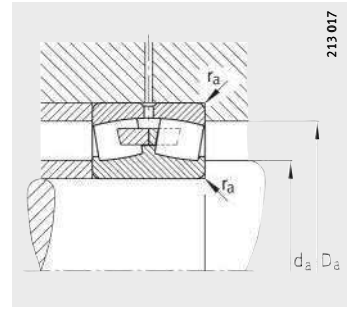
213 009

With central rib  
Cylindrical bore



213 010

Tapered bore  
K = taper 1:12, K30 = taper 1:30



213 017

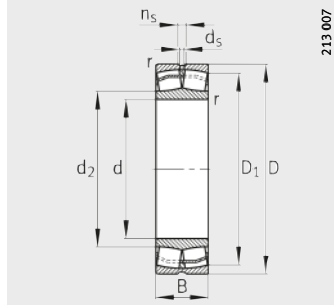
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
148,8	201,2	2	590 000	930 000	0,27	2,37	3,53	2,32	109 000	3 400	1 950
148,8	201,2	2	590 000	930 000	0,27	2,37	3,53	2,32	109 000	3 400	1 950
152	213	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
152	213	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
152	213	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
152	213	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
152	213	2,1	800 000	1 190 000	0,32	1,99	2,96	1,94	124 000	2 400	1 430
152	213	2,1	800 000	1 190 000	0,32	1,99	2,96	1,94	124 000	2 400	1 430
154	236	2,5	870 000	1 040 000	0,25	2,67	3,97	2,61	97 000	2 400	2 250
154	236	2,5	870 000	1 040 000	0,25	2,67	3,97	2,61	97 000	2 400	2 250
154	236	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
154	236	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
154	236	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
154	236	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
157	283	3	1 270 000	1 800 000	0,43	1,57	2,34	1,53	123 000	2 000	–

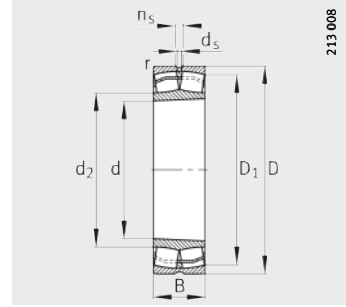


# Spherical roller bearings

Cylindrical or tapered bore



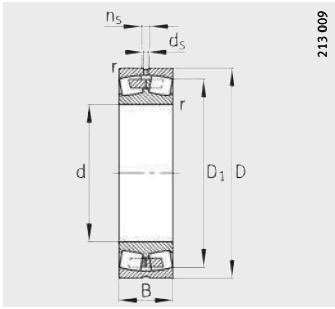
E1 design  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30

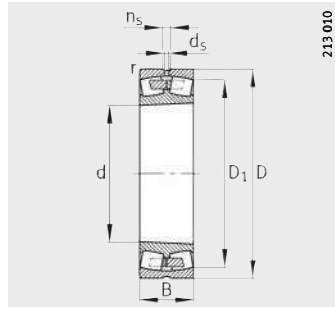
**Dimension table (continued)** · Dimensions in mm

Designation	X-life	Mass m ≈kg	Dimensions							
			d	D	B	r	D <sub>1</sub>	d <sub>2</sub>	d <sub>s</sub>	n <sub>s</sub>
						min.	≈	≈		
23030-E1-K-TVPB	XL	7,29	150	225	56	2,1	206,3	166,6	4,8	9,5
23030-E1A-K-M	XL	7,33	150	225	56	2,1	206,3	–	4,8	9,5
23030-E1-TVPB	XL	7,63	150	225	56	2,1	206,3	166,6	4,8	9,5
23030-E1A-M	XL	7,83	150	225	56	2,1	206,3	–	4,8	9,5
24030-E1-K30	XL	10,4	150	225	75	2,1	199,7	168,1	3,2	6,5
24030-E1	XL	10,6	150	225	75	2,1	199,7	168,1	3,2	6,5
23130-E1-K-TVPB	XL	14,5	150	250	80	2,1	220,8	170,1	6,3	12,2
23130-E1-TVPB	XL	15	150	250	80	2,1	220,8	170,2	6,3	12,2
23130-E1A-K-M	XL	15,8	150	250	80	2,1	220,8	–	6,3	12,2
23130-E1A-M	XL	16,2	150	250	80	2,1	220,8	–	6,3	12,2
24130-E1-K30	XL	18,8	150	250	100	2,1	213	170,4	4,8	9,5
24130-E1	XL	19,8	150	250	100	2,1	213	170,4	4,8	9,5
22230-E1-K	XL	17,8	150	270	73	3	240,8	177,9	8	15
22230-E1	XL	18,2	150	270	73	3	240,8	177,9	8	15
23230-E1-K-TVPB	XL	22,3	150	270	96	3	232,6	174	6,3	12,2
23230-E1A-K-M	XL	22,9	150	270	96	3	232,6	–	6,3	12,2
23230-E1-TVPB	XL	22,9	150	270	96	3	232,6	174	6,3	12,2
23230-E1A-M	XL	23,7	150	270	96	3	232,6	–	6,3	12,2
22330-E1-K	XL	41,2	150	320	108	4	273,2	185,3	9,5	17,7
22330-E1-K-T41A	XL	41,2	150	320	108	4	273,2	185,3	9,5	17,7
22330-E1	XL	42,2	150	320	108	4	273,2	185,3	9,5	17,7
22330-E1-T41D	XL	42,2	150	320	108	4	273,2	185,3	9,5	17,7
23330-A-MA-T41A	–	49,8	150	320	128	4	264,5	–	8	15



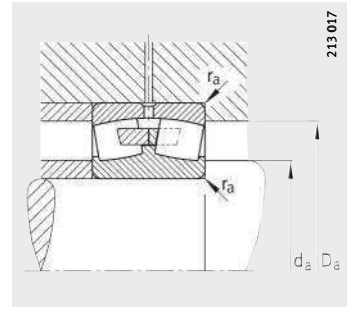
213 009

With central rib  
Cylindrical bore



213 010

Tapered bore  
K = taper 1:12, K30 = taper 1:30



213 017

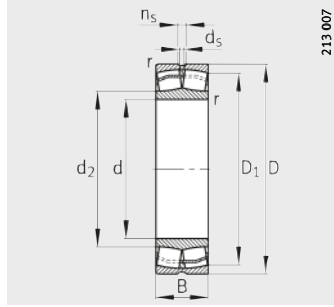
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
160,2	214,8	2,1	680 000	1 090 000	0,27	2,32	3,45	2,26	123 000	2 800	1 790
160,2	214,8	2,1	680 000	1 090 000	0,27	2,32	3,45	2,26	123 000	2 800	1 790
162	238	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
162	238	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
162	238	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
162	238	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
162	238	2,1	1 050 000	1 520 000	0,34	1,83	2,72	1,79	149 000	2 200	1 270
162	238	2,1	1 050 000	1 520 000	0,34	1,83	2,72	1,79	149 000	2 200	1 270
164	256	2,5	1 010 000	1 210 000	0,25	2,69	4	2,63	111 000	2 600	2 050
164	256	2,5	1 010 000	1 210 000	0,25	2,69	4	2,63	111 000	2 600	2 050
164	256	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
164	256	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
164	256	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
164	256	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
167	303	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
167	303	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
167	303	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
167	303	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
167	303	3	1 500 000	2 120 000	0,44	1,52	2,26	1,49	135 000	2 000	–

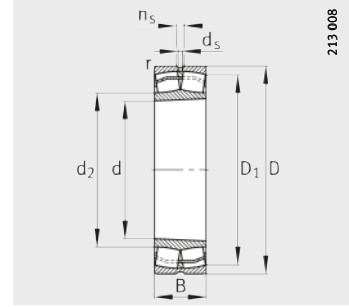


# Spherical roller bearings

Cylindrical or tapered bore



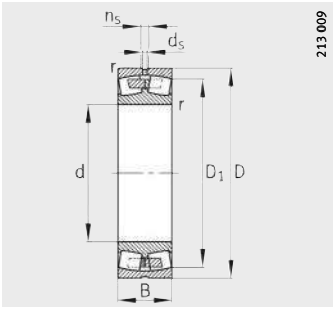
E1 design  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30

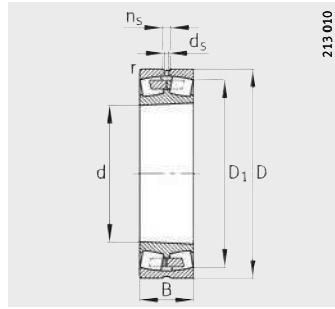
**Dimension table (continued)** · Dimensions in mm

Designation	X-life	Mass m ≈kg	Dimensions							
			d	D	B	r min.	D <sub>1</sub> ≈	d <sub>2</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
23032-E1-K-TVPB	XL	8,67	160	240	60	2,1	219,9	177	6,3	12,2
23032-E1-TVPB	XL	8,97	160	240	60	2,1	219,9	177,5	6,3	12,2
23032-E1A-K-M	XL	9,42	160	240	60	2,1	219,9	–	6,3	12,2
23032-E1A-M	XL	9,71	160	240	60	2,1	219,9	–	6,3	12,2
24032-E1-K30	XL	12,4	160	240	80	2,1	212,9	179,2	4,8	9,5
24032-E1	XL	12,9	160	240	80	2,1	212,9	179,2	4,8	9,5
23132-E1-K-TVPB	XL	18,4	160	270	86	2,1	238,3	183,2	8	15
23132-E1A-K-M	XL	18,6	160	270	86	2,1	238,3	–	8	15
23132-E1-TVPB	XL	19,1	160	270	86	2,1	238,3	183,2	8	15
23132-E1A-M	XL	20	160	270	86	2,1	238,3	–	8	15
24132-E1-K30	XL	23,6	160	270	109	2,1	228,9	183,6	4,8	9,5
24132-E1	XL	25,6	160	270	109	2,1	228,9	183,6	4,8	9,5
22232-E1-K	XL	22,4	160	290	80	3	258,2	190,9	8	15
22232-E1	XL	23,3	160	290	80	3	258,2	190,9	8	15
23232-E1-K-TVPB	XL	27,7	160	290	104	3	249,3	186,7	8	15
23232-E1A-K-M	XL	28,5	160	290	104	3	249,3	–	8	15
23232-E1-TVPB	XL	28,6	160	290	104	3	249,3	186,7	8	15
23232-E1A-M	XL	29,8	160	290	104	3	249,3	–	8	15
22332-K-MB	–	50,1	160	340	114	4	288,3	–	9,5	17,7
22332-MB	–	51,1	160	340	114	4	288,3	–	9,5	17,7
22332-A-MA-T41A	–	52,4	160	340	114	4	288,3	–	9,5	17,7
23332-A-MA-T41A	–	61,3	160	340	136	4	280,6	–	9,5	17,7



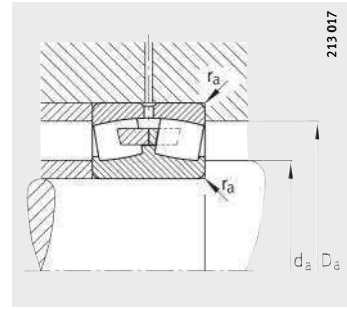
213 009

With central rib  
Cylindrical bore



213 010

Tapered bore  
K = taper 1:12, K30 = taper 1:30



213 017

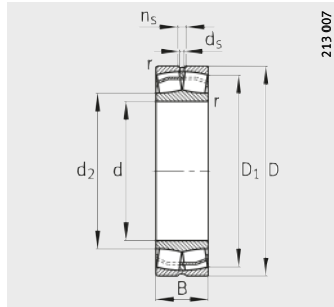
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	Cur	nG	nB
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
170,2	229,8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
170,2	229,8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
170,2	229,8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
170,2	229,8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
170,2	229,8	2,1	770 000	1 240 000	0,27	2,32	3,45	2,26	137 000	2 600	1 660
170,2	229,8	2,1	770 000	1 240 000	0,27	2,32	3,45	2,26	137 000	2 600	1 660
172	258	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 560
172	258	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 560
172	258	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 560
172	258	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 560
172	258	2,1	1 220 000	1 800 000	0,35	1,8	2,69	1,76	168 000	1 800	1 140
172	258	2,1	1 220 000	1 800 000	0,35	1,8	2,69	1,76	168 000	1 800	1 140
174	276	2,5	1 150 000	1 400 000	0,26	2,64	3,93	2,58	125 000	2 600	1 900
174	276	2,5	1 150 000	1 400 000	0,26	2,64	3,93	2,58	125 000	2 600	1 900
174	276	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
174	276	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
174	276	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
174	276	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
177	323	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	121 000	2 000	1 490
177	323	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	121 000	2 000	1 490
177	323	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	136 000	2 000	1 500
177	323	3	1 660 000	2 320 000	0,44	1,54	2,3	1,51	152 000	2 000	–

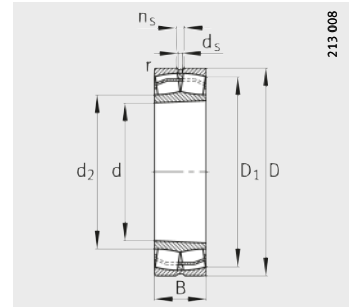


# Spherical roller bearings

Cylindrical or tapered bore



E1 design  
Cylindrical bore

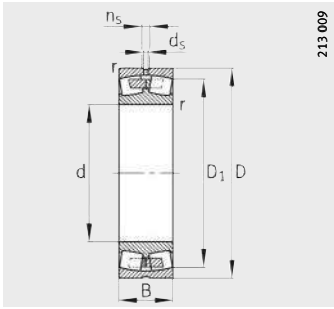


Tapered bore  
K = taper 1:12, K30 = taper 1:30

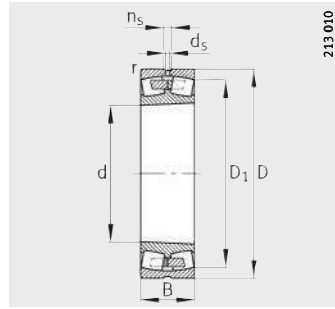
**Dimension table** (continued) · Dimensions in mm

Designation	X-life	Mass m ≈kg	Dimensions							
			d	D	B	r min.	D <sub>1</sub> ≈	d <sub>2</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
23034-E1-K-TVPB	XL	11,9	170	260	67	2,1	237,2	189,8	6,3	12,2
23034-E1A-K-M	XL	12	170	260	67	2,1	237,2	–	6,3	12,2
23034-E1-TVPB	XL	12,3	170	260	67	2,1	237,2	189,8	6,3	12,2
23034-E1A-M	XL	13	170	260	67	2,1	237,2	–	6,3	12,2
24034-E1-K30	XL	16,7	170	260	90	2,1	228,8	190	4,8	9,5
24034-E1	XL	17,4	170	260	90	2,1	228,8	190	4,8	9,5
23134-E1A-K-M	XL	19,5	170	280	88	2,1	248,1	–	8	15
23134-E1-K-TVPB	XL	19,9	170	280	88	2,1	248,1	193,4	8	15
23134-E1-TVPB	XL	20,7	170	280	88	2,1	248,1	193,4	8	15
23134-E1A-M	XL	22,1	170	280	88	2,1	248,1	–	8	15
24134-E1-K30	XL	26	170	280	109	2,1	240	194,2	4,8	9,5
24134-E1	XL	26,8	170	280	109	2,1	240	194,2	4,8	9,5
22234-E1-K	XL	27,1	170	310	86	4	275,4	199,8	9,5	17,7
22234-E1	XL	27,8	170	310	86	4	275,4	199,8	9,5	17,7
23234-E1-K-TVPB	XL	33,1	170	310	110	4	267,4	199,8	8	15
23234-E1A-K-M	XL	34,6	170	310	110	4	267,4	–	8	15
23234-E1-TVPB	XL	34,9	170	310	110	4	267,4	199,8	8	15
23234-E1A-M	XL	36,5	170	310	110	4	267,4	–	8	15
22334-K-MB	–	56,9	170	360	120	4	304,2	–	9,5	17,7
22334-A-MA-T41A	–	59,5	170	360	120	4	304,2	–	9,5	17,7
22334-MB	–	59,5	170	360	120	4	304,2	–	9,5	17,7

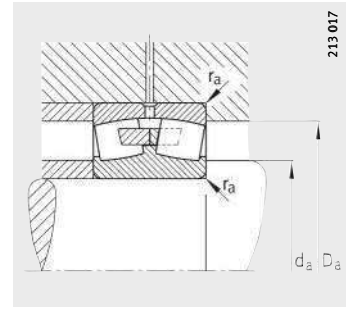




With central rib  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30



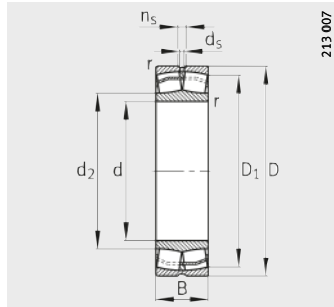
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	Cur	nG	nB
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
180,2	249,8	2,1	870 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
180,2	249,8	2,1	880 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
180,2	249,8	2,1	870 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
180,2	249,8	2,1	870 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
180,2	249,8	2,1	940 000	1 480 000	0,29	2,2	3,27	2,15	159 000	2 400	1 540
180,2	249,8	2,1	940 000	1 480 000	0,29	2,2	3,27	2,15	159 000	2 400	1 540
182	268	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
182	268	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
182	268	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
182	268	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
182	268	2,1	1 260 000	1 900 000	0,33	1,9	2,83	1,86	179 000	1 800	1 060
182	268	2,1	1 260 000	1 900 000	0,33	1,9	2,83	1,86	179 000	1 800	1 060
187	293	3	1 320 000	1 570 000	0,26	2,6	3,87	2,54	140 000	2 400	1 780
187	293	3	1 320 000	1 570 000	0,26	2,6	3,87	2,54	140 000	2 400	1 780
187	293	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
187	293	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
187	293	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
187	293	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
187	343	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	134 000	1 800	1 380
187	343	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	144 000	1 800	1 380
187	343	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	134 000	1 800	1 380

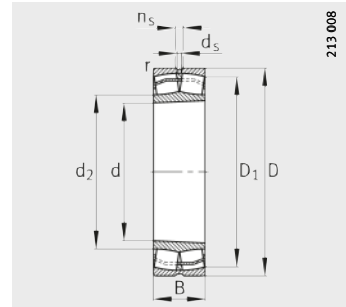


# Spherical roller bearings

Cylindrical or tapered bore



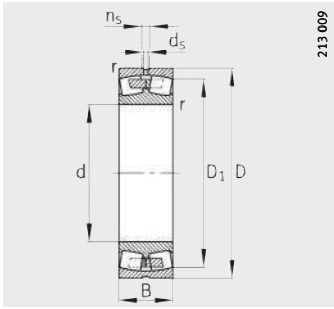
E1 design  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30

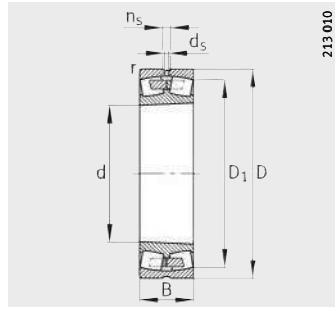
**Dimension table (continued)** · Dimensions in mm

Designation	X-life	Mass m ≈kg	Dimensions							
			d	D	B	r	D <sub>1</sub>	d <sub>2</sub>	d <sub>s</sub>	n <sub>s</sub>
						min.	≈	≈		
<b>23936-S-K-MB</b>	–	7,76	<b>180</b>	250	52	2	230,9	–	4,8	9,5
<b>23936-S-MB</b>	–	7,96	<b>180</b>	250	52	2	230,9	–	4,8	9,5
<b>23036-E1-K-TVPB</b>	<b>XL</b>	15,6	<b>180</b>	280	74	2,1	254,3	201,8	8	15
<b>23036-E1-TVPB</b>	<b>XL</b>	15,9	<b>180</b>	280	74	2,1	254,3	201,8	8	15
<b>23036-E1A-K-M</b>	<b>XL</b>	16	<b>180</b>	280	74	2,1	254,3	–	8	15
<b>23036-E1A-M</b>	<b>XL</b>	16,8	<b>180</b>	280	74	2,1	254,3	–	8	15
<b>24036-E1-K30</b>	<b>XL</b>	22,7	<b>180</b>	280	100	2,1	244,6	201,7	4,8	9,5
<b>24036-E1</b>	<b>XL</b>	23,1	<b>180</b>	280	100	2,1	244,6	201,7	4,8	9,5
<b>23136-E1A-K-M</b>	<b>XL</b>	25,5	<b>180</b>	300	96	3	264,8	–	8	15
<b>23136-E1-K-TVPB</b>	<b>XL</b>	25,9	<b>180</b>	300	96	3	264,8	204,1	8	15
<b>23136-E1A-M</b>	<b>XL</b>	26,1	<b>180</b>	300	96	3	264,8	–	8	15
<b>23136-E1-TVPB</b>	<b>XL</b>	27,3	<b>180</b>	300	96	3	264,8	204,1	8	15
<b>24136-E1-K30</b>	<b>XL</b>	33,2	<b>180</b>	300	118	3	256,2	204,9	6,3	12,2
<b>24136-E1</b>	<b>XL</b>	33,6	<b>180</b>	300	118	3	256,2	204,9	6,3	12,2
<b>22236-E1-K</b>	<b>XL</b>	28,5	<b>180</b>	320	86	4	285,9	211,3	9,5	17,7
<b>22236-E1</b>	<b>XL</b>	29,2	<b>180</b>	320	86	4	285,9	211,3	9,5	17,7
<b>23236-E1-K-TVPB</b>	<b>XL</b>	36	<b>180</b>	320	112	4	277,3	210,6	8	15
<b>23236-E1A-K-M</b>	<b>XL</b>	37	<b>180</b>	320	112	4	277,3	–	8	15
<b>23236-E1-TVPB</b>	<b>XL</b>	37,2	<b>180</b>	320	112	4	277,3	210,6	8	15
<b>23236-E1A-M</b>	<b>XL</b>	38,5	<b>180</b>	320	112	4	277,3	–	8	15
<b>22336-A-MA-T41A</b>	–	71,7	<b>180</b>	380	126	4	323,4	–	12,5	23,5
<b>22336-K-MB</b>	–	66,7	<b>180</b>	380	126	4	323,4	–	12,5	23,5
<b>22336-MB</b>	–	69	<b>180</b>	380	126	4	323,4	–	12,5	23,5



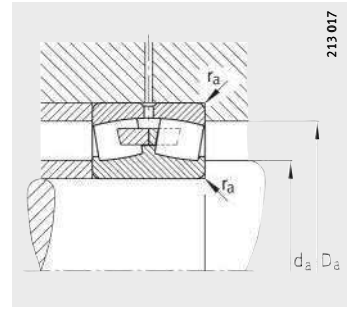
213 009

With central rib  
Cylindrical bore



213 010

Tapered bore  
K = taper 1:12, K30 = taper 1:30



213 017

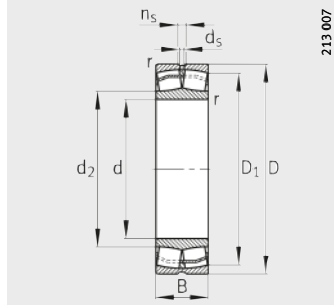
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
188,8	241,2	2	440 000	850 000	0,2	3,42	5,09	3,34	57 000	2 200	1 850
188,8	241,2	2	440 000	850 000	0,2	3,42	5,09	3,34	57 000	2 200	1 850
190,2	269,8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
190,2	269,8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
190,2	269,8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
190,2	269,8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
190,2	269,8	2,1	1 130 000	1 770 000	0,3	2,1	3,13	2,06	181 000	2 200	1 420
190,2	269,8	2,1	1 130 000	1 770 000	0,3	2,1	3,13	2,06	181 000	2 200	1 420
194	286	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
194	286	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
194	286	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
194	286	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
194	286	2,5	1 460 000	2 170 000	0,34	1,86	2,77	1,82	203 000	1 700	980
194	286	2,5	1 460 000	2 170 000	0,34	1,86	2,77	1,82	203 000	1 700	980
197	303	3	1 360 000	1 680 000	0,25	2,71	4,04	2,65	148 000	2 400	1 670
197	303	3	1 360 000	1 680 000	0,25	2,71	4,04	2,65	148 000	2 400	1 670
197	303	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
197	303	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
197	303	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
197	303	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
197	363	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	234 000	1 500	1 270
197	363	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	209 000	1 500	1 270
197	363	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	209 000	1 500	1 270

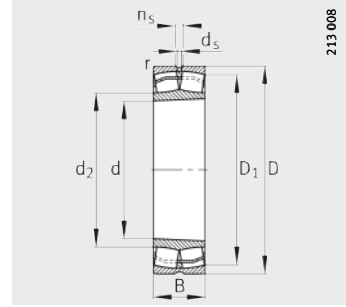


# Spherical roller bearings

Cylindrical or tapered bore



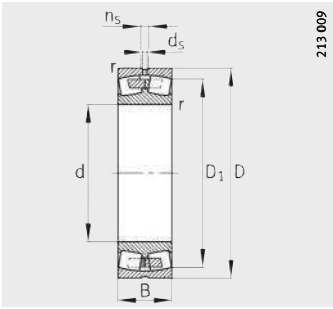
E1 design  
Cylindrical bore



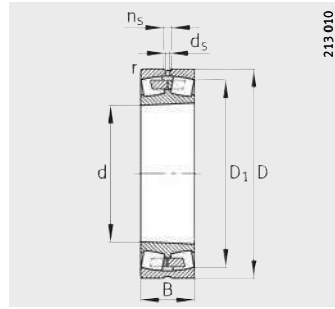
Tapered bore  
K = taper 1:12, K30 = taper 1:30

**Dimension table (continued)** · Dimensions in mm

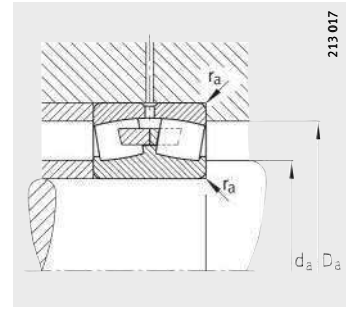
Designation	X-life	Mass m ≈kg	Dimensions							
			d	D	B	r min.	D <sub>1</sub> ≈	d <sub>2</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
<b>23938-S-MB</b>	–	8,43	<b>190</b>	260	52	2	240,2	–	4,8	9,5
<b>23038-E1-K-TVPB</b>	<b>XL</b>	16,3	<b>190</b>	290	75	2,1	264,5	211,9	8	15
<b>23038-E1-TVPB</b>	<b>XL</b>	17,2	<b>190</b>	290	75	2,1	264,5	211,9	8	15
<b>23038-E1A-K-M</b>	<b>XL</b>	17,7	<b>190</b>	290	75	2,1	264,5	–	8	15
<b>23038-E1A-M</b>	<b>XL</b>	18,3	<b>190</b>	290	75	2,1	264,5	–	8	15
<b>24038-E1-K30</b>	<b>XL</b>	23,8	<b>190</b>	290	100	2,1	255,5	212	4,8	9,5
<b>24038-E1</b>	<b>XL</b>	24,1	<b>190</b>	290	100	2,1	255,5	212	4,8	9,5
<b>23138-E1-K-TVPB</b>	<b>XL</b>	30,3	<b>190</b>	320	104	3	281,6	217	8	15
<b>23138-E1-TVPB</b>	<b>XL</b>	32	<b>190</b>	320	104	3	281,6	217	8	15
<b>23138-E1A-K-M</b>	<b>XL</b>	32,4	<b>190</b>	320	104	3	281,6	–	8	15
<b>23138-E1A-M</b>	<b>XL</b>	33,9	<b>190</b>	320	104	3	281,6	–	8	15
<b>24138-E1-K30</b>	<b>XL</b>	41,4	<b>190</b>	320	128	3	271,6	217,5	6,3	12,2
<b>24138-E1</b>	<b>XL</b>	42,1	<b>190</b>	320	128	3	271,6	217,5	6,3	12,2
<b>22238-K-MB</b>	–	36,2	<b>190</b>	340	92	4	296	–	9,5	17,7
<b>22238-MB</b>	–	37	<b>190</b>	340	92	4	296	–	9,5	17,7
<b>23238-B-K-MB</b>	–	46	<b>190</b>	340	120	4	291,2	–	9,5	17,7
<b>23238-B-MB</b>	–	48,4	<b>190</b>	340	120	4	291,2	–	9,5	17,7
<b>22338-K-MB</b>	–	77,3	<b>190</b>	400	132	5	338,2	–	12,5	23,5
<b>22338-A-MA-T41A</b>	–	80,5	<b>190</b>	400	132	5	338,2	–	12,5	23,5
<b>22338-MB</b>	–	80,5	<b>190</b>	400	132	5	338,2	–	12,5	23,5
<b>23338-A-MA-T41A</b>	–	97,1	<b>190</b>	400	155	5	331,6	–	9,5	17,7



With central rib  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30



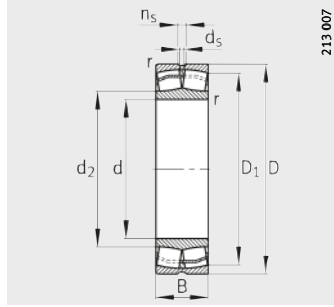
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	Cur	nG	nB
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
198,8	251,2	2	465 000	900 000	0,18	3,66	5,46	3,58	62 000	2 000	1 750
200,2	279,8	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
200,2	279,8	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
200,2	279,8	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
200,2	279,8	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
200,2	279,8	2,1	1 160 000	1 860 000	0,29	2,2	3,27	2,15	192 000	2 200	1 330
200,2	279,8	2,1	1 160 000	1 860 000	0,29	2,2	3,27	2,15	192 000	2 200	1 330
204	306	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
204	306	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
204	306	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
204	306	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
204	306	2,5	1 680 000	2 550 000	0,35	1,82	2,7	1,78	226 000	1 400	880
204	306	2,5	1 680 000	2 550 000	0,35	1,82	2,7	1,78	226 000	1 400	880
207	323	3	1 200 000	1 830 000	0,28	2,39	3,56	2,34	122 000	1 800	1 600
207	323	3	1 200 000	1 830 000	0,28	2,39	3,56	2,34	122 000	1 800	1 600
207	323	3	1 560 000	2 600 000	0,36	1,86	2,77	1,82	156 000	1 700	1 020
207	323	3	1 560 000	2 600 000	0,36	1,86	2,77	1,82	156 000	1 700	1 020
210	380	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	213 000	1 500	1 220
210	380	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	213 000	1 500	1 220
210	380	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	213 000	1 500	1 220
210	380	4	2 200 000	3 200 000	0,43	1,57	2,34	1,53	223 000	1 400	–

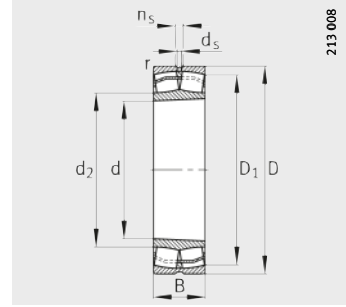


# Spherical roller bearings

Cylindrical or tapered bore



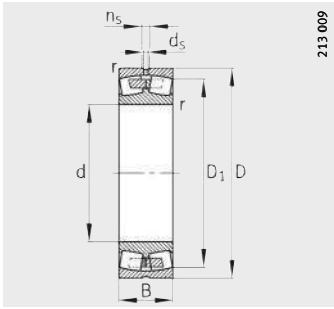
E1 design  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30

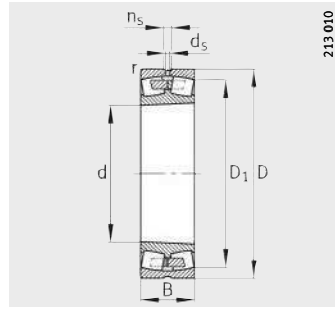
**Dimension table (continued)** · Dimensions in mm

Designation	X-life	Mass m ≈kg	Dimensions							
			d	D	B	r min.	D <sub>1</sub> ≈	d <sub>2</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
<b>23940-S-K-MB</b>	–	11,5	<b>200</b>	280	60	2,1	256,9	–	6,3	12,2
<b>23940-S-MB</b>	–	11,8	<b>200</b>	280	60	2,1	256,9	–	6,3	12,2
<b>23040-E1-K-TVPB</b>	<b>XL</b>	20,8	<b>200</b>	310	82	2,1	281,6	223,4	8	15
<b>23040-E1A-K-M</b>	<b>XL</b>	21,4	<b>200</b>	310	82	2,1	281,6	–	8	15
<b>23040-E1-TVPB</b>	<b>XL</b>	21,5	<b>200</b>	310	82	2,1	281,6	223,4	8	15
<b>23040-E1A-M</b>	<b>XL</b>	22,8	<b>200</b>	310	82	2,1	281,6	–	8	15
<b>24040-E1-K30</b>	<b>XL</b>	30,3	<b>200</b>	310	109	2,1	271,6	223,7	6,3	12,2
<b>24040-E1</b>	<b>XL</b>	30,7	<b>200</b>	310	109	2,1	271,6	223,7	6,3	12,2
<b>23140-B-K-MB</b>	–	41,7	<b>200</b>	340	112	3	293,3	–	9,5	17,7
<b>23140-B-MB</b>	–	43	<b>200</b>	340	112	3	293,3	–	9,5	17,7
<b>24140-B-K30</b>	–	51,6	<b>200</b>	340	140	3	285,9	–	6,3	12,2
<b>24140-B</b>	–	52,4	<b>200</b>	340	140	3	285,9	–	6,3	12,2
<b>22240-B-K-MB</b>	–	42,3	<b>200</b>	360	98	4	312	–	9,5	17,7
<b>22240-B-MB</b>	–	44,2	<b>200</b>	360	98	4	312	–	9,5	17,7
<b>23240-B-K-MB</b>	–	55,8	<b>200</b>	360	128	4	307,5	–	9,5	17,7
<b>23240-B-MB</b>	–	60,5	<b>200</b>	360	128	4	307,5	–	9,5	17,7
<b>22340-K-MB</b>	–	89,5	<b>200</b>	420	138	5	357,4	–	12,5	23,5
<b>22340-MB</b>	–	91	<b>200</b>	420	138	5	357,4	–	12,5	23,5
<b>22340-A-MA-T41A</b>	–	92,4	<b>200</b>	420	138	5	357,4	–	12,5	23,5
<b>23340-A-MA-T41A</b>	–	108	<b>200</b>	420	165	5	350,2	–	9,5	17,7



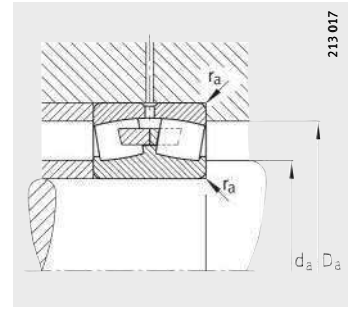
213 009

With central rib  
Cylindrical bore



213 010

Tapered bore  
K = taper 1:12, K30 = taper 1:30



213 017

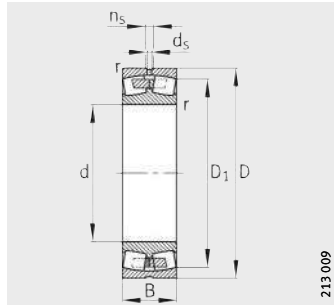
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
210,2	269,8	2,1	550 000	1 080 000	0,2	3,42	5,09	3,34	71 000	2 000	1 650
210,2	269,8	2,1	550 000	1 080 000	0,2	3,42	5,09	3,34	71 000	2 000	1 650
210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
210,2	299,8	2,1	1 350 000	2 150 000	0,3	2,13	3,17	2,08	216 000	2 000	1 240
210,2	299,8	2,1	1 350 000	2 150 000	0,3	2,13	3,17	2,08	216 000	2 000	1 240
214	326	2,5	1 320 000	2 280 000	0,35	1,95	2,9	1,91	131 000	1 700	1 240
214	326	2,5	1 320 000	2 280 000	0,35	1,95	2,9	1,91	131 000	1 700	1 240
214	326	2,5	1 700 000	3 000 000	0,42	1,62	2,42	1,59	190 000	1 400	810
214	326	2,5	1 700 000	3 000 000	0,42	1,62	2,42	1,59	190 000	1 400	810
217	343	3	1 320 000	2 000 000	0,29	2,35	3,5	2,3	123 000	1 700	1 530
217	343	3	1 320 000	2 000 000	0,29	2,35	3,5	2,3	123 000	1 700	1 530
217	343	3	1 660 000	2 750 000	0,37	1,83	2,72	1,79	163 000	1 500	980
217	343	3	1 660 000	2 750 000	0,37	1,83	2,72	1,79	163 000	1 500	980
220	400	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 120
220	400	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 120
220	400	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 120
220	400	4	2 450 000	3 600 000	0,43	1,55	2,31	1,52	238 000	1 300	–

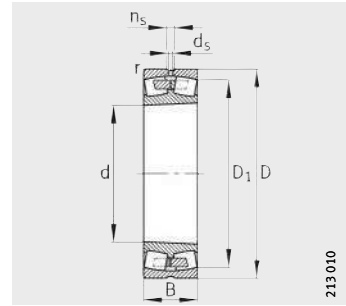


# Spherical roller bearings

Cylindrical or tapered bore



With central rib  
Cylindrical bore

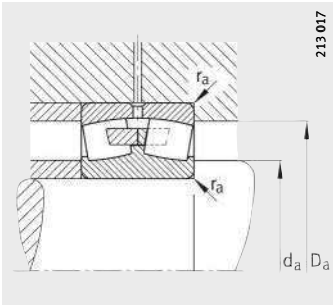


Tapered bore  
K = taper 1:12, K30 = taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
<b>23944-S-MB</b>	12,3	<b>220</b>	300	60	2,1	277,4	6,3	12,2
<b>23944-S-K-MB</b>	12,3	<b>220</b>	300	60	2,1	277,4	6,3	12,2
<b>23044-K-MB</b>	29,9	<b>220</b>	340	90	3	301,8	8	15
<b>23044-MB</b>	31,7	<b>220</b>	340	90	3	301,8	8	15
<b>24044-B-K30-MB</b>	38,9	<b>220</b>	340	118	3	297,4	6,3	12,2
<b>24044-B-MB</b>	39,5	<b>220</b>	340	118	3	297,4	6,3	12,2
<b>23144-B-K-MB</b>	52	<b>220</b>	370	120	4	319,2	9,5	17,7
<b>23144-B-MB</b>	54,5	<b>220</b>	370	120	4	319,2	9,5	17,7
<b>24144-B-K30</b>	64,4	<b>220</b>	370	150	4	311,7	6,3	12,2
<b>24144-B</b>	65,6	<b>220</b>	370	150	4	311,7	6,3	12,2
<b>22244-B-K-MB</b>	59,6	<b>220</b>	400	108	4	348,7	9,5	17,7
<b>22244-B-MB</b>	61,5	<b>220</b>	400	108	4	348,7	9,5	17,7
<b>23244-K-MB</b>	79	<b>220</b>	400	144	4	337,6	9,5	17,7
<b>23244-MB</b>	81,1	<b>220</b>	400	144	4	337,6	9,5	17,7
<b>22344-K-MB</b>	114	<b>220</b>	460	145	5	391,2	12,5	23,5
<b>22344-A-MA-T41A</b>	119	<b>220</b>	460	145	5	391,2	12,5	23,5
<b>22344-MB</b>	119	<b>220</b>	460	145	5	391,2	12,5	23,5
<b>23948-K-MB</b>	13,4	<b>240</b>	320	60	2,1	297,8	6,3	12,2
<b>23948-MB</b>	13,9	<b>240</b>	320	60	2,1	297,8	6,3	12,2
<b>23048-K-MB</b>	31,9	<b>240</b>	360	92	3	322,1	8	15
<b>23048-MB</b>	34,8	<b>240</b>	360	92	3	322,1	8	15
<b>24048-B-K30-MB</b>	43,2	<b>240</b>	360	118	3	318,9	6,3	12,2
<b>24048-B-MB</b>	43,6	<b>240</b>	360	118	3	318,9	6,3	12,2
<b>23148-B-K-MB</b>	65,3	<b>240</b>	400	128	4	346,2	9,5	17,7
<b>23148-B-MB</b>	67,3	<b>240</b>	400	128	4	346,2	9,5	17,7
<b>24148-B-K30</b>	78,7	<b>240</b>	400	160	4	338	6,3	12,2
<b>24148-B</b>	80,7	<b>240</b>	400	160	4	338	6,3	12,2
<b>22248-B-K-MB</b>	81,2	<b>240</b>	440	120	4	380,7	12,5	23,5
<b>22248-B-MB</b>	83,4	<b>240</b>	440	120	4	380,7	12,5	23,5
<b>23248-B-K-MB</b>	105	<b>240</b>	440	160	4	371	12,5	23,5
<b>23248-B-MB</b>	111	<b>240</b>	440	160	4	371	12,5	23,5
<b>22348-K-MB</b>	145	<b>240</b>	500	155	5	420	12,5	23,5
<b>22348-MB</b>	151	<b>240</b>	500	155	5	420	12,5	23,5





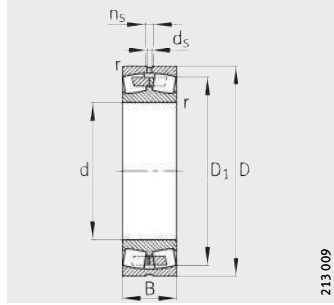
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
230,2	289,8	2,1	600 000	1 250 000	0,18	3,76	5,59	3,67	72 000	1 800	1 460
230,2	289,8	2,1	600 000	1 250 000	0,18	3,76	5,59	3,67	72 000	1 800	1 460
232,4	327,6	2,5	1 100 000	2 000 000	0,26	2,55	3,8	2,5	132 000	1 700	1 440
232,4	327,6	2,5	1 100 000	2 000 000	0,26	2,55	3,8	2,5	132 000	1 700	1 440
232,4	327,6	2,5	1 400 000	2 700 000	0,34	1,96	2,92	1,92	139 000	1 300	1 070
232,4	327,6	2,5	1 400 000	2 700 000	0,34	1,96	2,92	1,92	139 000	1 300	1 070
237	353	3	1 630 000	2 900 000	0,33	2,03	3,02	1,98	165 000	1 400	1 060
237	353	3	1 630 000	2 900 000	0,33	2,03	3,02	1,98	165 000	1 400	1 060
237	353	3	1 900 000	3 450 000	0,41	1,63	2,43	1,6	197 000	1 300	720
237	353	3	1 900 000	3 450 000	0,41	1,63	2,43	1,6	197 000	1 300	720
237	383	3	1 630 000	2 450 000	0,29	2,35	3,5	2,3	153 000	1 400	1 340
237	383	3	1 630 000	2 450 000	0,29	2,35	3,5	2,3	153 000	1 400	1 340
237	383	3	2 040 000	3 450 000	0,37	1,83	2,72	1,79	181 000	1 400	850
237	383	3	2 040 000	3 450 000	0,37	1,83	2,72	1,79	181 000	1 400	850
240	440	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	970
240	440	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	970
240	440	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	970
250,2	309,8	2,1	640 000	1 370 000	0,17	4,05	6,04	3,96	93 000	1 500	1 310
250,2	309,8	2,1	640 000	1 370 000	0,17	4,05	6,04	3,96	93 000	1 500	1 310
252,4	347,6	2,5	1 160 000	2 200 000	0,25	2,74	4,08	2,68	130 000	1 400	1 320
252,4	347,6	2,5	1 160 000	2 200 000	0,25	2,74	4,08	2,68	130 000	1 400	1 320
252,4	347,6	2,5	1 500 000	2 900 000	0,32	2,1	3,13	2,06	150 000	1 300	970
252,4	347,6	2,5	1 500 000	2 900 000	0,32	2,1	3,13	2,06	150 000	1 300	970
257	383	3	1 860 000	3 250 000	0,33	2,06	3,06	2,01	177 000	1 300	970
257	383	3	1 860 000	3 250 000	0,33	2,06	3,06	2,01	177 000	1 300	970
257	383	3	2 120 000	3 900 000	0,41	1,66	2,47	1,62	231 000	1 200	660
257	383	3	2 120 000	3 900 000	0,41	1,66	2,47	1,62	231 000	1 200	660
257	423	3	1 960 000	3 050 000	0,29	2,35	3,5	2,3	184 000	1 300	1 180
257	423	3	1 960 000	3 050 000	0,29	2,35	3,5	2,3	184 000	1 300	1 180
257	423	3	2 450 000	4 250 000	0,37	1,8	2,69	1,76	231 000	1 300	750
257	423	3	2 450 000	4 250 000	0,37	1,8	2,69	1,76	231 000	1 300	750
260	480	4	2 650 000	3 900 000	0,35	1,95	2,9	1,91	249 000	1 500	870
260	480	4	2 650 000	3 900 000	0,35	1,95	2,9	1,91	249 000	1 500	870

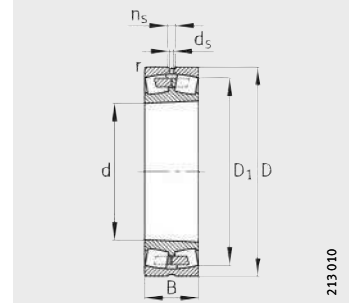


# Spherical roller bearings

Cylindrical or tapered bore



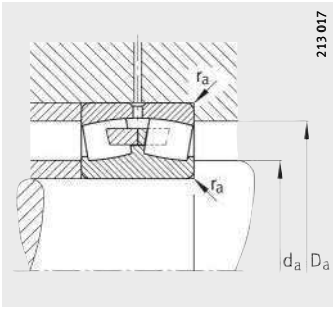
With central rib  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30

**Dimension table (continued)** · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions						
		d	D	B	r	D <sub>1</sub>	d <sub>s</sub>	n <sub>s</sub>
					min.	≈		
<b>23952-K-MB</b>	22,4	<b>260</b>	360	75	2,1	330,5	8	15
<b>23952-MB</b>	24,1	<b>260</b>	360	75	2,1	330,5	8	15
<b>23052-K-MB</b>	46,2	<b>260</b>	400	104	4	357,2	9,5	17,7
<b>23052-MB</b>	49,3	<b>260</b>	400	104	4	357,2	9,5	17,7
<b>24052-B-K30-MB</b>	64,5	<b>260</b>	400	140	4	349,1	6,3	12,2
<b>24052-B-MB</b>	67,2	<b>260</b>	400	140	4	349,1	6,3	12,2
<b>23152-K-MB</b>	89,6	<b>260</b>	440	144	4	379,7	9,5	17,7
<b>23152-MB</b>	92,5	<b>260</b>	440	144	4	379,7	9,5	17,7
<b>24152-B-K30</b>	112	<b>260</b>	440	180	4	370,3	8	15
<b>24152-B</b>	114	<b>260</b>	440	180	4	370,3	8	15
<b>22252-B-K-MB</b>	106	<b>260</b>	480	130	5	415,3	12,5	23,5
<b>22252-B-MB</b>	110	<b>260</b>	480	130	5	415,3	12,5	23,5
<b>23252-B-K-MB</b>	136	<b>260</b>	480	174	5	405,4	12,5	23,5
<b>23252-B-MB</b>	144	<b>260</b>	480	174	5	405,4	12,5	23,5
<b>22352-K-MB</b>	177	<b>260</b>	540	165	6	452,1	12,5	23,5
<b>22352-MB</b>	181	<b>260</b>	540	165	6	452,1	12,5	23,5
<b>23956-K-MB</b>	24,7	<b>280</b>	380	75	2,1	350	8	15
<b>23956-MB</b>	25,5	<b>280</b>	380	75	2,1	350	8	15
<b>23056-B-K-MB</b>	50,3	<b>280</b>	420	106	4	376,5	9,5	17,7
<b>23056-B-MB</b>	52,9	<b>280</b>	420	106	4	376,5	9,5	17,7
<b>24056-B-K30-MB</b>	69,7	<b>280</b>	420	140	4	369,5	6,3	12,2
<b>24056-B-MB</b>	70,8	<b>280</b>	420	140	4	369,5	6,3	12,2
<b>23156-B-K-MB</b>	96,4	<b>280</b>	460	146	5	401,4	9,5	17,7
<b>23156-B-MB</b>	99,5	<b>280</b>	460	146	5	401,4	9,5	17,7
<b>24156-B-K30</b>	118	<b>280</b>	460	180	5	392,8	8	15
<b>24156-B</b>	119	<b>280</b>	460	180	5	392,8	8	15
<b>22256-B-K-MB</b>	110	<b>280</b>	500	130	5	435,2	12,5	23,5
<b>22256-B-MB</b>	113	<b>280</b>	500	130	5	435,2	12,5	23,5
<b>23256-K-MB</b>	153	<b>280</b>	500	176	5	426,3	12,5	23,5
<b>23256-MB</b>	157	<b>280</b>	500	176	5	426,3	12,5	23,5
<b>22356-K-MB</b>	224	<b>280</b>	580	175	6	489,3	12,5	23,5
<b>22356-MB</b>	233	<b>280</b>	580	175	6	489,3	12,5	23,5



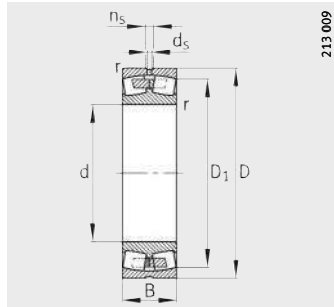
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{0r}$	$e$	$Y_1$	$Y_2$	$Y_0$	$C_{ur}$	$n_G$	$n_B$
min.	max.	max.	N	N					N	$\text{min}^{-1}$	$\text{min}^{-1}$
270,2	349,8	2,1	930 000	1 930 000	0,19	3,54	5,27	3,46	108 000	1 400	1 190
270,2	349,8	2,1	930 000	1 930 000	0,19	3,54	5,27	3,46	108 000	1 400	1 190
274,6	385,4	3	1 500 000	2 800 000	0,26	2,64	3,93	2,58	154 000	1 300	1 170
274,6	385,4	3	1 500 000	2 800 000	0,26	2,64	3,93	2,58	154 000	1 300	1 170
274,6	385,4	3	1 900 000	3 800 000	0,35	1,94	2,88	1,89	204 000	1 100	870
274,6	385,4	3	1 900 000	3 800 000	0,35	1,94	2,88	1,89	204 000	1 100	870
277	423	3	2 200 000	4 000 000	0,33	2,03	3,02	1,98	213 000	1 200	850
277	423	3	2 200 000	4 000 000	0,33	2,03	3,02	1,98	213 000	1 200	850
277	423	3	2 700 000	5 100 000	0,42	1,61	2,4	1,58	315 000	1 100	550
277	423	3	2 700 000	5 100 000	0,42	1,61	2,4	1,58	315 000	1 100	550
280	460	4	2 240 000	3 450 000	0,29	2,32	3,45	2,26	217 000	1 100	1 070
280	460	4	2 240 000	3 450 000	0,29	2,32	3,45	2,26	217 000	1 100	1 070
280	460	4	2 900 000	4 900 000	0,37	1,8	2,69	1,76	270 000	1 100	660
280	460	4	2 900 000	4 900 000	0,37	1,8	2,69	1,76	270 000	1 100	660
286	514	5	3 000 000	4 400 000	0,34	2	2,98	1,96	290 000	1 100	790
286	514	5	3 000 000	4 400 000	0,34	2	2,98	1,96	290 000	1 100	790
290,2	369,8	2,1	970 000	2 040 000	0,18	3,76	5,59	3,67	129 000	1 300	1 100
290,2	369,8	2,1	970 000	2 040 000	0,18	3,76	5,59	3,67	129 000	1 300	1 100
294,6	405,4	3	1 560 000	3 000 000	0,25	2,74	4,08	2,68	156 000	1 300	1 090
294,6	405,4	3	1 560 000	3 000 000	0,25	2,74	4,08	2,68	156 000	1 300	1 090
294,6	405,4	3	2 000 000	4 000 000	0,33	2,04	3,04	2	225 000	1 100	810
294,6	405,4	3	2 000 000	4 000 000	0,33	2,04	3,04	2	225 000	1 100	810
300	440	4	2 360 000	4 400 000	0,32	2,12	3,15	2,07	241 000	1 100	780
300	440	4	2 360 000	4 400 000	0,32	2,12	3,15	2,07	241 000	1 100	780
300	440	4	2 700 000	5 200 000	0,39	1,71	2,54	1,67	365 000	1 000	520
300	440	4	2 700 000	5 200 000	0,39	1,71	2,54	1,67	365 000	1 000	520
300	480	4	2 360 000	3 650 000	0,28	2,43	3,61	2,37	238 000	1 100	1 010
300	480	4	2 360 000	3 650 000	0,28	2,43	3,61	2,37	238 000	1 100	1 010
300	480	4	3 000 000	5 300 000	0,36	1,86	2,77	1,82	260 000	1 100	620
300	480	4	3 000 000	5 300 000	0,36	1,86	2,77	1,82	260 000	1 100	620
306	554	5	3 550 000	5 400 000	0,33	2,03	3,02	1,98	335 000	950	680
306	554	5	3 550 000	5 400 000	0,33	2,03	3,02	1,98	335 000	950	680

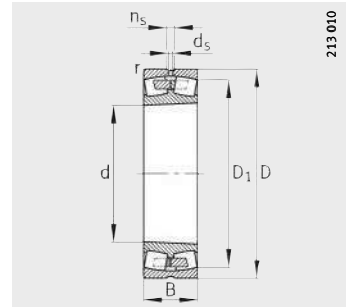


# Spherical roller bearings

Cylindrical or tapered bore



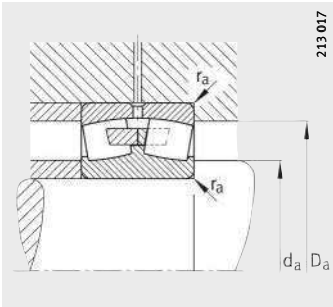
With central rib  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
<b>23960-B-K-MB</b>	39,1	<b>300</b>	420	90	3	384,6	9,5	17,7
<b>23960-B-MB</b>	40,6	<b>300</b>	420	90	3	384,6	9,5	17,7
<b>23060-K-MB</b>	72,2	<b>300</b>	460	118	4	412,6	9,5	17,7
<b>23060-MB</b>	73,8	<b>300</b>	460	118	4	412,6	9,5	17,7
<b>24060-B-K30-MB</b>	97,7	<b>300</b>	460	160	4	401,5	8	15
<b>24060-B-MB</b>	102	<b>300</b>	460	160	4	401,5	8	15
<b>23160-B-K-MB</b>	123	<b>300</b>	500	160	5	434,7	9,5	17,7
<b>23160-B-MB</b>	134	<b>300</b>	500	160	5	434,7	9,5	17,7
<b>24160-B-K30</b>	158	<b>300</b>	500	200	5	424,4	8	15
<b>24160-B</b>	159	<b>300</b>	500	200	5	424,4	8	15
<b>22260-K-MB</b>	136	<b>300</b>	540	140	5	468,8	12,5	23,5
<b>22260-MB</b>	142	<b>300</b>	540	140	5	468,8	12,5	23,5
<b>23260-K-MB</b>	192	<b>300</b>	540	192	5	458,7	12,5	23,5
<b>23260-MB</b>	198	<b>300</b>	540	192	5	458,7	12,5	23,5
<b>23964-K-MB</b>	41	<b>320</b>	440	90	3	406,2	9,5	17,7
<b>23964-MB</b>	41,8	<b>320</b>	440	90	3	406,2	9,5	17,7
<b>23064-K-MB</b>	77,1	<b>320</b>	480	121	4	432,6	9,5	17,7
<b>23064-MB</b>	79,9	<b>320</b>	480	121	4	432,6	9,5	17,7
<b>24064-B-K30-MB</b>	103	<b>320</b>	480	160	4	424	8	15
<b>24064-B-MB</b>	107	<b>320</b>	480	160	4	424	8	15
<b>23164-K-MB</b>	159	<b>320</b>	540	176	5	466,2	12,5	23,5
<b>23164-MB</b>	170	<b>320</b>	540	176	5	466,2	12,5	23,5
<b>24164-B-K30</b>	197	<b>320</b>	540	218	5	456,1	9,5	17,7
<b>24164-B</b>	204	<b>320</b>	540	218	5	456,1	9,5	17,7
<b>22264-K-MB</b>	166	<b>320</b>	580	150	5	503,5	12,5	23,5
<b>22264-MB</b>	177	<b>320</b>	580	150	5	503,5	12,5	23,5
<b>23264-K-MB</b>	229	<b>320</b>	580	208	5	489,6	12,5	23,5
<b>23264-MB</b>	242	<b>320</b>	580	208	5	489,6	12,5	23,5



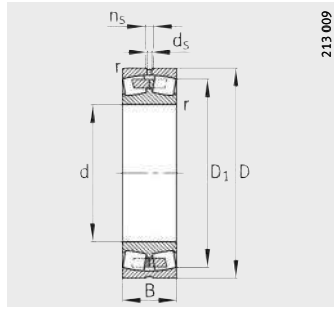
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
312,4	407,6	2,5	1 270 000	2 650 000	0,2	3,42	5,09	3,34	165 000	1 200	1 000
312,4	407,6	2,5	1 270 000	2 650 000	0,2	3,42	5,09	3,34	165 000	1 200	1 000
314,6	445,4	3	1 960 000	3 650 000	0,25	2,69	4	2,63	223 000	1 100	960
314,6	445,4	3	1 960 000	3 650 000	0,25	2,69	4	2,63	223 000	1 100	960
314,6	445,4	3	2 500 000	5 200 000	0,35	1,95	2,9	1,91	300 000	1 000	700
314,6	445,4	3	2 500 000	5 200 000	0,35	1,95	2,9	1,91	300 000	1 000	700
320	480	4	2 650 000	4 900 000	0,33	2,06	3,06	2,01	270 000	1 100	720
320	480	4	2 650 000	4 900 000	0,33	2,06	3,06	2,01	270 000	1 100	720
320	480	4	3 250 000	6 300 000	0,4	1,67	2,49	1,63	540 000	900	455
320	480	4	3 250 000	6 300 000	0,4	1,67	2,49	1,63	540 000	900	455
320	520	4	2 750 000	4 400 000	0,27	2,47	3,67	2,41	300 000	1 000	900
320	520	4	2 750 000	4 400 000	0,27	2,47	3,67	2,41	300 000	1 000	900
320	520	4	3 450 000	6 200 000	0,37	1,83	2,72	1,79	300 000	1 000	560
320	520	4	3 450 000	6 200 000	0,37	1,83	2,72	1,79	300 000	1 000	560
332,4	427,6	2,5	1 310 000	2 750 000	0,19	3,62	5,39	3,54	202 000	1 100	930
332,4	427,6	2,5	1 310 000	2 750 000	0,19	3,62	5,39	3,54	202 000	1 100	930
334,6	465,4	3	2 040 000	4 000 000	0,25	2,74	4,08	2,68	243 000	1 100	900
334,6	465,4	3	2 040 000	4 000 000	0,25	2,74	4,08	2,68	243 000	1 100	900
334,6	465,4	3	2 600 000	5 400 000	0,33	2,06	3,06	2,01	360 000	950	660
334,6	465,4	3	2 600 000	5 400 000	0,33	2,06	3,06	2,01	360 000	950	660
340	520	4	3 200 000	6 000 000	0,34	1,98	2,94	1,93	305 000	950	650
340	520	4	3 200 000	6 000 000	0,34	1,98	2,94	1,93	305 000	950	650
340	520	4	3 800 000	7 350 000	0,41	1,65	2,46	1,61	530 000	850	415
340	520	4	3 800 000	7 350 000	0,41	1,65	2,46	1,61	530 000	850	415
340	560	4	3 050 000	4 900 000	0,27	2,47	3,67	2,41	345 000	950	830
340	560	4	3 050 000	4 900 000	0,27	2,47	3,67	2,41	345 000	950	830
340	560	4	3 900 000	6 950 000	0,37	1,8	2,69	1,76	330 000	950	510
340	560	4	3 900 000	6 950 000	0,37	1,8	2,69	1,76	330 000	950	510

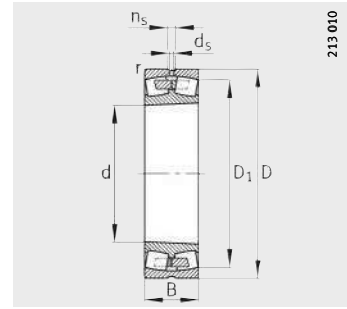


# Spherical roller bearings

Cylindrical or tapered bore



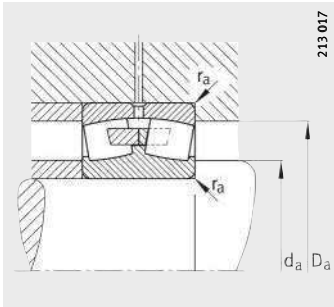
With central rib  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30

**Dimension table (continued)** · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
<b>23968-MB</b>	47,8	<b>340</b>	460	90	3	426,7	9,5	17,7
<b>23068-K-MB</b>	101	<b>340</b>	520	133	5	464,6	12,5	23,5
<b>23068-MB</b>	105	<b>340</b>	520	133	5	464,6	12,5	23,5
<b>24068-B-K30-MB</b>	143	<b>340</b>	520	180	5	457,1	9,5	17,7
<b>24068-B-MB</b>	146	<b>340</b>	520	180	5	457,1	9,5	17,7
<b>23168-B-K-MB</b>	203	<b>340</b>	580	190	5	499,5	12,5	23,5
<b>23168-B-MB</b>	215	<b>340</b>	580	190	5	499,5	12,5	23,5
<b>24168-B-K30</b>	260	<b>340</b>	580	243	5	481,1	9,5	17,7
<b>24168-B</b>	266	<b>340</b>	580	243	5	481,1	9,5	17,7
<b>23268-B-K-MB</b>	291	<b>340</b>	620	224	6	521,2	12,5	23,5
<b>23268-B-MB</b>	309	<b>340</b>	620	224	6	521,2	12,5	23,5
<b>23972-K-MB</b>	45	<b>360</b>	480	90	3	447,1	9,5	17,7
<b>23972-MB</b>	46,5	<b>360</b>	480	90	3	447,1	9,5	17,7
<b>23072-K-MB</b>	107	<b>360</b>	540	134	5	485,2	12,5	23,5
<b>23072-MB</b>	112	<b>360</b>	540	134	5	485,2	12,5	23,5
<b>24072-B-MB</b>	138	<b>360</b>	540	180	5	478,5	9,5	17,7
<b>23172-K-MB</b>	217	<b>360</b>	600	192	5	520	12,5	23,5
<b>23172-MB</b>	230	<b>360</b>	600	192	5	520	12,5	23,5
<b>24172-B-K30</b>	275	<b>360</b>	600	243	5	503,6	9,5	17,7
<b>24172-B</b>	279	<b>360</b>	600	243	5	503,6	9,5	17,7
<b>23272-B-K-MB</b>	328	<b>360</b>	650	232	6	548,3	12,5	23,5
<b>23272-B-MB</b>	347	<b>360</b>	650	232	6	548,3	12,5	23,5
<b>23976-K-MB</b>	66,3	<b>380</b>	520	106	4	477,6	9,5	17,7
<b>23976-MB</b>	68,5	<b>380</b>	520	106	4	477,6	9,5	17,7
<b>23076-B-K-MB</b>	113	<b>380</b>	560	135	5	505,6	12,5	23,5
<b>23076-B-MB</b>	117	<b>380</b>	560	135	5	505,6	12,5	23,5
<b>24076-B-K30-MB</b>	155	<b>380</b>	560	180	5	499	9,5	17,7
<b>24076-B-MB</b>	158	<b>380</b>	560	180	5	499	9,5	17,7
<b>23176-K-MB</b>	226	<b>380</b>	620	194	5	539,6	12,5	23,5
<b>23176-MB</b>	241	<b>380</b>	620	194	5	539,6	12,5	23,5
<b>24176-B-K30</b>	277	<b>380</b>	620	243	5	525,8	9,5	17,7
<b>24176-B</b>	279	<b>380</b>	620	243	5	525,8	9,5	17,7
<b>23276-B-K-MB</b>	367	<b>380</b>	680	240	6	576,4	12,5	23,5
<b>23276-B-MB</b>	390	<b>380</b>	680	240	6	576,4	12,5	23,5



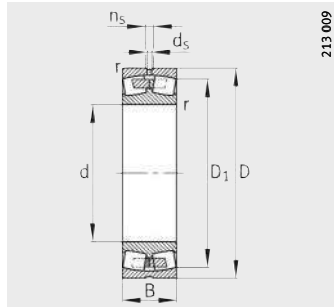
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{Or}$	$e$	$Y_1$	$Y_2$	$Y_0$	$C_{Ur}$	$n_G$	$n_B$
min.	max.	max.	N	N					N	$\text{min}^{-1}$	$\text{min}^{-1}$
352,4	447,6	2,5	1 370 000	3 000 000	0,18	3,85	5,73	3,76	199 000	1 100	860
358	502	4	2 360 000	4 550 000	0,25	2,69	4	2,63	285 000	1 000	840
358	502	4	2 360 000	4 550 000	0,25	2,69	4	2,63	285 000	1 000	840
358	502	4	3 100 000	6 550 000	0,34	1,98	2,94	1,93	530 000	850	600
358	502	4	3 100 000	6 550 000	0,34	1,98	2,94	1,93	530 000	850	600
360	560	4	3 650 000	6 950 000	0,34	1,98	2,94	1,93	570 000	900	590
360	560	4	3 650 000	6 950 000	0,34	1,98	2,94	1,93	570 000	900	590
360	560	4	4 400 000	8 500 000	0,43	1,56	2,32	1,53	680 000	800	380
360	560	4	4 400 000	8 500 000	0,43	1,56	2,32	1,53	680 000	800	380
366	594	5	4 500 000	8 150 000	0,38	1,78	2,65	1,74	650 000	850	465
366	594	5	4 500 000	8 150 000	0,38	1,78	2,65	1,74	650 000	850	465
372,4	467,6	2,5	1 430 000	3 200 000	0,17	4,05	6,04	3,96	209 000	1 000	800
372,4	467,6	2,5	1 430 000	3 200 000	0,17	4,05	6,04	3,96	209 000	1 000	800
378	522	4	2 450 000	4 800 000	0,25	2,74	4,08	2,68	295 000	950	790
378	522	4	2 450 000	4 800 000	0,25	2,74	4,08	2,68	295 000	950	790
378	522	4	3 250 000	6 800 000	0,33	2,06	3,06	2,01	530 000	800	560
380	580	4	3 800 000	7 350 000	0,33	2,06	3,06	2,01	360 000	850	550
380	580	4	3 800 000	7 350 000	0,33	2,06	3,06	2,01	360 000	850	550
380	580	4	4 500 000	9 000 000	0,41	1,63	2,43	1,6	550 000	750	355
380	580	4	4 500 000	9 000 000	0,41	1,63	2,43	1,6	550 000	750	355
386	624	5	4 900 000	9 150 000	0,38	1,78	2,65	1,74	720 000	800	425
386	624	5	4 900 000	9 150 000	0,38	1,78	2,65	1,74	720 000	800	425
394,6	505,4	3	1 760 000	4 000 000	0,19	3,58	5,33	3,5	265 000	950	750
394,6	505,4	3	1 760 000	4 000 000	0,19	3,58	5,33	3,5	265 000	950	750
398	542	4	2 550 000	5 300 000	0,24	2,84	4,23	2,78	430 000	900	730
398	542	4	2 550 000	5 300 000	0,24	2,84	4,23	2,78	430 000	900	730
398	542	4	3 350 000	7 200 000	0,31	2,15	3,2	2,1	580 000	750	520
398	542	4	3 350 000	7 200 000	0,31	2,15	3,2	2,1	580 000	750	520
400	600	4	4 050 000	8 150 000	0,32	2,12	3,15	2,07	385 000	800	510
400	600	4	4 050 000	8 150 000	0,32	2,12	3,15	2,07	385 000	800	510
400	600	4	4 650 000	9 500 000	0,39	1,71	2,54	1,67	770 000	700	330
400	600	4	4 650 000	9 500 000	0,39	1,71	2,54	1,67	770 000	700	330
406	654	5	5 300 000	9 800 000	0,37	1,8	2,69	1,76	780 000	750	395
406	654	5	5 300 000	9 800 000	0,37	1,8	2,69	1,76	780 000	750	395

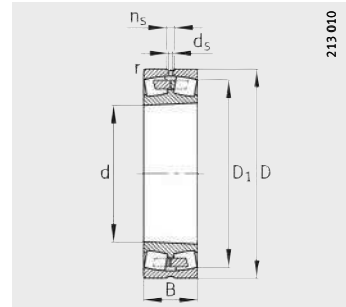


# Spherical roller bearings

Cylindrical or tapered bore



With central rib  
Cylindrical bore

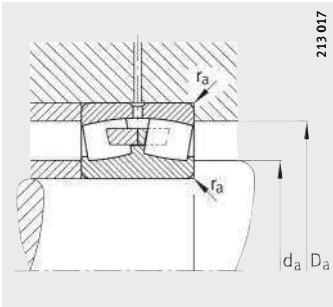


Tapered bore  
K = taper 1:12, K30 = taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
<b>23980-B-K-MB</b>	68,2	<b>400</b>	540	106	4	499	9,5	17,7
<b>23980-B-MB</b>	72,9	<b>400</b>	540	106	4	499	9,5	17,7
<b>23080-K-MB</b>	143	<b>400</b>	600	148	5	540,5	12,5	23,5
<b>23080-MB</b>	151	<b>400</b>	600	148	5	540,5	12,5	23,5
<b>24080-B-K30-MB</b>	196	<b>400</b>	600	200	5	530,9	12,5	23,5
<b>24080-B-MB</b>	198	<b>400</b>	600	200	5	530,9	12,5	23,5
<b>23180-B-K-MB</b>	261	<b>400</b>	650	200	6	567,2	12,5	23,5
<b>23180-B-MB</b>	270	<b>400</b>	650	200	6	567,2	12,5	23,5
<b>24180-B-K30</b>	312	<b>400</b>	650	250	6	553,5	12,5	23,5
<b>24180-B</b>	326	<b>400</b>	650	250	6	553,5	12,5	23,5
<b>23280-B-K-MB</b>	442	<b>400</b>	720	256	6	609,8	12,5	23,5
<b>23280-B-MB</b>	469	<b>400</b>	720	256	6	609,8	12,5	23,5
<b>23984-K-MB</b>	78	<b>420</b>	560	106	4	519,5	9,5	17,7
<b>23984-MB</b>	80,5	<b>420</b>	560	106	4	519,5	9,5	17,7
<b>23084-B-K-MB</b>	155	<b>420</b>	620	150	5	560,7	12,5	23,5
<b>23084-B-MB</b>	162	<b>420</b>	620	150	5	560,7	12,5	23,5
<b>24084-B-K30-MB</b>	214	<b>420</b>	620	200	5	550,2	12,5	23,5
<b>24084-B-MB</b>	217	<b>420</b>	620	200	5	550,2	12,5	23,5
<b>23184-K-MB</b>	339	<b>420</b>	700	224	6	605,4	12,5	23,5
<b>23184-MB</b>	360	<b>420</b>	700	224	6	605,4	12,5	23,5
<b>24184-B-K30</b>	407	<b>420</b>	700	280	6	590,3	12,5	23,5
<b>24184-B</b>	442	<b>420</b>	700	280	6	590,3	12,5	23,5
<b>23284-B-K-MB</b>	537	<b>420</b>	760	272	7,5	642,2	12,5	23,5
<b>23284-B-MB</b>	558	<b>420</b>	760	272	7,5	642,2	12,5	23,5





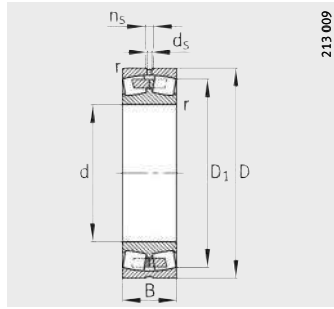
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{0r}$	$e$	$Y_1$	$Y_2$	$Y_0$	$C_{ur}$	$n_G$	$n_B$
min.	max.	max.	N	N					N	$\text{min}^{-1}$	$\text{min}^{-1}$
414,6	525,4	3	1 830 000	4 150 000	0,18	3,71	5,52	3,63	275 000	900	710
414,6	525,4	3	1 830 000	4 150 000	0,18	3,71	5,52	3,63	275 000	900	710
418	582	4	3 050 000	6 200 000	0,24	2,79	4,15	2,73	365 000	800	670
418	582	4	3 050 000	6 200 000	0,24	2,79	4,15	2,73	365 000	800	670
418	582	4	3 900 000	8 500 000	0,33	2,06	3,06	2,01	670 000	700	485
418	582	4	3 900 000	8 500 000	0,33	2,06	3,06	2,01	670 000	700	485
426	624	5	4 250 000	8 500 000	0,31	2,15	3,2	2,1	670 000	750	485
426	624	5	4 250 000	8 500 000	0,31	2,15	3,2	2,1	670 000	750	485
426	624	5	5 100 000	10 400 000	0,39	1,72	2,56	1,68	720 000	670	310
426	624	5	5 100 000	10 400 000	0,39	1,72	2,56	1,68	720 000	670	310
426	694	5	5 700 000	10 800 000	0,38	1,78	2,65	1,74	820 000	700	370
426	694	5	5 700 000	10 800 000	0,38	1,78	2,65	1,74	820 000	700	370
434,6	545,4	3	1 900 000	4 500 000	0,18	3,85	5,73	3,76	300 000	850	660
434,6	545,4	3	1 900 000	4 500 000	0,18	3,85	5,73	3,76	300 000	850	660
438	602	4	3 150 000	6 550 000	0,24	2,84	4,23	2,78	395 000	800	640
438	602	4	3 150 000	6 550 000	0,24	2,84	4,23	2,78	395 000	800	640
438	602	4	4 000 000	8 800 000	0,32	2,13	3,17	2,08	710 000	670	460
438	602	4	4 000 000	8 800 000	0,32	2,13	3,17	2,08	710 000	670	460
446	674	5	5 000 000	9 650 000	0,33	2,03	3,02	1,98	465 000	700	455
446	674	5	5 000 000	9 650 000	0,33	2,03	3,02	1,98	465 000	700	455
446	674	5	6 200 000	12 700 000	0,4	1,67	2,49	1,63	980 000	630	265
446	674	5	6 200 000	12 700 000	0,4	1,67	2,49	1,63	980 000	630	265
452	728	6	6 550 000	12 200 000	0,38	1,77	2,64	1,73	930 000	670	340
452	728	6	6 550 000	12 200 000	0,38	1,77	2,64	1,73	930 000	670	340

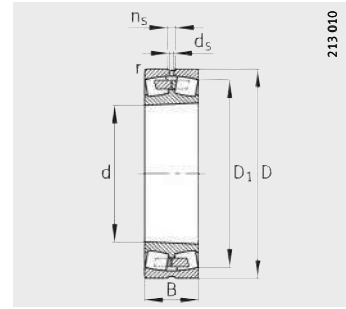


# Spherical roller bearings

Cylindrical or tapered bore



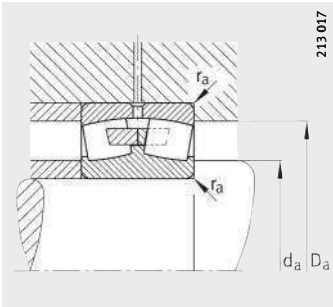
With central rib  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30

**Dimension table (continued)** · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
<b>23988-K-MB</b>	98,3	<b>440</b>	600	118	4	552,8	12,5	23,5
<b>23988-MB</b>	101	<b>440</b>	600	118	4	552,8	12,5	23,5
<b>23088-K-MB</b>	177	<b>440</b>	650	157	6	586,8	12,5	23,5
<b>23088-MB</b>	190	<b>440</b>	650	157	6	586,8	12,5	23,5
<b>24088-B-K30-MB</b>	247	<b>440</b>	650	212	6	575,6	12,5	23,5
<b>24088-B-MB</b>	250	<b>440</b>	650	212	6	575,6	12,5	23,5
<b>23188-K-MB</b>	378	<b>440</b>	720	226	6	626	12,5	23,5
<b>23188-MB</b>	381	<b>440</b>	720	226	6	626	12,5	23,5
<b>24188-B-K30</b>	451	<b>440</b>	720	280	6	612,4	12,5	23,5
<b>24188-B</b>	453	<b>440</b>	720	280	6	612,4	12,5	23,5
<b>23288-B-K-MB</b>	586	<b>440</b>	790	280	7,5	669,3	12,5	23,5
<b>23288-B-MB</b>	615	<b>440</b>	790	280	7,5	669,3	12,5	23,5
<b>23992-B-K-MB</b>	103	<b>460</b>	620	118	4	573,3	12,5	23,5
<b>23992-B-MB</b>	111	<b>460</b>	620	118	4	573,3	12,5	23,5
<b>23092-B-K-MB</b>	204	<b>460</b>	680	163	6	612,2	12,5	23,5
<b>23092-B-MB</b>	208	<b>460</b>	680	163	6	612,2	12,5	23,5
<b>24092-B-MB</b>	282	<b>460</b>	680	218	6	603,3	12,5	23,5
<b>23192-K-MB</b>	420	<b>460</b>	760	240	7,5	661,4	12,5	23,5
<b>23192-MB</b>	447	<b>460</b>	760	240	7,5	661,4	12,5	23,5
<b>24192-B-K30-MB</b>	578	<b>460</b>	760	300	7,5	642,8	12,5	23,5
<b>24192-B-MB</b>	582	<b>460</b>	760	300	7,5	642,8	12,5	23,5
<b>23292-K-MB</b>	699	<b>460</b>	830	296	7,5	701,6	12,5	23,5
<b>23292-MB</b>	700	<b>460</b>	830	296	7,5	701,6	12,5	23,5
<b>23996-B-K-MB</b>	121	<b>480</b>	650	128	5	598,8	12,5	23,5
<b>23996-B-MB</b>	126	<b>480</b>	650	128	5	598,8	12,5	23,5
<b>23096-K-MB</b>	208	<b>480</b>	700	165	6	632,6	12,5	23,5
<b>23096-MB</b>	222	<b>480</b>	700	165	6	632,6	12,5	23,5
<b>24096-B-K30-MB</b>	289	<b>480</b>	700	218	6	625,4	12,5	23,5
<b>24096-B-MB</b>	291	<b>480</b>	700	218	6	625,4	12,5	23,5
<b>23196-K-MB</b>	470	<b>480</b>	790	248	7,5	688,3	12,5	23,5
<b>23196-MB</b>	508	<b>480</b>	790	248	7,5	688,3	12,5	23,5
<b>24196-B-K30-MB</b>	700	<b>480</b>	790	308	7,5	669,9	12,5	23,5
<b>23296-K-MB</b>	806	<b>480</b>	870	310	7,5	734,8	12,5	23,5
<b>23296-MB</b>	830	<b>480</b>	870	310	7,5	734,8	12,5	23,5



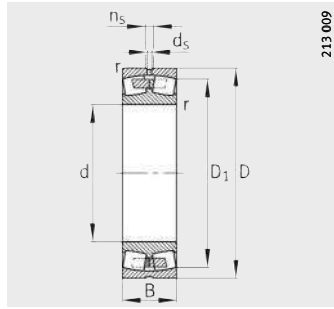
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
454,6	585,4	3	2 240 000	5 200 000	0,18	3,66	5,46	3,58	295 000	800	620
454,6	585,4	3	2 240 000	5 200 000	0,18	3,66	5,46	3,58	295 000	800	620
463	627	5	3 400 000	7 100 000	0,24	2,84	4,23	2,78	405 000	750	610
463	627	5	3 400 000	7 100 000	0,24	2,84	4,23	2,78	405 000	750	610
463	627	5	4 300 000	9 650 000	0,32	2,12	3,15	2,07	750 000	630	430
463	627	5	4 300 000	9 650 000	0,32	2,12	3,15	2,07	750 000	630	430
466	694	5	5 200 000	10 400 000	0,32	2,1	3,13	2,06	485 000	700	425
466	694	5	5 200 000	10 400 000	0,32	2,1	3,13	2,06	485 000	700	425
466	694	5	6 400 000	13 200 000	0,38	1,76	2,62	1,72	1 020 000	600	255
466	694	5	6 400 000	13 200 000	0,38	1,76	2,62	1,72	1 020 000	600	255
472	758	6	7 100 000	13 400 000	0,37	1,8	2,69	1,76	990 000	630	320
472	758	6	7 100 000	13 400 000	0,37	1,8	2,69	1,76	990 000	630	320
474,6	605,4	3	2 280 000	5 400 000	0,18	3,85	5,73	3,76	370 000	750	590
474,6	605,4	3	2 280 000	5 400 000	0,18	3,85	5,73	3,76	370 000	750	590
483	657	5	3 650 000	7 650 000	0,24	2,84	4,23	2,78	520 000	700	580
483	657	5	3 650 000	7 650 000	0,24	2,84	4,23	2,78	520 000	700	580
483	657	5	4 750 000	10 600 000	0,31	2,16	3,22	2,12	710 000	630	405
492	728	6	5 850 000	11 600 000	0,32	2,12	3,15	2,07	530 000	630	390
492	728	6	5 850 000	11 600 000	0,32	2,12	3,15	2,07	530 000	630	390
492	728	6	7 500 000	15 600 000	0,39	1,73	2,58	1,69	1 160 000	560	227
492	728	6	7 500 000	15 600 000	0,39	1,73	2,58	1,69	1 160 000	560	227
492	798	6	7 800 000	15 000 000	0,37	1,8	2,69	1,76	620 000	600	295
492	798	6	7 800 000	15 000 000	0,37	1,8	2,69	1,76	620 000	600	295
498	632	4	2 550 000	6 000 000	0,18	3,76	5,59	3,67	460 000	700	570
498	632	4	2 550 000	6 000 000	0,18	3,76	5,59	3,67	460 000	700	570
503	677	5	3 800 000	8 150 000	0,23	2,9	4,31	2,83	455 000	670	550
503	677	5	3 800 000	8 150 000	0,23	2,9	4,31	2,83	455 000	670	550
503	677	5	4 900 000	11 200 000	0,3	2,25	3,34	2,2	830 000	600	380
503	677	5	4 900 000	11 200 000	0,3	2,25	3,34	2,2	830 000	600	380
512	758	6	6 300 000	12 700 000	0,32	2,12	3,15	2,07	570 000	630	370
512	758	6	6 300 000	12 700 000	0,32	2,12	3,15	2,07	570 000	630	370
512	758	6	8 000 000	16 600 000	0,39	1,75	2,61	1,71	1 190 000	560	213
512	838	6	8 800 000	17 000 000	0,37	1,83	2,72	1,79	700 000	600	265
512	838	6	8 800 000	17 000 000	0,37	1,83	2,72	1,79	700 000	600	265

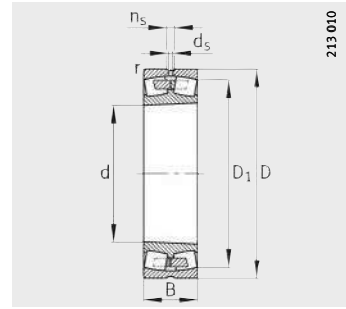


# Spherical roller bearings

Cylindrical or tapered bore



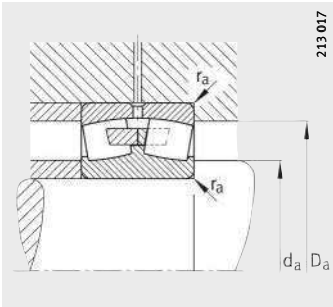
With central rib  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r	D <sub>1</sub>	d <sub>s</sub>	n <sub>s</sub>
					min.	≈		
239/500-K-MB	124	500	670	128	5	619,3	12,5	23,5
239/500-MB	132	500	670	128	5	619,3	12,5	23,5
230/500-B-K-MB	219	500	720	167	6	653,5	12,5	23,5
230/500-B-MB	233	500	720	167	6	653,5	12,5	23,5
240/500-B-MB	297	500	720	218	6	645,8	12,5	23,5
231/500-B-K-MB	556	500	830	264	7,5	720,9	12,5	23,5
231/500-B-MB	588	500	830	264	7,5	720,9	12,5	23,5
241/500-B-K30-MB	717	500	830	325	7,5	701,8	12,5	23,5
241/500-B-MB	725	500	830	325	7,5	701,8	12,5	23,5
239/530-K-MB	146	530	710	136	5	656,4	12,5	23,5
239/530-MB	160	530	710	136	5	656,4	12,5	23,5
230/530-B-K-MB	291	530	780	185	6	703,7	12,5	23,5
230/530-B-MB	321	530	780	185	6	703,7	12,5	23,5
240/530-B-MB	415	530	780	250	6	691,9	12,5	23,5
231/530-K-MB	643	530	870	272	7,5	756,3	12,5	23,5
241/530-B-K30-MB	845	530	870	335	7,5	739,1	12,5	23,5
239/560-B-K-MB	169	560	750	140	5	693,4	12,5	23,5
239/560-B-MB	181	560	750	140	5	693,4	12,5	23,5
230/560-B-K-MB	339	560	820	195	6	741,5	12,5	23,5
230/560-B-MB	358	560	820	195	6	741,5	12,5	23,5
240/560-B-MB	468	560	820	258	6	731,2	12,5	23,5
231/560-K-MB	737	560	920	280	7,5	800,2	12,5	23,5
231/560-MB	760	560	920	280	7,5	800,2	12,5	23,5
241/560-B-K30-MB	974	560	920	355	7,5	785	12,5	23,5
239/600-B-K-MB	210	600	800	150	5	740,5	12,5	23,5
239/600-B-MB	224	600	800	150	5	740,5	12,5	23,5
230/600-B-K-MB	388	600	870	200	6	791,9	12,5	23,5
230/600-B-MB	409	600	870	200	6	791,9	12,5	23,5
240/600-B-MB	540	600	870	272	6	773,3	12,5	23,5
231/600-K-MB	901	600	980	300	7,5	852,6	12,5	23,5
231/600-MB	929	600	980	300	7,5	852,6	12,5	23,5
241/600-B-K30-MB	1170	600	980	375	7,5	833	12,5	23,5
241/600-B-MB	1180	600	980	375	7,5	833	12,5	23,5



213 017

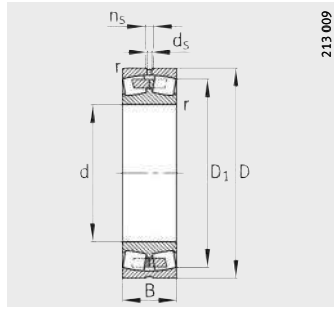
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
da	Da	ra	dyn. Cr	stat. Cor	e	Y1	Y2	Y0	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
518	652	4	2 600 000	6 300 000	0,17	3,9	5,81	3,81	400 000	670	540
518	652	4	2 600 000	6 300 000	0,17	3,9	5,81	3,81	400 000	670	540
523	697	5	3 900 000	8 500 000	0,22	3,01	4,48	2,94	510 000	670	520
523	697	5	3 900 000	8 500 000	0,22	3,01	4,48	2,94	510 000	670	520
523	697	5	4 900 000	11 200 000	0,29	2,32	3,45	2,26	850 000	560	370
532	798	6	7 100 000	14 300 000	0,32	2,1	3,13	2,06	990 000	600	340
532	798	6	7 100 000	14 300 000	0,32	2,1	3,13	2,06	990 000	600	340
532	798	6	8 650 000	18 300 000	0,39	1,73	2,58	1,69	1 340 000	530	199
532	798	6	8 650 000	18 300 000	0,39	1,73	2,58	1,69	1 340 000	530	199
548	692	4	2 850 000	6 800 000	0,18	3,85	5,73	3,76	385 000	630	500
548	692	4	2 850 000	6 800 000	0,18	3,85	5,73	3,76	385 000	630	500
553	757	5	4 400 000	9 500 000	0,22	3,04	4,53	2,97	540 000	600	490
553	757	5	4 400 000	9 500 000	0,22	3,04	4,53	2,97	540 000	600	490
553	757	5	6 000 000	13 700 000	0,31	2,15	3,2	2,1	910 000	530	335
562	838	6	7 350 000	15 300 000	0,32	2,12	3,15	2,07	670 000	560	325
562	838	6	9 500 000	20 000 000	0,38	1,77	2,64	1,73	1 450 000	500	184
578	732	4	3 100 000	7 650 000	0,17	3,95	5,88	3,86	570 000	600	465
578	732	4	3 100 000	7 650 000	0,17	3,95	5,88	3,86	570 000	600	465
583	797	5	5 100 000	11 000 000	0,23	2,95	4,4	2,89	740 000	560	450
583	797	5	5 100 000	11 000 000	0,23	2,95	4,4	2,89	740 000	560	450
583	797	5	6 400 000	14 600 000	0,31	2,2	3,27	2,15	1 050 000	500	315
592	888	6	8 150 000	16 600 000	0,31	2,21	3,29	2,16	750 000	530	300
592	888	6	8 150 000	16 600 000	0,31	2,21	3,29	2,16	750 000	530	300
592	888	6	10 600 000	22 400 000	0,38	1,77	2,64	1,73	1 600 000	480	167
618	782	4	3 450 000	8 650 000	0,17	3,95	5,88	3,86	630 000	560	430
618	782	4	3 450 000	8 650 000	0,17	3,95	5,88	3,86	630 000	560	430
623	847	5	5 700 000	12 500 000	0,22	3,07	4,57	3	890 000	530	405
623	847	5	5 700 000	12 500 000	0,22	3,07	4,57	3	890 000	530	405
623	847	5	7 100 000	16 600 000	0,31	2,21	3,29	2,16	1 200 000	630	285
632	948	6	9 000 000	19 300 000	0,31	2,2	3,27	2,15	810 000	500	270
632	948	6	9 000 000	19 300 000	0,31	2,2	3,27	2,15	810 000	500	270
632	948	6	11 600 000	26 000 000	0,38	1,79	2,67	1,75	1 780 000	450	149
632	948	6	11 600 000	26 000 000	0,38	1,79	2,67	1,75	1 780 000	450	149

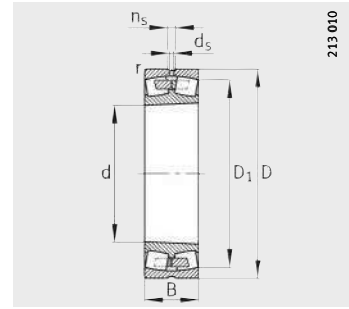


# Spherical roller bearings

Cylindrical or tapered bore



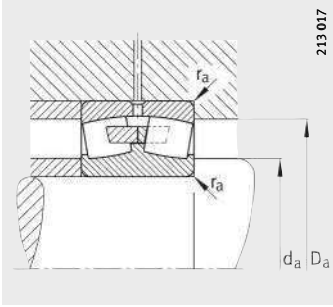
With central rib  
Cylindrical bore



Tapered bore  
K = taper 1:12, K30 = taper 1:30

Dimension table (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						
		d	D	B	r min.	D <sub>1</sub> ≈	d <sub>s</sub>	n <sub>s</sub>
<b>239/630-B-K-MB</b>	283	<b>630</b>	850	165	6	784,5	12,5	23,5
<b>239/630-B-MB</b>	292	<b>630</b>	850	165	6	784,5	12,5	23,5
<b>230/630-B-MB</b>	496	<b>630</b>	920	212	7,5	834,3	12,5	23,5
<b>230/630-B-K-MB</b>	502	<b>630</b>	920	212	7,5	834,3	12,5	23,5
<b>240/630-B-K30-MB</b>	649	<b>630</b>	920	290	7,5	817,9	12,5	23,5
<b>240/630-B-MB</b>	660	<b>630</b>	920	290	7,5	817,9	12,5	23,5
<b>241/630-B-K30-MB</b>	1 360	<b>630</b>	1 030	400	7,5	872,2	12,5	23,5
<b>239/670-B-K-MB</b>	310	<b>670</b>	900	170	6	831,5	12,5	23,5
<b>239/670-B-MB</b>	320	<b>670</b>	900	170	6	831,5	12,5	23,5
<b>230/670-B-K-MB</b>	590	<b>670</b>	980	230	7,5	888,7	12,5	23,5
<b>230/670-B-MB</b>	600	<b>670</b>	980	230	7,5	888,7	12,5	23,5
<b>241/670-B-K30-MB</b>	1 540	<b>670</b>	1 090	412	7,5	929,4	12,5	23,5
<b>239/710-K-MB</b>	336	<b>710</b>	950	180	6	877,5	12,5	23,5
<b>239/710-MB</b>	355	<b>710</b>	950	180	6	877,5	12,5	23,5
<b>230/710-B-K-MB</b>	650	<b>710</b>	1 030	236	7,5	938,8	12,5	23,5
<b>230/710-B-MB</b>	674	<b>710</b>	1 030	236	7,5	938,8	12,5	23,5
<b>240/710-B-K30-MB</b>	873	<b>710</b>	1 030	315	7,5	921,6	12,5	23,5
<b>241/710-B-K30-MB</b>	1 820	<b>710</b>	1 150	438	9,5	982	12,5	23,5
<b>241/710-B-MB</b>	1 830	<b>710</b>	1 150	438	9,5	982	12,5	23,5
<b>239/750-K-MB</b>	394	<b>750</b>	1 000	185	6	923,2	12,5	23,5
<b>239/750-MB</b>	426	<b>750</b>	1 000	185	6	923,2	12,5	23,5
<b>230/750-K-MB</b>	792	<b>750</b>	1 090	250	7,5	990,9	12,5	23,5
<b>230/750-MB</b>	806	<b>750</b>	1 090	250	7,5	990,9	12,5	23,5
<b>240/750-B-K30-MB</b>	1 070	<b>750</b>	1 090	335	7,5	976,2	12,5	23,5
<b>239/800-B-K-MB</b>	490	<b>800</b>	1 060	195	6	983,7	12,5	23,5
<b>239/800-B-MB</b>	506	<b>800</b>	1 060	195	6	983,7	12,5	23,5
<b>230/800-K-MB</b>	861	<b>800</b>	1 150	258	7,5	1 050,9	12,5	23,5
<b>230/800-MB</b>	899	<b>800</b>	1 150	258	7,5	1 050,9	12,5	23,5
<b>240/800-B-MB</b>	1 200	<b>800</b>	1 150	345	7,5	1 034,1	12,5	23,5
<b>239/850-K-MB</b>	554	<b>850</b>	1 120	200	6	1 039,9	12,5	23,5
<b>239/850-MB</b>	579	<b>850</b>	1 120	200	6	1 039,9	12,5	23,5
<b>240/850-B-K30-MB</b>	1 420	<b>850</b>	1 220	365	7,5	1 092,9	12,5	23,5
<b>239/900-K-MB</b>	641	<b>900</b>	1 180	206	6	1 098,8	12,5	23,5
<b>239/900-MB</b>	653	<b>900</b>	1 180	206	6	1 098,8	12,5	23,5



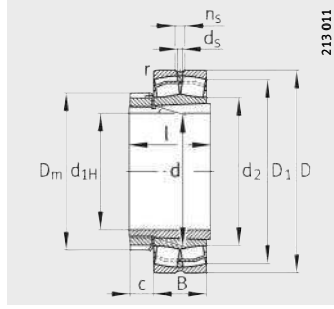
Mounting dimensions

Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
653	827	5	4 050 000	9 800 000	0,18	3,8	5,66	3,72	710 000	530	405
653	827	5	4 050 000	9 800 000	0,18	3,8	5,66	3,72	710 000	530	405
658	892	6	6 300 000	13 700 000	0,22	3,01	4,48	2,94	890 000	500	380
658	892	6	6 300 000	13 700 000	0,22	3,01	4,48	2,94	890 000	500	380
658	892	6	8 000 000	19 000 000	0,31	2,21	3,29	2,16	1 350 000	480	260
658	892	6	8 000 000	19 000 000	0,31	2,21	3,29	2,16	1 350 000	480	260
662	998	6	12 900 000	29 000 000	0,38	1,78	2,65	1,74	1 960 000	450	136
693	877	5	4 300 000	10 600 000	0,17	3,95	5,88	3,86	750 000	500	375
693	877	5	4 300 000	10 600 000	0,17	3,95	5,88	3,86	750 000	500	375
698	952	6	7 200 000	16 000 000	0,22	3,01	4,48	2,94	1 100 000	480	350
698	952	6	7 200 000	16 000 000	0,22	3,01	4,48	2,94	1 100 000	480	350
702	1058	6	14 000 000	31 500 000	0,37	1,83	2,72	1,79	2 110 000	430	127
733	927	5	4 800 000	12 000 000	0,18	3,85	5,73	3,76	720 000	480	350
733	927	5	4 800 000	12 000 000	0,18	3,85	5,73	3,76	720 000	480	350
738	1002	6	7 650 000	17 000 000	0,22	3,07	4,57	3	1 140 000	480	325
738	1002	6	7 650 000	17 000 000	0,22	3,07	4,57	3	1 140 000	480	325
738	1002	6	9 500 000	22 800 000	0,3	2,26	3,37	2,21	1 550 000	430	223
750	1110	8	15 600 000	35 500 000	0,38	1,79	2,67	1,75	2 340 000	400	116
750	1110	8	15 600 000	35 500 000	0,38	1,79	2,67	1,75	2 340 000	400	116
773	977	5	5 200 000	12 900 000	0,17	3,95	5,88	3,86	790 000	480	325
773	977	5	5 200 000	12 900 000	0,17	3,95	5,88	3,86	790 000	480	325
778	1062	6	8 500 000	19 000 000	0,22	3,01	4,48	2,94	1 010 000	450	305
778	1062	6	8 500 000	19 000 000	0,22	3,01	4,48	2,94	1 010 000	450	305
778	1062	6	10 800 000	26 000 000	0,3	2,26	3,37	2,21	1 730 000	400	204
823	1037	5	5 850 000	15 000 000	0,17	4,05	6,04	3,96	1 010 000	450	295
823	1037	5	5 850 000	15 000 000	0,17	4,05	6,04	3,96	1 010 000	450	295
828	1122	6	9 300 000	21 200 000	0,22	3,07	4,57	3	1 430 000	430	280
828	1122	6	9 300 000	21 200 000	0,22	3,07	4,57	3	1 430 000	430	280
828	1122	6	11 600 000	28 500 000	0,29	2,33	3,47	2,28	1 810 000	360	188
873	1097	5	6 300 000	16 300 000	0,16	4,11	6,12	4,02	960 000	430	275
873	1097	5	6 300 000	16 300 000	0,16	4,11	6,12	4,02	960 000	430	275
878	1192	6	12 900 000	32 000 000	0,29	2,33	3,47	2,28	2 060 000	480	173
923	1157	5	6 550 000	17 300 000	0,16	4,28	6,37	4,19	1 010 000	400	260
923	1157	5	6 550 000	17 300 000	0,16	4,28	6,37	4,19	1 010 000	400	260

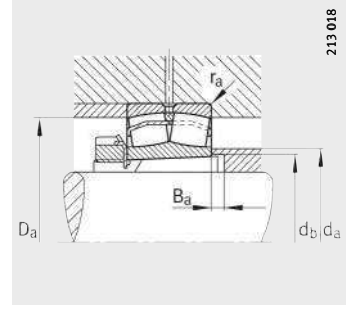


# Spherical roller bearings

With adapter sleeve



E1 design



Mounting dimensions

Dimension table - Dimensions in mm

Designation			Mass m		Dimensions												
Bearing	X-life	Adapter sleeve	Bearing	Adapter sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>2</sub>	d <sub>s</sub>	n <sub>s</sub>	D <sub>m</sub>	l	c	
			≈kg	≈kg	min.	≈	≈										
22205-E1-K	XL	H305	0,175	0,075	20	25	52	18	1	44,5	31,3	3,2	4,8	38	29	9	
22206-E1-K	XL	H306	0,269	0,099	25	30	62	20	1	53,7	37,9	3,2	4,8	45	31	9	
22207-E1-K	XL	H307	0,425	0,147	30	35	72	23	1,1	62,5	43,8	3,2	4,8	57	35	10	
21307-E1-K-TVPB	XL	H307	0,496	0,147	30	35	80	21	1,5	66,6	47,4	-	-	57	35	10	
22208-E1-K	XL	H308	0,517	0,185	35	40	80	23	1,1	70,4	48,6	3,2	4,8	58	36	11	
21308-E1-K	XL	H308	0,702	0,185	35	40	90	23	1,5	80,8	59,7	3,2	4,8	58	36	11	
22308-E1-K	XL	H2308	1,03	0,222	35	40	90	33	1,5	76	52,4	3,2	4,8	58	46	11	
22209-E1-K	XL	H309	0,577	0,246	40	45	85	23	1,1	75,6	54,8	3,2	4,8	65	39	12	
21309-E1-K	XL	H309	0,845	0,246	40	45	100	25	1,5	89,8	67,6	3,2	4,8	65	39	12	
22309-E1-K	XL	H2309	1,36	0,283	40	45	100	36	1,5	84,7	58,9	3,2	6,5	65	50	12	
22210-E1-K	XL	H310	0,608	0,301	45	50	90	23	1,1	80,8	59,7	3,2	4,8	70	42	13	
21310-E1-K	XL	H310	1,28	0,301	45	50	110	27	2	89,8	67,3	3,2	4,8	70	42	13	
22310-E1-K	XL	H2310	1,86	0,353	45	50	110	40	2	92,6	63	3,2	6,5	70	55	13	
22211-E1-K	XL	H311	0,825	0,35	50	55	100	25	1,5	89,8	67,3	3,2	4,8	75	45	13	
21311-E1-K	XL	H311	1,19	0,35	50	55	120	29	2	98,3	71,4	3,2	6,5	75	45	13	
22311-E1-K	XL	H2311	2,22	0,426	50	55	120	43	2	101,4	68,9	3,2	6,5	75	59	13	
22311-E1-K-T41A	XL	H2311	2,22	0,426	50	55	120	43	2	101,4	68,9	3,2	6,5	75	59	13	
22212-E1-K	XL	H312	1,09	0,373	55	60	110	28	1,5	98,7	71,4	3,2	6,5	80	47	13	
21312-E1-K	XL	H312	1,78	0,373	55	60	130	31	2,1	112,5	84,4	3,2	6,5	80	47	13	
22312-E1-K	XL	H2312	2,83	0,464	55	60	130	46	2,1	110,1	74,8	3,2	6,5	80	62	13	
22312-E1-K-T41A	XL	H2312	2,83	0,464	55	60	130	46	2,1	110,1	74,8	3,2	6,5	80	62	13	
22213-E1-K	XL	H313	1,52	0,452	60	65	120	31	1,5	107,3	79,1	3,2	6,5	92	50	14	
21313-E1-K	XL	H313	2,42	0,452	60	65	140	33	2,1	126,8	94,9	3,2	6,5	92	50	14	
22313-E1-K	XL	H2313	3,49	0,553	60	65	140	48	2,1	119,3	83,2	4,8	9,5	92	65	14	
22313-E1-K-T41A	XL	H2313	3,49	0,553	60	65	140	48	2,1	119,3	83,2	4,8	9,5	92	65	14	
22214-E1-K	XL	H314	1,61	0,715	60	70	125	31	1,5	112,5	84,4	3,2	6,5	92	52	14	
21314-E1-K	XL	H314	3	0,715	60	70	150	35	2,1	126,2	94,9	3,2	6,5	92	52	14	
22314-E1-K	XL	H2314	4,12	0,895	60	70	150	51	2,1	128	86,7	4,8	9,5	98	68	14	
22314-E1-K-T41A	XL	H2314	4,12	0,895	60	70	150	51	2,1	128	86,7	4,8	9,5	98	68	14	
22215-E1-K	XL	H315	1,68	0,826	65	75	130	31	1,5	117,7	89,8	3,2	6,5	104	55	15	
21315-E1-K	XL	H315	2,86	0,826	65	75	160	37	2,1	135,2	99,7	3,2	6,5	104	55	15	
22315-E1-K	XL	H2315	5,06	1,05	65	75	160	55	2,1	136,3	92,4	4,8	9,5	98	73	15	
22315-E1-K-T41A	XL	H2315	5,06	1,05	65	75	160	55	2,1	136,3	92,4	4,8	9,5	98	73	15	

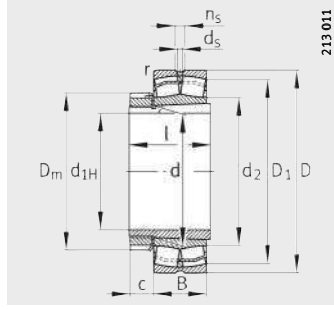


Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d <sub>a</sub>	D <sub>a</sub>	d <sub>b</sub>	B <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	max.	min.	min.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
31	46,4	28	5	1	48 000	42 500	0,34	1,98	2,94	1,93	4 800	17 000	9 200
37	54,6	33	5	1	64 000	57 000	0,31	2,15	3,2	2,1	6 900	13 000	7 800
43	65	39	5	1	88 000	81 500	0,31	2,16	3,22	2,12	9 400	11 000	7 000
47	71	39	8	1,5	83 000	74 000	0,26	2,55	3,8	2,5	8 100	9 500	6 800
48	73	44	5	1	101 000	91 000	0,28	2,41	3,59	2,35	11 800	10 000	6 200
59	81	44	5	1,5	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 200
52	81	45	5	1,5	156 000	149 000	0,36	1,86	2,77	1,82	13 100	7 500	5 500
54	78	50	8	1	104 000	99 000	0,26	2,62	3,9	2,56	12 700	10 000	5 600
67	91	50	5	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 500
58	91	50	5	1,5	187 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 000
59	83	55	10	1	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 100
67	99	55	5	2	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 400
63	99	56	5	2	229 000	223 000	0,36	1,86	2,77	1,82	20 300	6 000	4 800
67	91	60	10	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	4 650
71	109	60	6	2	160 000	155 000	0,24	2,84	4,23	2,78	20 200	6 300	5 100
67	109	61	6	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
67	109	61	6	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
71	101	65	8	1,5	160 000	155 000	0,24	2,84	4,23	2,78	20 200	7 500	4 550
84	118	65	5	2,1	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	4 100
74	118	66	5	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
74	118	66	5	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
79	111	70	8	1,5	202 000	210 000	0,24	2,81	4,19	2,75	25 500	6 700	4 200
94	128	70	5	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 600
83	128	72	5	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
83	128	72	5	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
84	116	75	11	1,5	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	3 950
94	138	75	6	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 950
86	138	77	5	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
86	138	77	5	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
89	121	80	12	1,5	216 000	236 000	0,22	3,1	4,62	3,03	29 500	6 300	3 700
99	148	80	5	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 750
92	148	82	5	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
92	148	82	5	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550

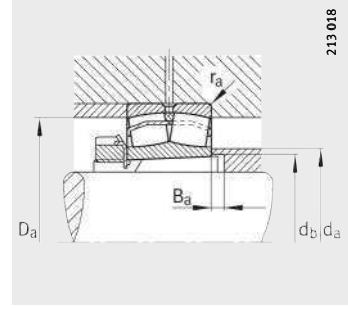


# Spherical roller bearings

With adapter sleeve



E1 design



Mounting dimensions

Dimension table (continued) · Dimensions in mm

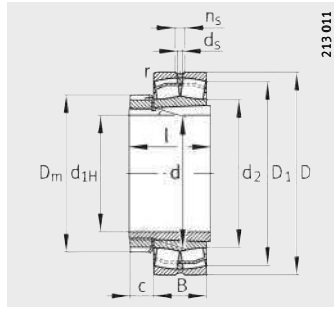
Designation			Mass m		Dimensions											
Bearing	X-life	Adapter sleeve	Bearing	Adapter sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>2</sub>	d <sub>s</sub>	n <sub>s</sub>	D <sub>m</sub>	l	c
			≈ kg	≈ kg	min.	≈	≈									≈
22216-E1-K	XL	H316	2,08	1,01	70	80	140	33	2	126,8	94,9	3,2	6,5	105	59	17
21316-E1-K	XL	H316	2,65	1,01	70	80	170	39	2,1	135,4	99,8	3,2	6,5	105	59	17
22316-E1-K	XL	H2316	6,05	1,27	70	80	170	58	2,1	145,1	98,3	4,8	9,5	105	78	17
22316-E1-K-T41A	XL	H2316	6,05	1,27	70	80	170	58	2,1	145,1	98,3	4,8	9,5	105	78	17
22217-E1-K	XL	H317	2,59	1,16	75	85	150	36	2	135,4	99,7	3,2	6,5	110	63	18
21317-E1-K	XL	H317	5,37	1,16	75	85	180	41	3	143,9	106,1	4,8	9,5	110	63	18
22317-E1-K	XL	H2317	7,06	1,44	75	85	180	60	3	154,2	104,4	4,8	9,5	110	82	18
22317-E1-K-T41A	XL	H2317	7,06	1,44	75	85	180	60	3	154,2	104,4	4,8	9,5	110	82	18
22218-E1-K	XL	H318	3,35	1,36	80	90	160	40	2	143,9	106,1	3,2	6,5	126	65	18
23218-E1A-K-M	XL	H2318	4,34	1,68	80	90	160	52,4	2	140	–	3,2	6,5	126	86	18
23218-E1-K-TVPB	XL	H2318	4,08	1,68	80	90	160	52,4	2	140	104,1	3,2	6,5	126	86	18
21318-E1-K	XL	H318	6,26	1,36	80	90	190	43	3	152,7	112,6	4,8	9,5	126	65	18
22318-E1-K	XL	H2318	8,33	1,68	80	90	190	64	3	162,5	110,2	6,3	12,2	126	86	18
22318-E1-K-T41A	XL	H2318	8,33	1,68	80	90	190	64	3	162,5	110,2	6,3	12,2	126	86	18
22219-E1-K	XL	H319	4,04	1,51	85	95	170	43	2,1	152,7	112,6	4,8	9,5	125	68	19
21319-E1-K-TVPB	XL	H319	6,53	1,51	85	95	200	45	3	169,4	124,3	4,8	9,5	125	68	19
22319-E1-K	XL	H2319	9,46	1,89	85	95	200	67	3	171,2	116	6,3	12,2	133	90	19
22319-E1-K-T41A	XL	H2319	9,46	1,89	85	95	200	67	3	171,2	116	6,3	12,2	133	90	19
23120-E1A-K-M	XL	H3120	4,23	1,78	90	100	165	52	2	146,3	–	3,2	6,5	130	76	20
23120-E1-K-TVPB	XL	H3120	4,06	1,78	90	100	165	52	2	146,3	113,9	3,2	6,5	130	76	20
22220-E1-K	XL	H320	4,91	1,69	90	100	180	46	2,1	161,4	119	4,8	9,5	130	71	20
23220-E1A-K-M	XL	H2320	6,33	2,17	90	100	180	60,3	2,1	156,7	–	4,8	9,5	142	97	20
23220-E1-K-TVPB	XL	H2320	6,13	2,17	90	100	180	60,3	2,1	156,7	116,7	4,8	9,5	142	97	20
21320-E1-K-TVPB	XL	H320	8,08	1,69	90	100	215	47	3	182	132	4,8	9,5	130	71	20
22320-E1-K	XL	H2320	13,1	2,17	90	100	215	73	3	184,7	130,2	6,3	12,2	142	97	20
22320-E1-K-T41A	XL	H2320	13,1	2,17	90	100	215	73	3	184,7	130,2	6,3	12,2	142	97	20
23122-E1A-K-M	XL	H3122	5,1	2,23	100	110	180	56	2	160	–	4,8	9,5	154	81	21
23122-E1-K-TVPB	XL	H3122	4,95	2,23	100	110	180	56	2	160	124,6	4,8	9,5	154	81	21
22222-E1-K	XL	H322	6,82	2,15	100	110	200	53	2,1	178,7	129,4	4,8	9,5	154	77	21
23222-E1A-K-M	XL	H2322	9,32	2,74	100	110	200	69,8	2,1	172,7	–	4,8	9,5	154	105	21
23222-E1-K-TVPB	XL	H2322	8,82	2,74	100	110	200	69,8	2,1	172,7	129,1	4,8	9,5	154	105	21
21322-E1-K-TVPB	XL	H322	10,9	2,15	100	110	240	50	3	202,5	146,4	6,3	12,2	154	77	21
22322-E1-K	XL	H2322	17,4	2,74	100	110	240	80	3	204,9	143,1	8	15	154	105	21
22322-E1-K-T41A	XL	H2322	17,4	2,74	100	110	240	80	3	204,9	143,1	8	15	154	105	21

Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d <sub>a</sub>	D <sub>a</sub>	d <sub>b</sub>	B <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	max.	min.	min.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
94	129	85	12	2	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 600	3 550
99	158	85	5	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	4 050
98	158	88	5	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
98	158	88	5	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
99	139	91	12	2	305 000	325 000	0,22	3,04	4,53	2,97	38 500	5 300	3 450
106	166	91	6	2,5	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 800
104	166	94	6	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
104	166	94	6	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
106	149	96	10	2	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 400
107	149	100	18	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
104	149	100	18	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
112	176	96	6	2,5	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 600
110	176	100	6	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
110	176	100	6	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
112	158	102	9	2,1	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 300
124	186	102	7	2,5	430 000	460 000	0,22	3,04	4,53	2,97	47 500	4 000	3 200
115	186	105	7	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
115	186	105	7	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
115	154	107	7	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
113	154	107	7	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
118	168	108	8	2,1	430 000	475 000	0,24	2,84	4,23	2,78	52 000	4 300	3 150
120	168	110	19	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
116	168	110	19	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
131	201	108	7	2,5	495 000	530 000	0,22	3,14	4,67	3,07	61 000	3 600	3 050
129	201	110	7	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
129	201	110	7	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
127	169	117	7	2	530 000	680 000	0,28	2,41	3,59	2,35	61 000	4 000	2 550
124	169	117	7	2	530 000	680 000	0,28	2,39	3,56	2,34	61 000	4 000	2 550
129	188	118	6	2,1	550 000	600 000	0,25	2,71	4,04	2,65	62 000	4 000	3 000
130	188	121	17	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
129	188	121	17	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
146	226	118	9	2,5	600 000	640 000	0,21	3,24	4,82	3,16	69 000	3 000	2 700
135	226	121	7	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130
135	226	121	7	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130

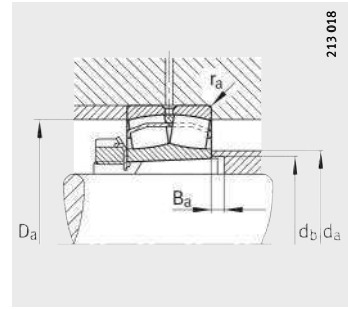


# Spherical roller bearings

With adapter sleeve



E1 design



Mounting dimensions

Dimension table (continued) · Dimensions in mm

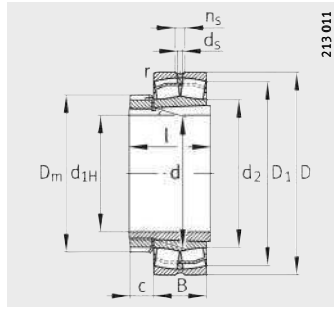
Designation			Mass m		Dimensions											
Bearing	X-life	Adapter sleeve	Bearing	Adapter sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>2</sub>	d <sub>s</sub>	n <sub>s</sub>	D <sub>m</sub>	l	c
			≈ kg	≈ kg	min.	≈	≈	≈	≈	≈	≈	≈	≈	≈		
23024-E1A-K-M	XL	H3024	4,09	1,95	110	120	180	46	2	164,7	–	3,2	6,5	145	72	22
23024-E1-K-TVPB	XL	H3024	3,67	1,95	110	120	180	46	2	164,7	133	3,2	6,5	145	72	22
23124-E1A-K-M	XL	H3124	7,57	2,61	110	120	200	62	2	177,4	–	4,8	9,5	155	88	22
23124-E1-K-TVPB	XL	H3124	7,06	2,61	110	120	200	62	2	177,4	136,2	4,8	9,5	155	88	22
22224-E1-K	XL	H3124	8,84	2,61	110	120	215	58	2,1	192	141,8	6,3	12,2	155	88	22
23224-E1A-K-M	XL	H2324	11,4	3,18	110	120	215	76	2,1	185,5	–	4,8	9,5	155	112	22
23224-E1-K-TVPB	XL	H2324	11,1	3,18	110	120	215	76	2,1	185,5	139	4,8	9,5	155	112	22
22324-E1-K	XL	H2324	22,1	3,18	110	120	260	86	3	222,4	150,7	8	15	155	112	22
22324-E1-K-T41A	XL	H2324	22,1	3,18	110	120	260	86	3	222,4	150,7	8	15	155	112	22
23026-E1A-K-M	XL	H3026	5,7	2,9	115	130	200	52	2	182,3	–	4,8	9,5	155	80	23
23026-E1-K-TVPB	XL	H3026	5,42	2,9	115	130	200	52	2	182,3	145,9	4,8	9,5	155	80	23
23126-E1A-K-M	XL	H3126	8,1	3,63	115	130	210	64	2	187,3	–	4,8	9,5	175	92	23
23126-E1-K-TVPB	XL	H3126	7,82	3,63	115	130	210	64	2	187,3	146	4,8	9,5	175	92	23
22226-E1-K	XL	H3126	10,9	3,63	115	130	230	64	3	205	151,7	6,3	12,2	175	92	23
23226-E1A-K-M	XL	H2326	13,6	4,61	115	130	230	80	3	199,3	–	4,8	9,5	165	121	23
23226-E1-K-TVPB	XL	H2326	12,6	4,61	115	130	230	80	3	199,3	150	4,8	9,5	165	121	23
22326-E1-K	XL	H2326	27,4	4,61	115	130	280	93	4	239,5	162,2	9,5	17,7	165	121	23
22326-E1-K-T41A	XL	H2326	27,4	4,61	115	130	280	93	4	239,5	162,2	9,5	17,7	165	121	23
23028-E1A-K-M	XL	H3028	6	3,25	125	140	210	53	2	192,3	–	4,8	9,5	165	82	24
23028-E1-K-TVPB	XL	H3028	5,81	3,25	125	140	210	53	2	192,3	155,4	4,8	9,5	165	82	24
23128-E1A-K-M	XL	H3128	7,78	4,33	125	140	225	68	2,1	201	–	4,8	9,5	180	97	24
23128-E1-K-TVPB	XL	H3128	9,46	4,33	125	140	225	68	2,1	201	157,1	4,8	9,5	180	97	24
22228-E1-K	XL	H3128	13,7	4,33	125	140	250	68	3	223,4	164,9	6,3	12,2	180	97	24
23228-E1A-K-M	XL	H2328	17,6	5,6	125	140	250	88	3	216	–	6,3	12,2	180	131	24
23228-E1-K-TVPB	XL	H2328	17,1	5,6	125	140	250	88	3	216	162	6,3	12,2	180	131	24
22328-E1-K	XL	H2328	34,4	5,6	125	140	300	102	4	255,7	173,5	9,5	17,7	180	131	24
22328-E1-K-T41A	XL	H2328	34,4	5,6	125	140	300	102	4	255,7	173,5	9,5	17,7	180	131	24
23030-E1A-K-M	XL	H3030	7,33	3,98	135	150	225	56	2,1	206,3	–	4,8	9,5	180	87	26
23030-E1-K-TVPB	XL	H3030	7,29	3,98	135	150	225	56	2,1	206,3	166,6	4,8	9,5	180	87	26
23130-E1A-K-M	XL	H3130	15,8	5,49	135	150	250	80	2,1	220,8	–	6,3	12,2	195	111	26
23130-E1-K-TVPB	XL	H3130	14,5	5,49	135	150	250	80	2,1	220,8	170,1	6,3	12,2	195	111	26
22230-E1-K	XL	H3130	17,8	5,49	135	150	270	73	3	240,8	177,9	8	15	195	111	26
23230-E1A-K-M	XL	H2330	22,9	6,71	135	150	270	96	3	232,6	–	6,3	12,2	195	139	26
23230-E1-K-TVPB	XL	H2330	22,3	6,71	135	150	270	96	3	232,6	174	6,3	12,2	195	139	26
22330-E1-K	XL	H2330	41,2	6,71	135	150	320	108	4	273,2	185,3	9,5	17,7	195	139	26
22330-E1-K-T41A	XL	H2330	41,2	6,71	135	150	320	108	4	273,2	185,3	9,5	17,7	195	139	26

Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d <sub>a</sub>	D <sub>a</sub>	d <sub>b</sub>	B <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	max.	min.	min.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
133	171,2	127	7	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
133	171,2	127	7	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
139	189	128	7	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
136	189	128	7	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
141	203	128	11	2,1	640 000	740 000	0,25	2,71	4,04	2,65	71 000	3 400	2 700
141	203	131	17	2	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
139	203	131	17	2	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
150	246	131	7	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
150	246	131	7	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
146	191,2	137	8	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
145	191,2	137	8	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
149	199	138	8	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
145	199	138	8	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
151	216	138	8	2,5	760 000	890 000	0,26	2,62	3,9	2,56	79 000	3 000	2 500
152	216	142	21	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
150	216	142	21	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
162	263	142	8	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
162	263	142	8	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
155	201,2	147	8	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
155	201,2	147	8	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
159	213	149	8	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
157	213	149	8	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
164	236	149	8	2,5	870 000	1 040 000	0,25	2,67	3,97	2,61	97 000	2 400	2 250
162	236	152	22	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
162	236	152	22	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
169	283	152	8	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
169	283	152	8	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
166	214,8	158	8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
166	214,8	158	8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
170	238	160	8	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
170	238	160	8	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
177	256	160	15	2,5	1 010 000	1 210 000	0,25	2,69	4	2,63	111 000	2 600	2 050
174	256	163	20	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
174	256	163	20	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
185	303	163	8	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
185	303	163	8	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520

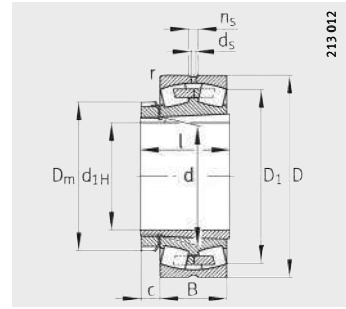


# Spherical roller bearings

With adapter sleeve



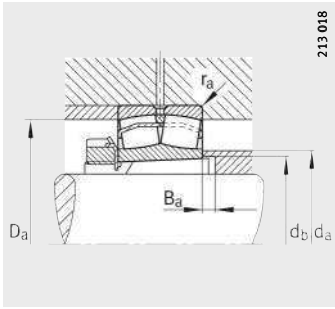
E1 design



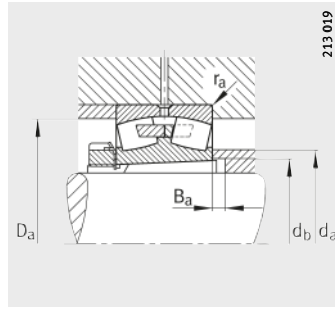
With central rib

Dimension table (continued) · Dimensions in mm

Designation			Mass m		Dimensions											
Bearing	X-life	Adapter sleeve	Bearing	Adapter sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>2</sub>	d <sub>s</sub>	n <sub>s</sub>	D <sub>m</sub>	l	c
			≈ kg	≈ kg	min.	≈	≈		≈	≈		≈				
23032-E1A-K-M	XL	H3032	9,42	5,33	140	160	240	60	2,1	219,9	–	6,3	12,2	190	93	28
23032-E1-K-TVPB	XL	H3032	8,67	5,33	140	160	240	60	2,1	219,9	177	6,3	12,2	190	93	28
23132-E1A-K-M	XL	H3132	18,6	7,57	140	160	270	86	2,1	238,3	–	8	15	210	119	28
23132-E1-K-TVPB	XL	H3132	18,4	7,57	140	160	270	86	2,1	238,3	183,2	8	15	210	119	28
22232-E1-K	XL	H3132	22,4	7,57	140	160	290	80	3	258,2	190,9	8	15	210	119	28
23232-E1A-K-M	XL	H2332	28,5	9,1	140	160	290	104	3	249,3	–	8	15	210	147	28
23232-E1-K-TVPB	XL	H2332	27,7	9,1	140	160	290	104	3	249,3	186,7	8	15	210	147	28
22332-K-MB	–	H2332	50,1	9,1	140	160	340	114	4	288,3	–	9,5	17,7	210	147	28
23034-E1A-K-M	XL	H3034	12	6,13	150	170	260	67	2,1	237,2	–	6,3	12,2	211	101	29
23034-E1-K-TVPB	XL	H3034	11,9	6,13	150	170	260	67	2,1	237,2	189,8	6,3	12,2	211	101	29
23134-E1A-K-M	XL	H3134	19,5	8,35	150	170	280	88	2,1	248,1	–	8	15	220	122	29
23134-E1-K-TVPB	XL	H3134	19,9	8,35	150	170	280	88	2,1	248,1	193,4	8	15	220	122	29
22234-E1-K	XL	H3134	27,1	8,35	150	170	310	86	4	275,4	199,8	9,5	17,7	220	122	29
23234-E1A-K-M	XL	H2334	34,6	10,2	150	170	310	110	4	267,4	–	8	15	232	154	29
23234-E1-K-TVPB	XL	H2334	33,1	10,2	150	170	310	110	4	267,4	199,8	8	15	232	154	29
22334-K-MB	–	H2334	56,9	10,2	150	170	360	120	4	304,2	–	9,5	17,7	232	154	29
23936-S-K-MB	–	H3936	7,76	6,25	160	180	250	52	2	230,9	–	4,8	9,5	210	87	30
23036-E1A-K-M	XL	H3036	16	7,01	160	180	280	74	2,1	254,3	–	8	15	221	109	30
23036-E1-K-TVPB	XL	H3036	15,6	7,01	160	180	280	74	2,1	254,3	201,8	8	15	221	109	30
23136-E1A-K-M	XL	H3136	25,5	9,46	160	180	300	96	3	264,8	–	8	15	230	131	30
23136-E1-K-TVPB	XL	H3136	25,9	9,46	160	180	300	96	3	264,8	204,1	8	15	230	131	30
22236-E1-K	XL	H3136	28,5	9,46	160	180	320	86	4	285,9	211,3	9,5	17,7	230	131	30
23236-E1A-K-M	XL	H2336	37	11,4	160	180	320	112	4	277,3	–	8	15	230	161	30
23236-E1-K-TVPB	XL	H2336	36	11,4	160	180	320	112	4	277,3	210,6	8	15	230	161	30
22336-K-MB	–	H2336	66,7	11,4	160	180	380	126	4	323,4	–	12,5	23,5	230	161	30
23038-E1A-K-M	XL	H3038	17,7	7,66	170	190	290	75	2,1	264,5	–	8	15	220	112	31
23038-E1-K-TVPB	XL	H3038	16,3	7,66	170	190	290	75	2,1	264,5	211,9	8	15	220	112	31
23138-E1A-K-M	XL	H3138	32,4	10,8	170	190	320	104	3	281,6	–	8	15	252	141	31
23138-E1-K-TVPB	XL	H3138	30,3	10,8	170	190	320	104	3	281,6	217	8	15	252	141	31
22238-K-MB	–	H3138	36,2	10,8	170	190	340	92	4	296	–	9,5	17,7	252	141	31
23238-B-K-MB	–	H2338	46	12,7	170	190	340	120	4	291,2	–	9,5	17,7	240	169	31
22338-K-MB	–	H2338	77,3	12,7	170	190	400	132	5	338,2	–	12,5	23,5	240	169	31



Mounting dimensions  
E1 design



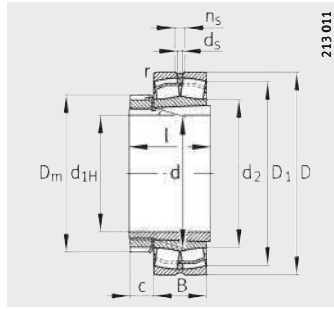
Mounting dimensions  
With central rib

Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d <sub>a</sub>	D <sub>a</sub>	d <sub>b</sub>	B <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	max.	min.	min.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
177	229,8	168	8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
177	229,8	168	8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
183	258	170	8	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 560
183	258	170	8	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 590
190	276	170	14	2,5	1 150 000	1 400 000	0,26	2,64	3,93	2,58	125 000	2 600	1 900
186	276	174	18	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
186	276	174	18	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
191	323	174	8	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	121 000	2 000	1 490
190	249,8	179	8	2,1	880 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
189	249,8	179	8	2,1	870 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
193	268	180	8	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
193	268	180	8	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
199	293	180	10	3	1 320 000	1 570 000	0,26	2,6	3,87	2,54	140 000	2 400	1 780
199	293	185	18	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
199	293	185	18	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
204	343	185	8	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	134 000	1 800	1 380
198	241,2	188	8	2	440 000	850 000	0,2	3,42	5,09	3,34	57 000	2 200	1 850
201	269,8	189	8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
201	269,8	189	8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
204	286	180	8	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
204	286	191	8	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
211	303	191	18	3	1 360 000	1 680 000	0,25	2,71	4,04	2,65	148 000	2 400	1 670
210	303	195	22	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
210	303	195	22	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
217	363	195	8	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	209 000	1 500	1 270
211	279,8	199	9	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
211	279,8	199	9	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
216	306	202	9	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
216	306	202	9	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
223	323	202	21	3	1 200 000	1 830 000	0,28	2,39	3,56	2,34	122 000	1 800	1 600
222	323	206	21	3	1 560 000	2 600 000	0,36	1,86	2,77	1,82	156 000	1 700	1 020
228	380	206	9	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	213 000	1 500	1 220

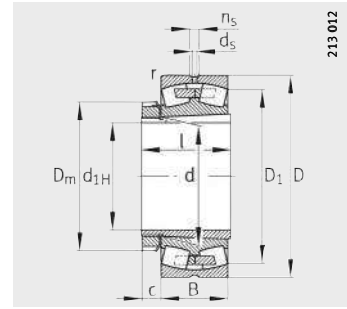


# Spherical roller bearings

With adapter sleeve



E1 design

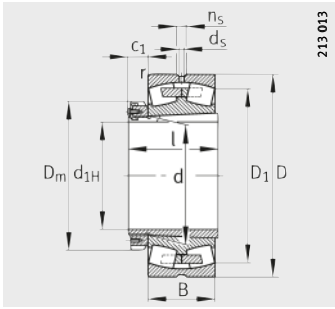


With central rib

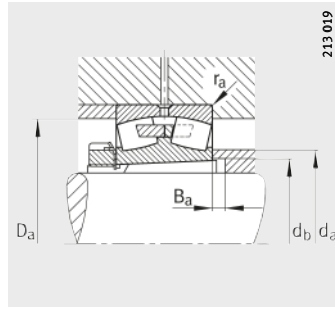
Dimension table (continued) · Dimensions in mm

Designation			Mass m		Dimensions										
Bearing	X-life	Adapter sleeve	Bearing	Adapter sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>2</sub>	d <sub>s</sub>	n <sub>s</sub>	D <sub>m</sub>	l
			≈ kg	≈ kg						min.	≈				
23940-S-K-MB	-	H3940	11,5	7,82	180	200	280	60	2,1	256,9	-	6,3	12,2	240	98
23040-E1A-K-M	XL	H3040	21,4	9,22	180	200	310	82	2,1	281,6	-	8	15	240	120
23040-E1-K-TVPB	XL	H3040	20,8	9,22	180	200	310	82	2,1	281,6	223,4	8	15	240	120
23140-B-K-MB	-	H3140	41,7	12,1	180	200	340	112	3	293,3	-	9,5	17,7	250	150
22240-B-K-MB	-	H3140	42,3	12,1	180	200	360	98	4	312	-	9,5	17,7	250	150
23240-B-K-MB	-	H2340	55,8	14	180	200	360	128	4	307,5	-	9,5	17,7	250	176
22340-K-MB	-	H2340	89,5	14	180	200	420	138	5	357,4	-	12,5	23,5	250	176
23944-S-K-MB	-	H3944	12,3	8,27	200	220	300	60	2,1	277,4	-	6,3	12,2	260	96
23044-K-MB	-	H3044X	29,9	10,4	200	220	340	90	3	301,8	-	8	15	260	126
23144-B-K-MB	-	H3144X	52	15,4	200	220	370	120	4	319,2	-	9,5	17,7	292	161
22244-B-K-MB	-	H3144X	59,6	15,4	200	220	400	108	4	348,7	-	9,5	17,7	292	161
23244-K-MB	-	H2344X	79	17,5	200	220	400	144	4	337,6	-	9,5	17,7	280	186
22344-K-MB	-	H2344X	114	17,5	200	220	460	145	5	391,2	-	12,5	23,5	280	186
23948-K-MB	-	H3948	13,4	10,9	220	240	320	60	2,1	297,8	-	6,3	12,2	290	101
23048-K-MB	-	H3048	31,9	13,4	220	240	360	92	3	322,1	-	8	15	290	133
23148-B-K-MB	-	H3148X	65,3	18,1	220	240	400	128	4	346,2	-	9,5	17,7	312	172
22248-B-K-MB	-	H3148X	81,2	18,1	220	240	440	120	4	380,7	-	12,5	23,5	312	172
23248-B-K-MB	-	H2348X	105	20,6	220	240	440	160	4	371	-	12,5	23,5	300	199
22348-K-MB	-	H2348X	145	20,6	220	240	500	155	5	420	-	12,5	23,5	300	199
23952-K-MB	-	H3952	22,4	13,1	240	260	360	75	2,1	330,5	-	8	15	310	116
23052-K-MB	-	H3052X	46,2	15,6	240	260	400	104	4	357,2	-	9,5	17,7	310	145
23152-K-MB	-	H3152X	89,6	22,9	240	260	440	144	4	379,7	-	9,5	17,7	330	190
22252-B-K-MB	-	H3152X	106	22,9	240	260	480	130	5	415,3	-	12,5	23,5	330	190
23252-B-K-MB	-	H2352X	136	25,1	240	260	480	174	5	405,4	-	12,5	23,5	330	211
22352-K-MB	-	H2352X	177	25,1	240	260	540	165	6	452,1	-	12,5	23,5	330	211
23956-K-MB	-	H3956	24,7	15	260	280	380	75	2,1	350	-	8	15	330	121
23056-B-K-MB	-	H3056	50,3	18	260	280	420	106	4	376,5	-	9,5	17,7	330	152
23156-B-K-MB	-	H3156X	96,4	25,4	260	280	460	146	5	401,4	-	9,5	17,7	362	195
22256-B-K-MB	-	H3156X	110	25,4	260	280	500	130	5	435,2	-	12,5	23,5	362	195
23256-K-MB	-	H2356X	153	28,8	260	280	500	176	5	426,3	-	12,5	23,5	350	224
22356-K-MB	-	H2356X	224	28,8	260	280	580	175	6	489,3	-	12,5	23,5	350	224
23960-B-K-MB	-	H3960	39,1	20,3	280	300	420	90	3	384,6	-	9,5	17,7	360	140
23060-K-MB	-	H3060	72,2	23,2	280	300	460	118	4	412,6	-	9,5	17,7	360	168
23160-B-K-MB	-	H3160	123	29,9	280	300	500	160	5	434,7	-	9,5	17,7	380	208
22260-K-MB	-	H3160	136	29,9	280	300	540	140	5	468,8	-	12,5	23,5	380	208
23260-K-MB	-	H3260	192	34,1	280	300	540	192	5	458,7	-	12,5	23,5	380	240

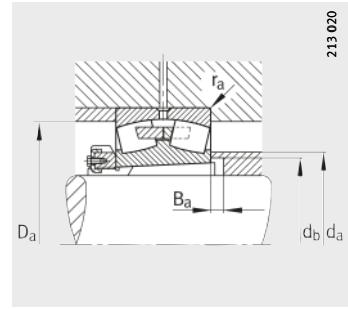




With central rib  
Locknut with retaining bracket



Mounting dimensions  
With central rib



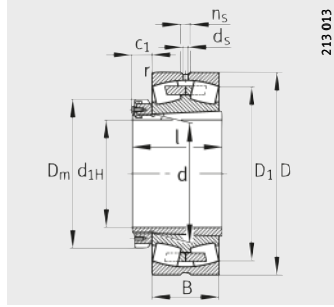
With central rib  
Locknut with retaining bracket

		Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
c	c <sub>1</sub>	d <sub>a</sub>	D <sub>a</sub>	d <sub>b</sub>	B <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
≈	≈	max.	max.	min.	min.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
32	-	220	269,8	210	9	2,1	550 000	1 080 000	0,2	3,42	5,09	3,34	71 000	2 000	1 650
32	-	223	299,8	210	10	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
32	-	223	299,8	210	10	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
32	-	231	326	212	10	2,5	1 320 000	2 280 000	0,35	1,95	2,9	1,91	131 000	1 700	1 240
32	-	234	343	212	24	3	1 320 000	2 000 000	0,29	2,35	3,5	2,3	123 000	1 700	1 530
32	-	237	343	216	20	3	1 660 000	2 750 000	0,37	1,83	2,72	1,79	163 000	1 500	980
32	-	240	400	216	10	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 120
-	40	241	289,8	230	9	2,1	600 000	1 250 000	0,18	3,76	5,59	3,67	72 000	1 800	1 460
-	40	247	327,6	231	12	2,5	1 100 000	2 000 000	0,26	2,55	3,8	2,5	132 000	1 700	1 440
35	-	253	353	233	10	3	1 630 000	2 900 000	0,33	2,03	3,02	1,98	165 000	1 400	1 060
35	-	258	383	233	22	3	1 630 000	2 450 000	0,29	2,35	3,5	2,3	153 000	1 400	1 340
35	-	259	383	236	11	3	2 040 000	3 450 000	0,37	1,83	2,72	1,79	181 000	1 400	850
35	-	272	440	236	10	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1 300	970
-	45	261	309,8	250	11	2,1	640 000	1 370 000	0,17	4,05	6,04	3,96	93 000	1 500	1 310
-	45	268	347,6	251	11	2,5	1 160 000	2 200 000	0,25	2,74	4,08	2,68	130 000	1 400	1 320
37	-	276	383	254	11	3	1 860 000	3 250 000	0,33	2,06	3,06	2,01	177 000	1 300	970
37	-	283	423	254	19	3	1 960 000	3 050 000	0,29	2,35	3,5	2,3	184 000	1 300	1 180
37	-	284	423	257	6	3	2 450 000	4 250 000	0,37	1,8	2,69	1,76	231 000	1 300	750
37	-	296	480	257	11	4	2 650 000	3 900 000	0,35	1,95	2,9	1,91	249 000	1 500	870
-	45	285	349,8	270	11	2,1	930 000	1 930 000	0,19	3,54	5,27	3,46	108 000	1 400	1 190
-	45	291	385,4	272	13	3	1 500 000	2 800 000	0,26	2,64	3,93	2,58	154 000	1 300	1 170
39	-	302	423	276	11	3	2 200 000	4 000 000	0,33	2,03	3,02	1,98	213 000	1 200	850
39	-	308	460	276	25	4	2 240 000	3 450 000	0,29	2,32	3,45	2,26	217 000	1 100	1 070
39	-	309	460	278	2	4	2 900 000	4 900 000	0,37	1,8	2,69	1,76	270 000	1 100	660
39	-	322	514	278	11	5	3 000 000	4 400 000	0,34	2	2,98	1,96	290 000	1 100	790
-	49	303	369,8	290	12	2,1	970 000	2 040 000	0,18	3,76	5,59	3,67	129 000	1 300	1 100
-	49	310	405,4	292	12	3	1 560 000	3 000 000	0,25	2,74	4,08	2,68	156 000	1 300	1 090
39	-	321	440	296	12	4	2 360 000	4 400 000	0,32	2,12	3,15	2,07	241 000	1 100	780
39	-	324	480	296	28	4	2 360 000	3 650 000	0,28	2,43	3,61	2,37	238 000	1 100	1 010
41	-	329	480	299	11	4	3 000 000	5 300 000	0,36	1,86	2,77	1,82	260 000	1 100	620
41	-	349	554	299	12	5	3 550 000	5 400 000	0,33	2,03	3,02	1,98	335 000	950	680
-	53	329	407,6	311	12	2,5	1 270 000	2 650 000	0,2	3,42	5,09	3,34	165 000	1 200	1 000
-	53	337	445,4	313	12	3	1 960 000	3 650 000	0,25	2,69	4	2,63	223 000	1 100	960
-	53	347	480	318	12	4	2 650 000	4 900 000	0,33	2,06	3,06	2,01	270 000	1 100	720
-	53	352	520	318	32	4	2 750 000	4 400 000	0,27	2,47	3,67	2,41	300 000	1 000	900
-	53	353	520	321	12	4	3 450 000	6 200 000	0,37	1,83	2,72	1,79	300 000	1 000	560

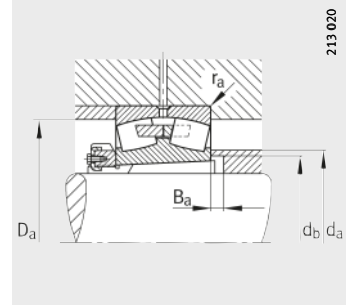


# Spherical roller bearings

With adapter sleeve



With central rib  
Locknut with retaining bracket



Mounting dimensions

Dimension table (continued) · Dimensions in mm

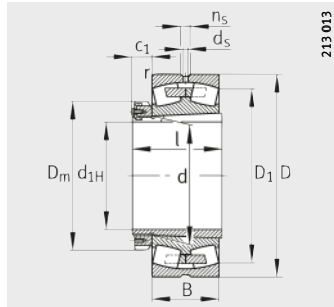
Designation		Mass m		Dimensions										
Bearing	Adapter sleeve	Bearing ≈kg	Adapter sleeve ≈kg	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>s</sub>	n <sub>s</sub>	D <sub>m</sub>	l	c <sub>1</sub>
								min.	≈					≈
<b>23964-K-MB</b>	<b>H3964</b>	41	21,5	<b>300</b>	320	440	90	3	406,2	9,5	17,7	380	140	56
<b>23064-K-MB</b>	<b>H3064</b>	77,1	25,1	<b>300</b>	320	480	121	4	432,6	9,5	17,7	380	171	56
<b>23164-K-MB</b>	<b>H3164</b>	159	34,8	<b>300</b>	320	540	176	5	466,2	12,5	23,5	400	226	56
<b>22264-K-MB</b>	<b>H3164</b>	166	34,8	<b>300</b>	320	580	150	5	503,5	12,5	23,5	400	226	56
<b>23264-K-MB</b>	<b>H3264</b>	229	39,3	<b>300</b>	320	580	208	5	489,6	12,5	23,5	400	258	56
<b>23068-K-MB</b>	<b>H3068</b>	101	29,3	<b>320</b>	340	520	133	5	464,6	12,5	23,5	400	187	57
<b>23168-B-K-MB</b>	<b>H3168</b>	203	49,5	<b>320</b>	340	580	190	5	499,5	12,5	23,5	440	254	70
<b>23268-B-K-MB</b>	<b>H3268</b>	291	54,9	<b>320</b>	340	620	224	6	521,2	12,5	23,5	440	288	70
<b>23972-K-MB</b>	<b>H3972</b>	45	27,1	<b>340</b>	360	480	90	3	447,1	9,5	17,7	420	144	57
<b>23072-K-MB</b>	<b>H3072</b>	107	30,9	<b>340</b>	360	540	134	5	485,2	12,5	23,5	420	188	57
<b>23172-K-MB</b>	<b>H3172</b>	217	54,3	<b>340</b>	360	600	192	5	520	12,5	23,5	460	259	73
<b>23272-B-K-MB</b>	<b>H3272</b>	328	61,1	<b>340</b>	360	650	232	6	548,3	12,5	23,5	460	299	73
<b>23976-K-MB</b>	<b>H3976</b>	66,3	32,4	<b>360</b>	380	520	106	4	477,6	9,5	17,7	450	164	62
<b>23076-B-K-MB</b>	<b>H3076</b>	113	36,5	<b>360</b>	380	560	135	5	505,6	12,5	23,5	450	193	62
<b>23176-K-MB</b>	<b>H3176</b>	226	60,9	<b>360</b>	380	620	194	5	539,6	12,5	23,5	490	264	75
<b>23276-B-K-MB</b>	<b>H3276</b>	367	69,3	<b>360</b>	380	680	240	6	576,4	12,5	23,5	490	310	75
<b>23980-B-K-MB</b>	<b>H3980</b>	68,2	38,5	<b>380</b>	400	540	106	4	499	9,5	17,5	470	168	66
<b>23080-K-MB</b>	<b>H3080</b>	143	42,3	<b>380</b>	400	600	148	5	540,5	12,5	23,5	470	210	66
<b>23180-B-K-MB</b>	<b>H3180</b>	261	69,6	<b>380</b>	400	650	200	6	567,2	12,5	23,5	520	272	81
<b>23280-B-K-MB</b>	<b>H3280</b>	442	80,5	<b>380</b>	400	720	256	6	609,8	12,5	23,5	520	328	81
<b>23984-K-MB</b>	<b>H3984</b>	78	37,5	<b>400</b>	420	560	106	4	519,5	9,5	17,7	490	168	66
<b>23084-B-K-MB</b>	<b>H3084X</b>	155	44,6	<b>400</b>	420	620	150	5	560,7	12,5	23,5	490	212	66
<b>23184-K-MB</b>	<b>H3184</b>	339	84,5	<b>400</b>	420	700	224	6	605,4	12,5	23,5	540	304	89
<b>23284-B-K-MB</b>	<b>H3284</b>	537	94,8	<b>400</b>	420	760	272	7,5	642,2	12,5	23,5	540	352	89
<b>23988-K-MB</b>	<b>H3988</b>	98,3	58,3	<b>410</b>	440	600	118	4	552,8	12,5	23,5	520	189	75
<b>23088-K-MB</b>	<b>H3088</b>	177	67	<b>410</b>	440	650	157	6	586,8	12,5	23,5	520	228	75
<b>23188-K-MB</b>	<b>H3188</b>	378	103	<b>410</b>	440	720	226	6	626	12,5	23,5	560	307	89
<b>23288-B-K-MB</b>	<b>H3288</b>	586	125	<b>410</b>	440	790	280	7,5	669,3	12,5	23,5	560	361	89
<b>23992-B-K-MB</b>	<b>H3992</b>	103	64,7	<b>430</b>	460	620	118	4	573,3	12,5	23,5	540	189	75
<b>23092-B-K-MB</b>	<b>H3092</b>	204	71,6	<b>430</b>	460	680	163	6	612,2	12,5	23,5	540	234	75
<b>23192-K-MB</b>	<b>H3192</b>	420	120	<b>430</b>	460	760	240	7,5	661,4	12,5	23,5	580	326	94
<b>23292-K-MB</b>	<b>H3292</b>	699	137	<b>430</b>	460	830	296	7,5	701,6	12,5	23,5	580	382	94
<b>23996-B-K-MB</b>	<b>H3996</b>	121	70,2	<b>450</b>	480	650	128	5	598,8	12,5	23,5	560	200	75
<b>23096-K-MB</b>	<b>H3096</b>	208	75,3	<b>450</b>	480	700	165	6	632,6	12,5	23,5	560	237	75
<b>23196-K-MB</b>	<b>H3196</b>	470	135	<b>450</b>	480	790	248	7,5	688,3	12,5	23,5	620	335	94
<b>23296-K-MB</b>	<b>H3296</b>	806	154	<b>450</b>	480	870	310	7,5	734,8	12,5	23,5	620	397	94

Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d <sub>a</sub>	D <sub>a</sub>	d <sub>b</sub>	B <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	max.	min.	min.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
349	427,6	332	12	2,5	1 310 000	2 750 000	0,19	3,62	5,39	3,54	202 000	1 100	930
357	465,4	334	13	3	2 040 000	4 000 000	0,25	2,74	4,08	2,68	243 000	1 100	900
369	520	338	13	4	3 200 000	6 000 000	0,34	1,98	2,94	1,93	305 000	950	650
378	560	338	39	4	3 050 000	4 900 000	0,27	2,47	3,67	2,41	345 000	950	830
378	560	343	13	4	3 900 000	6 950 000	0,37	1,8	2,69	1,76	330 000	950	510
382	502	355	14	4	2 360 000	4 550 000	0,25	2,69	4	2,63	285 000	1 000	840
395	560	360	14	4	3 650 000	6 950 000	0,34	1,98	2,94	1,93	570 000	900	590
402	594	364	14	5	4 500 000	8 150 000	0,38	1,78	2,65	1,74	650 000	850	465
389	467,6	372	14	2,5	1 430 000	3 200 000	0,17	4,05	6,04	3,96	209 000	1 000	800
402	522	375	14	4	2 450 000	4 800 000	0,25	2,74	4,08	2,68	295 000	950	790
416	580	380	14	4	3 800 000	7 350 000	0,33	2,06	3,06	2,01	360 000	850	550
424	624	385	14	5	4 900 000	9 150 000	0,38	1,78	2,65	1,74	720 000	800	425
415	505,4	393	15	3	1 760 000	4 000 000	0,19	3,58	5,33	3,5	265 000	950	750
422	542	396	15	4	2 550 000	5 300 000	0,24	2,84	4,23	2,78	430 000	900	730
436	600	401	15	4	4 050 000	8 150 000	0,32	2,12	3,15	2,07	385 000	800	510
447	654	405	15	5	5 300 000	9 800 000	0,37	1,8	2,69	1,76	780 000	750	395
435	525,4	413	15	3	1 830 000	4 150 000	0,18	3,71	5,52	3,63	275 000	900	710
448	582	417	15	4	3 050 000	6 200 000	0,24	2,79	4,15	2,73	365 000	800	670
457	624	421	15	5	4 250 000	8 500 000	0,31	2,15	3,2	2,1	670 000	750	485
473	694	427	15	5	5 700 000	10 800 000	0,38	1,78	2,65	1,74	820 000	700	370
455	545,4	433	15	3	1 900 000	4 500 000	0,18	3,85	5,73	3,76	300 000	850	660
468	602	437	16	4	3 150 000	6 550 000	0,24	2,84	4,23	2,78	395 000	800	640
483	674	443	16	5	5 000 000	9 650 000	0,33	2,03	3,02	1,98	465 000	700	455
495	728	449	16	6	6 550 000	12 200 000	0,38	1,77	2,64	1,73	930 000	670	340
482	585,4	454	17	3	2 240 000	5 200 000	0,18	3,66	5,46	3,58	295 000	800	620
488	627	458	17	5	3 400 000	7 100 000	0,24	2,84	4,23	2,78	405 000	750	610
504	694	463	17	5	5 200 000	10 400 000	0,32	2,1	3,13	2,06	485 000	700	425
516	758	469	17	6	7 100 000	13 400 000	0,37	1,8	2,69	1,76	990 000	630	320
500	605,4	474	17	3	2 280 000	5 400 000	0,18	3,85	5,73	3,76	370 000	750	590
509	657	478	17	5	3 650 000	7 650 000	0,24	2,84	4,23	2,78	520 000	700	580
533	728	484	17	6	5 850 000	11 600 000	0,32	2,12	3,15	2,07	530 000	630	390
541	798	490	17	6	7 800 000	15 000 000	0,37	1,8	2,69	1,76	620 000	600	295
523	632	496	18	4	2 550 000	6 000 000	0,18	3,76	5,59	3,67	460 000	700	570
529	677	499	18	5	3 800 000	8 150 000	0,23	2,9	4,31	2,83	455 000	670	550
554	758	505	18	6	6 300 000	12 700 000	0,32	2,12	3,15	2,07	570 000	630	370
568	838	512	18	6	8 800 000	17 000 000	0,37	1,83	2,72	1,79	700 000	600	265

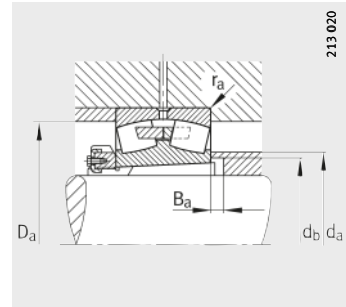


# Spherical roller bearings

With adapter sleeve



With central rib



Mounting dimensions

**Dimension table** (continued) · Dimensions in mm

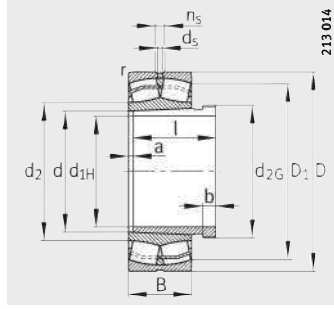
Designation		Mass m		Dimensions										
Bearing	Adapter sleeve	Bearing	Adapter sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>s</sub>	n <sub>s</sub>	D <sub>m</sub>	l	c <sub>1</sub>
		≈kg	≈kg					min.	≈					≈
<b>239/500-K-MB</b>	<b>H39/500</b>	124	74,3	<b>470</b>	500	670	128	5	619,3	12,5	23,5	580	208	83
<b>230/500-B-K-MB</b>	<b>H30/500</b>	219	84,5	<b>470</b>	500	720	167	6	653,5	12,5	23,5	580	247	83
<b>231/500-B-K-MB</b>	<b>H31/500</b>	556	143	<b>470</b>	500	830	264	7,5	720,9	12,5	23,5	630	356	99
<b>239/530-K-MB</b>	<b>H39/530</b>	146	89,3	<b>500</b>	530	710	136	5	656,4	12,5	23,5	630	216	89
<b>230/530-B-K-MB</b>	<b>H30/530</b>	291	103	<b>500</b>	530	780	185	6	703,7	12,5	23,5	630	265	89
<b>231/530-K-MB</b>	<b>H31/530</b>	643	160	<b>500</b>	530	870	272	7,5	756,3	12,5	23,5	670	364	102
<b>239/560-B-K-MB</b>	<b>H39/560</b>	169	95,8	<b>530</b>	560	750	140	5	693,4	12,5	23,5	650	227	96
<b>230/560-B-K-MB</b>	<b>H30/560</b>	339	113	<b>530</b>	560	820	195	6	741,5	12,5	23,5	650	282	96
<b>231/560-K-MB</b>	<b>H31/560</b>	737	183	<b>530</b>	560	920	280	7,5	800,2	12,5	23,5	710	377	107
<b>239/600-B-K-MB</b>	<b>H39/600</b>	210	129	<b>560</b>	600	800	150	5	740,5	12,5	23,5	700	239	96
<b>230/600-B-K-MB</b>	<b>H30/600</b>	388	149	<b>560</b>	600	870	200	6	791,9	12,5	23,5	700	289	96
<b>231/600-K-MB</b>	<b>H31/600</b>	901	233	<b>560</b>	600	980	300	7,5	852,6	12,5	23,5	750	399	107
<b>239/630-B-K-MB</b>	<b>H39/630</b>	283	123	<b>600</b>	630	850	165	6	784,5	12,5	23,5	730	254	96
<b>230/630-B-K-MB</b>	<b>H30/630</b>	502	140	<b>600</b>	630	920	212	7,5	834,3	12,5	23,5	730	301	96
<b>239/670-B-K-MB</b>	<b>H39/670</b>	310	166	<b>630</b>	670	900	170	6	831,5	12,5	23,5	780	264	101
<b>230/670-B-K-MB</b>	<b>H30/670</b>	590	194	<b>630</b>	670	980	230	7,5	888,7	12,5	23,5	780	324	101
<b>239/710-K-MB</b>	<b>H39/710</b>	336	201	<b>670</b>	710	950	180	6	877,5	12,5	23,5	830	286	111
<b>230/710-B-K-MB</b>	<b>H30/710</b>	650	229	<b>670</b>	710	1030	236	7,5	938,8	12,5	23,5	830	342	111
<b>239/750-K-MB</b>	<b>H39/750</b>	394	215	<b>710</b>	750	1000	185	6	923,2	12,5	23,5	870	291	111
<b>230/750-K-MB</b>	<b>H30/750</b>	792	250	<b>710</b>	750	1090	250	7,5	990,9	12,5	23,5	870	356	111
<b>239/800-B-K-MB</b>	<b>H39/800</b>	490	263	<b>750</b>	800	1060	195	6	983,7	12,5	23,5	920	303	111
<b>230/800-K-MB</b>	<b>H30/800</b>	861	306	<b>750</b>	800	1150	258	7,5	1050,9	12,5	23,5	920	366	111
<b>239/850-K-MB</b>	<b>H39/850</b>	554	300	<b>800</b>	850	1120	200	6	1039,9	12,5	23,5	980	308	112
<b>239/900-K-MB</b>	<b>H39/900</b>	641	327	<b>850</b>	900	1180	206	6	1098,8	12,5	23,5	1030	326	112

Mounting dimensions					Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
d <sub>a</sub>	D <sub>a</sub>	d <sub>b</sub>	B <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
max.	max.	min.	min.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
543	652	516	18	4	2 600 000	6 300 000	0,17	3,9	5,81	3,81	400 000	670	540
550	697	519	18	5	3 900 000	8 500 000	0,22	3,01	4,48	2,94	510 000	670	520
578	798	527	18	6	7 100 000	14 300 000	0,32	2,1	3,13	2,06	990 000	600	340
576	692	546	18	4	2 850 000	6 800 000	0,18	3,85	5,73	3,76	385 000	630	500
589	757	550	18	5	4 400 000	9 500 000	0,22	3,04	4,53	2,97	540 000	600	490
609	838	558	18	6	7 350 000	15 300 000	0,32	2,12	3,15	2,07	670 000	560	325
609	732	577	18	4	3 100 000	7 650 000	0,17	3,95	5,88	3,86	570 000	600	465
619	797	581	18	5	5 100 000	11 000 000	0,23	2,95	4,4	2,89	740 000	560	450
644	888	589	18	6	8 150 000	16 600 000	0,31	2,21	3,29	2,16	750 000	530	300
653	782	618	20	4	3 450 000	8 650 000	0,17	3,95	5,88	3,86	630 000	560	430
661	847	622	20	5	5 700 000	12 500 000	0,22	3,07	4,57	3	890 000	530	405
693	948	629	20	6	9 000 000	19 300 000	0,31	2,2	3,27	2,15	810 000	500	270
688	827	649	20	5	4 050 000	9 800 000	0,18	3,8	5,66	3,72	710 000	530	405
696	892	653	20	6	6 300 000	13 700 000	0,22	3,01	4,48	2,94	890 000	500	380
730	877	689	20	5	4 300 000	10 600 000	0,17	3,95	5,88	3,86	750 000	500	375
741	952	694	20	6	7 200 000	16 000 000	0,22	3,01	4,48	2,94	1 100 000	480	350
770	927	730	22	5	4 800 000	12 000 000	0,18	3,85	5,73	3,76	720 000	480	350
785	1 002	735	23	6	7 650 000	17 000 000	0,22	3,07	4,57	3	1 140 000	480	325
810	977	771	23	5	5 200 000	12 900 000	0,17	3,95	5,88	3,86	790 000	480	325
828	1 062	776	23	6	8 500 000	19 000 000	0,22	3,01	4,48	2,94	1 010 000	450	305
865	1 037	822	25	5	5 850 000	15 000 000	0,17	4,05	6,04	3,96	1 010 000	450	295
879	1 122	828	25	6	9 300 000	21 200 000	0,22	3,07	4,57	3	1 430 000	430	280
917	1 097	873	25	5	6 300 000	16 300 000	0,16	4,11	6,12	4,02	960 000	430	275
972	1 157	923	27	5	6 550 000	17 300 000	0,16	4,28	6,37	4,19	1 010 000	400	260

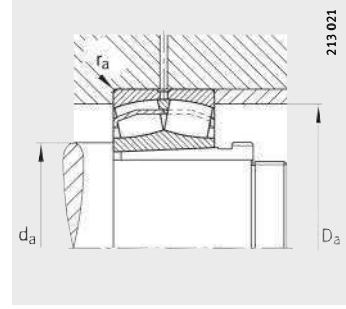


# Spherical roller bearings

With withdrawal sleeve



E1 design



Mounting dimensions

**Dimension table** - Dimensions in mm

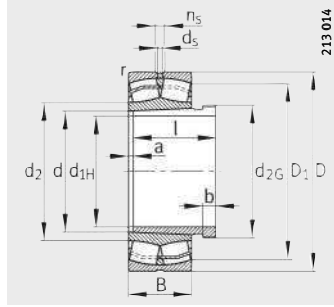
Designation			Mass m		Dimensions										
Bearing	X-life	With-drawal sleeve	Bearing	With-drawal sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>2</sub>	d <sub>s</sub>	n <sub>s</sub>	a	b
			≈kg	≈kg						min.	≈	≈			≈
22208-E1-K	XL	AH308	0,517	0,089	35	40	80	23	1,1	70,4	48,6	3,2	4,8	3	6
21308-E1-K	XL	AH308	0,702	0,089	35	40	90	23	1,5	80,8	59,7	3,2	4,8	3	6
22308-E1-K	XL	AH2308	1,03	0,128	35	40	90	33	1,5	76	52,4	3,2	4,8	3	7
22209-E1-K	XL	AH309	0,577	0,108	40	45	85	23	1,1	75,6	54,8	3,2	4,8	3	6
21309-E1-K	XL	AH309	0,845	0,108	40	45	100	25	1,5	89,8	67,6	3,2	4,8	3	6
22309-E1-K	XL	AH2309	1,36	0,163	40	45	100	36	1,5	84,7	58,9	3,2	6,5	3	7
22210-E1-K	XL	AHX310	0,608	0,138	45	50	90	23	1,1	80,8	59,7	3,2	4,8	3	7
21310-E1-K	XL	AHX310	1,28	0,138	45	50	110	27	2	89,8	67,3	3,2	4,8	3	7
22310-E1-K	XL	AHX2310	1,86	0,213	45	50	110	40	2	92,6	63	3,2	6,5	3	9
22211-E1-K	XL	AHX311	0,825	0,164	50	55	100	25	1,5	89,8	67,3	3,2	4,8	3	7
21311-E1-K	XL	AHX311	1,19	0,164	50	55	120	29	2	98,3	71,4	3,2	6,5	3	7
22311-E1-K	XL	AHX2311	2,22	0,255	50	55	120	43	2	101,4	68,9	3,2	6,5	3	10
22311-E1-K-T41A	XL	AHX2311	2,22	0,255	50	55	120	43	2	101,4	68,9	3,2	6,5	3	10
22212-E1-K	XL	AHX312	1,09	0,195	55	60	110	28	1,5	98,7	71,4	3,2	6,5	3	8
21312-E1-K	XL	AHX312	1,78	0,195	55	60	130	31	2,1	112,5	84,4	3,2	6,5	3	8
22312-E1-K	XL	AHX2312	2,83	0,3	55	60	130	46	2,1	110,1	74,8	3,2	6,5	3	11
22312-E1-K-T41A	XL	AHX2312	2,83	0,3	55	60	130	46	2,1	110,1	74,8	3,2	6,5	3	11
22213-E1-K	XL	AH313G	1,52	0,224	60	65	120	31	1,5	107,3	79,1	3,2	6,5	3	8
21313-E1-K	XL	AH313G	2,42	0,224	60	65	140	33	2,1	126,8	94,9	3,2	6,5	3	8
22313-E1-K	XL	AH2313G	3,49	0,4	60	65	140	48	2,1	119,3	83,2	4,8	9,5	3	12
22313-E1-K-T41A	XL	AH2313G	3,49	0,4	60	65	140	48	2,1	119,3	83,2	4,8	9,5	3	12
22214-E1-K	XL	AH314G	1,61	0,25	65	70	125	31	1,5	112,5	84,4	3,2	6,5	4	8
21314-E1-K	XL	AH314G	3	0,25	65	70	150	35	2,1	126,2	94,9	3,2	6,5	4	8
22314-E1-K	XL	AHX2314G	4,12	0,407	65	70	150	51	2,1	128	86,7	4,8	9,5	4	12
22314-E1-K-T41A	XL	AHX2314G	4,12	0,407	65	70	150	51	2,1	128	86,7	4,8	9,5	4	12
22215-E1-K	XL	AH315G	1,68	0,284	70	75	130	31	1,5	117,7	89,8	3,2	6,5	4	8
21315-E1-K	XL	AH315G	2,86	0,284	70	75	160	37	2,1	135,2	99,7	3,2	6,5	4	8
22315-E1-K	XL	AHX2315G	5,06	0,5	70	75	160	55	2,1	136,3	92,4	4,8	9,5	4	12
22315-E1-K-T41A	XL	AHX2315G	5,06	0,5	70	75	160	55	2,1	136,3	92,4	4,8	9,5	4	12
22216-E1-K	XL	AH316	2,08	0,366	75	80	140	33	2	126,8	94,9	3,2	6,5	4	8
21316-E1-K	XL	AH316	2,65	0,366	75	80	170	39	2,1	135,4	99,8	3,2	6,5	4	8
22316-E1-K	XL	AHX2316	6,05	0,6	75	80	170	58	2,1	145,1	98,3	4,8	9,5	4	12
22316-E1-K-T41A	XL	AHX2316	6,05	0,6	75	80	170	58	2,1	145,1	98,3	4,8	9,5	4	12

		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d <sub>2G</sub>	l	d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
		min.	max.	max.	N	N							
M45X1,5	29	47	73	1	101 000	91 000	0,28	2,41	3,59	2,35	11 800	10 000	6 200
M45X1,5	29	49	81	1,5	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 200
M45X1,5	40	49	81	1,5	156 000	149 000	0,36	1,86	2,77	1,82	13 100	7 500	5 500
M50X1,5	31	52	78	1	104 000	99 000	0,26	2,62	3,9	2,56	12 700	10 000	5 600
M50X1,5	31	54	91	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 500
M50X1,5	44	54	91	1,5	187 000	183 000	0,36	1,9	2,83	1,86	16 100	6 700	5 000
M55X2	35	57	83	1	109 000	107 000	0,24	2,81	4,19	2,75	14 300	9 500	5 100
M55X2	35	61	99	2	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	5 400
M55X2	50	61	99	2	229 000	223 000	0,36	1,86	2,77	1,82	20 300	6 000	4 800
M60X2	37	64	91	1,5	129 000	130 000	0,23	2,92	4,35	2,86	17 300	8 500	4 650
M60X2	37	66	109	2	160 000	155 000	0,24	2,84	4,23	2,78	20 200	6 300	5 100
M60X2	54	66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
M60X2	54	66	109	2	265 000	260 000	0,36	1,89	2,81	1,84	23 900	5 600	4 500
M65X2	40	69	101	1,5	160 000	155 000	0,24	2,84	4,23	2,78	20 200	7 500	4 550
M65X2	40	72	118	2,1	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	4 100
M65X2	58	72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
M65X2	58	72	118	2,1	310 000	310 000	0,35	1,91	2,85	1,87	28 000	5 000	4 200
M70X2	42	74	111	1,5	202 000	210 000	0,24	2,81	4,19	2,75	25 500	6 700	4 200
M70X2	42	77	128	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 600
M70X2	61	77	128	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
M70X2	61	77	128	2,1	350 000	365 000	0,34	2	2,98	1,96	32 500	4 800	3 800
M75X2	43	79	116	1,5	211 000	226 000	0,23	2,95	4,4	2,89	28 000	6 300	3 950
M75X2	43	82	138	2,1	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 000	3 950
M75X2	64	82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
M75X2	64	82	138	2,1	390 000	390 000	0,34	2	2,98	1,96	36 500	4 500	3 700
M80X2	45	84	121	1,5	216 000	236 000	0,22	3,1	4,62	3,03	29 500	6 300	3 700
M80X2	45	87	148	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	3 750
M80X2	68	87	148	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
M80X2	68	87	148	2,1	445 000	450 000	0,34	1,99	2,96	1,94	40 500	4 300	3 550
M90X2	48	91	129	2	249 000	270 000	0,22	3,14	4,67	3,07	33 500	5 600	3 550
M90X2	48	92	158	2,1	305 000	325 000	0,22	3,04	4,53	2,97	38 500	4 800	4 050
M90X2	71	92	158	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400
M90X2	71	92	158	2,1	495 000	510 000	0,34	1,99	2,96	1,94	45 000	4 300	3 400

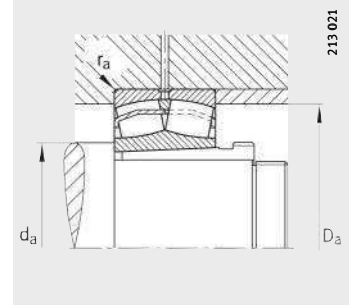


# Spherical roller bearings

With withdrawal sleeve



E1 design



Mounting dimensions

Dimension table (continued) · Dimensions in mm

Designation			Mass m		Dimensions										
Bearing	X-life	With- drawal sleeve	Bearing	With- drawal sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>2</sub>	d <sub>s</sub>	n <sub>s</sub>	a	b
			≈kg	≈kg					min.	≈	≈		≈		
22217-E1-K	XL	AHX317	2,59	0,43	80	85	150	36	2	135,4	99,7	3,2	6,5	4	9
21317-E1-K	XL	AHX317	5,37	0,43	80	85	180	41	3	143,9	106,1	4,8	9,5	4	9
22317-E1-K	XL	AHX2317	7,06	0,7	80	85	180	60	3	154,2	104,4	4,8	9,5	4	13
22317-E1-K-T41A	XL	AHX2317	7,06	0,7	80	85	180	60	3	154,2	104,4	4,8	9,5	4	13
22218-E1-K	XL	AHX318	3,35	0,466	85	90	160	40	2	143,9	106,1	3,2	6,5	4	9
23218-E1A-K-M	XL	AHX3218	4,34	0,6	85	90	160	52,4	2	140	–	3,2	6,5	4	10
23218-E1-K-TVPB	XL	AHX3218	4,08	0,6	85	90	160	52,4	2	140	104,1	3,2	6,5	4	10
21318-E1-K	XL	AHX318	6,26	0,466	85	90	190	43	3	152,7	112,6	4,8	9,5	4	9
22318-E1-K	XL	AHX2318	8,33	0,8	85	90	190	64	3	162,5	110,2	6,3	12,2	4	14
22318-E1-K-T41A	XL	AHX2318	8,33	0,8	85	90	190	64	3	162,5	110,2	6,3	12,2	4	14
22219-E1-K	XL	AHX319	4,04	0,54	90	95	170	43	2,1	152,7	112,6	4,8	9,5	4	10
21319-E1-K-TVPB	XL	AHX319	6,53	0,54	90	95	200	45	3	169,4	124,3	4,8	9,5	4	10
22319-E1-K	XL	AHX2319	9,46	0,894	90	95	200	67	3	171,2	116	6,3	12,2	4	16
22319-E1-K-T41A	XL	AHX2319	9,46	0,894	90	95	200	67	3	171,2	116	6,3	12,2	4	16
23120-E1A-K-M	XL	AHX3120	4,23	0,654	95	100	165	52	2	146,3	–	3,2	6,5	4	11
23120-E1-K-TVPB	XL	AHX3120	4,06	0,654	95	100	165	52	2	146,3	113,9	3,2	6,5	4	11
22220-E1-K	XL	AHX320	4,91	0,595	95	100	180	46	2,1	161,4	119	4,8	9,5	4	10
23220-E1A-K-M	XL	AHX3220	6,33	0,765	95	100	180	60,3	2,1	156,7	–	4,8	9,5	4	11
23220-E1-K-TVPB	XL	AHX3220	6,13	0,765	95	100	180	60,3	2,1	156,7	116,7	4,8	9,5	4	11
21320-E1-K-TVPB	XL	AHX320	8,08	0,595	95	100	215	47	3	182	132	4,8	9,5	4	10
22320-E1-K	XL	AHX2320	13,1	1,01	95	100	215	73	3	184,7	130,2	6,3	12,2	4	16
22320-E1-K-T41A	XL	AHX2320	13,1	1,01	95	100	215	73	3	184,7	130,2	6,3	12,2	4	16
23122-E1A-K-M	XL	AHX3122	5,1	0,774	105	110	180	56	2	160	–	4,8	9,5	4	11
23122-E1-K-TVPB	XL	AHX3122	4,95	0,774	105	110	180	56	2	160	124,6	4,8	9,5	4	11
24122-E1-K30	XL	AH24122	6,76	0,725	105	110	180	69	2	155,3	125,6	3,2	6,5	9	13
22222-E1-K	XL	AHX3122	6,82	0,774	105	110	200	53	2,1	178,7	129,4	4,8	9,5	4	11
23222-E1A-K-M	XL	AHX3222A	9,32	0,974	105	110	200	69,8	2,1	172,7	–	4,8	9,5	4	11
23222-E1-K-TVPB	XL	AHX3222A	8,82	0,974	105	110	200	69,8	2,1	172,7	129,1	4,8	9,5	4	11
21322-E1-K-TVPB	XL	AHX322	10,9	0,663	105	110	240	50	3	202,5	146,4	6,3	12,2	4	12
22322-E1-K	XL	AHX2322G	17,4	1,24	105	110	240	80	3	204,9	143,1	8	15	4	16
22322-E1-K-T41A	XL	AHX2322G	17,4	1,24	105	110	240	80	3	204,9	143,1	8	15	4	16

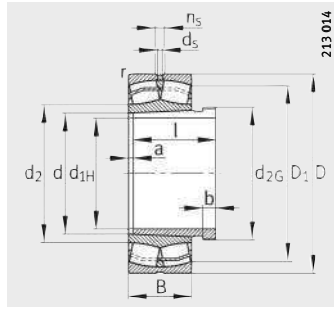


		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d <sub>2G</sub>	l	d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
		min.	max.	max.	N	N							
M95X2	52	96	139	2	305 000	325 000	0,22	3,04	4,53	2,97	38 500	5 300	3 450
M95X2	52	99	166	2,5	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 800
M95X2	74	99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
M95X2	74	99	166	2,5	540 000	560 000	0,33	2,04	3,04	2	50 000	4 000	3 200
M100X2	53	101	149	2	345 000	375 000	0,23	2,9	4,31	2,83	42 500	4 800	3 400
M100X2	63	101	149	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
M100X2	63	101	149	2	445 000	520 000	0,31	2,2	3,27	2,15	48 500	4 300	2 650
M100X2	53	104	176	2,5	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 600
M100X2	79	104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
M100X2	79	104	176	2,5	610 000	630 000	0,33	2,03	3,02	1,98	55 000	3 600	3 000
M105X2	57	107	158	2,1	380 000	415 000	0,24	2,87	4,27	2,8	47 000	4 500	3 300
M105X2	57	109	186	2,5	430 000	460 000	0,22	3,04	4,53	2,97	47 500	4 000	3 200
M105X2	85	109	186	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
M105X2	85	109	186	2,5	670 000	700 000	0,33	2,03	3,02	1,98	60 000	3 000	2 800
M110X2	64	111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
M110X2	64	111	154	2	450 000	570 000	0,28	2,37	3,53	2,32	52 000	4 300	2 750
M110X2	59	112	168	2,1	430 000	475 000	0,24	2,84	4,23	2,78	52 000	4 300	3 150
M110X2	73	112	168	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
M110X2	73	112	168	2,1	550 000	660 000	0,31	2,15	3,2	2,1	60 000	3 600	2 410
M110X2	59	114	201	2,5	495 000	530 000	0,22	3,14	4,67	3,07	61 000	3 600	3 050
M110X2	90	114	201	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
M110X2	90	114	201	2,5	810 000	920 000	0,33	2,03	3,02	1,98	75 000	3 000	2 380
M120X2	68	121	169	2	530 000	680 000	0,28	2,41	3,59	2,35	61 000	4 000	2 550
M120X2	68	121	169	2	530 000	680 000	0,28	2,39	3,56	2,34	61 000	4 000	2 550
M115X2	82	121	169	2	530 000	750 000	0,32	1,96	2,92	1,92	84 000	2 800	1 960
M120X2	68	122	188	2,1	550 000	600 000	0,25	2,71	4,04	2,65	62 000	4 000	3 000
M120X2	82	122	188	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
M120X2	82	122	188	2,1	710 000	870 000	0,33	2,06	3,06	2,01	72 000	3 000	2 100
M120X2	63	124	226	2,5	600 000	640 000	0,21	3,24	4,82	3,16	69 000	3 000	2 700
M120X2	98	124	226	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130
M120X2	98	124	226	2,5	950 000	1 070 000	0,33	2,07	3,09	2,03	91 000	2 600	2 130

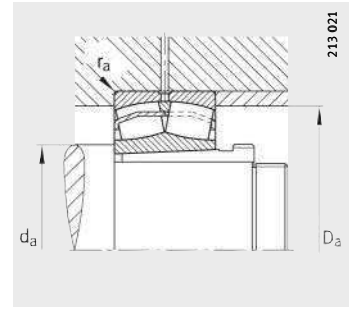


# Spherical roller bearings

With withdrawal sleeve



E1 design



Mounting dimensions  
E1 design

Dimension table (continued) · Dimensions in mm

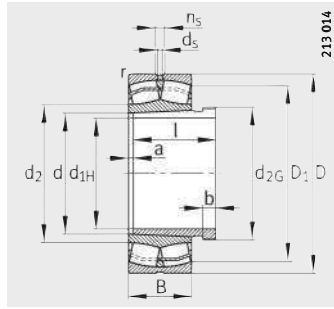
Designation			Mass m		Dimensions										
Bearing	X-life	With- drawal sleeve	Bearing	With- drawal sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>2</sub>	d <sub>s</sub>	n <sub>s</sub>	a	b
			≈kg	≈kg					min.	≈	≈		≈		
23024-E1A-K-M	XL	AHX3024	4,09	0,741	115	120	180	46	2	164,7	–	3,2	6,5	4	13
23024-E1-K-TVPB	XL	AHX3024	3,67	0,741	115	120	180	46	2	164,7	133	3,2	6,5	4	13
24024-E1-K30+AH	XL	AH24024	5,32	0,694	115	120	180	60	2	159,8	134,4	3,2	6,5	9	13
23124-E1A-K-M	XL	AHX3124	7,57	0,954	115	120	200	62	2	177,4	–	4,8	9,5	4	12
23124-E1-K-TVPB	XL	AHX3124	7,06	0,954	115	120	200	62	2	177,4	136,2	4,8	9,5	4	12
24124-E1-K30+AH	XL	AH24124	10	1	115	120	200	80	2	170,7	136,7	3,2	6,5	9	13
22224-E1-K	XL	AHX3124	8,84	0,954	115	120	215	58	2,1	192	141,8	6,3	12,2	4	12
23224-E1A-K-M	XL	AHX3224A	11,4	1,2	115	120	215	76	2,1	185,5	–	4,8	9,5	4	13
23224-E1-K-TVPB	XL	AHX3224A	11,1	1,2	115	120	215	76	2,1	185,5	139	4,8	9,5	4	13
22324-E1-K	XL	AHX2324G	22,1	1,5	115	120	260	86	3	222,4	150,7	8	15	4	17
22324-E1-K-T41A	XL	AHX2324G	22,1	1,5	115	120	260	86	3	222,4	150,7	8	15	4	17
23026-E1A-K-M	XL	AHX3026	5,7	0,916	125	130	200	52	2	182,3	–	4,8	9,5	4	14
23026-E1-K-TVPB	XL	AHX3026	5,42	0,916	125	130	200	52	2	182,3	145,9	4,8	9,5	4	19
24026-E1-K30+AH	XL	AH24026	7,83	0,875	125	130	200	69	2	176,1	146,2	3,2	6,5	10	14
23126-E1A-K-M	XL	AHX3126	8,1	1,1	125	130	210	64	2	187,3	–	4,8	9,5	4	12
23126-E1-K-TVPB	XL	AHX3126	7,82	1,1	125	130	210	64	2	187,3	146	4,8	9,5	4	12
24126-E1-K30+AH	XL	AH24126	10,3	1,12	125	130	210	80	2	181,5	148,4	3,2	6,5	10	14
22226-E1-K	XL	AHX3126	10,9	1,1	125	130	230	64	3	205	151,7	6,3	12,2	4	12
23226-E1A-K-M	XL	AHX3226G	13,6	1,5	125	130	230	80	3	199,3	–	4,8	9,5	4	15
23226-E1-K-TVPB	XL	AHX3226G	12,6	1,5	125	130	230	80	3	199,3	150	4,8	9,5	4	15
22326-E1-K	XL	AHX2326G	27,4	1,8	125	130	280	93	4	239,5	162,2	9,5	17,7	4	19
22326-E1-K-T41A	XL	AHX2326G	27,4	1,8	125	130	280	93	4	239,5	162,2	9,5	17,7	4	19
23028-E1A-K-M	XL	AHX3028	6	1,01	135	140	210	53	2	192,3	–	4,8	9,5	5	14
23028-E1-K-TVPB	XL	AHX3028G	5,81	1,01	135	140	210	53	2	192,3	155,4	4,8	9,5	5	14
24028-E1-K30+AH	XL	AH24028	8,29	0,944	135	140	210	69	2	186,8	157,1	3,2	6,5	10	14
23128-E1A-K-M	XL	AHX3128	7,78	1,28	135	140	225	68	2,1	201	–	4,8	9,5	5	14
23128-E1-K-TVPB	XL	AHX3128	9,46	1,28	135	140	225	68	2,1	201	157,1	4,8	9,5	5	14
24128-E1-K30+AH	XL	AH24128	12,1	1,28	135	140	225	85	2,1	194,8	158,9	4,8	9,5	10	14
22228-E1-K	XL	AHX3128	13,7	1,28	135	140	250	68	3	223,4	164,9	6,3	12,2	5	14
23228-E1A-K-M	XL	AHX3228G	17,6	1,72	135	140	250	88	3	216	–	6,3	12,2	5	15
23228-E1-K-TVPB	XL	AHX3228G	17,1	1,72	135	140	250	88	3	216	162	6,3	12,2	5	15
22328-E1-K	XL	AHX2328G	34,4	2,21	135	140	300	102	4	255,7	173,5	9,5	17,7	5	20
22328-E1-K-T41A	XL	AHX2328G	34,4	2,21	135	140	300	102	4	255,7	173,5	9,5	17,7	5	20

		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d <sub>2G</sub>	l	d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
		min.	max.	max.	N	N							
M130X2	60	128,8	171,2	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
M130X2	60	128,8	171,2	2	430 000	580 000	0,22	3,04	4,53	2,97	58 000	4 300	2 800
M125X2	73	128,8	171,2	2	450 000	690 000	0,27	2,33	3,47	2,28	84 000	4 000	2 260
M130X2	75	131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
M130X2	75	131	189	2	630 000	800 000	0,28	2,39	3,56	2,34	73 000	3 400	2 290
M130X2	93	131	189	2	680 000	950 000	0,34	1,84	2,74	1,8	101 000	2 600	1 580
M130X2	75	132	203	2,1	640 000	740 000	0,25	2,71	4,04	2,65	71 000	3 400	2 700
M130X2	90	132	203	2,1	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
M130X2	90	132	203	2,1	820 000	1 020 000	0,33	2,03	3,02	1,98	80 000	2 800	1 910
M130X2	105	134	246	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
M130X2	105	134	246	2,5	1 080 000	1 170 000	0,33	2,06	3,06	2,01	103 000	2 600	2 000
M140X2	67	138,8	191,2	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
M140X2	67	138,8	191,2	2	540 000	730 000	0,23	2,95	4,4	2,89	70 000	3 600	2 600
M135X2	83	138,8	191,2	2	570 000	860 000	0,28	2,21	3,29	2,16	101 000	3 000	2 010
M140X2	78	141	199	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
M140X2	78	141	199	2	680 000	890 000	0,28	2,45	3,64	2,39	79 000	3 000	2 110
M140X2	94	141	199	2	710 000	1 050 000	0,32	1,98	2,94	1,93	110 000	2 600	1 460
M140X2	78	144	216	2,5	760 000	890 000	0,26	2,62	3,9	2,56	79 000	3 000	2 500
M140X2	98	144	216	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
M140X2	98	144	216	2,5	910 000	1 150 000	0,33	2,07	3,09	2,03	89 000	2 600	1 740
M140X2	115	147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
M140X2	115	147	263	3	1 250 000	1 370 000	0,33	2,06	3,06	2,01	117 000	2 400	1 820
M150X2	68	148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
M150X2	68	148,8	201,2	2	570 000	800 000	0,22	3,07	4,57	3	76 000	3 600	2 390
M145X2	83	148,8	201,2	2	590 000	930 000	0,27	2,37	3,53	2,32	109 000	3 400	1 860
M150X2	83	152	213	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
M150X2	83	152	213	2,1	760 000	1 010 000	0,27	2,49	3,71	2,43	88 000	2 800	1 930
M150X2	99	152	213	2,1	800 000	1 190 000	0,32	1,99	2,96	1,94	124 000	2 400	1 320
M150X2	83	154	236	2,5	870 000	1 040 000	0,25	2,67	3,97	2,61	97 000	2 400	2 250
M150X2	104	154	236	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
M150X2	104	154	236	2,5	1 090 000	1 400 000	0,33	2,04	3,04	2	113 000	2 400	1 550
M150X2	125	157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660
M150X2	125	157	283	3	1 460 000	1 630 000	0,34	2	2,98	1,96	132 000	2 200	1 660

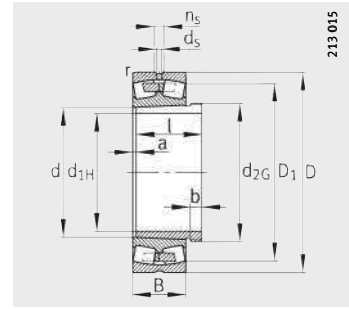


# Spherical roller bearings

With withdrawal sleeve



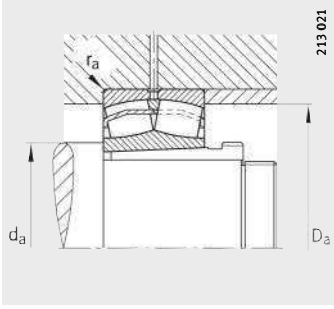
E1 design



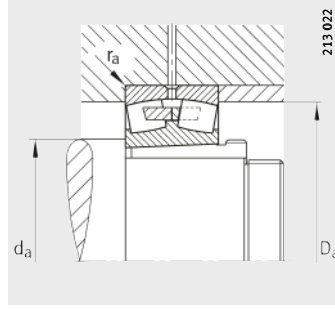
With central rib

Dimension table (continued) · Dimensions in mm

Designation			Mass m		Dimensions										
Bearing	X-life	With- drawal sleeve	Bearing	With- drawal sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>2</sub>	d <sub>s</sub>	n <sub>s</sub>	a	b
			≈kg	≈kg					min.	≈	≈		≈		
23030-E1A-K-M	XL	AHX3030	7,33	1,15	145	150	225	56	2,1	206,3	–	4,8	9,5	5	15
23030-E1-K-TVPB	XL	AHX3030	7,29	1,15	145	150	225	56	2,1	206,3	166,6	4,8	9,5	5	15
24030-E1-K30	XL	AH24030	10,4	1,1	145	150	225	75	2,1	199,7	168,1	3,2	6,5	11	15
23130-E1A-K-M	XL	AHX3130G	15,8	1,64	145	150	250	80	2,1	220,8	–	6,3	12,2	5	15
23130-E1-K-TVPB	XL	AHX3130G	14,5	1,64	145	150	250	80	2,1	220,8	170,1	6,3	12,2	5	15
24130-E1-K30	XL	AH24130	18,8	1,61	145	150	250	100	2,1	213	170,4	4,8	9,5	11	15
22230-E1-K	XL	AHX3130G	17,8	1,64	145	150	270	73	3	240,8	177,9	8	15	5	15
23230-E1A-K-M	XL	AHX3230G	22,9	2,07	145	150	270	96	3	232,6	–	6,3	12,2	5	17
23230-E1-K-TVPB	XL	AHX3230G	22,3	2,07	145	150	270	96	3	232,6	174	6,3	12,2	5	17
22330-E1-K	XL	AHX2330G	41,2	2,6	145	150	320	108	4	273,2	185,3	9,5	17,7	5	24
22330-E1-K-T41A	XL	AHX2330G	41,2	2,6	145	150	320	108	4	273,2	185,3	9,5	17,7	5	24
23032-E1A-K-M	XL	AH3032	9,42	2,04	150	160	240	60	2,1	219,9	–	6,3	12,2	5	16
23032-E1-K-TVPB	XL	AH3032	8,67	2,04	150	160	240	60	2,1	219,9	177	6,3	12,2	5	16
24032-E1-K30	XL	AH24032	12,4	2,27	150	160	240	80	2,1	212,9	179,2	4,8	9,5	11	15
23132-E1A-K-M	XL	AH3132A	18,6	2,87	150	160	270	86	2,1	238,3	–	8	15	5	16
23132-E1-K-TVPB	XL	AH3132A	18,4	2,87	150	160	270	86	2,1	238,3	183,2	8	15	5	16
24132-E1-K30	XL	AH24132	23,6	3,02	150	160	270	109	2,1	228,9	183,6	4,8	9,5	11	15
22232-E1-K	XL	AH3132A	22,4	2,87	150	160	290	80	3	258,2	190,9	8	15	5	16
23232-E1A-K-M	XL	AH3232G	28,5	3,6	150	160	290	104	3	249,3	–	8	15	6	20
23232-E1-K-TVPB	XL	AH3232G	27,7	3,6	150	160	290	104	3	249,3	186,7	8	15	6	20
22332-K-MB	–	AH2332G	50,1	4,24	150	160	340	114	4	288,3	–	9,5	17,7	6	24
23034-E1A-K-M	XL	AH3034	12	2,43	160	170	260	67	2,1	237,2	–	6,3	12,2	5	17
23034-E1-K-TVPB	XL	AH3034	11,9	2,43	160	170	260	67	2,1	237,2	189,8	6,3	12,2	5	17
24034-E1-K30	XL	AH24034	16,7	2,7	160	170	260	90	2,1	228,8	190	4,8	9,5	11	16
23134-E1A-K-M	XL	AH3134A	19,5	3,09	160	170	280	88	2,1	248,1	194,2	8	15	5	16
23134-E1-K-TVPB	XL	AH3134A	19,9	3,09	160	170	280	88	2,1	248,1	193,4	8	15	5	16
24134-E1-K30	XL	AH24134	26	3,25	160	170	280	109	2,1	240	194,2	4,8	9,5	11	16
22234-E1-K	XL	AH3134A	27,1	3,09	160	170	310	86	4	275,4	199,8	9,5	17,7	5	16
23234-E1A-K-M	XL	AH3234G	34,6	4,25	160	170	310	110	4	267,4	–	8	15	6	24
23234-E1-K-TVPB	XL	AH3234G	33,1	4,25	160	170	310	110	4	267,4	199,8	8	15	6	24
22334-K-MB	–	AH2334G	56,9	4,76	160	170	360	120	4	304,2	–	9,5	17,7	6	24



Mounting dimensions  
E1 design



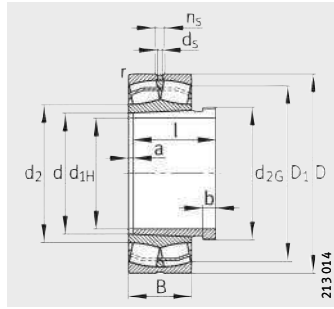
Mounting dimensions  
With central rib

		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread $d_{2G}$	l	$d_a$	$D_a$	$r_a$	dyn. $C_r$	stat. $C_{0r}$	e	$Y_1$	$Y_2$	$Y_0$	$C_{ur}$	$n_G$	$n_B$
		min.	max.	max.	N	N							
M160X3	72	160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
M160X3	72	160,2	214,8	2,1	630 000	880 000	0,22	3,1	4,62	3,03	85 000	3 400	2 210
M155X3	90	160,2	214,8	2,1	680 000	1 090 000	0,27	2,32	3,45	2,26	123 000	2 800	1 820
M160X3	96	162	238	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
M160X3	96	162	238	2,1	1 000 000	1 330 000	0,29	2,32	3,45	2,26	143 000	2 600	1 720
M160X3	115	162	238	2,1	1 050 000	1 520 000	0,34	1,83	2,72	1,79	149 000	2 200	1 270
M160X3	96	164	256	2,5	1 010 000	1 210 000	0,25	2,69	4	2,63	111 000	2 600	2 050
M160X3	114	164	256	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
M160X3	114	164	256	2,5	1 280 000	1 660 000	0,33	2,02	3	1,97	129 000	2 200	1 400
M160X3	135	167	303	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
M160X3	135	167	303	3	1 640 000	1 850 000	0,33	2,02	3	1,97	148 000	2 000	1 520
M170X3	77	170,2	229,8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
M170X3	77	170,2	229,8	2,1	720 000	1 010 000	0,22	3,1	4,62	3,03	94 000	2 800	2 060
M170X3	95	170,2	229,8	2,1	770 000	1 240 000	0,27	2,32	3,45	2,26	137 000	2 650	1 660
M170X3	103	172	258	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 560
M170X3	103	172	258	2,1	1 160 000	1 550 000	0,29	2,32	3,45	2,26	164 000	2 400	1 590
M170X3	124	172	258	2,1	1 220 000	1 800 000	0,35	1,8	2,69	1,76	168 000	1 800	1 150
M170X3	103	174	276	2,5	1 150 000	1 400 000	0,26	2,64	3,93	2,58	125 000	2 600	1 900
M170X3	124	174	276	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
M170X3	124	174	276	2,5	1 460 000	1 910 000	0,34	2	2,98	1,96	146 000	2 200	1 280
M170X3	140	177	323	3	1 430 000	1 900 000	0,37	1,8	2,69	1,76	121 000	2 000	1 490
M180X3	85	180,2	249,8	2,1	880 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
M180X3	85	180,2	249,8	2,1	870 000	1 230 000	0,23	2,98	4,44	2,92	146 000	2 600	1 890
M180X3	106	180,2	249,8	2,1	940 000	1 480 000	0,29	2,2	3,27	2,15	159 000	2 400	1 540
M180X3	104	182	268	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
M180X3	104	182	268	2,1	1 220 000	1 690 000	0,28	2,37	3,53	2,32	174 000	2 400	1 460
M180X3	125	182	268	2,1	1 260 000	1 900 000	0,33	1,9	2,83	1,86	179 000	1 800	1 060
M180X3	104	187	293	3	1 320 000	1 570 000	0,26	2,6	3,87	2,54	140 000	2 400	1 780
M180X3	134	187	293	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
M180X3	134	187	293	3	1 640 000	2 170 000	0,33	2,03	3,02	1,98	163 000	2 000	1 160
M180X3	146	187	343	3	1 600 000	2 120 000	0,37	1,83	2,72	1,79	134 000	1 800	1 380

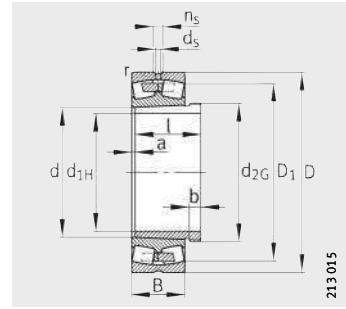


# Spherical roller bearings

With withdrawal sleeve



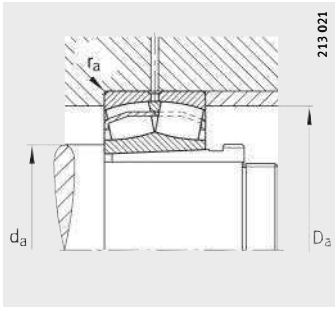
E1 design



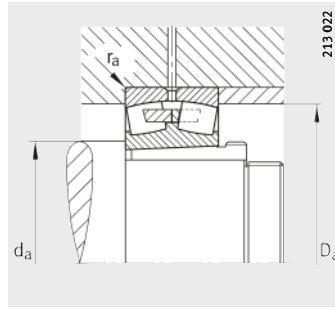
With central rib

Dimension table (continued) · Dimensions in mm

Designation			Mass m		Dimensions										
Bearing	X-life	With- drawal sleeve	Bearing	With- drawal sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>2</sub>	d <sub>s</sub>	n <sub>s</sub>	a	b
			≈kg	≈kg					min.	≈	≈		≈		
23936-S-K-MB	-	AH3936	7,76	1,91	170	180	250	52	2	230,9	-	4,8	9,5	5	13
23036-E1A-K-M	XL	AH3036	16	2,84	170	180	280	74	2,1	254,3	-	8	15	6	17
23036-E1-K-TVPB	XL	AH3036	15,6	2,84	170	180	280	74	2,1	254,3	201,8	8	15	6	17
24036-E1-K30	XL	AH24036	22,7	3,18	170	180	280	100	2,1	244,6	201,7	4,8	9,5	11	16
23136-E1A-K-M	XL	AH3136A	25,5	3,77	170	180	300	96	3	264,8	-	8	15	6	19
23136-E1-K-TVPB	XL	AH3136A	25,9	3,77	170	180	300	96	3	264,8	204,1	8	15	6	19
24136-E1-K30	XL	AH24136	33,2	3,72	170	180	300	118	3	256,2	204,9	6,3	12,2	11	16
22236-E1-K	XL	AH2236G	28,5	3,3	170	180	320	86	4	285,9	211,3	9,5	17,7	5	17
23236-E1A-K-M	XL	AH3236G	37	4,8	170	180	320	112	4	277,3	-	8	15	6	25
23236-E1-K-TVPB	XL	AH3236G	36	4,8	170	180	320	112	4	277,3	210,6	8	15	6	25
22336-K-MB	-	AH2336G	66,7	5,4	170	180	380	126	4	323,4	-	12,5	23,5	6	26
23038-E1A-K-M	XL	AH3038G	17,7	3,16	180	190	290	75	2,1	264,5	-	8	15	6	18
23038-E1-K-TVPB	XL	AH3038G	16,3	3,16	180	190	290	75	2,1	264,5	211,9	8	15	6	18
24038-E1-K30	XL	AH24038	23,8	3,46	180	190	290	100	2,1	255,5	212	4,8	9,5	13	18
23138-E1A-K-M	XL	AH3138G	32,4	4,4	180	190	320	104	3	281,6	-	8	15	6	20
23138-E1-K-TVPB	XL	AH3138G	30,3	4,4	180	190	320	104	3	281,6	217	8	15	6	20
24138-E1-K30	XL	AH24138	41,4	4,37	180	190	320	128	3	271,6	217,5	6,3	12,2	13	18
22238-K-MB	-	AH2238G	36,2	3,8	180	190	340	92	4	296	-	9,5	17,7	5	18
23238-B-K-MB	-	AH3238G	46	5,3	180	190	340	120	4	291,2	-	9,5	17,7	7	25
22338-K-MB	-	AH2338G	77,3	6,04	180	190	400	132	5	338,2	-	12,5	23,5	7	26
23940-S-K-MB	-	AH3940	11,5	2,62	190	200	280	60	2,1	256,9	-	6,3	12,2	6	16
23040-E1A-K-M	XL	AH3040G	21,4	3,57	190	200	310	82	2,1	281,6	-	8	15	6	19
23040-E1-K-TVPB	XL	AH3040G	20,8	3,57	190	200	310	82	2,1	281,6	223,4	8	15	6	19
24040-E1-K30	XL	AH24040	30,3	3,93	190	200	310	109	2,1	271,6	223,7	6,3	12,2	13	18
23140-B-K-MB	-	AH3140	41,7	5,5	190	200	340	112	3	293,3	-	9,5	17,7	6	21
24140-B-K30	-	AH24140	51,6	5	190	200	340	140	3	285,9	-	6,3	12,2	13	18
22240-B-K-MB	-	AH2240	42,3	4,73	190	200	360	98	4	312	-	9,5	17,7	5	19
23240-B-K-MB	-	AH3240	55,8	6,59	190	200	360	128	4	307,5	-	9,5	17,7	7	24
22340-K-MB	-	AH2340	89,5	7,6	190	200	420	138	5	357,4	-	12,5	23,5	7	30



Mounting dimensions  
E1 design



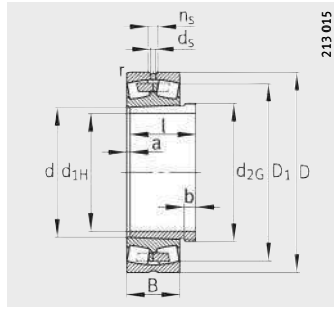
Mounting dimensions  
With central rib

Thread d <sub>2G</sub>	l	Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
		d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
		min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
M190X3	66	188,8	241,2	2	440 000	850 000	0,2	3,42	5,09	3,34	57 000	2 200	1 850
M190X3	92	190,2	269,8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
M190X3	92	190,2	269,8	2,1	1 040 000	1 450 000	0,23	2,9	4,31	2,83	170 000	2 600	1 760
M190X3	116	190,2	269,8	2,1	1 130 000	1 770 000	0,3	2,1	3,13	2,06	181 000	2 200	1 420
M190X3	116	194	286	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
M190X3	116	194	286	2,5	1 420 000	1 950 000	0,29	2,32	3,45	2,26	196 000	2 200	1 350
M190X3	134	194	286	2,5	1 460 000	2 170 000	0,34	1,86	2,77	1,82	203 000	1 700	980
M190X3	105	197	303	3	1 360 000	1 680 000	0,25	2,71	4,04	2,65	148 000	2 400	1 670
M190X3	140	197	303	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
M190X3	140	197	303	3	1 710 000	2 340 000	0,33	2,07	3,09	2,03	173 000	2 000	1 090
M190X3	154	197	363	3	1 760 000	2 360 000	0,37	1,83	2,72	1,79	209 000	1 500	1 270
M200X3	96	200,2	279,8	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
M200X3	96	200,2	279,8	2,1	1 080 000	1 550 000	0,23	2,98	4,44	2,92	180 000	2 400	1 660
M200X3	118	200,2	279,8	2,1	1 160 000	1 860 000	0,29	2,2	3,27	2,15	192 000	2 200	1 330
M200X3	125	204	306	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
M200X3	125	204	306	2,5	1 610 000	2 220 000	0,3	2,28	3,39	2,23	218 000	2 000	1 260
M200X3	146	204	306	2,5	1 680 000	2 550 000	0,35	1,82	2,7	1,78	226 000	1 400	880
M200X3	112	207	323	3	1 200 000	1 830 000	0,28	2,39	3,56	2,34	122 000	1 800	1 600
M200X3	145	207	323	3	1 560 000	2 600 000	0,36	1,86	2,77	1,82	156 000	1 700	1 020
M200X3	160	210	380	4	1 860 000	2 500 000	0,37	1,83	2,72	1,79	213 000	1 500	1 220
Tr210X4	77	210,2	269,8	2,1	550 000	1 080 000	0,2	3,42	5,09	3,34	71 000	2 000	1 650
Tr210X4	102	210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
Tr210X4	102	210,2	299,8	2,1	1 270 000	1 800 000	0,23	2,9	4,31	2,83	203 000	2 400	1 550
Tr210X4	127	210,2	299,8	2,1	1 350 000	2 150 000	0,3	2,13	3,17	2,08	216 000	2 000	1 240
Tr220X4	134	214	326	2,5	1 320 000	2 280 000	0,35	1,95	2,9	1,91	131 000	1 700	1 240
Tr210X4	158	214	326	2,5	1 700 000	3 000 000	0,42	1,62	2,42	1,59	190 000	1 400	810
Tr220X4	118	217	343	3	1 320 000	2 000 000	0,29	2,35	3,5	2,3	123 000	1 700	1 530
Tr220X4	153	217	343	3	1 660 000	2 750 000	0,37	1,83	2,72	1,79	163 000	1 500	980
Tr220X4	170	220	400	4	2 080 000	2 800 000	0,36	1,87	2,79	1,83	189 000	1 400	1 120

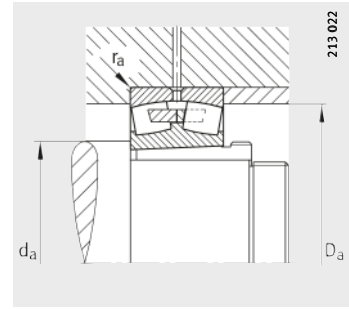


# Spherical roller bearings

With withdrawal sleeve



With central rib



Mounting dimensions

**Dimension table** (continued) · Dimensions in mm

Designation		Mass m		Dimensions									
Bearing	With- drawal sleeve	Bearing	With- drawal sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>s</sub>	n <sub>s</sub>	a	b
		≈kg	≈kg					min.	≈			≈	
<b>23944-S-K-MB</b>	<b>AH3944</b>	12,3	4,74	<b>200</b>	220	300	60	2,1	277,4	6,3	12,2	6	16
<b>23044-K-MB</b>	<b>AH3044G</b>	29,9	7,13	<b>200</b>	220	340	90	3	301,8	8	15	6	20
<b>24044-B-K30-MB</b>	<b>AH24044</b>	38,9	8,11	<b>200</b>	220	340	118	3	297,4	6,3	12,2	14	18
<b>23144-B-K-MB</b>	<b>AH3144</b>	52	10,4	<b>200</b>	220	370	120	4	319,2	9,5	17,7	6	23
<b>24144-B-K30</b>	<b>AH24144</b>	64,4	3,61	<b>200</b>	220	370	150	4	311,7	6,3	12,2	14	20
<b>22244-B-K-MB</b>	<b>AH2244</b>	59,6	9,1	<b>200</b>	220	400	108	4	348,7	9,5	17,7	6	20
<b>23244-K-MB</b>	<b>AH2344</b>	79	13,6	<b>200</b>	220	400	144	4	337,6	9,5	17,7	8	30
<b>22344-K-MB</b>	<b>AH2344</b>	114	13,6	<b>200</b>	220	460	145	5	391,2	12,5	23,5	8	30
<b>23948-K-MB</b>	<b>AH3948</b>	13,4	5,29	<b>220</b>	240	320	60	2,1	297,8	6,3	12,2	6	16
<b>23048-K-MB</b>	<b>AH3048</b>	31,9	8,8	<b>220</b>	240	360	92	3	322,1	8	15	7	21
<b>24048-B-K30-MB</b>	<b>AH24048</b>	43,2	8,87	<b>220</b>	240	360	118	3	318,9	6,3	12,2	15	20
<b>23148-B-K-MB</b>	<b>AH3148</b>	65,3	12,2	<b>220</b>	240	400	128	4	346,2	9,5	17,7	7	25
<b>24148-B-K30</b>	<b>AH24148</b>	78,7	12,4	<b>220</b>	240	400	160	4	338	6,3	12,2	15	20
<b>22248-B-K-MB</b>	<b>AH2248</b>	81,2	11,2	<b>220</b>	240	440	120	4	380,7	12,5	23,5	6	21
<b>23248-B-K-MB</b>	<b>AH2348</b>	105	15,6	<b>220</b>	240	440	160	4	371	12,5	23,5	8	30
<b>22348-K-MB</b>	<b>AH2348</b>	145	15,6	<b>220</b>	240	500	155	5	420	12,5	23,5	8	30
<b>23952-K-MB</b>	<b>AH3952G</b>	22,4	7,58	<b>240</b>	260	360	75	2,1	330,5	8	15	6	18
<b>23052-K-MB</b>	<b>AH3052</b>	46,2	10,7	<b>240</b>	260	400	104	4	357,2	9,5	17,7	7	23
<b>24052-B-K30-MB</b>	<b>AH24052</b>	64,5	11,8	<b>240</b>	260	400	140	4	349,1	6,3	12,2	16	20
<b>23152-K-MB</b>	<b>AH3152G</b>	89,6	15,1	<b>240</b>	260	440	144	4	379,7	9,5	17,7	7	26
<b>24152-B-K30</b>	<b>AH24152</b>	112	15,4	<b>240</b>	260	440	180	4	370,3	8	15	16	22
<b>22252-B-K-MB</b>	<b>AH2252G</b>	106	13,3	<b>240</b>	260	480	130	5	415,3	12,5	23,5	6	23
<b>23252-B-K-MB</b>	<b>AH2352G</b>	136	18,7	<b>240</b>	260	480	174	5	405,4	12,5	23,5	8	30
<b>22352-K-MB</b>	<b>AH2352G</b>	177	18,7	<b>240</b>	260	540	165	6	452,1	12,5	23,5	8	30
<b>23956-K-MB</b>	<b>AH3956G</b>	24,7	8,19	<b>260</b>	280	380	75	2,1	350	8	15	6	18
<b>23056-B-K-MB</b>	<b>AH3056</b>	50,3	11,9	<b>260</b>	280	420	106	4	376,5	9,5	17,7	8	24
<b>24056-B-K30-MB</b>	<b>AH24056</b>	69,7	12,4	<b>260</b>	280	420	140	4	369,5	6,3	12,2	17	22
<b>23156-B-K-MB</b>	<b>AH3156G</b>	96,4	17,6	<b>260</b>	280	460	146	5	401,4	9,5	17,7	8	28
<b>24156-B-K30</b>	<b>AH24156</b>	118	16,6	<b>260</b>	280	460	180	5	392,8	8	15	17	22
<b>22256-B-K-MB</b>	<b>AH2256G</b>	110	14,4	<b>260</b>	280	500	130	5	435,2	12,5	23,5	8	24
<b>23256-K-MB</b>	<b>AH2356G</b>	153	21	<b>260</b>	280	500	176	5	426,3	12,5	23,5	8	30
<b>22356-K-MB</b>	<b>AH2356G</b>	224	21	<b>260</b>	280	580	175	6	489,3	12,5	23,5	8	30

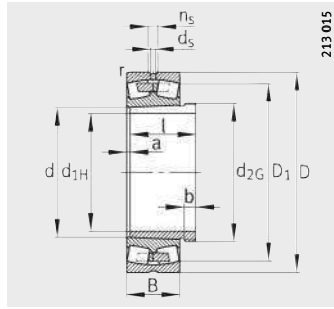


		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d <sub>2G</sub>	l	d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
		min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
Tr230X4	77	230,2	289,8	2,1	600 000	1 250 000	0,18	3,76	5,59	3,67	72 000	1800	1 460
Tr230X4	111	232,4	327,6	2,5	1 100 000	2 000 000	0,26	2,55	3,8	2,5	132 000	1700	1 440
Tr230X4	138	232,4	327,6	2,5	1 400 000	2 700 000	0,34	1,96	2,92	1,92	139 000	1300	1 070
Tr240X4	145	237	353	3	1 630 000	2 900 000	0,33	2,03	3,02	1,98	165 000	1400	1 060
Tr230X4	170	237	353	3	1 900 000	3 450 000	0,41	1,63	2,43	1,6	197 000	1300	720
Tr240X4	130	237	383	3	1 630 000	2 450 000	0,29	2,35	3,5	2,3	153 000	1400	1 340
Tr240X4	181	237	383	3	2 040 000	3 450 000	0,37	1,83	2,72	1,79	181 000	1400	850
Tr240X4	181	240	440	4	2 320 000	3 350 000	0,35	1,95	2,9	1,91	217 000	1300	970
Tr250X4	77	250,2	309,8	2,1	640 000	1 370 000	0,17	4,05	6,04	3,96	93 000	1500	1 310
Tr260X4	116	252,4	347,6	2,5	1 160 000	2 200 000	0,25	2,74	4,08	2,68	130 000	1400	1 320
Tr250X4	138	252,4	347,6	2,5	1 500 000	2 900 000	0,32	2,1	3,13	2,06	150 000	1300	970
Tr260X4	154	257	383	3	1 860 000	3 250 000	0,33	2,06	3,06	2,01	177 000	1300	970
Tr260X4	180	257	383	3	2 120 000	3 900 000	0,41	1,66	2,47	1,62	231 000	1200	660
Tr260X4	144	257	423	3	1 960 000	3 050 000	0,29	2,35	3,5	2,3	184 000	1300	1 180
Tr260X4	189	257	423	3	2 450 000	4 250 000	0,37	1,8	2,69	1,76	231 000	1300	750
Tr260X4	189	260	480	4	2 650 000	3 900 000	0,35	1,95	2,9	1,91	249 000	1500	870
Tr280X4	94	270,2	349,8	2,1	930 000	1 930 000	0,19	3,54	5,27	3,46	108 000	1400	1 190
Tr280X4	128	274,6	385,4	3	1 500 000	2 800 000	0,26	2,64	3,93	2,58	154 000	1300	1 170
Tr270X4	162	274,6	385,4	3	1 900 000	3 800 000	0,35	1,94	2,88	1,89	204 000	1100	870
Tr280X4	172	277	423	3	2 200 000	4 000 000	0,33	2,03	3,02	1,98	213 000	1200	850
Tr280X4	202	277	423	3	2 700 000	5 100 000	0,42	1,61	2,4	1,58	315 000	1100	550
Tr280X4	155	280	460	4	2 240 000	3 450 000	0,29	2,32	3,45	2,26	217 000	1100	1 070
Tr280X4	205	280	460	4	2 900 000	4 900 000	0,37	1,8	2,69	1,76	270 000	1100	660
Tr280X4	205	286	514	5	3 000 000	4 400 000	0,34	2	2,98	1,96	290 000	1100	790
Tr300X4	94	290,2	369,8	2,1	970 000	2 040 000	0,18	3,76	5,59	3,67	129 000	1300	1 100
Tr300X4	131	294,6	405,4	3	1 560 000	3 000 000	0,25	2,74	4,08	2,68	156 000	1300	1 090
Tr290X4	162	294,6	405,4	3	2 000 000	4 000 000	0,33	2,04	3,04	2	225 000	1100	810
Tr300X4	175	300	440	4	2 360 000	4 400 000	0,32	2,12	3,15	2,07	241 000	1100	780
Tr300X4	202	300	440	4	2 700 000	5 200 000	0,39	1,71	2,54	1,67	365 000	1000	520
Tr300X4	155	300	480	4	2 360 000	3 650 000	0,28	2,43	3,61	2,37	238 000	1100	1 010
Tr300X4	212	300	480	4	3 000 000	5 300 000	0,36	1,86	2,77	1,82	260 000	1100	620
Tr300X4	212	306	554	5	3 550 000	5 400 000	0,33	2,03	3,02	1,98	335 000	950	680

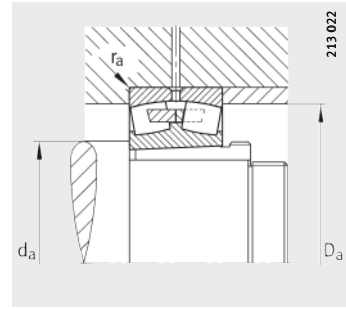


# Spherical roller bearings

With withdrawal sleeve



With central rib



Mounting dimensions

Dimension table (continued) · Dimensions in mm

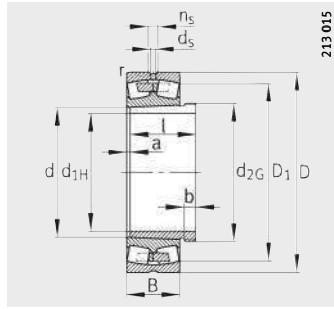
Designation		Mass m		Dimensions									
Bearing	With- drawal sleeve	Bearing ≈kg	With- drawal sleeve ≈kg	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>s</sub>	n <sub>s</sub>	a	b
								min.	≈			≈	
23960-B-K-MB	AH3960G	39,1	10,7	280	300	420	90	3	384,6	9,5	17,7	7	21
23060-K-MB	AH3060	72,2	14,3	280	300	460	118	4	412,6	9,5	17,7	8	26
24060-B-K30-MB	AH24060	97,7	15,3	280	300	460	160	4	401,5	8	15	18	24
23160-B-K-MB	AH3160G	123	19,9	280	300	500	160	5	434,7	9,5	17,7	8	30
24160-B-K30	AH24160	158	20	280	300	500	200	5	424,4	8	15	18	24
22260-K-MB	AH2260G	136	17,2	280	300	540	140	5	468,8	12,5	23,5	8	26
23260-K-MB	AH3260G	192	24,6	280	300	540	192	5	458,7	12,5	23,5	8	34
23964-K-MB	AH3964G	41	11,4	300	320	440	90	3	406,2	9,5	17,7	7	21
23064-K-MB	AH3064G	77,1	15,8	300	320	480	121	4	432,6	9,5	17,7	8	27
24064-B-K30-MB	AH24064	103	16,6	300	320	480	160	4	424	8	15	18	24
23164-K-MB	AH3164G	159	23,6	300	320	540	176	5	466,2	12,5	23,5	8	31
24164-B-K30	AH24164	197	23,4	300	320	540	218	5	456,1	9,5	17,7	18	24
22264-K-MB	AH2264G	166	19,8	300	320	580	150	5	503,5	12,5	23,5	10	27
23264-K-MB	AH3264G	229	28,9	300	320	580	208	5	489,6	12,5	23,5	8	36
23068-K-MB	AH3068G	101	18,6	320	340	520	133	5	464,6	12,5	23,5	9	28
24068-B-K30-MB	AH24068	143	21,7	320	340	520	180	5	457,1	9,5	17,7	19	26
23168-B-K-MB	AH3168G	203	27,6	320	340	580	190	5	499,5	12,5	23,5	9	33
24168-B-K30	AH24168	260	27,9	320	340	580	243	5	481,1	9,5	17,7	19	26
23268-B-K-MB	AH3268G	291	33,7	320	340	620	224	6	521,2	12,5	23,5	9	38
23972-K-MB	AH3972G	45	12,8	340	360	480	90	3	447,1	9,5	17,7	7	21
23072-K-MB	AH3072G	107	20,4	340	360	540	134	5	485,2	12,5	23,5	9	30
23172-K-MB	AH3172G	217	29,9	340	360	600	192	5	520	12,5	23,5	9	35
24172-B-K30	AH24172	275	29,6	340	360	600	243	5	503,6	9,5	17,7	20	26
23272-B-K-MB	AH3272G	328	37,5	340	360	650	232	6	548,3	12,5	23,5	9	40
23976-K-MB	AH3976G	66,3	16	360	380	520	106	4	477,6	9,5	17,7	8	22
23076-B-K-MB	AH3076G	113	22,1	360	380	560	135	5	505,6	12,5	23,5	10	31
24076-B-K30-MB	AH24076	155	23,7	360	380	560	180	5	499	9,5	17,7	20	28
23176-K-MB	AH3176G	226	32,2	360	380	620	194	5	539,6	12,5	23,5	10	36
24176-B-K30	AH24176	277	31,3	360	380	620	243	5	525,8	9,5	17,7	20	28
23276-B-K-MB	AH3276G	367	41,5	360	380	680	240	6	576,4	12,5	23,5	10	42
23980-B-K-MB	AH3980G	68,2	16,9	380	400	540	106	4	499	9,5	17,7	8	22
23080-K-MB	AH3080G	143	25,4	380	400	600	148	5	540,5	12,5	23,5	10	33
24080-B-K30-MB	AH24080	196	27,1	380	400	600	200	5	530,9	12,5	23,5	20	28
23180-B-K-MB	AH3180G	261	35,3	380	400	650	200	6	567,2	12,5	23,5	10	38
24180-B-K30	AH24180	312	34,3	380	400	650	250	6	553,5	12,5	23,5	20	28
23280-B-K-MB	AH3280G	442	47,4	380	400	720	256	6	609,8	12,5	23,5	10	44

		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d <sub>2G</sub>	l	d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub> N	n <sub>G</sub> min <sup>-1</sup>	n <sub>B</sub> min <sup>-1</sup>
		min.	max.	max.	N	N							
Tr320X5	112	312,4	407,6	2,5	1 270 000	2 650 000	0,2	3,42	5,09	3,34	165 000	1 200	1 000
Tr320X5	145	314,6	445,4	3	1 960 000	3 650 000	0,25	2,69	4	2,63	223 000	1 100	960
Tr310X4	184	314,6	445,4	3	2 500 000	5 200 000	0,35	1,95	2,9	1,91	300 000	1 000	700
Tr320X5	192	320	480	4	2 650 000	4 900 000	0,33	2,06	3,06	2,01	270 000	1 100	720
Tr320X5	224	320	480	4	3 250 000	6 300 000	0,4	1,67	2,49	1,63	540 000	900	455
Tr320X5	170	320	520	4	2 750 000	4 400 000	0,27	2,47	3,67	2,41	300 000	1 000	900
Tr320X5	228	320	520	4	3 450 000	6 200 000	0,37	1,83	2,72	1,79	300 000	1 000	560
Tr340X5	112	332,4	427,6	2,5	1 310 000	2 750 000	0,19	3,62	5,39	3,54	202 000	1 100	930
Tr340X5	149	334,6	465,4	3	2 040 000	4 000 000	0,25	2,74	4,08	2,68	243 000	1 100	900
Tr330X5	184	334,6	465,4	3	2 600 000	5 400 000	0,33	2,06	3,06	2,01	360 000	950	660
Tr340X5	209	340	520	4	3 200 000	6 000 000	0,34	1,98	2,94	1,93	305 000	950	650
Tr340X5	242	340	520	4	3 800 000	7 350 000	0,41	1,65	2,46	1,61	530 000	850	415
Tr340X5	180	340	560	4	3 050 000	4 900 000	0,27	2,47	3,67	2,41	345 000	950	830
Tr340X5	246	340	560	4	3 900 000	6 950 000	0,37	1,8	2,69	1,76	330 000	950	510
Tr360X5	162	358	502	4	2 360 000	4 550 000	0,25	2,69	4	2,63	285 000	1 000	840
Tr360X5	206	358	502	4	3 100 000	6 550 000	0,34	1,98	2,94	1,93	530 000	850	600
Tr360X5	225	360	560	4	3 650 000	6 950 000	0,34	1,98	2,94	1,93	570 000	900	590
Tr360X5	269	360	560	4	4 400 000	8 500 000	0,43	1,56	2,32	1,53	680 000	800	380
Tr360X5	264	366	594	5	4 500 000	8 150 000	0,38	1,78	2,65	1,74	650 000	850	465
Tr380X5	112	372,4	467,6	2,5	1 430 000	3 200 000	0,17	4,05	6,04	3,96	209 000	1 000	800
Tr380X5	167	378	522	4	2 450 000	4 800 000	0,25	2,74	4,08	2,68	295 000	950	790
Tr380X5	229	380	580	4	3 800 000	7 350 000	0,33	2,06	3,06	2,01	360 000	850	550
Tr380X5	269	380	580	4	4 500 000	9 000 000	0,41	1,63	2,43	1,6	550 000	750	355
Tr380X5	274	386	624	5	4 900 000	9 150 000	0,38	1,78	2,65	1,74	720 000	800	425
Tr400X5	130	394,6	505,4	3	1 760 000	4 000 000	0,19	3,58	5,33	3,5	265 000	950	750
Tr400X5	170	398	542	4	2 550 000	5 300 000	0,24	2,84	4,23	2,78	430 000	900	730
Tr400X5	208	398	542	4	3 350 000	7 200 000	0,31	2,15	3,2	2,1	580 000	750	520
Tr400X5	232	400	600	4	4 050 000	8 150 000	0,32	2,12	3,15	2,07	385 000	800	510
Tr400X5	271	400	600	4	4 650 000	9 500 000	0,39	1,71	2,54	1,67	770 000	700	330
Tr400X5	284	406	654	5	5 300 000	9 800 000	0,37	1,8	2,69	1,76	780 000	750	395
Tr420X5	130	414,6	525,4	3	1 830 000	4 150 000	0,18	3,71	5,52	3,63	275 000	900	710
Tr420X5	183	418	582	4	3 050 000	6 200 000	0,24	2,79	4,15	2,73	365 000	800	670
Tr420X5	228	418	582	4	3 900 000	8 500 000	0,33	2,06	3,06	2,01	670 000	700	485
Tr420X5	240	426	624	5	4 250 000	8 500 000	0,31	2,15	3,2	2,1	670 000	750	485
Tr420X5	278	426	624	5	5 100 000	10 400 000	0,39	1,72	2,56	1,68	720 000	670	310
Tr420X5	302	426	694	5	5 700 000	10 800 000	0,38	1,78	2,65	1,74	820 000	700	370

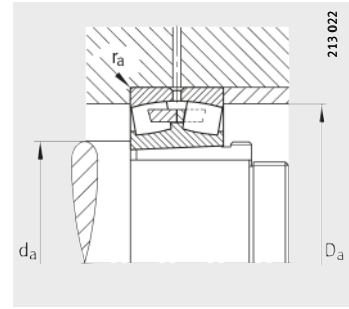


# Spherical roller bearings

With withdrawal sleeve



With central rib



Mounting dimensions

Dimension table (continued) · Dimensions in mm

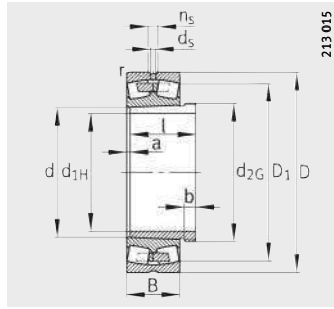
Designation		Mass m		Dimensions									
Bearing	With- drawal sleeve	Bearing	With- drawal sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>s</sub>	n <sub>s</sub>	a	b
		≈kg	≈kg					min.	≈			≈	
23984-K-MB	AH3984G	78	17,8	400	420	560	106	4	519,5	9,5	17,7	8	22
23084-B-K-MB	AH3084G	155	27,2	400	420	620	150	5	560,7	12,5	23,5	10	34
24084-B-K30-MB	AH24084	214	29	400	420	620	200	5	550,2	12,5	23,5	22	30
23184-K-MB	AH3184G	339	42,3	400	420	700	224	6	605,4	12,5	23,5	10	40
24184-B-K30	AH24184	407	40,3	400	420	700	280	6	590,3	12,5	23,5	22	30
23284-B-K-MB	AH3284G	537	54	400	420	760	272	7,5	642,2	12,5	23,5	10	46
23988-K-MB	AH3988	98,3	21,2	420	440	600	118	4	552,8	12,5	23,5	8	25
23088-K-MB	AHX3088G	177	30,1	420	440	650	157	6	586,8	12,5	23,5	11	35
24088-B-K30-MB	AH24088	247	31,9	420	440	650	212	6	575,6	12,5	23,5	22	30
23188-K-MB	AHX3188G	378	45,3	420	440	720	226	6	626	12,5	23,5	11	42
24188-B-K30	AH24188	451	42,3	420	440	720	280	6	612,4	12,5	23,5	22	30
23288-B-K-MB	AHX3288G	586	58,8	420	440	790	280	7,5	669,3	12,5	23,5	11	48
23992-B-K-MB	AH3992	103	22,5	440	460	620	118	4	573,3	12,5	23,5	8	25
23092-B-K-MB	AHX3092G	204	33,1	440	460	680	163	6	612,2	12,5	23,5	11	37
23192-K-MB	AHX3192G	420	50,8	440	460	760	240	7,5	661,4	12,5	23,5	11	43
24192-B-K30-MB	AH24192	578	47,4	440	460	760	300	7,5	642,8	12,5	23,5	23	32
23292-K-MB	AHX3292G	699	66,2	440	460	830	296	7,5	701,6	12,5	23,5	11	50
23996-B-K-MB	AH3996	121	25,7	460	480	650	128	5	598,8	12,5	23,5	9	28
23096-K-MB	AHX3096G	208	35,2	460	480	700	165	6	632,6	12,5	23,5	12	38
24096-B-K30-MB	AH24096	289	36,6	460	480	700	218	6	625,4	12,5	23,5	23	32
23196-K-MB	AHX3196G	470	55,5	460	480	790	248	7,5	688,3	12,5	23,5	12	45
24196-B-K30-MB	AH24196	700	53,1	460	480	790	308	7,5	669,9	12,5	23,5	25	35
23296-K-MB	AHX3296G	806	73,3	460	480	870	310	7,5	734,8	12,5	23,5	12	52
239/500-K-MB	AH39/500	124	27,7	480	500	670	128	5	619,3	12,5	23,5	10	32
230/500-B-K-MB	AHX30/500	219	42,5	480	500	720	167	6	653,5	12,5	23,5	12	40
231/500-B-K-MB	AHX31/500	556	71,3	480	500	830	264	7,5	720,9	12,5	23,5	12	47
241/500-B-K30-MB	AH241/500	717	60,5	480	500	830	325	7,5	701,8	12,5	23,5	25	37
239/530-K-MB	AH39/530	146	43,4	500	530	710	136	5	656,4	12,5	23,5	10	37
230/530-B-K-MB	AH30/530A	291	61,8	500	530	780	185	6	703,7	12,5	23,5	12	45
231/530-K-MB	AH31/530A	643	93,4	500	530	870	272	7,5	756,3	12,5	23,5	12	53
241/530-B-K30-MB	AH241/530	845	89	500	530	870	335	7,5	739,1	12,5	23,5	25	40
239/560-B-K-MB	AH39/560	169	47	530	560	750	140	5	693,4	12,5	23,5	10	37
230/560-B-K-MB	AH30/560A	339	68,6	530	560	820	195	6	741,5	12,5	23,5	12	45
231/560-K-MB	AH31/560A	737	102	530	560	920	280	7,5	800,2	12,5	23,5	12	55
241/560-B-K30-MB	AH241/560	974	101	530	560	920	355	7,5	785	12,5	23,5	28	45

Thread d <sub>2G</sub>	l	Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
		d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
		min.	max.	max.	N	N					N	min <sup>-1</sup>	min <sup>-1</sup>
Tr440X5	130	434,6	545,4	3	1 900 000	4 500 000	0,18	3,85	5,73	3,76	300 000	850	660
Tr440X5	186	438	602	4	3 150 000	6 550 000	0,24	2,84	4,23	2,78	395 000	800	640
Tr440X5	230	438	602	4	4 000 000	8 800 000	0,32	2,13	3,17	2,08	710 000	670	460
Tr440X5	266	446	674	5	5 000 000	9 650 000	0,33	2,03	3,02	1,98	465 000	700	455
Tr440X5	310	446	674	5	6 200 000	12 700 000	0,4	1,67	2,49	1,63	980 000	630	265
Tr440X5	321	452	728	6	6 550 000	12 200 000	0,38	1,77	2,64	1,73	930 000	670	340
Tr460X5	145	454,6	585,4	3	2 240 000	5 200 000	0,18	3,66	5,46	3,58	295 000	800	620
Tr460X5	194	463	627	5	3 400 000	7 100 000	0,24	2,84	4,23	2,78	405 000	750	610
Tr460X5	242	463	627	5	4 300 000	9 650 000	0,32	2,12	3,15	2,07	750 000	630	430
Tr460X5	270	466	694	5	5 200 000	10 400 000	0,32	2,1	3,13	2,06	485 000	700	425
Tr460X5	310	466	694	5	6 400 000	13 200 000	0,38	1,76	2,62	1,72	1 020 000	600	255
Tr460X5	330	472	758	6	7 100 000	13 400 000	0,37	1,8	2,69	1,76	990 000	630	320
Tr480X5	145	474,6	605,4	3	2 280 000	5 400 000	0,18	3,85	5,73	3,76	370 000	750	590
Tr480X5	202	483	657	5	3 650 000	7 650 000	0,24	2,84	4,23	2,78	520 000	700	580
Tr480X5	285	492	728	6	5 850 000	11 600 000	0,32	2,12	3,15	2,07	530 000	630	390
Tr480X5	332	492	728	6	7 500 000	15 600 000	0,39	1,73	2,58	1,69	1 160 000	560	227
Tr480X5	349	492	798	6	7 800 000	15 000 000	0,37	1,8	2,69	1,76	620 000	600	295
Tr500X5	158	498	632	4	2 550 000	6 000 000	0,18	3,76	5,59	3,67	460 000	700	570
Tr500X5	205	503	677	5	3 800 000	8 150 000	0,23	2,9	4,31	2,83	455 000	670	550
Tr500X5	250	503	677	5	4 900 000	11 200 000	0,3	2,25	3,34	2,2	830 000	600	380
Tr500X5	295	512	758	6	6 300 000	12 700 000	0,32	2,12	3,15	2,07	570 000	630	370
Tr500X5	343	512	758	6	8 000 000	16 600 000	0,39	1,75	2,61	1,71	1 190 000	560	213
Tr500X5	364	512	838	6	8 800 000	17 000 000	0,37	1,83	2,72	1,79	700 000	600	265
Tr520X6	162	518	652	4	2 600 000	6 300 000	0,17	3,9	5,81	3,81	400 000	670	540
Tr540X6	209	523	697	5	3 900 000	8 500 000	0,22	3,01	4,48	2,94	510 000	670	520
Tr550X6	313	532	798	6	7 100 000	14 300 000	0,32	2,1	3,13	2,06	990 000	600	340
Tr520X6	362	532	798	6	8 650 000	18 300 000	0,39	1,73	2,58	1,69	1 340 000	530	199
Tr550X6	175	548	692	4	2 850 000	6 800 000	0,18	3,85	5,73	3,76	385 000	630	500
Tr560X6	230	553	757	5	4 400 000	9 500 000	0,22	3,04	4,53	2,97	540 000	600	490
Tr560X6	325	562	838	6	7 350 000	15 300 000	0,32	2,12	3,15	2,07	670 000	560	325
Tr550X6	375	562	838	6	9 500 000	20 000 000	0,38	1,77	2,64	1,73	1 450 000	500	184
Tr580X6	180	578	732	4	3 100 000	7 650 000	0,17	3,95	5,88	3,86	570 000	600	465
Tr590X6	240	583	797	5	5 100 000	11 000 000	0,23	2,95	4,4	2,89	740 000	560	450
Tr590X6	335	592	888	6	8 150 000	16 600 000	0,31	2,21	3,29	2,16	750 000	530	300
Tr580X6	400	592	888	6	10 600 000	22 400 000	0,38	1,77	2,64	1,73	1 600 000	480	167

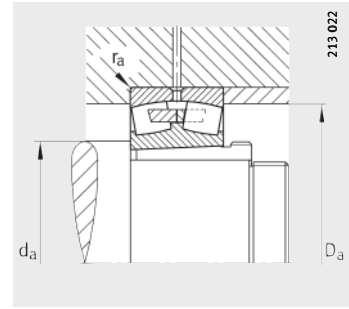


# Spherical roller bearings

With withdrawal sleeve



With central rib



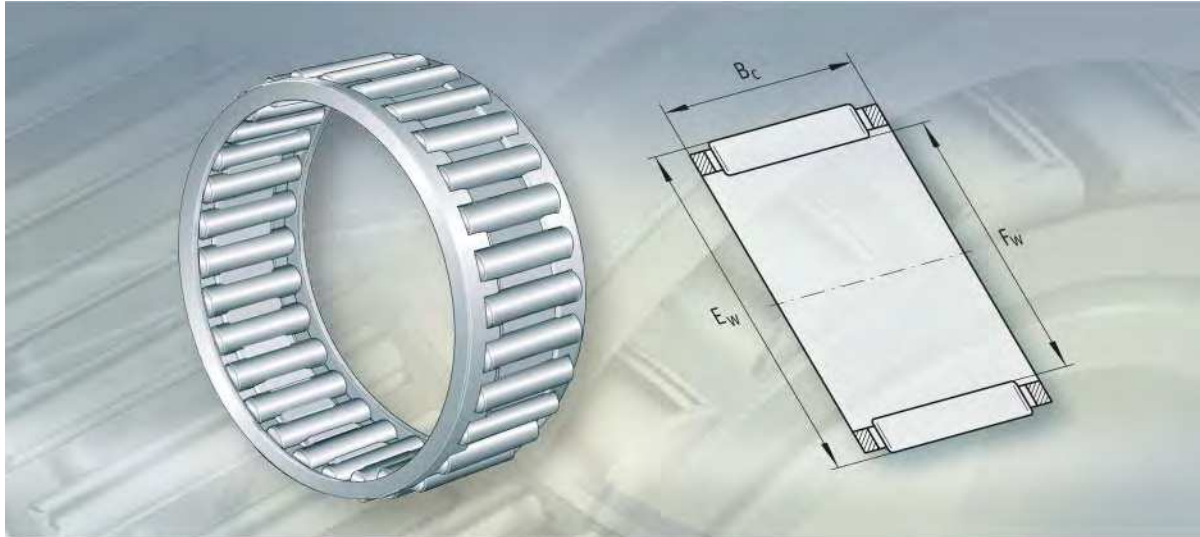
Mounting dimensions

**Dimension table** (continued) · Dimensions in mm

Designation		Mass m		Dimensions									
Bearing	With- drawal sleeve	Bearing	With- drawal sleeve	d <sub>1H</sub>	d	D	B	r	D <sub>1</sub>	d <sub>s</sub>	n <sub>s</sub>	a	b
		≈kg	≈kg					min.	≈			≈	
<b>239/600-B-K-MB</b>	<b>AH39/600</b>	210	55,6	<b>570</b>	600	800	150	5	740,5	12,5	23,5	10	38
<b>230/600-B-K-MB</b>	<b>AH30/600A</b>	388	75,6	<b>570</b>	600	870	200	6	791,9	12,5	23,5	14	45
<b>231/600-K-MB</b>	<b>AH31/600A</b>	901	118	<b>570</b>	600	980	300	7,5	852,6	12,5	23,5	14	55
<b>241/600-B-K30-MB</b>	<b>AH241/600</b>	1 170	118	<b>570</b>	600	980	375	7,5	833	12,5	23,5	30	50
<b>239/630-B-K-MB</b>	<b>AH39/630</b>	283	64,7	<b>600</b>	630	850	165	6	784,5	12,5	23,5	12	40
<b>230/630-B-K-MB</b>	<b>AH30/630A</b>	502	87,8	<b>600</b>	630	920	212	7,5	834,3	12,5	23,5	14	46
<b>240/630-B-K30-MB</b>	<b>AH240/630</b>	649	95,1	<b>600</b>	630	920	290	7,5	817,9	12,5	23,5	30	45
<b>241/630-B-K30-MB</b>	<b>AH241/630</b>	1 360	133	<b>600</b>	630	1 030	400	7,5	872,2	12,5	23,5	30	50
<b>239/670-B-K-MB</b>	<b>AH39/670</b>	310	88	<b>630</b>	670	900	170	6	831,5	12,5	23,5	12	41
<b>230/670-B-K-MB</b>	<b>AH30/670A</b>	590	125	<b>630</b>	670	980	230	7,5	888,7	12,5	23,5	14	50
<b>241/670-B-K30-MB</b>	<b>AH241/670</b>	1 540	184	<b>630</b>	670	1 090	412	7,5	929,4	12,5	23,5	30	55
<b>239/710-K-MB</b>	<b>AH39/710</b>	336	102	<b>670</b>	710	950	180	6	877,5	12,5	23,5	12	43
<b>230/710-B-K-MB</b>	<b>AH30/710A</b>	650	136	<b>670</b>	710	1 030	236	7,5	938,8	12,5	23,5	16	50
<b>240/710-B-K30-MB</b>	<b>AH240/710</b>	873	153	<b>670</b>	710	1 030	315	7,5	921,6	12,5	23,5	33	50
<b>241/710-B-K30-MB</b>	<b>AH241/710</b>	1 820	209	<b>670</b>	710	1 150	438	9,5	982	12,5	23,5	26	45
<b>239/750-K-MB</b>	<b>AH39/750</b>	394	110	<b>710</b>	750	1 000	185	6	923,2	12,5	23,5	12	44
<b>230/750-K-MB</b>	<b>AH30/750A</b>	792	156	<b>710</b>	750	1 090	250	7,5	990,9	12,5	23,5	16	50
<b>240/750-B-K30-MB</b>	<b>AH240/750</b>	1 070	170	<b>710</b>	750	1 090	335	7,5	976,2	12,5	23,5	35	50
<b>239/800-B-K-MB</b>	<b>AH39/800</b>	490	146	<b>750</b>	800	1 060	195	6	983,7	12,5	23,5	12	45
<b>230/800-K-MB</b>	<b>AH30/800A</b>	861	200	<b>750</b>	800	1 150	258	7,5	1 050,9	12,5	23,5	18	50
<b>239/850-K-MB</b>	<b>AH39/850</b>	554	165	<b>800</b>	850	1 120	200	6	1 039,9	12,5	23,5	12	50
<b>240/850-B-K30-MB</b>	<b>AH240/850</b>	1 420	252	<b>800</b>	850	1 220	365	7,5	1 092,9	12,5	23,5	40	53
<b>239/900-K-MB</b>	<b>AH39/900</b>	641	180	<b>850</b>	900	1 180	206	6	1 098,8	12,5	23,5	12	51

		Mounting dimensions			Basic load ratings		Calculation factors				Fatigue limit load	Limiting speed	Reference speed
Thread d <sub>2G</sub>	l	d <sub>a</sub>	D <sub>a</sub>	r <sub>a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	e	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>0</sub>	C <sub>ur</sub>	n <sub>G</sub>	n <sub>B</sub>
		min.	max.	max.	N	N							
Tr625X6	192	618	782	4	3 450 000	8 650 000	0,17	3,95	5,88	3,86	630 000	560	430
Tr630X6	245	623	847	5	5 700 000	12 500 000	0,22	3,07	4,57	3	890 000	530	405
Tr630X6	355	632	948	6	9 000 000	19 300 000	0,31	2,2	3,27	2,15	810 000	500	270
Tr625X6	425	632	948	6	11 600 000	26 000 000	0,38	1,79	2,67	1,75	1 780 000	450	149
Tr655X6	210	653	827	5	4 050 000	9 800 000	0,18	3,8	5,66	3,72	710 000	530	405
Tr670X6	258	658	892	6	6 300 000	13 700 000	0,22	3,01	4,48	2,94	890 000	500	380
Tr655X6	335	658	892	6	8 000 000	19 000 000	0,31	2,21	3,29	2,16	1 350 000	480	260
Tr655X6	450	662	998	6	12 900 000	29 000 000	0,38	1,78	2,65	1,74	1 960 000	450	136
Tr695X6	216	693	877	5	4 300 000	10 600 000	0,17	3,95	5,88	3,86	750 000	500	375
Tr710X7	280	698	952	6	7 200 000	16 000 000	0,22	3,01	4,48	2,94	1 100 000	480	350
Tr710X7	467	702	1 058	6	14 000 000	31 500 000	0,37	1,83	2,72	1,79	2 110 000	430	127
Tr740X7	228	733	927	5	4 800 000	12 000 000	0,18	3,85	5,73	3,76	720 000	480	350
Tr750X7	286	738	1 002	6	7 650 000	17 000 000	0,22	3,07	4,57	3	1 140 000	480	325
Tr740X7	365	738	1 002	6	9 500 000	22 800 000	0,3	2,26	3,37	2,21	1 550 000	430	223
Tr740X7	483	750	1 110	8	15 600 000	35 500 000	0,38	1,79	2,67	1,75	2 340 000	400	116
Tr780X7	234	773	977	5	5 200 000	12 900 000	0,17	3,95	5,88	3,86	790 000	480	325
Tr800X7	300	778	1 062	6	8 500 000	19 000 000	0,22	3,01	4,48	2,94	1 010 000	450	305
Tr800X7	385	778	1 062	6	10 800 000	26 000 000	0,3	2,26	3,37	2,21	1 730 000	400	204
Tr830X7	245	823	1 037	5	5 850 000	15 000 000	0,17	4,05	6,04	3,96	1 010 000	450	295
Tr850X7	308	828	1 122	6	9 300 000	21 200 000	0,22	3,07	4,57	3	1 430 000	430	280
Tr880X7	258	873	1 097	5	6 300 000	16 300 000	0,16	4,11	6,12	4,02	960 000	430	275
Tr900X7	418	878	1 192	6	12 900 000	32 000 000	0,29	2,33	3,47	2,28	2 060 000	480	173
Tr830X8	265	923	1 157	5	6 550 000	17 300 000	0,16	4,28	6,37	4,19	1 010 000	400	260





## Needle roller and cage assemblies



# Needle roller and cage assemblies

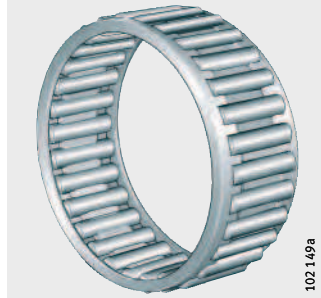
	Page
<b>Product overview</b>	Needle roller and cage assemblies..... 666
<b>Features</b>	Needle rollers ..... 667
	Operating temperature ..... 667
	Cages ..... 668
	Other products ..... 668
	Suffixes ..... 668
<b>Design and safety guidelines</b>	Raceway design ..... 668
	Axial location ..... 669
<b>Accuracy</b>	Radial internal clearance ..... 669
<b>Dimension tables</b>	Needle roller and cage assemblies, single row ..... 670
	Needle roller and cage assemblies, single row and double row ..... 671
	Needle roller and cage assemblies, single row ..... 678



# Product overview Needle roller and cage assemblies

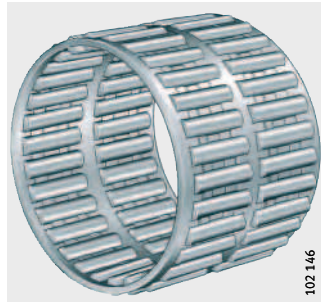
## Single row

K



## Double row

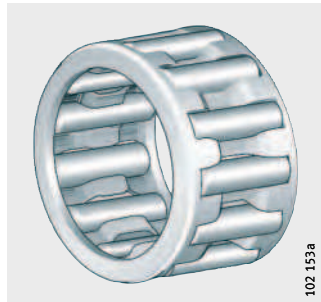
K..-ZW



## Other products

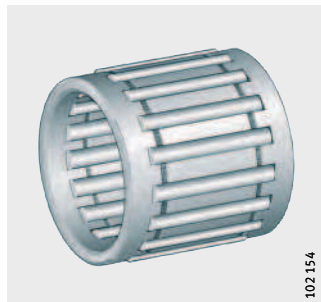
Needle roller and cage assemblies for crank pin bearing arrangements

KZK



Needle roller and cage assemblies for piston pin bearing arrangements

KBK



# Needle roller and cage assemblies

**Features** Needle roller and cage assemblies are single or double row units comprising cages and needle rollers. The single row design is based on DIN 5 405-1.

**Very small cross-section height** Since its radial section height is equivalent to the diameter of the needle rollers, needle roller and cage assemblies allow bearing arrangements requiring only a very small radial design envelope. They have high load carrying capacity, are suitable for high speeds and are particularly easy to fit.

If the raceways are produced to high geometrical accuracy, bearing arrangements with high runout accuracy can be achieved.

The radial internal clearance can be influenced by the needle roller sort as well as by the shaft and housing tolerances.

Needle roller and cage assemblies require a hardened and ground raceway on the shaft and in the housing.

**Double row** Double row needle roller and cage assemblies are only available in particular enveloping circle diameters  $F_W$ . These are indicated by the suffix ZW.

**Needle rollers** Needle roller and cage assemblies are supplied with standard needle roller sorts in accordance with the table. However, each needle roller and cage assembly is fitted with needle rollers of one sort only. The sort is printed on the packaging and is colour coded, see table.

The sorts are indicated by the upper and lower deviation (in  $\mu\text{m}$ ), the maximum diameter tolerance is  $2\ \mu\text{m}$ , see table. In each case, two neighbouring needle roller sorts are matched as sort pairs.

## Standard needle roller sorts

Sort pair Colour code	Needle roller sorts $\mu\text{m}$
Red	0-2 / -1-3
Blue	-2-4 / -3-5
White (grey)	-4-6 / -5-7

**Operating temperature** Needle roller and cage assemblies with a plastic cage can be used at operating temperatures from  $-20\ \text{°C}$  to  $+120\ \text{°C}$ .



# Needle roller and cage assemblies

**Cages** Needle roller and cage assemblies are available with plastic cages and sheet steel cages. Plastic cages have the suffix TV and are only available in particular sizes.

**Other products** Needle roller and cage assemblies are also available in designs for connecting rod bearing arrangements:

- series KZK for crank pin bearing arrangements
- series KBK for piston pin bearing arrangements.

These needle roller and cage assemblies are described in detail in TPI 94, Needle roller and cage assemblies for crank pins and piston pins.

**Suffixes** Suffixes for available designs: see table.

**Available designs**

Suffix	Description	Design
TV	Cage made from glass fibre reinforced polyamide 66 Bearings with plastic cage: see dimension table	Standard
ZW	Double row design (certain sizes only)	

## Design and safety guidelines

### Raceway design

Where needle roller and cage assemblies are to be used, the housing bore and the shaft raceway must be hardened and ground. The surface hardness of the raceways must be 670 HV + 170 HV, the hardening depth CHD or SHD must be sufficiently large.

Design of raceways, see table and section Design of bearing arrangements, from page 174.

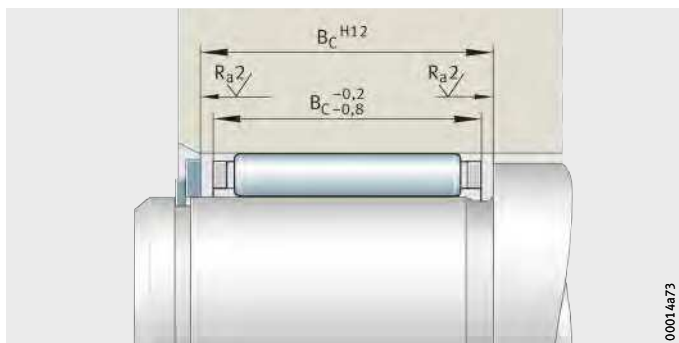
### Raceway design

Shaft diameter		Bore tolerance	Shaft tolerance			Roughness	Roundness	Parallelism
Nominal dimension mm			Bearing clearance					
over	incl.		Small	Normal	Large	max.	max.	max.
–	80	G6	j5	h5	g6	R <sub>a</sub> 0,2 (R <sub>z</sub> 1)	IT3	IT3
		H6	h5	g5	f6			
80	120	G6	h5	g5	f6	R <sub>a</sub> 0,3 (R <sub>z</sub> 1,6)		
120	–	G6	h5	g5	f6	R <sub>a</sub> 0,4 (R <sub>z</sub> 2,5)		
		H6	–	f5	e6			

**Raceway width** The raceway width must be at least equal to the cage width  $B_c$  ( $B_c$  is produced with a minus (-) tolerance); values for  $B_c$ , see dimension tables. The distance between the axial limit surfaces should therefore be toleranced to H12, *Figure 1*.



The axial running surfaces for the needle roller and cage assemblies must be precision machined ( $R_a2$  recommended) and resistant to wear.



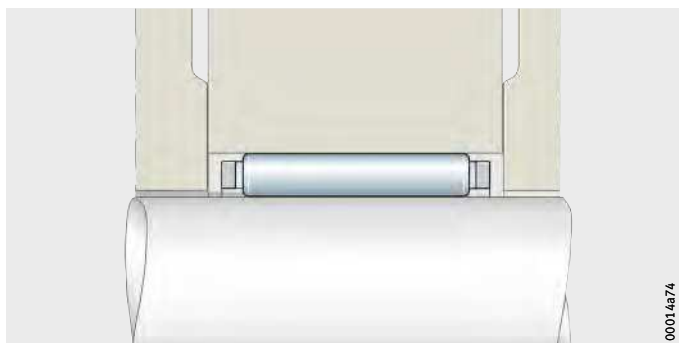
*Figure 1*  
Raceway width  
and axial running surfaces

### Axial location



Needle roller and cage assemblies must be axially located. They are located by means of snap rings or appropriate design of the adjacent construction, *Figure 1* and *Figure 2*.

If location is by means of snap rings or retaining rings, a washer must be arranged in front of the ring. It must be ensured that there is sufficient interference between the ring and washer.



*Figure 2*  
Axial location  
by adjacent construction

### Accuracy

The width of the needle roller and cage assembly  $B_{c-0,2}$  corresponds to DIN 5 405-1.

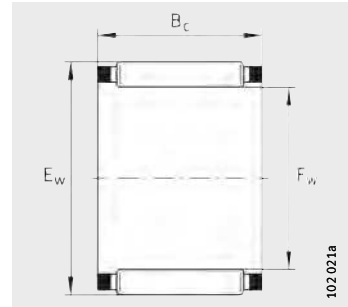
### Radial internal clearance

When standard needle roller sorts are used, a radial internal clearance of C2 to CN is achieved (radial internal clearance for needle and cylindrical roller bearings to DIN 620-4), if the shaft and housing tolerances according to table Raceway design, page 668, are observed.

If the actual values are on the plus side, a radial internal clearance of 0 can be achieved.

# Needle roller and cage assemblies

Single row



K..-TV

**Dimension table** - Dimensions in mm

Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>	Reference speed n <sub>B</sub> min <sup>-1</sup>
		F <sub>w</sub>	E <sub>w</sub>	B <sub>c</sub>	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N			
K3X5X7-TV	0,3	3	5	7	1 540	1 290	152	50 000	78 000
K3X5X9-TV	0,4	3	5	9	1 710	1 480	188	50 000	80 000
K3X6X7-TV	0,4	3	6	7	1 430	970	109	47 000	75 000
K4X7X7-TV	0,5	4	7	7	1 740	1 270	145	42 500	59 000
K4X7X10-TV	0,7	4	7	10	2 330	1 840	236	42 500	59 000
K5X8X8-TV	0,7	5	8	8	2 350	1 920	237	39 000	48 000
K5X8X10-TV	0,9	5	8	10	3 000	2 650	350	39 000	47 000
K6X9X8-TV	0,8	6	9	8	2 600	2 280	285	36 500	41 000
K6X9X10-TV	1	6	9	10	3 350	3 150	420	36 500	40 000
K6X10X13-TV	1	6	10	13	3 800	3 100	395	35 500	40 000
K7X9X7-TV	0,6	7	9	7	1 730	1 770	215	35 500	40 000
K7X10X8-TV	0,9	7	10	8	2 850	2 650	330	34 500	36 000
K7X10X10-TV	1	7	10	10	3 650	3 600	485	34 500	35 000
K8X11X8-TV	1,1	8	11	8	3 100	3 000	375	32 500	32 000
K8X11X10-TV	1,2	8	11	10	3 950	4 100	560	32 500	31 000
K8X11X13-TV	1,7	8	11	13	5 100	5 800	790	32 500	30 500
K8X12X10-TV	2	8	12	10	5 000	4 700	560	31 500	29 000
K9X12X10-TV	2	9	12	10	4 500	5 000	680	31 000	27 500
K9X12X13-TV	2,1	9	12	13	5 900	7 100	970	31 000	27 000
K10X13X10-TV	2	10	13	10	4 750	5 500	750	29 500	24 900
K10X13X13-TV	2	10	13	13	6 200	7 800	1 060	29 500	24 400
K10X13X16-TV	2,9	10	13	16	7 100	9 300	1 310	29 500	24 600
K10X14X10-TV	2,5	10	14	10	5 800	6 000	720	29 000	23 500
K10X14X13-TV	4,6	10	14	13	7 500	8 400	1 020	29 000	23 000
K10X16X12-TV	5	10	16	12	8 100	7 200	1 000	27 500	21 800
K12X15X10-TV	2,9	12	15	10	4 900	6 100	830	27 000	21 500
K12X15X13-TV	2,3	12	15	13	6 400	8 500	1 170	27 000	21 100
K12X16X13-TV	3,6	12	16	13	8 000	9 400	1 150	26 500	19 900
K12X17X13-TV	4,9	12	17	13	9 600	10 400	1 330	26 500	18 800
K12X18X12-TV	6	12	18	12	10 000	9 900	1 400	26 000	18 100

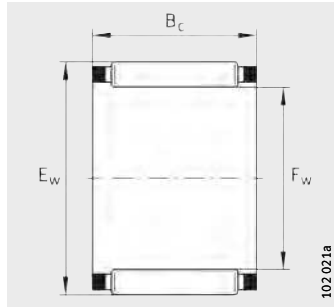
**Dimension table (continued) - Dimensions in mm**

Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>	Reference speed n <sub>B</sub> min <sup>-1</sup>
		F <sub>w</sub>	E <sub>w</sub>	B <sub>c</sub>	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N			
		<b>K14X18X10</b>	4	<b>14</b>	18	10			
<b>K14X18X13</b>	6,5	<b>14</b>	18	13	8 200	10 100	1 320	25 000	17 700
<b>K14X18X15-TV</b>	5	<b>14</b>	18	15	9 500	12 300	1 540	25 000	17 400
<b>K14X18X17</b>	8	<b>14</b>	18	17	10 800	14 400	1 890	25 000	17 300
<b>K14X20X12</b>	8,5	<b>14</b>	20	12	10 300	10 600	1 490	24 300	16 200
<b>K15X18X17-TV</b>	4,6	<b>15</b>	18	17	8 000	12 100	1 730	24 600	17 700
<b>K15X19X10</b>	5,1	<b>15</b>	19	10	7 500	9 200	1 140	24 300	16 200
<b>K15X19X13</b>	7	<b>15</b>	19	13	8 500	10 900	1 420	24 300	16 600
<b>K15X19X17</b>	9,5	<b>15</b>	19	17	11 300	15 600	2 040	24 300	16 200
<b>K15X20X13</b>	7	<b>15</b>	20	13	9 900	11 500	1 430	23 900	15 900
<b>K15X21X15</b>	11	<b>15</b>	21	15	14 300	16 400	2 210	23 600	14 700
<b>K15X21X21</b>	17	<b>15</b>	21	21	19 400	24 300	3 300	23 600	14 400
<b>K16X20X10</b>	5	<b>16</b>	20	10	7 800	9 900	1 230	23 600	15 200
<b>K16X20X13</b>	8	<b>16</b>	20	13	8 900	11 800	1 530	23 600	15 600
<b>K16X20X17</b>	10,4	<b>16</b>	20	17	11 700	16 800	2 190	23 600	15 200
<b>K16X22X12</b>	10	<b>16</b>	22	12	11 500	12 500	1 780	22 900	14 300
<b>K16X22X16</b>	12	<b>16</b>	22	16	14 800	17 500	2 390	22 900	14 100
<b>K16X22X20</b>	15	<b>16</b>	22	20	18 300	22 800	3 050	22 900	14 000
<b>K16X24X20</b>	22	<b>16</b>	24	20	21 400	23 500	2 950	22 400	13 200
<b>K17X21X10</b>	5	<b>17</b>	21	10	8 100	10 600	1 310	22 900	14 400
<b>K17X21X13</b>	6,5	<b>17</b>	21	13	10 400	14 600	1 810	22 900	14 100
<b>K17X21X17</b>	9,5	<b>17</b>	21	17	12 200	17 900	2 350	22 900	14 400
<b>K18X22X10</b>	6	<b>18</b>	22	10	8 400	11 300	1 400	22 400	13 600
<b>K18X22X13</b>	8	<b>18</b>	22	13	9 200	12 700	1 650	22 400	14 200
<b>K18X22X17</b>	11	<b>18</b>	22	17	12 100	18 000	2 360	22 400	13 900
<b>K18X24X12</b>	12	<b>18</b>	24	12	12 800	14 900	2 120	21 800	12 700
<b>K18X24X13</b>	13	<b>18</b>	24	13	13 100	15 300	1 990	21 800	12 900
<b>K18X24X20</b>	18	<b>18</b>	24	20	20 200	27 000	3 550	21 800	12 400
<b>K18X25X22</b>	23	<b>18</b>	25	22	23 100	29 000	3 750	21 600	12 200
<b>K19X23X13</b>	8	<b>19</b>	23	13	9 500	13 500	1 750	21 800	13 500
<b>K19X23X17</b>	11	<b>19</b>	23	17	12 500	19 200	2 500	21 800	13 200

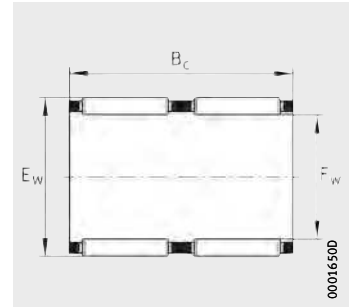


# Needle roller and cage assemblies

Single row  
Double row



K, K..-TV



K..-ZW

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>	Reference speed n <sub>B</sub> min <sup>-1</sup>
		F <sub>w</sub>	E <sub>w</sub>	B <sub>c</sub>	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N			
<b>K20X24X10</b>	7	<b>20</b>	24	10	8 900	12 600	1 570	21 300	12 400
<b>K20X24X13</b>	9	<b>20</b>	24	13	9 800	14 300	1 860	21 300	12 800
<b>K20X24X17</b>	13	<b>20</b>	24	17	12 900	20 400	2 650	21 300	12 500
<b>K20X26X12</b>	12	<b>20</b>	26	12	13 400	16 200	2 310	20 900	11 700
<b>K20X26X13</b>	12	<b>20</b>	26	13	14 400	17 900	2 330	20 900	11 600
<b>K20X26X17</b>	16	<b>20</b>	26	17	19 200	26 000	3 300	20 900	11 200
<b>K20X26X20</b>	19	<b>20</b>	26	20	21 100	29 000	3 900	20 900	11 400
<b>K20X28X16</b>	20	<b>20</b>	28	16	19 800	22 400	3 000	20 400	11 100
<b>K20X28X20</b>	27	<b>20</b>	28	20	23 900	28 500	3 600	20 400	11 100
<b>K20X28X25</b>	32	<b>20</b>	28	25	30 500	39 000	5 300	20 400	10 800
<b>K20X30X30</b>	49	<b>20</b>	30	30	35 500	41 500	5 500	19 600	10 800
<b>K21X25X13</b>	9	<b>21</b>	25	13	10 100	15 100	1 970	20 900	12 300
<b>K22X26X10</b>	8	<b>22</b>	26	10	9 100	13 400	1 670	20 400	11 500
<b>K22X26X13</b>	10	<b>22</b>	26	13	10 400	15 900	2 080	20 400	11 800
<b>K22X26X17</b>	12,1	<b>22</b>	26	17	13 700	22 700	3 000	20 400	11 500
<b>K22X28X17</b>	18	<b>22</b>	28	17	19 400	27 000	3 450	19 600	10 500
<b>K22X29X16</b>	16	<b>22</b>	29	16	20 000	25 500	3 350	19 200	10 300
<b>K22X30X15-TV</b>	18	<b>22</b>	30	15	20 100	23 400	3 050	18 800	10 200
<b>K22X32X24</b>	43	<b>22</b>	32	24	34 000	40 000	4 900	18 100	9 700
<b>K23X35X16-TV</b>	29	<b>23</b>	35	16	24 500	23 900	2 950	16 900	9 500
<b>K24X28X10</b>	9	<b>24</b>	28	10	9 600	14 800	1 840	18 800	10 600
<b>K24X28X13</b>	12	<b>24</b>	28	13	11 000	17 600	2 290	18 800	10 800
<b>K24X28X17</b>	13	<b>24</b>	28	17	14 500	25 000	3 300	18 800	10 600
<b>K24X30X17</b>	20	<b>24</b>	30	17	19 500	27 500	3 500	18 100	10 000
<b>K24X30X31-ZW</b>	32	<b>24</b>	30	31	27 500	43 500	5 800	18 100	10 400



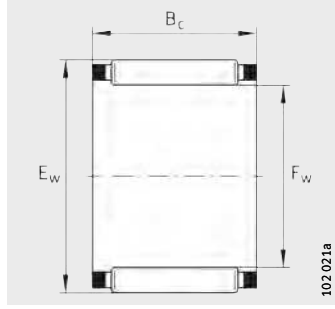
**Dimension table** (continued) - Dimensions in mm

Designation	Mass	Dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
		$F_w$	$E_w$	$B_c$	dyn. $C_r$ N	stat. $C_{0r}$ N			
	m $\approx g$								
<b>K25X29X10</b>	7	<b>25</b>	29	10	9 900	15 400	1 930	18 100	10 200
<b>K25X29X13</b>	11	<b>25</b>	29	13	11 300	18 400	2 400	18 100	10 400
<b>K25X29X17</b>	14	<b>25</b>	29	17	14 900	26 000	3 450	18 100	10 200
<b>K25X30X17</b>	16	<b>25</b>	30	17	18 700	30 000	3 850	17 800	9 600
<b>K25X30X20</b>	18	<b>25</b>	30	20	21 700	36 500	4 850	17 800	9 500
<b>K25X30X26-ZW</b>	19	<b>25</b>	30	26	21 400	35 500	4 500	17 800	10 400
<b>K25X31X17</b>	19	<b>25</b>	31	17	19 600	28 500	3 600	17 500	9 600
<b>K25X31X21</b>	20	<b>25</b>	31	21	24 700	38 000	5 100	17 500	9 400
<b>K25X32X16</b>	21	<b>25</b>	32	16	20 800	27 500	3 650	17 200	9 400
<b>K25X33X20</b>	34	<b>25</b>	33	20	28 500	38 000	4 850	16 900	9 000
<b>K25X33X24</b>	39	<b>25</b>	33	24	34 000	47 000	6 300	16 900	8 900
<b>K25X35X30</b>	65	<b>25</b>	35	30	47 000	62 000	8 300	16 300	8 500
<b>K26X30X13</b>	11	<b>26</b>	30	13	11 600	19 200	2 500	17 500	10 100
<b>K26X30X17</b>	15	<b>26</b>	30	17	15 200	27 500	3 600	17 500	9 800
<b>K26X30X22-ZW</b>	21	<b>26</b>	30	22	15 700	28 500	3 550	17 500	10 400
<b>K28X33X13</b>	14	<b>28</b>	33	13	15 300	24 200	3 100	16 100	8 900
<b>K28X33X17</b>	17	<b>28</b>	33	17	19 700	33 500	4 250	16 100	8 700
<b>K28X34X17</b>	24	<b>28</b>	34	17	21 800	33 500	4 300	15 800	8 600
<b>K28X35X16</b>	24	<b>28</b>	35	16	21 500	29 500	3 950	15 600	8 700
<b>K28X35X18</b>	29	<b>28</b>	35	18	24 000	34 000	4 700	15 600	8 600
<b>K28X40X25</b>	72	<b>28</b>	40	25	45 500	55 000	6 600	14 400	7 700
<b>K30X34X13</b>	14	<b>30</b>	34	13	12 300	21 700	2 850	15 300	8 900
<b>K30X35X13</b>	14	<b>30</b>	35	13	15 600	25 500	3 250	15 100	8 400
<b>K30X35X17</b>	19	<b>30</b>	35	17	19 600	34 000	4 300	15 100	8 300
<b>K30X35X27</b>	30	<b>30</b>	35	27	30 500	59 000	8 500	15 100	8 100
<b>K30X37X16</b>	27	<b>30</b>	37	16	23 100	33 500	4 450	14 600	8 000
<b>K30X37X18</b>	30	<b>30</b>	37	18	26 000	38 500	5 300	14 600	8 000
<b>K30X40X18</b>	48	<b>30</b>	40	18	32 000	40 000	5 000	14 000	7 600
<b>K30X40X30</b>	73	<b>30</b>	40	30	49 000	69 000	9 200	14 000	7 500

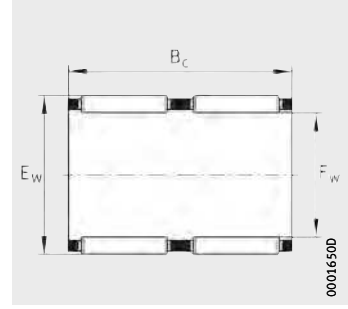


# Needle roller and cage assemblies

Single row  
Double row



K



K..-ZW, K..-ZW-TV

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>	Reference speed n <sub>B</sub> min <sup>-1</sup>
		F <sub>w</sub>	E <sub>w</sub>	B <sub>c</sub>	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N			
<b>K32X37X13</b>	19	<b>32</b>	37	13	15 500	25 500	3 300	14 200	8 100
<b>K32X37X17</b>	19	<b>32</b>	37	17	19 900	35 500	4 500	14 200	7 900
<b>K32X37X27</b>	30	<b>32</b>	37	27	30 000	60 000	8 500	14 200	7 800
<b>K32X38X20</b>	30	<b>32</b>	38	20	26 500	45 000	6 000	14 000	7 700
<b>K32X39X16</b>	29	<b>32</b>	39	16	23 800	35 500	4 700	13 800	7 600
<b>K32X39X18</b>	31	<b>32</b>	39	18	26 500	41 000	5 200	13 800	7 500
<b>K32X40X25</b>	50	<b>32</b>	40	25	37 500	58 000	7 900	13 600	7 400
<b>K32X40X42-ZW-TV</b>	65	<b>32</b>	40	42	50 000	84 000	10 500	13 600	7 800
<b>K32X46X32</b>	119	<b>32</b>	46	32	66 000	84 000	11 100	12 600	6 700
<b>K35X40X13</b>	19	<b>35</b>	40	13	16 200	28 000	3 600	13 100	7 500
<b>K35X40X17</b>	21	<b>35</b>	40	17	20 800	38 500	4 900	13 100	7 400
<b>K35X40X25</b>	31	<b>35</b>	40	25	29 500	60 000	8 400	13 100	7 200
<b>K35X40X27-TV</b>	39	<b>35</b>	40	27	25 000	48 500	6 700	13 100	7 900
<b>K35X42X16</b>	34	<b>35</b>	42	16	24 400	37 500	5 000	12 700	7 100
<b>K35X42X18</b>	34	<b>35</b>	42	18	27 500	43 000	6 000	12 700	7 100
<b>K35X42X20</b>	40	<b>35</b>	42	20	30 000	49 000	6 200	12 700	7 000
<b>K35X42X30</b>	67	<b>35</b>	42	30	39 000	68 000	9 400	12 700	7 200
<b>K35X45X20</b>	56	<b>35</b>	45	20	37 000	50 000	6 500	12 300	6 800
<b>K35X45X30</b>	80	<b>35</b>	45	30	53 000	79 000	10 500	12 300	6 700
<b>K37X42X17</b>	23	<b>37</b>	42	17	22 400	43 000	5 500	12 400	6 900
<b>K38X43X17</b>	29	<b>38</b>	43	17	20 500	38 500	4 850	12 100	7 000
<b>K38X43X27</b>	43	<b>38</b>	43	27	31 500	68 000	9 600	12 100	6 800
<b>K38X46X20</b>	51	<b>38</b>	46	20	35 500	57 000	7 200	11 700	6 300
<b>K38X46X32</b>	76	<b>38</b>	46	32	55 000	99 000	14 200	11 700	6 200
<b>K39X44X26-ZW</b>	45	<b>39</b>	44	26	27 500	56 000	7 100	11 800	7 000

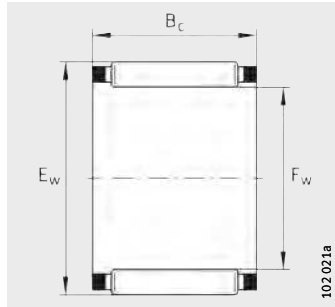
**Dimension table (continued) - Dimensions in mm**

Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>	Reference speed n <sub>B</sub> min <sup>-1</sup>
		F <sub>w</sub>	E <sub>w</sub>	B <sub>c</sub>	dyn.	stat.			
					C <sub>r</sub> N	C <sub>0r</sub> N			
<b>K40X45X13</b>	19	<b>40</b>	45	13	17 600	32 500	3 900	11 500	6 600
<b>K40X45X17</b>	31	<b>40</b>	45	17	21 400	41 500	5 200	11 500	6 700
<b>K40X45X27</b>	46	<b>40</b>	45	27	33 000	73 000	10 300	11 500	6 500
<b>K40X47X18</b>	39	<b>40</b>	47	18	29 500	50 000	6 900	11 300	6 300
<b>K40X47X20</b>	42	<b>40</b>	47	20	32 500	57 000	7 200	11 300	6 200
<b>K40X48X20</b>	49	<b>40</b>	48	20	36 000	59 000	7 500	11 100	6 100
<b>K42X47X13</b>	18	<b>42</b>	47	13	17 800	33 500	4 350	11 000	6 400
<b>K42X47X17</b>	32	<b>42</b>	47	17	21 700	43 000	5 400	11 000	6 400
<b>K42X47X30-ZW</b>	54	<b>42</b>	47	30	33 500	76 000	10 000	11 000	6 400
<b>K42X50X20</b>	53	<b>42</b>	50	20	35 000	57 000	7 300	10 700	6 000
<b>K43X48X17</b>	30	<b>43</b>	48	17	21 600	43 000	5 400	10 800	6 300
<b>K43X48X27</b>	50	<b>43</b>	48	27	33 500	75 000	10 700	10 800	6 200
<b>K45X50X17</b>	34	<b>45</b>	50	17	22 500	46 000	5 800	10 300	6 100
<b>K45X50X27</b>	52	<b>45</b>	50	27	34 500	80 000	11 400	10 300	5 900
<b>K45X52X18</b>	42	<b>45</b>	52	18	31 500	57 000	7 900	10 100	5 700
<b>K45X53X20</b>	55	<b>45</b>	53	20	39 000	67 000	8 700	10 000	5 500
<b>K45X53X21</b>	60	<b>45</b>	53	21	38 500	67 000	8 600	10 000	5 600
<b>K45X53X28</b>	80	<b>45</b>	53	28	52 000	98 000	13 700	10 000	5 400
<b>K45X59X18-TV</b>	72	<b>45</b>	59	18	44 500	54 000	6 900	9 400	5 400
<b>K45X59X32</b>	148	<b>45</b>	59	32	73 000	103 000	13 800	9 400	5 300
<b>K47X52X17</b>	35	<b>47</b>	52	17	23 300	49 000	6 100	9 900	5 800
<b>K47X52X27</b>	51	<b>47</b>	52	27	35 000	83 000	11 800	9 900	5 700

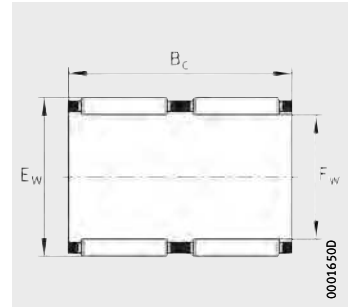


# Needle roller and cage assemblies

Single row  
Double row



K



K..-ZW

**Dimension table (continued)** · Dimensions in mm

Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C <sub>Ur</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>	Reference speed n <sub>B</sub> min <sup>-1</sup>
		F <sub>w</sub>	E <sub>w</sub>	B <sub>c</sub>	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N			
<b>K50X55X13,5</b>	30	<b>50</b>	55	13,5	18 200	36 500	4 600	9 300	5 700
<b>K50X55X17</b>	35	<b>50</b>	55	17	26 000	57 000	7 300	9 300	5 700
<b>K50X55X20</b>	45	<b>50</b>	55	20	26 500	60 000	7 800	9 300	5 500
<b>K50X55X30</b>	65	<b>50</b>	55	30	39 000	97 000	13 900	9 300	5 400
<b>K50X57X18</b>	47	<b>50</b>	57	18	33 500	63 000	8 800	9 200	5 200
<b>K50X58X20</b>	75	<b>50</b>	58	20	35 500	62 000	8 800	9 100	5 400
<b>K50X58X25</b>	90	<b>50</b>	58	25	44 000	81 000	10 800	9 100	5 300
<b>K52X57X12</b>	24	<b>52</b>	57	12	18 000	36 500	4 600	9 000	5 400
<b>K55X60X20</b>	40	<b>55</b>	60	20	28 500	66 000	8 600	8 500	5 100
<b>K55X60X27</b>	69	<b>55</b>	60	27	38 000	97 000	13 600	8 500	4 950
<b>K55X60X30</b>	72	<b>55</b>	60	30	41 000	108 000	15 400	8 500	4 950
<b>K55X62X18</b>	52	<b>55</b>	62	18	35 500	70 000	9 800	8 400	4 750
<b>K55X63X20</b>	67	<b>55</b>	63	20	40 000	74 000	9 500	8 300	4 800
<b>K55X63X25</b>	80	<b>55</b>	63	25	50 000	100 000	13 700	8 300	4 700
<b>K55X63X32</b>	102	<b>55</b>	63	32	62 000	130 000	18 600	8 300	4 650
<b>K58X65X18</b>	79	<b>58</b>	65	18	35 000	70 000	9 800	8 000	4 650
<b>K58X65X36-ZW</b>	127	<b>58</b>	65	36	49 000	107 000	14 600	8 000	5 100
<b>K60X65X20</b>	52	<b>60</b>	65	20	29 500	72 000	9 300	7 800	4 750
<b>K60X65X30</b>	77	<b>60</b>	65	30	42 500	116 000	16 600	7 800	4 650
<b>K60X66X33-ZW</b>	104	<b>60</b>	66	33	46 000	112 000	15 100	7 800	4 800
<b>K60X66X40-ZW</b>	147	<b>60</b>	66	40	58 000	151 000	19 900	7 800	4 650
<b>K60X68X20</b>	71	<b>60</b>	68	20	43 500	85 000	11 000	7 700	4 400
<b>K60X68X23</b>	94	<b>60</b>	68	23	49 500	101 000	13 500	7 700	4 350
<b>K60X68X25</b>	89	<b>60</b>	68	25	53 000	111 000	15 200	7 700	4 350
<b>K60X68X30-ZW</b>	129	<b>60</b>	68	30	44 500	88 000	11 300	7 700	4 950
<b>K60X75X42</b>	240	<b>60</b>	75	42	118 000	199 000	27 000	7 300	4 050
<b>K62X70X40-ZW</b>	174	<b>62</b>	70	40	66 000	146 000	20 500	7 400	4 550
<b>K64X70X16</b>	53	<b>64</b>	70	16	28 000	60 000	8 100	7 300	4 500

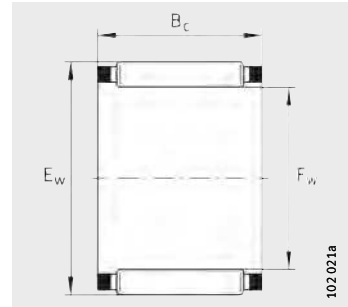
**Dimension table (continued) - Dimensions in mm**

Designation	Mass	Dimensions			Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ min <sup>-1</sup>	Reference speed $n_B$ min <sup>-1</sup>
		$F_w$	$E_w$	$B_c$	dyn. $C_r$ N	stat. $C_{0r}$ N			
	≈g								
<b>K65X70X20</b>	56	<b>65</b>	70	20	30 500	77 000	10 000	7 300	4 450
<b>K65X70X30</b>	83	<b>65</b>	70	30	44 000	124 000	17 800	7 300	4 350
<b>K65X73X23</b>	108	<b>65</b>	73	23	46 000	94 000	12 200	7 100	4 300
<b>K65X73X30</b>	141	<b>65</b>	73	30	57 000	123 000	17 100	7 100	4 300
<b>K68X74X20</b>	71	<b>68</b>	74	20	35 500	84 000	11 000	6 900	4 200
<b>K68X74X30</b>	100	<b>68</b>	74	30	46 500	118 000	16 900	6 900	4 300
<b>K68X74X35-ZW</b>	120	<b>68</b>	74	35	48 500	125 000	17 200	6 900	4 450
<b>K70X76X20</b>	71	<b>70</b>	76	20	36 000	86 000	11 300	6 700	4 100
<b>K70X76X30</b>	110	<b>70</b>	76	30	52 000	139 000	20 100	6 700	4 000
<b>K70X78X30</b>	148	<b>70</b>	78	30	60 000	135 000	18 800	6 600	4 000
<b>K72X80X20</b>	98	<b>72</b>	80	20	41 500	85 000	11 900	6 400	4 000
<b>K73X79X20</b>	75	<b>73</b>	79	20	37 000	90 000	11 800	6 400	4 000
<b>K75X81X20</b>	79	<b>75</b>	81	20	37 500	94 000	12 300	6 300	3 850
<b>K75X81X30</b>	114	<b>75</b>	81	30	52 000	143 000	20 400	6 300	3 850
<b>K75X83X23</b>	124	<b>75</b>	83	23	50 000	109 000	14 200	6 200	3 800
<b>K75X83X30</b>	147	<b>75</b>	83	30	62 000	143 000	20 000	6 200	3 800
<b>K75X83X35-ZW</b>	182	<b>75</b>	83	35	63 000	147 000	19 900	6 200	3 950
<b>K75X83X40-ZW</b>	211	<b>75</b>	83	40	73 000	177 000	25 000	6 200	3 900
<b>K80X86X20</b>	60	<b>80</b>	86	20	38 500	98 000	12 900	5 900	3 700
<b>K80X88X30</b>	138	<b>80</b>	88	30	71 000	176 000	25 000	5 800	3 400
<b>K80X88X40-ZW</b>	227	<b>80</b>	88	40	76 000	192 000	27 000	5 800	3 700
<b>K80X88X46-ZW</b>	260	<b>80</b>	88	46	88 000	231 000	30 000	5 800	3 650
<b>K85X92X20</b>	102	<b>85</b>	92	20	44 500	108 000	15 100	5 500	3 450
<b>K90X97X20</b>	109	<b>90</b>	97	20	45 000	113 000	15 800	5 200	3 300
<b>K90X98X27</b>	150	<b>90</b>	98	27	61 000	150 000	20 300	5 200	3 300
<b>K90X98X30</b>	172	<b>90</b>	98	30	68 000	172 000	24 000	5 200	3 300
<b>K95X103X30</b>	165	<b>95</b>	103	30	69 000	180 000	25 000	4 950	3 150
<b>K95X103X40-ZW</b>	266	<b>95</b>	103	40	83 000	228 000	32 500	4 950	3 200



# Needle roller and cage assemblies

Single row

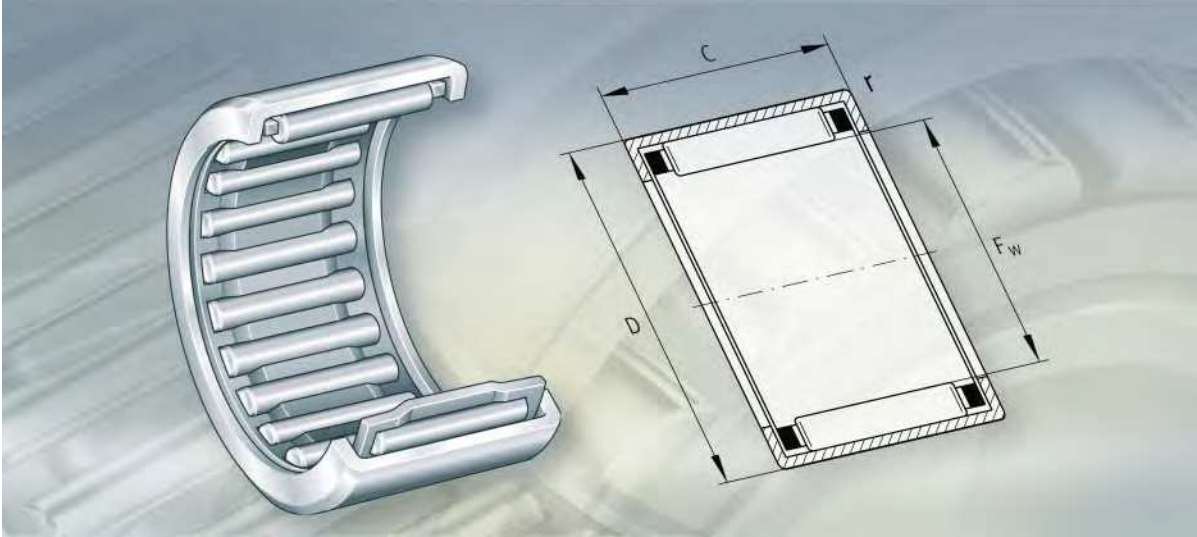


K

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈g	Dimensions			Basic load ratings		Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>	Reference speed n <sub>B</sub> min <sup>-1</sup>
		F <sub>w</sub>	E <sub>w</sub>	B <sub>c</sub>	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N			
<b>K100X107X21</b>	120	<b>100</b>	107	21	48 000	127 000	17 600	4 750	3 100
<b>K100X108X27</b>	185	<b>100</b>	108	27	57 000	143 000	18 900	4 700	3 200
<b>K100X108X30</b>	180	<b>100</b>	108	30	71 000	188 000	26 000	4 700	3 050
<b>K105X112X21</b>	129	<b>105</b>	112	21	47 500	127 000	17 400	4 500	3 000
<b>K110X117X24</b>	172	<b>110</b>	117	24	56 000	158 000	19 800	4 300	2 850
<b>K110X118X30</b>	217	<b>110</b>	118	30	78 000	219 000	29 500	4 300	2 750
<b>K115X123X27</b>	200	<b>115</b>	123	27	63 000	170 000	21 600	4 100	2 850
<b>K120X127X24</b>	165	<b>120</b>	127	24	59 000	174 000	21 400	3 950	2 650
<b>K125X133X35</b>	275	<b>125</b>	133	35	86 000	260 000	34 500	3 800	2 600
<b>K130X137X24</b>	170	<b>130</b>	137	24	61 000	186 000	22 300	3 650	2 500
<b>K135X143X35</b>	300	<b>135</b>	143	35	91 000	290 000	37 500	3 550	2 390
<b>K145X153X26</b>	262	<b>145</b>	153	26	74 000	225 000	27 000	3 300	2 280
<b>K150X160X46</b>	570	<b>150</b>	160	46	147 000	470 000	60 000	3 150	2 100
<b>K155X163X26</b>	265	<b>155</b>	163	26	75 000	236 000	28 000	3 100	2 180
<b>K160X170X46</b>	550	<b>160</b>	170	46	152 000	510 000	63 000	2 950	1 970
<b>K165X173X26</b>	320	<b>165</b>	173	26	81 000	265 000	30 500	2 900	2 030
<b>K175X183X32</b>	400	<b>175</b>	183	32	99 000	350 000	41 500	2 750	1 930
<b>K185X195X37</b>	607	<b>185</b>	195	37	128 000	425 000	48 500	2 600	1 840
<b>K195X205X37</b>	620	<b>195</b>	205	37	133 000	450 000	51 000	2 450	1 760
<b>K210X220X42</b>	740	<b>210</b>	220	42	154 000	560 000	63 000	2 280	1 590
<b>K220X230X42</b>	790	<b>220</b>	230	42	158 000	590 000	66 000	2 180	1 510
<b>K240X250X42</b>	850	<b>240</b>	250	42	164 000	630 000	69 000	2 000	1 390
<b>K265X280X50</b>	1 810	<b>265</b>	280	50	255 000	860 000	91 000	1 800	1 160





**Drawn cup needle roller bearings  
with open ends**  
**Drawn cup needle roller bearings  
with closed end**



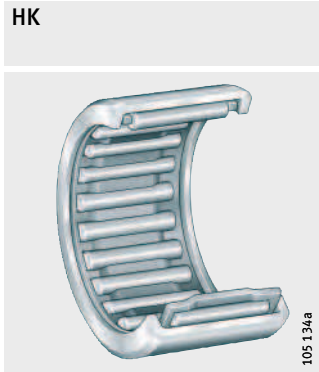
# Drawn cup needle roller bearings

	Page
<b>Product overview</b>	Drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end ..... 682
<b>Features</b>	Drawn cup needle roller bearings with open ends..... 683 Drawn cup needle roller bearings with closed end ..... 683 Sealing..... 684 Lubrication ..... 684 Operating temperature ..... 684 Cages..... 684 Special designs ..... 684 Suffixes..... 684
<b>Design and safety guidelines</b>	Static load safety factor ..... 685 Minimum radial load ..... 685 Speeds..... 685 Design of bearing arrangements ..... 686 Location ..... 687
<b>Accuracy</b>	Enveloping circle ..... 688
<b>Dimension tables</b>	Drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end, unsealed ..... 690 Drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end, sealed ..... 694 Drawn cup needle roller bearings, full complement, unsealed ..... 696



# Product overview Drawn cup needle roller bearings

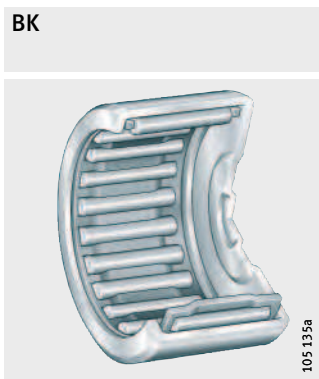
**Drawn cup  
needle roller bearings  
with open ends**  
With cage or  
full complement



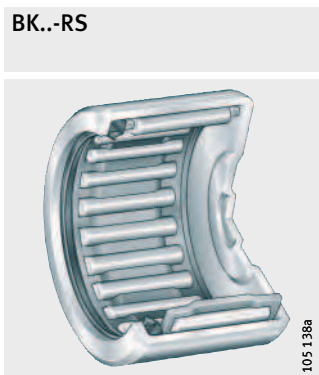
Lip seals



**Drawn cup  
needle roller bearings  
with closed end**



Lip seal



# Drawn cup needle roller bearings

**Features** Drawn cup needle roller bearings with open ends and with closed end are needle roller bearings with a very small radial section height. They comprise thin-walled, drawn cup outer rings and needle roller and cage assemblies which together form a complete unit.

These bearings allow the design of particularly compact and easy-to-fit bearing arrangements with high radial load carrying capacity. In order to support axial forces, they can also be combined with axial needle roller bearings AXW, series AXW, see dimension table, page 880.

The majority of the bearings are of a single row design and do not have a lubrication hole. Double row designs have a lubrication hole and the suffix ZW.

For particular applications, drawn cup needle roller bearings with open ends are also available in a full complement design.

Drawn cup needle roller bearings require a hardened and ground bearing raceway on the shaft. If the shaft cannot be used as a raceway, the bearings can be combined with inner rings IR or LR. Suitable inner rings: see page 776.

If axial locating elements such as shoulders, snap rings etc. are not used, the housing bore can be produced easily and particularly economically. As a result, fitting of the bearings is simplified.

## **Drawn cup needle roller bearings with open ends**

Drawn cup needle roller bearings with open ends are supplied with a needle roller and cage assembly or a full complement needle roller set. Bearings with needle roller and cage assemblies allow higher speeds than the full complement designs.

## **Full complement drawn cup needle roller bearings with open ends**

Full complement drawn cup needle roller bearings have the maximum number of needle rollers and therefore offer extremely high load carrying capacity within a very small design envelope. However, their use at high speeds is restricted.

Since the needle rollers are not retained by mechanical means, they are secured for transport and fitting by means of a special grease (DIN 51 825–K1/2K–30). However, this does not have adequate long term lubrication capacity. Relubrication is therefore recommended after fitting.

## **Drawn cup needle roller bearings with closed end**

Some designs of drawn cup needle roller bearings are closed at one end. They are thus suitable for closing off the shaft ends of bearing arrangements. This gives protection against injury by rotating shafts and protects the bearing against contamination and moisture.

Depending on the size, the base is either smooth or lock-beaded (stiffened). Due to the profiled base, small axial guidance forces are possible.



# Drawn cup needle roller bearings

**Sealing** Drawn cup needle roller bearings with open ends and drawn cup needle roller bearings with closed end are available in an unsealed design in accordance with DIN 618-1/ISO 3 245 and a sealed design in accordance with DIN 618-2.

Under normal operating conditions, the lip seals give protection against contamination, spray water and the loss of lubricant.

**Lubrication** Sealed bearings are greased with a lithium complex soap grease to GA08.

**Operating temperature** Unsealed bearings can be used at temperatures up to +140 °C.



Sealed drawn cup needle roller bearings with open ends and with closed end are suitable for temperatures from -30 °C to +100 °C, restricted by the lubricant and seal material.

Bearings with a plastic cage are suitable for operating temperatures from -20 °C to +120 °C.

**Cages** With only a few exceptions, the cages are made from sheet steel. Bearings with a plastic cage have the suffix TV.

**Special designs** The following special designs are available by agreement:

- unsealed bearings, greased with lithium complex soap grease to GA08 (suffix GA08)
- bearings with a lubrication hole for sizes from HK0609 (suffix AS1).

**Special bearings** In addition to the catalogue designs, special designs are available by agreement:

- with an enveloping circle diameter  $F_w$  from 2 mm to 100 mm
- for special noise requirements (bearings with special noise testing).

**Universal joint bearings** For universal joints, universal joint bearings of series BU and BBU are available by agreement.

**Suffixes** Suffixes for available designs: see table.

## Available designs

Suffix	Description	Design
AS1	With lubrication hole from HK0609	Special design, available by agreement only
GA08	Unsealed, greased bearings for operating temperatures from -30 °C to +140 °C	
RS	Contact seal on one side	Standard
TV	Cage made from glass fibre reinforced polyamide 66	
ZW	Double row design, with lubrication hole	
2RS	Contact seals on both sides	

## Design and safety guidelines

### Static load safety factor

The static load safety factor  $S_0$  is the security against permanent deformation at the rolling contact and is determined as follows:

$$S_0 = \frac{C_{0r}}{P_0}$$

$S_0$  – Static load safety factor  
 $C_{0r}$  N Basic radial static load rating according to dimension tables  
 $P_0$  N Equivalent static bearing load.



The static load safety factor  $S_0$  must be  $\geq 3$ .

### Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum load  $F_{r\min}$  in a radial direction. This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways. In continuous operation, a minimum radial load of the order of  $P \geq 0,02 \cdot C_r$  is necessary.

### Speeds



The speeds  $n_G$  in the dimension tables are valid for oil lubrication. If grease lubrication is used, the permissible value is 60% of the stated value.



# Drawn cup needle roller bearings

## Design of bearing arrangements

### Raceway for bearings without inner ring

For drawn cup needle roller bearings without an inner ring, the rolling element raceway must be hardened and ground, see table. The surface hardness must be 670 HV, the hardening depth CHD or SHD must be sufficiently large.



In order to fully utilise the load carrying capacity of the bearings, sufficient rigid support must be provided for the thin-walled outer rings.

### Design of housing bore

The bore tolerance is dependent on the housing material. The recommended tolerances are listed in the table.

### Tolerances for shaft raceway and housing bore

Housing material	Tolerance	
	Shaft for bearings without inner ring	Housing bore
Steel or cast iron	h6	N6
Light metal Al		R6
Mg		S6

### Surface for shaft raceway and housing bore

Surface quality	Shaft raceway for bearings without inner ring	Housing bore
Roughness max.	R <sub>a</sub> 0,2 (R <sub>z</sub> 1)	R <sub>a</sub> 0,8 (R <sub>z</sub> 4)
Roundness	IT 3	IT 5/2
Parallelism	IT 3	IT 5/2

### Lead chamfer

The shaft and housing bore must have a lead chamfer of 10° to 15°.

## Location

### Radial and axial location

Drawn cup needle roller bearings are located in the housing bore by means of a press fit. They are pressed into the bore and require no further axial locating elements.

### Installation with fitting mandrel

The bearings should be installed using a special fitting mandrel, *Figure 1*. The shoulder of the fitting mandrel must rest against the end face of the bearing. This is indicated by the designation.

A toroidal ring should be used to retain the bearing. The length and oversize of the ring must be matched by the customer to the dimensions and mass of the bearing.

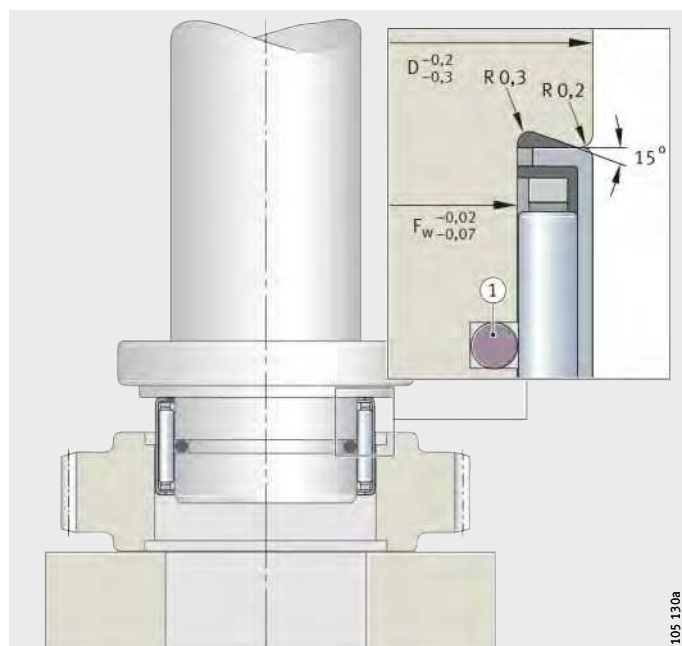
If grease lubrication is to be used, the bearings should be lubricated with grease before fitting.



Drawn cup bearings must not be tilted while they are being pressed in.

The forces occurring during pressing-in are dependent on several factors. The fitting situation should be arranged so that the bearing rib on the end face is not deformed.

If the application requires a fitting procedure different from the one described, fitting trials must be carried out in order to ensure that the bearings can be fitted correctly and without causing damage.



① Toroidal ring

*Figure 1*  
Installation using a fitting mandrel

# Drawn cup needle roller bearings

**Accuracy** The main dimensions of the bearings conform to DIN 618/ISO 3 245. The thin-walled outer rings adopt the dimensional and geometrical accuracy of the housing bore.

**Enveloping circle** In the case of bearings without an inner ring, the dimension for the enveloping circle  $F_w$  is used instead of the radial internal clearance. The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway. Once the bearings are fitted, the enveloping circle  $F_w$  is approximately in tolerance zone F8; for bore tolerances to table, page 686. Deviations for the tolerance zone F8, see table, page 168.

**Inspection dimensions** The enveloping circle is determined on the basis of the inspection dimensions in the table according to DIN 620-1.



Bearings used for enveloping circle measurement should not be repeatedly pushed in and out of the gauge. Bearings that have been checked in the ring gauge should not be used again.

## Inspection dimensions for drawn cup needle roller bearings

Enveloping circle $F_w$ mm	Outside diameter D mm	Ring gauge bore Actual dimension mm	Enveloping circle	
			Upper deviation $\mu\text{m}$	Lower deviation $\mu\text{m}$
2	4,6	4,587	+24	+6
3	6,5	6,484	+24	+6
4	8	7,984	+28	+10
5	9	8,984	+28	+10
6	10	9,984	+28	+10
7	11	10,980	+31	+13
8	12	11,980	+31	+13
9	13	12,980	+31	+13
10	14	13,980	+31	+13
12	16	15,980	+34	+16
12	18	17,980	+34	+16
13	19	18,976	+34	+16
14	20	19,976	+34	+16
15	21	20,976	+34	+16
16	22	21,976	+34	+16
17	23	22,976	+34	+16
18	24	23,976	+34	+16
20	26	25,976	+41	+20
22	28	27,976	+41	+20
25	32	31,972	+41	+20
28	35	34,972	+41	+20
30	37	36,972	+41	+20
32	39	38,972	+50	+25
35	42	41,972	+50	+25
40	47	46,972	+50	+25
45	52	51,967	+50	+25
50	58	57,967	+50	+25
55	63	62,967	+60	+30
60	68	67,967	+60	+30

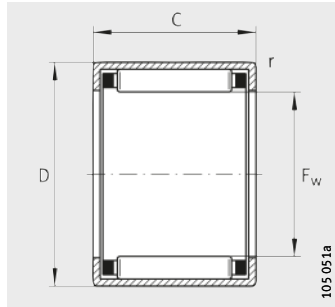




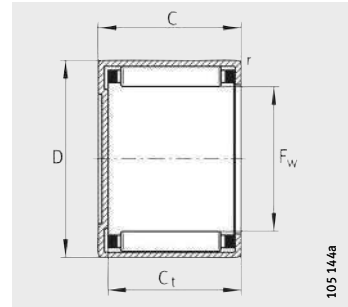
**Drawn cup needle roller bearings with open ends**

**Drawn cup needle roller bearings with closed end**

Unsealed



HK



BK

**Dimension table** - Dimensions in mm

Drawn cup needle roller bearings with open ends		Drawn cup needle roller bearings with closed end		Dimensions				
Designation	Mass m ≈g	Designation	Mass m ≈g	F <sub>w</sub>	D	C	C <sub>t</sub>	r
						-0,3	min.	min.
+ HK0205-TV	0,3	-	-	2	4,6	5	-	0,3
+ HK0306-TV	1	+ BK0306-TV	1	3	6,5	6	5,2	0,3
+ HK0408	2	+ BK0408	2,1	4	8	8	6,4	0,3
+ HK0509	2	+ BK0509	2,1	5	9	9	7,4	0,4
+ HK0606	1,5	-	-	6	10	6	-	0,4
+ HK0608	2,1	-	-	6	10	8	-	0,4
HK0609	2,5	BK0609	2,6	6	10	9	7,4	0,4
HK0709	2,6	BK0709	2,9	7	11	9	7,4	0,4
HK0808	2,7	BK0808	3	8	12	8	6,4	0,4
HK0810	3	BK0810	3,4	8	12	10	8,4	0,4
HK0908	3	-	-	9	13	8	-	0,4
HK0910	4	BK0910	4,3	9	13	10	8,4	0,4
HK0912	4,6	BK0912	4,9	9	13	12	10,4	0,4
HK1010	4,1	BK1010	4,3	10	14	10	8,4	0,4
HK1012	4,8	BK1012	5	10	14	12	10,4	0,4
HK1015	6	BK1015	6,2	10	14	15	13,4	0,4
HK1210	4,6	BK1210	5,2	12	16	10	8,4	0,4
HK1212	9	BK1212	10	12	18	12	9,3	0,8
HK1312	10	BK1312	11	13	19	12	9,3	0,8
HK1412	10,5	BK1412	12	14	20	12	9,3	0,8
HK1512	11	BK1512	13	15	21	12	9,3	0,8
HK1516	15	BK1516	17	15	21	16	13,3	0,8
HK1522-ZW	20	-	-	15	21	22	-	0,8
HK1612	12	BK1612	14	16	22	12	9,3	0,8
HK1616	16	BK1616	18	16	22	16	13,3	0,8
HK1622-ZW	22	BK1622-ZW	24	16	22	22	19,3	0,8
HK1712	12	-	-	17	23	12	-	0,8
HK1812	13	BK1812	15	18	24	12	9,3	0,8
HK1816	18	BK1816	20	18	24	16	13,3	0,8
HK2010	12	-	-	20	26	10	-	0,8
HK2012	14	-	-	20	26	12	-	0,8
HK2016	19	BK2016	22	20	26	16	13,3	0,8
HK2020	24	BK2020	27	20	26	20	17,3	0,8
HK2030-ZW	35	-	-	20	26	30	-	0,8

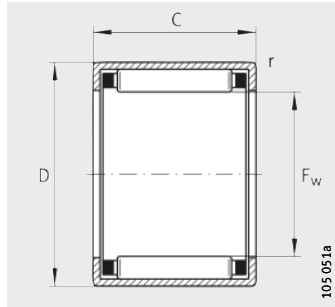
+ Not available with lubrication hole.

Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$	Suitable inner rings (to be ordered separately)	
dyn. $C_r$ N	stat. $C_{0r}$ N				LR Designation	IR Designation
465	265	28,5	58 000	93 000	–	–
1 230	840	113	48 000	57 000	–	–
1 780	1 310	144	42 500	44 500	–	–
2 400	1 990	239	39 000	36 500	–	–
1 610	1 220	167	36 500	31 500	–	–
2 030	1 650	184	36 500	31 500	–	–
2 850	2 600	310	36 500	30 500	–	–
3 100	2 950	355	33 000	26 500	–	–
2 750	2 600	290	29 500	23 800	–	–
3 800	3 950	500	29 500	23 200	–	<b>IR5X8X12</b>
3 550	3 750	440	26 500	20 600	–	–
4 250	4 650	600	26 500	20 600	–	–
5 300	6 300	860	26 500	20 200	–	<b>IR6X9X12</b>
4 400	5 100	650	24 300	18 700	<b>LR7X10X10,5</b>	<b>IR7X10X10,5</b>
5 500	6 800	930	24 300	18 400	–	<b>IR7X10X12</b>
6 800	8 800	1 210	24 300	18 200	–	<b>IR7X10X16</b>
4 950	6 200	800	20 700	15 700	<b>LR8X12X10,5</b>	<b>IR8X12X10,5</b>
6 500	7 300	860	20 000	15 500	<b>LR8X12X12,5</b>	<b>IR8X12X12,5</b>
6 800	7 900	940	18 700	14 400	<b>LR10X13X12,5</b>	<b>IR10X13X12,5</b>
7 100	8 500	1 010	17 500	13 500	–	<b>IR10X14X13</b>
7 900	9 400	1 150	16 300	12 300	<b>LR12X15X12,5</b>	<b>IR12X15X12,5</b>
10 500	14 400	1 780	16 500	12 300	<b>LR12X15X16,5</b>	<b>IR12X15X16,5</b>
13 400	19 500	2 380	16 500	12 300	<b>LR12X15X22,5</b>	<b>IR12X15X22,5</b>
7 600	9 700	1 160	15 600	11 900	–	<b>IR12X16X13</b>
10 900	15 300	1 900	15 600	11 600	–	<b>IR12X16X16</b>
13 100	19 400	2 310	15 600	11 700	–	<b>IR12X16X22</b>
7 900	10 300	1 230	14 700	11 200	–	–
8 100	10 900	1 300	14 000	10 700	<b>LR15X18X12,5</b>	–
11 600	17 300	2 140	14 000	10 400	<b>LR15X18X16,5</b>	<b>IR15X18X16,5</b>
6 400	8 200	1 040	12 700	10 000	–	–
8 600	12 100	1 450	12 700	9 700	–	<b>IR15X20X13</b>
12 700	20 100	2 500	12 700	9 300	<b>LR17X20X16,5</b>	<b>IR17X20X16,5</b>
15 700	26 000	3 500	12 700	9 300	<b>LR17X20X20,5</b>	<b>IR17X20X20,5</b>
21 800	40 000	5 000	12 700	9 200	<b>LR17X20X30,5</b>	<b>IR17X20X30,5</b>

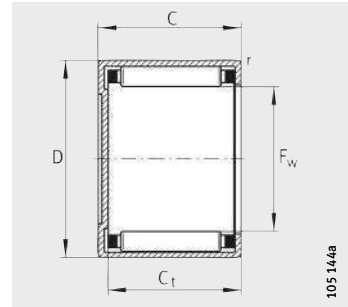


**Drawn cup needle roller bearings with open ends**  
**Drawn cup needle roller bearings with closed end**

Unsealed



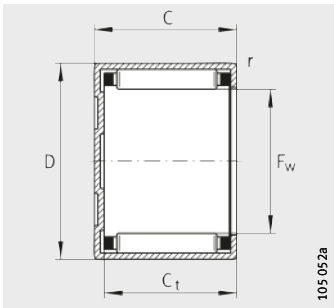
HK



BK with  $F_w < 25$  mm

**Dimension table** (continued) · Dimensions in mm

Drawn cup needle roller bearings with open ends		Drawn cup needle roller bearings with closed end		Dimensions				
Designation	Mass m ≈g	Designation	Mass m ≈g	$F_w$	D	C -0,3	$C_t$ min.	r min.
HK2210	13	-	-	22	28	10	-	0,8
HK2212	15	BK2212	18	22	28	12	9,3	0,8
HK2216	21	BK2216	24	22	28	16	13,3	0,8
HK2220	26	-	-	22	28	20	-	0,8
HK2512	20	-	-	25	32	12	-	0,8
HK2516	27	BK2516	32	25	32	16	13,3	0,8
HK2520	33	BK2520	38	25	32	20	17,3	0,8
HK2526	44	BK2526	48	25	32	26	23,3	0,8
HK2538-ZW	64	BK2538-ZW	68	25	32	38	35,3	0,8
HK2816	29	-	-	28	35	16	-	0,8
HK2820	36	-	-	28	35	20	-	0,8
HK3012	23	BK3012	28	30	37	12	9,3	0,8
HK3016	31	BK3016	38	30	37	16	13,3	0,8
HK3020	39	BK3020	47	30	37	20	17,3	0,8
HK3022	42	-	-	30	37	22	-	0,8
HK3026	51	BK3026	58	30	37	26	23,3	0,8
HK3038-ZW	76	BK3038-ZW	84	30	37	38	35,3	0,8
HK3220	40,6	-	-	32	39	20	-	0,8
HK3224	49	-	-	32	39	24	-	0,8
HK3512	27	-	-	35	42	12	-	0,8
HK3516	36	-	-	35	42	16	-	0,8
HK3520	44	BK3520	53	35	42	20	17,3	0,8
HK4012	30	-	-	40	47	12	-	0,8
HK4016	39	-	-	40	47	16	-	0,8
HK4020	54	BK4020	62	40	47	20	17,3	0,8
HK4512	33	-	-	45	52	12	-	0,8
HK4516	46	-	-	45	52	16	-	0,8
HK4520	56	BK4520	72	45	52	20	17,3	0,8
HK5020	70	-	-	50	58	20	-	0,8
HK5025	90	-	-	50	58	25	-	0,8
HK5520	74	-	-	55	63	20	-	0,8
HK5528	105	-	-	55	63	28	-	0,8
HK6012	49	-	-	60	68	12	-	0,8
HK6020	81	-	-	60	68	20	-	0,8
HK6032	136	-	-	60	68	32	-	0,8



BK with  $F_w \geq 25 \text{ mm}$

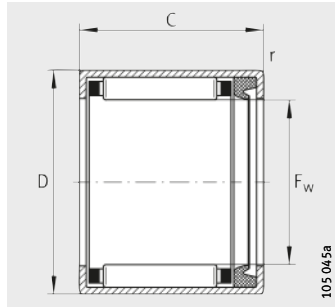
Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$	Suitable inner rings (to be ordered separately)	
dyn. $C_r$ N	stat. $C_{0r}$ N				LR Designation	IR Designation
7 500	10 500	1 360	11 700	9 000	–	–
9 100	13 400	1 600	11 700	8 900	–	<b>IR17X22X13</b>
13 400	22 100	2 800	11 700	8 500	–	<b>IR17X22X16</b>
16 500	29 000	3 850	11 700	8 500	–	<b>IR17X22X23</b>
11 000	15 200	1 990	10 200	7 800	<b>LR20X25X12,5</b>	–
15 600	24 000	3 150	10 200	7 500	<b>LR20X25X16,5</b>	<b>IR20X25X17</b>
19 900	33 000	4 200	10 200	7 400	<b>LR20X25X20,5</b>	<b>IR20X25X20,5</b>
25 500	45 000	6 200	10 200	7 300	<b>LR20X25X26,5</b>	<b>IR20X25X26,5</b>
34 000	66 000	8 400	10 200	7 300	<b>LR20X25X38,5</b>	<b>IR20X25X38,5</b>
16 400	26 500	3 450	9 200	6 800	–	<b>IR22X28X17</b>
20 900	36 000	4 650	9 200	6 700	<b>LR22X28X20,5</b>	<b>IR22X28X20,5</b>
12 100	18 200	2 390	8 600	6 600	<b>LR25X30X12,5</b>	–
17 200	29 000	3 750	8 600	6 400	<b>LR25X30X16,5</b>	<b>IR25X30X17</b>
22 000	39 500	5 100	8 600	6 300	<b>LR25X30X20,5</b>	<b>IR25X30X20,5</b>
24 800	46 000	6 100	8 600	6 200	–	–
28 000	54 000	7 400	8 600	6 200	<b>LR25X30X26,5</b>	<b>IR25X30X26,5</b>
37 500	79 000	10 100	8 600	6 200	<b>LR25X30X38,5</b>	<b>IR25X30X38,5</b>
23 000	42 500	5 500	8 100	5 900	<b>LR28X32X20</b>	–
27 500	54 000	7 300	8 100	5 800	–	–
13 100	21 300	2 800	7 500	5 800	<b>LR30X35X12,5</b>	–
18 700	33 500	4 400	7 500	5 600	<b>LR30X35X16,5</b>	<b>IR30X35X17</b>
23 800	46 000	5 900	7 500	5 500	<b>LR30X35X20,5</b>	<b>IR30X35X20,5</b>
14 000	24 300	3 200	6 600	5 200	<b>LR35X40X12,5</b>	–
20 000	38 500	5 000	6 600	5 000	<b>LR35X40X16,5</b>	<b>IR35X40X17</b>
25 500	52 000	6 800	6 600	4 900	<b>LR35X40X20,5</b>	<b>IR35X40X20,5</b>
14 900	27 500	3 600	5 900	4 650	–	–
21 300	43 000	5 700	5 900	4 550	<b>LR40X45X16,5</b>	<b>IR40X45X17</b>
27 000	59 000	7 600	5 900	4 450	<b>LR40X45X20,5</b>	<b>IR40X45X20,5</b>
31 000	63 000	8 200	5 300	4 050	<b>LR45X50X20,5</b>	–
38 500	84 000	11 700	5 300	4 000	<b>LR45X50X25,5</b>	<b>IR45X50X25,5</b>
31 500	67 000	8 700	4 850	3 800	<b>LR50X55X20,5</b>	–
44 000	103 000	14 700	4 850	3 700	–	–
17 400	32 000	4 250	4 450	3 750	–	–
33 500	75 000	9 800	4 450	3 500	–	–
53 000	135 000	19 700	4 450	3 400	–	–



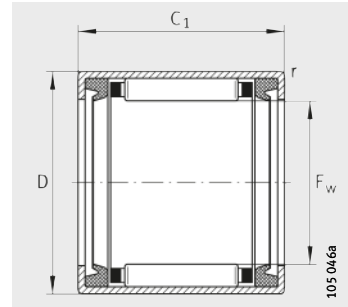
**Drawn cup needle roller bearings with open ends**

**Drawn cup needle roller bearings with closed end**

Sealed



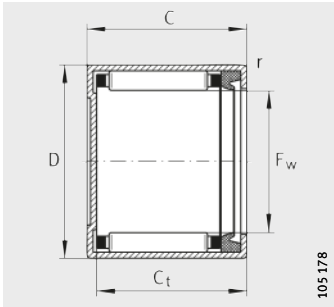
HK..-RS



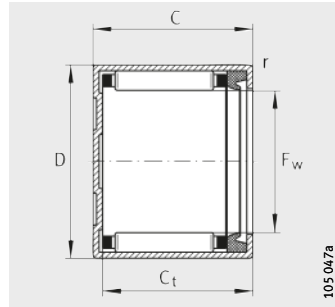
HK..-2RS

**Dimension table** - Dimensions in mm

Drawn cup needle roller bearings with open ends				Drawn cup needle roller bearings with closed end		Dimensions			
Sealed on one side		Sealed on both sides		Sealed		F <sub>w</sub>	D	C	C <sub>1</sub>
Designation	Mass m ≈g	Designation	Mass m ≈g	Designation	Mass m ≈g				
-	-	<b>HK0810-2RS</b>	3,2	-	-	<b>8</b>	12	-	10
<b>HK0810-RS</b>	3	<b>HK0812-2RS</b>	3,3	-	-	<b>8</b>	12	10	12
<b>HK0812-RS</b>	3,1	-	-	-	-	<b>8</b>	12	12	-
-	-	<b>HK1012-2RS</b>	4,3	-	-	<b>10</b>	14	-	12
<b>HK1012-RS</b>	4,2	<b>HK1014-2RS</b>	4,6	<b>BK1012-RS</b>	4,3	<b>10</b>	14	12	14
-	-	<b>HK1214-2RS</b>	8	-	-	<b>12</b>	16	-	14
<b>HK1214-RS</b>	10	<b>HK1216-2RS</b>	11	-	-	<b>12</b>	18	14	16
<b>HK1414-RS</b>	12	<b>HK1416-2RS</b>	13	<b>BK1414-RS</b>	13	<b>14</b>	20	14	16
<b>HK1514-RS</b>	12	<b>HK1516-2RS</b>	15	-	-	<b>15</b>	21	14	16
<b>HK1518-RS</b>	16	<b>HK1520-2RS</b>	18	-	-	<b>15</b>	21	18	20
<b>HK1614-RS</b>	13	<b>HK1616-2RS</b>	14	<b>BK1614-RS</b>	15	<b>16</b>	22	14	16
-	-	<b>HK1620-2RS</b>	18	-	-	<b>16</b>	22	-	20
<b>HK1814-RS</b>	14	<b>HK1816-2RS</b>	15	-	-	<b>18</b>	24	14	16
-	-	<b>HK2016-2RS</b>	18	-	-	<b>20</b>	26	-	16
<b>HK2018-RS</b>	21	<b>HK2020-2RS</b>	23	<b>BK2018-RS</b>	24	<b>20</b>	26	18	20
<b>HK2214-RS</b>	16	<b>HK2216-2RS</b>	18	-	-	<b>22</b>	28	14	16
<b>HK2218-RS</b>	24	<b>HK2220-2RS</b>	26	-	-	<b>22</b>	28	18	20
-	-	<b>HK2516-2RS</b>	27	-	-	<b>25</b>	32	-	16
<b>HK2518-RS</b>	29	<b>HK2520-2RS</b>	31	<b>BK2518-RS</b>	34	<b>25</b>	32	18	20
-	-	<b>HK2524-2RS</b>	40	-	-	<b>25</b>	32	-	24
-	-	<b>HK2530-2RS</b>	47	-	-	<b>25</b>	32	-	30
<b>HK2818-RS</b>	31	<b>HK2820-2RS</b>	34	-	-	<b>28</b>	35	18	20
-	-	<b>HK3016-2RS</b>	31	-	-	<b>30</b>	37	-	16
<b>HK3018-RS</b>	37	<b>HK3020-2RS</b>	36	-	-	<b>30</b>	37	18	20
-	-	<b>HK3024-2RS</b>	44	-	-	<b>30</b>	37	-	24
-	-	<b>HK3516-2RS</b>	32	-	-	<b>35</b>	42	-	16
<b>HK3518-RS</b>	39	<b>HK3520-2RS</b>	41	-	-	<b>35</b>	42	18	20
-	-	<b>HK4016-2RS</b>	37	-	-	<b>40</b>	47	-	16
<b>HK4018-RS</b>	45	<b>HK4020-2RS</b>	48	-	-	<b>40</b>	47	18	20
<b>HK4518-RS</b>	50	<b>HK4520-2RS</b>	54	-	-	<b>45</b>	52	18	20
<b>HK5022-RS</b>	76	<b>HK5024-2RS</b>	81	-	-	<b>50</b>	58	22	24



BK..-RS with  $F_w < 25$  mm



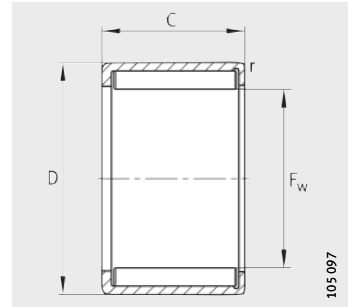
BK..-RS with  $F_w \geq 25$  mm

		Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ grease $\text{min}^{-1}$	Suitable inner rings (to be ordered separately)		
$C_t$ min.	$r$ min.	dyn. $C_r$ N	stat. $C_{0r}$ N			For HK..-RS and HK..-2RS		For BK..-RS, LR, IR
					LR Designation	IR Designation	Designation	
-	0,4	2180	1930	265	20 000	-	-	-
-	0,4	2750	2600	290	20 000	-	-	-
-	0,4	3800	3950	500	20 000	-	-	-
-	0,4	3200	3350	380	17 000	-	-	-
-	0,4	4400	5100	650	17 000	-	-	-
-	0,4	4950	6200	800	14 000	-	-	-
-	0,8	6500	7300	860	14 000	-	-	-
11,3	0,8	7100	8500	1010	12 000	-	-	-
-	0,8	7800	9800	1190	11 000	<b>LR12X15X16,5</b>	<b>IR12X15X16,5</b>	<b>LR12X15X12,5</b>
-	0,8	10500	14400	1780	11 000	-	-	-
11,3	0,8	7600	9700	1160	11 000	-	<b>IR12X16X20</b>	<b>IR12X16X13</b>
-	0,8	10900	15300	1900	11 000	-	-	-
-	0,8	8100	10900	1300	9 500	<b>LR15X18X16,5</b>	<b>IR15X18X16,5</b>	-
-	0,8	8600	12100	1450	8 500	<b>LR17X20X16,5</b>	<b>IR17X20X16,5</b>	-
15,3	0,8	12700	20100	2500	8 500	<b>LR17X20X20,5</b>	<b>IR17X20X20,5</b>	<b>LR17X20X16,5</b>
-	0,8	9100	13400	1600	8 000	-	<b>IR17X22X16</b>	-
-	0,8	13400	22100	2800	8 000	-	<b>IR17X22X23</b>	-
-	0,8	11000	15200	1990	7 000	<b>LR20X25X16,5</b>	<b>IR20X25X17</b>	-
15,3	0,8	15600	24000	3150	7 000	<b>LR20X25x20,5</b>	<b>IR20X25X20,5</b>	<b>LR20X25X16,5</b>
-	0,8	19900	33000	4200	7 000	-	-	-
-	0,8	25500	45000	6200	7 000	-	<b>IR20X25X30</b>	-
-	0,8	16400	26500	3450	6 000	<b>LR22X28X20,5</b>	<b>IR22X28X20,5</b>	-
-	0,8	12100	18200	2390	6 000	<b>LR25X30X16,5</b>	<b>IR25X30X17</b>	-
-	0,8	17200	29000	3750	6 000	<b>LR25X30X20,5</b>	<b>IR25X30X20,5</b>	-
-	0,8	22000	39500	5100	6 000	-	-	-
-	0,8	13100	21300	2800	5 000	<b>LR30X35X16,5</b>	<b>IR30X35X17</b>	-
-	0,8	18700	33500	4400	5 000	<b>LR30X35X20,5</b>	<b>IR30X35X20,5</b>	-
-	0,8	14000	24300	3200	4 500	<b>LR35X40X16,5</b>	<b>IR35X40X17</b>	-
-	0,8	20000	38500	5000	4 500	<b>LR35X40X20,5</b>	<b>IR35X40X20,5</b>	-
-	0,8	21300	43000	5700	4 000	<b>LR40X45X20,5</b>	<b>IR40X45X20,5</b>	-
-	0,8	31000	63000	8200	3 600	<b>LR45X50X25,5</b>	<b>IR45X50X25,5</b>	-



# Drawn cup needle roller bearings with open ends

Full complement needle roller set  
Unsealed



HN

**Dimension table** - Dimensions in mm

Designation	Mass m ≈g	Dimensions				Basic load ratings	
		F <sub>w</sub>	D	C	r min.	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
<b>HN0808</b>	3	<b>8</b>	12	8	0,4	5 000	6 700
<b>HN1010</b>	4,6	<b>10</b>	14	10	0,4	7 200	11 100
<b>HN1210</b>	5,3	<b>12</b>	16	10	0,4	8 000	13 400
<b>HN1212</b>	10,5	<b>12</b>	18	12	0,8	10 200	15 200
<b>HN1412</b>	12	<b>14</b>	20	12	0,8	11 000	17 500
<b>HN1516</b>	14	<b>15</b>	21	16	0,8	15 400	27 500
<b>HN1612</b>	13	<b>16</b>	22	12	0,8	12 000	20 300
<b>HN1816</b>	20	<b>18</b>	24	16	0,8	17 000	32 500
<b>HN2016</b>	22	<b>20</b>	26	16	0,8	18 100	36 500
<b>HN2020</b>	29,5	<b>20</b>	26	20	0,8	22 400	48 000
<b>HN2520</b>	39,6	<b>25</b>	32	20	0,8	28 000	59 000
<b>HN2820</b>	44	<b>28</b>	35	20	0,8	30 000	67 000
<b>HN3520</b>	54	<b>35</b>	42	20	0,8	33 500	83 000
<b>HN4020</b>	60,5	<b>40</b>	47	20	0,8	36 000	95 000
<b>HN4520</b>	66	<b>45</b>	52	20	0,8	38 500	108 000
<b>HN4525</b>	85	<b>45</b>	52	25	0,8	47 000	139 000
<b>HN5020</b>	85,3	<b>50</b>	58	20	0,8	44 500	119 000
<b>HN5025</b>	107	<b>50</b>	58	25	0,8	54 000	152 000



Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ grease $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$	Suitable inner rings (to be ordered separately)	
			LR Designation	IR Designation
870	12 700	18 000	–	–
1 540	10 400	14 200	<b>LR7X10X10,5</b>	<b>IR7X10X10,5</b>
1 850	8 900	11 900	<b>LR8X12X10,5</b>	<b>IR8X12X10,5</b>
1 950	8 900	11 400	<b>LR8X12X12,5</b>	<b>IR8X12X12,5</b>
2 260	7 500	10 400	–	<b>IR10X14X13</b>
3 600	7 100	9 600	<b>LR12X15X16,5</b>	<b>IR12X15X16,5</b>
2 600	6 700	9 200	–	<b>IR12X16X13</b>
4 250	6 000	8 000	<b>LR15X18X16,5</b>	<b>IR15X18X16,5</b>
4 750	5 400	7 300	<b>LR17X20X16,5</b>	<b>IR17X20X16,5</b>
6 600	5 400	7 200	<b>LR17X20X20,5</b>	<b>IR17X20X20,5</b>
7 900	4 350	5 800	<b>LR20X25X20,5</b>	<b>IR20X25X20,5</b>
9 000	3 950	5 200	<b>LR22X28X20,5</b>	<b>IR22X28X20,5</b>
11 100	3 200	4 250	<b>LR30X35X20,5</b>	<b>IR30X35X20,5</b>
12 700	2 800	3 750	<b>LR35X40X20,5</b>	<b>IR35X40X20,5</b>
14 500	2 500	3 400	<b>LR40X45X20,5</b>	<b>IR40X45X20,5</b>
19 500	2 500	3 350	–	–
16 200	2 260	3 100	<b>LR45X50X20,5</b>	–
21 700	2 260	3 050	<b>LR45X50X25,5</b>	<b>IR45X50X25,5</b>







## Machined needle roller bearings

- Needle roller bearings with ribs
- Needle roller bearings without ribs
- Aligning needle roller bearings
- Combined needle roller bearings
- Inner rings



# Machined needle roller bearings

<b>X-life</b> <b>Needle roller bearings with ribs</b>	..... 702
<p>In needle roller bearings with ribs, the outer ring forms a self-retaining unit with the needle roller and cage assembly. These radially compact bearings with high load capacity are highly suitable for designs with limited radial space. The bearings are available with and without inner ring and in both sealed and open versions. Bearings without an inner ring are the best solution for bearing arrangements where the shaft can be hardened and ground. Needle roller bearings with inner ring are used if the shaft is not configured as a rolling bearing raceway.</p>	
<b>X-life</b> <b>Needle roller bearings without ribs</b>	..... 736
<p>Needle roller bearings without ribs on the outer ring are not self-retaining. This means that the outer ring, needle roller and cage assembly and inner ring can be fitted independently of each other. This makes fitting of the bearings considerably easier. The bearings are available with and without an inner ring and in single row and double row designs. Bearings without an inner ring are used if the shaft is hardened and ground.</p>	
<b>X-life</b> <b>Aligning needle roller bearings</b>	..... 750
<p>Aligning needle roller bearings have a raceway ring with a spherical outside surface and a concave support ring. As a result, they can compensate for static misalignment of the bearing axis by up to 3°, but are not suitable for supporting swivel or tumbling motion. The bearings are available with and without an inner ring. Bearings without an inner ring are used if the shaft is hardened and ground.</p>	
<b>X-life</b> <b>Combined needle roller bearings</b>	..... 758
<p>Combined needle roller bearings are radial bearings with an axial component capable of supporting loads. They are used as locating or semi-locating bearings and do not permit any skewing between the shaft and housing. The bearings are available with and without an inner ring. Bearings without an inner ring are used if the shaft is hardened and ground.</p>	
<b>Inner rings</b>	..... 776
<p>Inner rings are used as raceways for rolling elements or seal lips where the shaft is unsuitable for this purpose. Where there is considerable axial displacement between the shaft and housing, wider inner rings can be used.</p>	



NK, NKS,  
RNA48, RNA49, RNA69



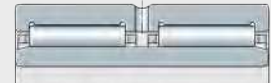
RNA69..-ZW



RNA49..-RSR



NKI, NKIS,  
NA48, NA49, NA69



NA69..-ZW

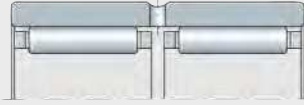


NA49..-RSR

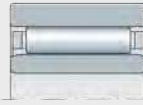
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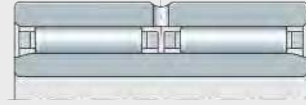
RNAO



RNAO..-ZW

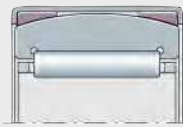


NAO

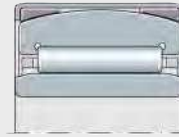


NAO..-ZW

105174

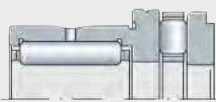


RPNA

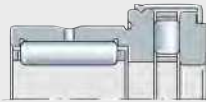


PNA

106016c



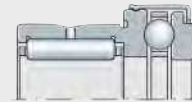
NKXR



NKXR..-Z



NKX



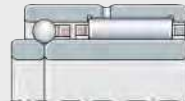
NKX..-Z



NX, NX..-Z



NKIA



NKIB

107545



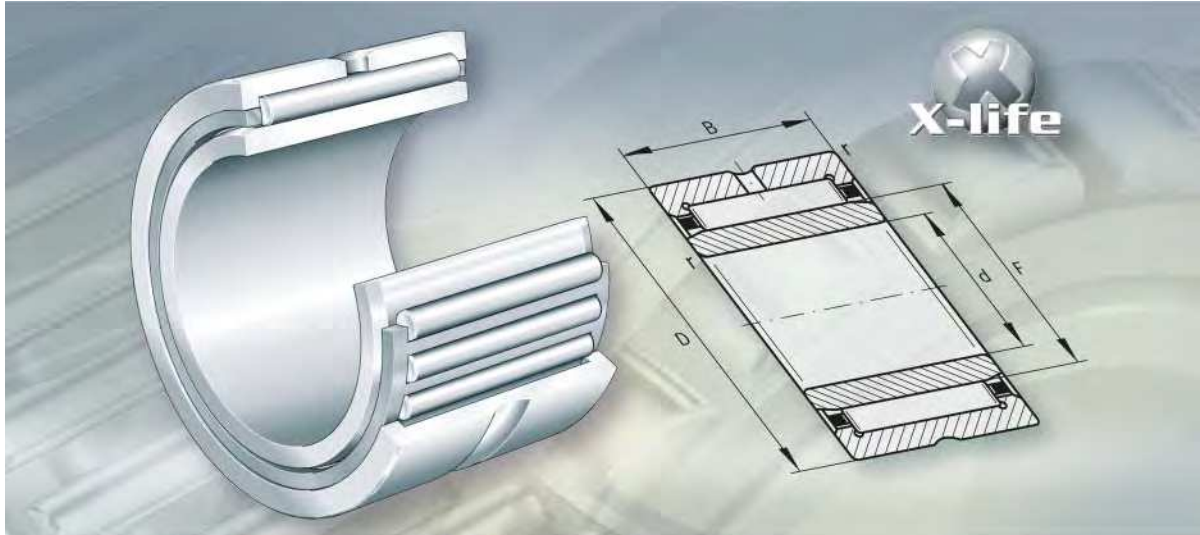
IR, IR..-IS1



LR

103267





## Needle roller bearings with ribs

# Needle roller bearings with ribs

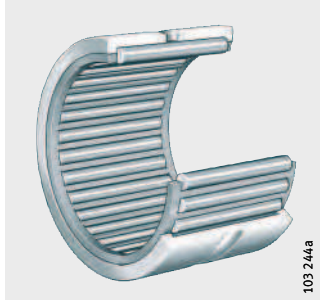
	Page
<b>Product overview</b>	Needle roller bearings with ribs ..... 704
<b>Features</b>	X-life ..... 705
	Needle roller bearings without inner ring..... 705
	Needle roller bearings with inner ring..... 705
	Sealing..... 705
	Lubrication ..... 705
	Sealing rings and wider inner rings ..... 706
	Operating temperature ..... 706
	Cages..... 706
	Suffixes..... 706
<b>Design and safety guidelines</b>	Minimum radial load ..... 707
	Speeds..... 707
	Design of bearing arrangements ..... 707
<b>Accuracy</b>	Radial internal clearance ..... 709
	Enveloping circle ..... 709
<b>Dimension tables</b>	Needle roller bearings without inner ring..... 710
	Needle roller bearing with inner ring ..... 722
	Needle roller bearings without inner ring, sealed..... 734
	Needle roller bearings with inner ring, sealed..... 735



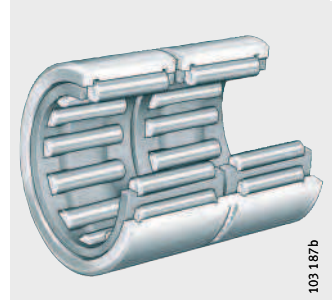
# Product overview Needle roller bearings with ribs

**Without inner ring**  
Single row or double row

NK, NKS, RNA48, RNA49,  
RNA69

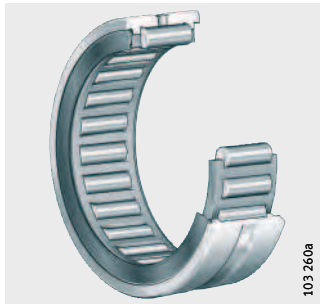


RNA69..-ZW

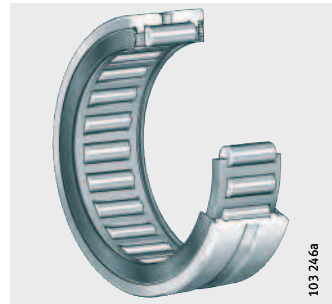


Lip seals

RNA49..-RSR

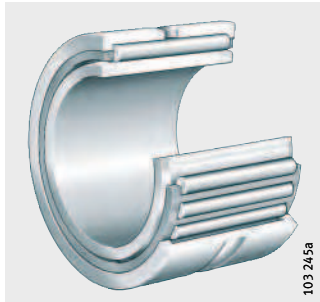


RNA49..-2RSR

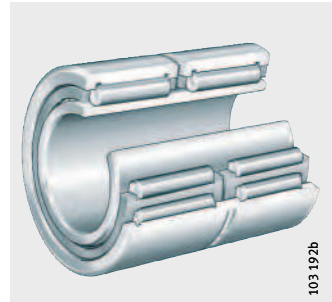


**With inner ring**  
Single row or double row

NKI, NKIS, NA48, NA49,  
NA69

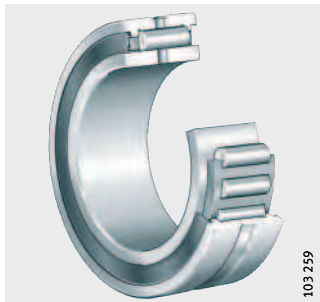


NA69..-ZW

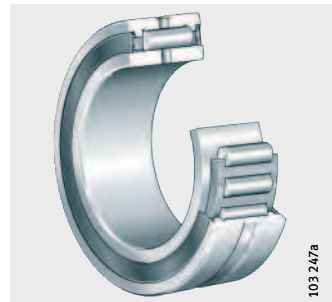


Lip seals

NA49..-RSR



NA49..-2RSR





# Needle roller bearings with ribs

**Features** Needle roller bearings with ribs are single or double row units comprising machined outer rings with ribs, needle roller and cage assemblies and removable inner rings.

**X-life** Needle roller bearings with ribs are X-life bearings. These bearings have optimised raceway surfaces. This gives higher load carrying capacity and longer rating life.

**Needle roller bearings without inner ring** Bearings without inner ring have particularly compact radial dimensions. However, they require a shaft raceway that is hardened and ground.

The bearings are of a single row design, RNA69 is of a double row design from  $F_w \geq 40$  mm.

**Needle roller bearings with inner ring** Bearings with an inner ring are used if the shaft is not configured as a rolling bearing raceway.

The bearings are of a single row design, NA69 is of a double row design from  $d \geq 32$  mm.

**Displacement of the inner ring** The standard inner ring allows axial displacement within the values "s" stated in the dimension tables. Where larger displacements occur, the standard ring can be replaced by a wider inner ring IR. Inner rings: see pages starting page 776.

**Sealing** Series RNA49..-RSR and NA49..-RSR are sealed on one side. The designs RNA49..-2RSR and NA49..-2RSR have contact seals on both sides.

**Lubrication** The bearings are greased using the lithium complex soap grease GA08. Arcanol LOAD150 is suitable for relubrication. For this purpose, the outer ring has a lubrication groove and a lubrication hole.  
There is no relubrication facility in series NK with  $F_w \leq 10$  mm and NKI with  $d \leq 7$  mm.



# Needle roller bearings with ribs

## Sealing rings and wider inner rings

The bearings can be sealed against external influences using sealing rings of series G, GR and SD in combination with wider inner rings IR. The sealing rings and inner rings are matched to the needle roller bearings.

The outer surface of the inner rings can be used as the sliding surface for seal lips.

Sealing rings: see page 804, and TPI 128, Sealing rings, single lip and double lip.

## Operating temperature

Open bearings can be used at operating temperatures from  $-20\text{ °C}$  to  $+120\text{ °C}$ .



Sealed needle roller bearings are suitable for operating temperatures from  $-20\text{ °C}$  to  $+100\text{ °C}$ , restricted by the grease and seal material.

## Cages

The cages are made from sheet steel or plastic. Bearings with a plastic cage have the suffix TV.



Before using bearings with plastic cages, the compatibility of the lubricant used with the cage material (PA66-GF/H) must be checked.

## Suffixes

Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
C3	Radial internal clearance larger than normal	Special design, available by agreement
P5	High dimensional and geometrical accuracy	
RSR	Contact seal on one side	Standard
TV	Bearing with cage made from glass fibre reinforced polyamide 66	
ZW	Double row design, dependent on the size	
2RSR	Contact seals on both sides	

## Design and safety guidelines

### Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum load  $F_{r,min}$  in a radial direction. This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways. In continuous operation, a minimum radial load of the order of  $C_r/P < 50$  is necessary.

### Speeds

The limiting speeds  $n_G$  given in the dimension tables for RNA49..-RSR (2RSR) and NA49..-RSR (2RSR) are valid for grease lubrication.

## Design of bearing arrangements

### Shaft and housing tolerances

Recommended shaft tolerances for bearings with an inner ring, see page 150.

For the design of shafts for bearings without an inner ring, see the section Raceway for bearings without inner ring and the association table.

Recommended housing tolerances, see page 152.

### Raceway for bearings without inner ring

Where bearings without an inner ring are to be used, the rolling element raceway on the shaft must be hardened and ground, see table. The surface hardness of the raceway must be 670 HV + 170 HV, the hardening depth CHD or SHD must be sufficiently large.



The values in the tables are valid for housing tolerances up to K7. For tighter housing bores, the operating clearance should be checked by either calculation or measurement.

If the surface of the shaft raceway is produced to DIN 617, the basic load ratings  $C_r$  in the dimension tables must be reduced by 15%.

### Raceway design

Shaft							
Diameter		Tolerance			Roughness max.	Roundness max.	Parallelism max.
Nominal dimension mm		Bearing clearance					
over	incl.	Small	Normal	Large			
–	65	k5	h5	g6	R <sub>a</sub> 0,1 (R <sub>z</sub> 0,4)	IT3	IT3
65	80	k5	h5	f6			
80	120	k5	g5	f6	R <sub>a</sub> 0,15 (R <sub>z</sub> 0,63)		
120	160	k5	g5	f6			
160	180	k5	g5	e6	R <sub>a</sub> 0,2 (R <sub>z</sub> 1)		
180	200	j5	g5	e6			
200	250	j5	f6	e6			
250	315	h5	f6	e6			
315	415	g5	f6	d6			



# Needle roller bearings with ribs

## Replacement of inner rings



In needle roller bearings with ribs, the inner ring is not self-retaining. In the standard bearings, the inner rings are matched to the enveloping circle tolerance F6 and can be interchanged with each other within the same accuracy class.

## Radial location

Needle roller bearings with an inner ring are radially located by means of a fit on the shaft and in the housing.

## Axial location

In order to prevent lateral creep of the bearing rings, they must be located by means of physical locking, *Figure 1*.

The abutment shoulders (shaft, housing) should be sufficiently high and perpendicular to the bearing axis. The transition from the bearing seat to the abutment shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. The minimum values for the chamfer dimensions  $r$  in the dimension tables must be observed.

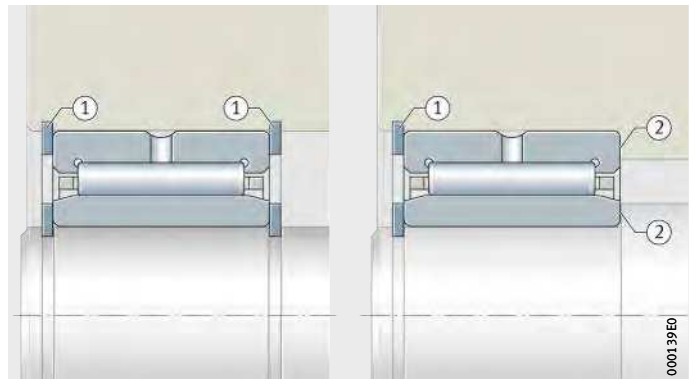
The overlap between the snap rings and the end faces of the bearing rings must be sufficiently large, *Figure 1*.

Maximum inner ring chamfer dimensions to DIN 620-6 must be taken into consideration.

NA49

- ① Snap rings
- ② Abutment shoulders

*Figure 1*  
Axial location of bearing rings



**Accuracy** The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620.

**Radial internal clearance** Bearings with inner ring have a radial internal clearance CN to DIN 620-4.

**Radial internal clearance**

Bore		Radial internal clearance			
d mm		CN μm		C3 μm	
over	incl.	min.	max.	min.	max.
–	24	20	45	35	60
24	30	20	45	35	60
30	40	25	50	45	70
40	50	30	60	50	80
50	65	40	70	60	90
65	80	40	75	65	100
80	100	50	85	75	110
100	120	50	90	85	125
120	140	60	105	100	145
140	160	70	120	115	165
160	180	75	125	120	170
180	200	90	145	140	195
200	225	105	165	160	220
225	250	110	175	170	235
250	280	125	195	190	260
280	315	130	205	200	275
315	355	145	225	225	305
355	400	190	280	280	370
400	450	210	310	310	410
450	500	220	330	330	440

**Enveloping circle** In the case of bearings without an inner ring, the dimension for the enveloping circle  $F_w$  is used instead of the radial internal clearance.

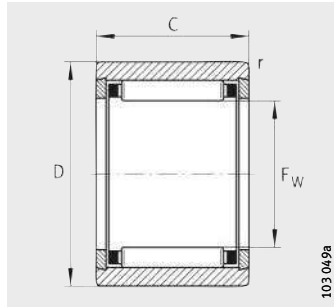
The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway.

For bearings before fitting, the enveloping circle  $F_w$  is in the tolerance zone F6. Deviations for the tolerance zone F6: see table, page 168.

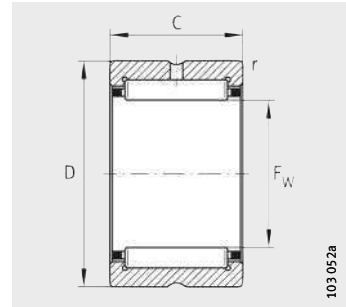


# Needle roller bearings

Without inner ring



NK ( $F_w \leq 10 \text{ mm}$ )



NK ( $F_w \geq 12 \text{ mm}$ ),  
RNA49, RNA69

**Dimension table** - Dimensions in mm

Designation			X-life	Mass m $\approx$ g	Dimensions			
					$F_w$	D	C	r min.
NK5/10-TV <sup>1)</sup>	-	-	XL	3,1	5	10	10	0,15
NK5/12-TV <sup>1)</sup>	-	-	XL	3,7	5	10	12	0,15
NK6/10-TV <sup>1)</sup>	-	-	XL	4,7	6	12	10	0,15
NK6/12-TV <sup>1)</sup>	-	-	XL	5,7	6	12	12	0,15
NK7/10-TV <sup>1)</sup>	-	-	XL	6,9	7	14	10	0,3
NK7/12-TV <sup>1)</sup>	-	-	XL	8,2	7	14	12	0,3
NK8/12-TV <sup>1)</sup>	-	-	XL	8,7	8	15	12	0,3
NK8/16-TV <sup>1)</sup>	-	-	XL	12	8	15	16	0,3
NK9/12-TV <sup>1)</sup>	-	-	XL	10,3	9	16	12	0,3
NK9/16-TV <sup>1)</sup>	-	-	XL	12,8	9	16	16	0,3
NK10/12-TV <sup>1)</sup>	-	-	XL	10,1	10	17	12	0,3
NK10/16-TV <sup>1)</sup>	-	-	XL	13,3	10	17	16	0,3
NK12/12	-	-	XL	12,1	12	19	12	0,3
NK12/16	-	-	XL	15,9	12	19	16	0,3
NK14/16	-	-	XL	20,7	14	22	16	0,3
NK14/20	-	-	XL	25,5	14	22	20	0,3
-	RNA4900	-	XL	16,5	14	22	13	0,3
NK15/16	-	-	XL	21,8	15	23	16	0,3
NK15/20	-	-	XL	26,6	15	23	20	0,3
NK16/16	-	-	XL	22,4	16	24	16	0,3
NK16/20	-	-	XL	28,4	16	24	20	0,3
-	RNA4901	-	XL	17,4	16	24	13	0,3
-	-	RNA6901	XL	31	16	24	22	0,3
NK17/16	-	-	XL	23,7	17	25	16	0,3
NK17/20	-	-	XL	29,8	17	25	20	0,3
NK18/16	-	-	XL	24,9	18	26	16	0,3
NK18/20	-	-	XL	31,4	18	26	20	0,3
NK19/16	-	-	XL	26,1	19	27	16	0,3
NK19/20	-	-	XL	32,2	19	27	20	0,3

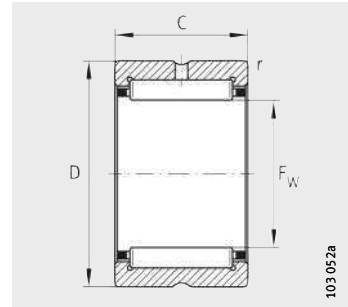
<sup>1)</sup> With closing rings, without lubrication hole and groove.

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. $C_r$ N	stat. $C_{0r}$ N	$C_{ur}$ N	$n_G$ $\text{min}^{-1}$	$n_B$ $\text{min}^{-1}$
2 650	1 920	295	39 000	55 000
3 400	2 650	435	39 000	54 000
2 950	2 280	355	36 500	48 500
3 800	3 150	520	36 500	47 500
3 250	2 650	410	34 500	43 000
4 150	3 600	600	34 500	42 000
4 450	4 100	690	32 500	37 000
5 800	5 800	970	32 500	36 500
5 100	5 000	840	31 000	32 000
6 600	7 100	1 190	31 000	32 000
5 300	5 500	930	29 500	29 000
7 000	7 800	1 310	29 500	28 500
7 200	7 100	1 280	26 500	22 400
10 100	11 000	1 920	26 500	21 600
11 400	11 500	2 100	24 600	18 600
14 500	15 600	2 700	24 600	18 300
9 600	9 200	1 630	23 600	15 400
12 100	12 700	2 320	23 900	17 300
15 400	17 200	3 000	23 900	17 000
12 800	13 900	2 550	23 200	16 200
16 300	18 800	3 250	23 200	15 900
10 600	10 900	1 940	23 200	15 900
18 100	21 600	3 800	23 200	15 900
13 500	15 000	2 750	22 600	15 300
17 100	20 400	3 550	22 600	15 000
14 100	16 200	3 000	22 100	14 400
17 900	22 000	3 850	22 100	14 100
14 700	17 400	3 200	21 600	13 700
18 700	23 600	4 150	21 600	13 400



# Needle roller bearings

Without inner ring  
Open



NK, NKS, RNA49, RNA69

**Dimension table** (continued) · Dimensions in mm

Designation				X-life	Mass m ≈g	Dimensions			
						F <sub>w</sub>	D	C	r min.
NK20/16	–	–	–	XL	27	20	28	16	0,3
NK20/20	–	–	–	XL	33,9	20	28	20	0,3
–	RNA4902	–	–	XL	21,7	20	28	13	0,3
–	–	RNA6902	–	XL	39,7	20	28	23	0,3
–	–	–	NKS20	XL	48,7	20	32	20	0,6
NK21/16	–	–	–	XL	28,1	21	29	16	0,3
NK21/20	–	–	–	XL	35,2	21	29	20	0,3
NK22/16	–	–	–	XL	30	22	30	16	0,3
NK22/20	–	–	–	XL	37	22	30	20	0,3
–	RNA4903	–	–	XL	22,2	22	30	13	0,3
–	–	RNA6903	–	XL	42,4	22	30	23	0,3
–	–	–	NKS22	XL	61,5	22	35	20	0,6
NK24/16	–	–	–	XL	31,9	24	32	16	0,3
NK24/20	–	–	–	XL	40	24	32	20	0,3
–	–	–	NKS24	XL	65,5	24	37	20	0,6
NK25/16	–	–	–	XL	32,6	25	33	16	0,3
NK25/20	–	–	–	XL	42	25	33	20	0,3
–	RNA4904	–	–	XL	52,3	25	37	17	0,3
–	–	RNA6904	–	XL	100	25	37	30	0,3
–	–	–	NKS25	XL	68,1	25	38	20	0,6
NK26/16	–	–	–	XL	34	26	34	16	0,3
NK26/20	–	–	–	XL	42	26	34	20	0,3
NK28/20	–	–	–	XL	52,2	28	37	20	0,3
NK28/30	–	–	–	XL	82	28	37	30	0,3
–	RNA49/22	–	–	XL	50,2	28	39	17	0,3
–	–	RNA69/22	–	XL	98	28	39	30	0,3
–	–	–	NKS28	XL	83,6	28	42	20	0,6
NK29/20-TV	–	–	–	XL	50	29	38	20	0,3
NK29/30	–	–	–	XL	84,3	29	38	30	0,3
NK30/20-TV	–	–	–	XL	61	30	40	20	0,3
NK30/30-TV	–	–	–	XL	92,4	30	40	30	0,3
–	RNA4905	–	–	XL	61	30	42	17	0,3
–	–	RNA6905	–	XL	112	30	42	30	0,3
–	–	–	NKS30	XL	104	30	45	22	0,6

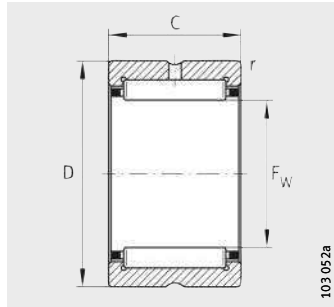


Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. $C_r$ N	stat. $C_{0r}$ N	$C_{ur}$ N	$n_G$ $\text{min}^{-1}$	$n_B$ $\text{min}^{-1}$
14 600	17 500	3 200	21 100	13 200
18 600	23 800	4 150	21 100	12 900
12 000	13 600	2 430	20 400	10 800
19 500	25 500	4 450	20 400	10 600
26 000	25 000	4 400	18 800	10 700
15 200	18 700	3 450	20 600	12 600
19 300	25 500	4 450	20 600	12 300
15 800	19 900	3 650	20 000	12 000
20 000	27 000	4 700	20 000	11 700
12 400	14 600	2 600	18 800	9 900
21 100	29 000	5 100	18 800	9 500
27 500	28 000	4 900	17 200	9 700
16 900	22 300	4 100	18 500	11 000
21 400	30 500	5 300	18 500	10 700
29 500	31 000	5 400	16 100	9 100
16 800	22 400	4 150	17 800	10 700
21 300	30 500	5 300	17 800	10 400
23 700	25 500	4 600	15 800	8 900
40 500	51 000	9 100	15 800	8 500
31 000	33 500	5 800	15 600	8 700
17 300	23 600	4 350	17 200	10 300
22 000	32 000	5 600	17 200	10 100
24 800	34 000	5 900	15 800	9 300
37 000	57 000	10 500	15 800	9 000
26 000	29 500	5 300	14 600	8 000
42 000	55 000	9 900	14 600	7 800
32 500	36 500	6 400	14 000	7 900
27 500	39 000	6 900	15 300	8 700
37 000	57 000	10 600	15 300	8 800
28 000	41 000	7 200	14 800	8 500
42 000	69 000	12 700	14 800	8 200
26 500	31 500	5 700	13 600	7 400
44 000	59 000	10 600	13 600	7 200
36 500	40 000	6 900	13 100	7 600

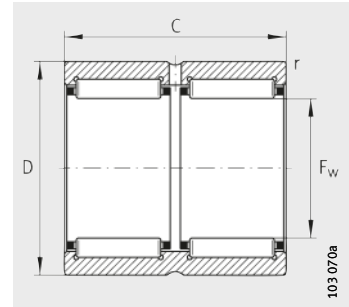


# Needle roller bearings

Without inner ring  
Open



NK, NKS, RNA49, RNA69



RNA69...-ZW

**Dimension table** (continued) · Dimensions in mm

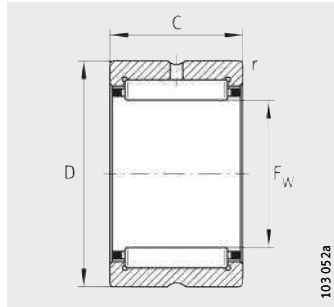
Designation				X-life	Mass m ≈g	Dimensions			
						F <sub>w</sub>	D	C	r min.
NK32/20-TV	–	–	–	XL	64	32	42	20	0,3
NK32/30	–	–	–	XL	102	32	42	30	0,3
–	RNA49/28	–	–	XL	73,2	32	45	17	0,3
–	–	RNA69/28	–	XL	135	32	45	30	0,3
–	–	–	NKS32	XL	110	32	47	22	0,6
NK35/20-TV	–	–	–	XL	69,4	35	45	20	0,3
NK35/30-TV	–	–	–	XL	106	35	45	30	0,3
–	RNA4906	–	–	XL	69,4	35	47	17	0,3
–	–	RNA6906	–	XL	126	35	47	30	0,3
–	–	–	NKS35	XL	118	35	50	22	0,6
NK37/20	–	–	–	XL	77	37	47	20	0,3
NK37/30	–	–	–	XL	113	37	47	30	0,3
–	–	–	NKS37	XL	123	37	52	22	0,6
NK38/20	–	–	–	XL	79,4	38	48	20	0,3
NK38/30	–	–	–	XL	116	38	48	30	0,3
NK40/20-TV	–	–	–	XL	78	40	50	20	0,3
NK40/30	–	–	–	XL	125	40	50	30	0,3
–	RNA49/32	–	–	XL	89,1	40	52	20	0,6
–	–	RNA69/32-ZW	–	XL	162	40	52	36	0,6
–	–	–	NKS40	XL	129	40	55	22	0,6
NK42/20	–	–	–	XL	85,8	42	52	20	0,3
NK42/30	–	–	–	XL	130	42	52	30	0,3
–	RNA4907	–	–	XL	107	42	55	20	0,6
–	–	RNA6907-ZW	–	XL	193	42	55	36	0,6
NK43/20	–	–	–	XL	86	43	53	20	0,3
NK43/30	–	–	–	XL	133	43	53	30	0,3
–	–	–	NKS43	XL	139	43	58	22	0,6
NK45/20-TV	–	–	–	XL	85,3	45	55	20	0,3
NK45/30-TV	–	–	–	XL	132	45	55	30	0,3
–	–	–	NKS45	XL	145	45	60	22	0,6
NK47/20	–	–	–	XL	94,5	47	57	20	0,3
NK47/30	–	–	–	XL	142	47	57	30	0,3
–	RNA4908	–	–	XL	140	48	62	22	0,6
–	–	RNA6908-ZW	–	XL	256	48	62	40	0,6

Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
dyn. $C_r$ N	stat. $C_{0r}$ N			
29 500	44 500	7 800	14 000	8 000
39 000	63 000	11 700	14 000	9 300
27 500	33 500	6 100	12 700	6 900
45 500	63 000	11 400	12 700	6 700
38 000	43 500	7 400	12 400	7 200
31 000	48 500	8 500	12 900	7 400
46 000	81 000	15 000	12 300	6 600
28 500	35 500	6 400	12 000	6 400
49 000	71 000	12 900	12 000	6 100
39 500	47 000	8 000	11 500	6 700
28 000	43 500	7 600	12 300	7 400
42 000	73 000	13 500	12 300	7 200
41 500	50 000	8 600	11 000	6 400
29 000	45 000	7 900	12 000	7 200
43 000	76 000	14 000	12 000	7 000
33 500	56 000	9 800	11 400	6 500
44 000	79 000	14 600	11 400	6 700
34 500	47 500	8 900	10 700	6 000
53 000	82 000	15 100	10 700	6 000
42 500	54 000	9 200	10 300	6 100
30 000	49 000	8 600	10 900	6 600
44 500	82 000	15 200	10 900	6 400
35 500	50 000	9 400	10 100	5 600
54 000	86 000	15 900	10 100	5 700
30 500	51 000	8 900	10 700	6 500
45 500	85 000	15 800	10 700	6 300
44 000	57 000	9 800	9 700	5 800
35 000	62 000	10 800	10 200	5 900
52 000	103 000	19 100	9 800	5 400
45 500	60 000	10 400	9 300	5 600
32 500	56 000	9 900	9 800	6 000
48 500	94 000	17 500	9 800	5 800
48 500	67 000	11 500	8 900	5 000
74 000	116 000	19 400	8 900	5 100

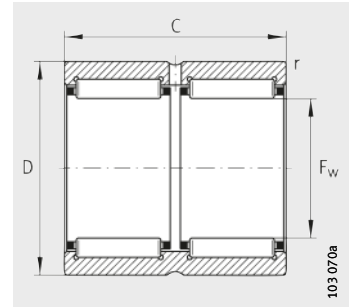


# Needle roller bearings

Without inner ring  
Open



NK, NKS, RNA49



RNA69..-ZW

**Dimension table** (continued) · Dimensions in mm

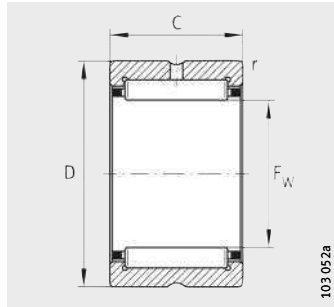
Designation				X-life	Mass m ≈g	Dimensions			
						F <sub>w</sub>	D	C	r min.
NK50/25-TV	–	–	–	XL	146	50	62	25	0,6
NK50/35-TV	–	–	–	XL	207	50	62	35	0,6
–	–	–	NKS50	XL	157	50	65	22	1
–	RNA4909	–	–	XL	182	52	68	22	0,6
–	–	RNA6909-ZW	–	XL	338	52	68	40	0,6
NK55/25	–	–	–	XL	180	55	68	25	0,6
NK55/35	–	–	–	XL	250	55	68	35	0,6
–	–	–	NKS55	XL	221	55	72	22	1
–	RNA4910	–	–	XL	163	58	72	22	0,6
–	–	RNA6910-ZW	–	XL	310	58	72	40	0,6
NK60/25-TV	–	–	–	XL	170	60	72	25	0,6
NK60/35	–	–	–	XL	258	60	72	35	0,6
–	–	–	NKS60	XL	335	60	80	28	1,1
–	RNA4911	–	–	XL	255	63	80	25	1
–	–	RNA6911-ZW	–	XL	470	63	80	45	1
NK65/25	–	–	–	XL	221	65	78	25	0,6
NK65/35	–	–	–	XL	310	65	78	35	0,6
–	–	–	NKS65	XL	356	65	85	28	1,1
NK68/25	–	–	–	XL	241	68	82	25	0,6
NK68/35	–	–	–	XL	338	68	82	35	0,6
–	RNA4912	–	–	XL	275	68	85	25	1
–	–	RNA6912-ZW	–	XL	488	68	85	45	1
NK70/25	–	–	–	XL	260	70	85	25	0,6
NK70/35	–	–	–	XL	370	70	85	35	0,6
–	–	–	NKS70	XL	380	70	90	28	1,1
–	RNA4913	–	–	XL	312	72	90	25	1
–	–	RNA6913-ZW	–	XL	580	72	90	45	1
NK73/25	–	–	–	XL	302	73	90	25	1
NK73/35	–	–	–	XL	428	73	90	35	1
NK75/25	–	–	–	XL	315	75	92	25	1
NK75/35	–	–	–	XL	445	75	92	35	1
–	–	–	NKS75	XL	402	75	95	28	1,1

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. $C_r$ N	stat. $C_{0r}$ N	$C_{ur}$ N	$n_G$ $\text{min}^{-1}$	$n_B$ $\text{min}^{-1}$
48 500	87 000	14 800	9 200	5 700
67 000	132 000	23 900	8 800	4 900
48 000	67 000	11 500	8 500	5 100
51 000	73 000	12 600	8 200	4 550
79 000	127 000	21 400	8 200	4 600
45 500	82 000	14 000	8 400	5 200
60 000	118 000	21 300	8 400	5 200
51 000	74 000	12 700	7 700	4 700
53 000	80 000	13 800	7 500	4 100
82 000	139 000	23 400	7 500	4 150
53 000	103 000	17 500	7 400	4 350
63 000	130 000	23 500	7 700	4 800
71 000	98 000	17 300	7 000	4 350
65 000	100 000	17 300	6 900	3 900
102 000	176 000	30 000	6 900	3 900
50 000	98 000	16 700	7 200	4 500
66 000	142 000	25 500	7 200	4 450
75 000	108 000	19 100	6 500	4 100
49 500	89 000	15 200	6 800	4 500
70 000	139 000	25 500	6 800	4 350
68 000	108 000	18 800	6 400	3 600
106 000	191 000	32 500	6 400	3 600
50 000	92 000	15 700	6 600	4 450
71 000	144 000	26 500	6 600	4 300
77 000	113 000	20 000	6 100	3 900
69 000	112 000	19 500	6 000	3 400
108 000	198 000	33 500	6 000	3 400
60 000	100 000	17 500	6 300	4 150
85 000	156 000	27 000	6 300	4 050
61 000	104 000	18 200	6 100	4 050
87 000	162 000	28 000	6 100	3 950
81 000	123 000	21 900	5 800	3 700

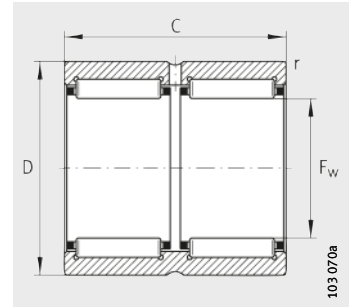


# Needle roller bearings

Without inner ring  
Open



NK, RNA49



RNA69...-ZW

**Dimension table** (continued) · Dimensions in mm

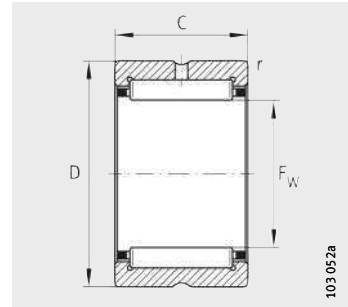
Designation			X-life	Mass m ≈ g	Dimensions			
					F <sub>w</sub>	D	C	r min.
NK80/25	–	–	XL	301	<b>80</b>	95	25	1
NK80/35	–	–	XL	425	<b>80</b>	95	35	1
–	RNA4914	–	XL	460	<b>80</b>	100	30	1
–	–	RNA6914-ZW	XL	857	<b>80</b>	100	54	1
NK85/25	–	–	XL	425	<b>85</b>	105	25	1
NK85/35	–	–	XL	600	<b>85</b>	105	35	1
–	RNA4915	–	XL	489	<b>85</b>	105	30	1
–	–	RNA6915-ZW	XL	935	<b>85</b>	105	54	1
NK90/25	–	–	XL	450	<b>90</b>	110	25	1
NK90/35	–	–	XL	630	<b>90</b>	110	35	1
–	RNA4916	–	XL	516	<b>90</b>	110	30	1
–	–	RNA6916-ZW	XL	987	<b>90</b>	110	54	1
NK95/26	–	–	XL	490	<b>95</b>	115	26	1
NK95/36	–	–	XL	680	<b>95</b>	115	36	1
NK100/26	–	–	XL	515	<b>100</b>	120	26	1
NK100/36	–	–	XL	715	<b>100</b>	120	36	1
–	RNA4917	–	XL	657	<b>100</b>	120	35	1,1
–	–	RNA6917-ZW	XL	1 200	<b>100</b>	120	63	1,1
NK105/26	–	–	XL	540	<b>105</b>	125	26	1
NK105/36	–	–	XL	713	<b>105</b>	125	36	1
–	RNA4918	–	XL	745	<b>105</b>	125	35	1,1
–	–	RNA6918-ZW	XL	1 330	<b>105</b>	125	63	1,1
NK110/30	–	–	XL	650	<b>110</b>	130	30	1,1
NK110/40	–	–	XL	830	<b>110</b>	130	40	1,1
–	RNA4919	–	XL	719	<b>110</b>	130	35	1,1
–	–	RNA6919-ZW	XL	1 460	<b>110</b>	130	63	1,1

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. $C_r$ N	stat. $C_{0r}$ N	$C_{ur}$ N	$n_G$ $\text{min}^{-1}$	$n_B$ $\text{min}^{-1}$
63 000	119 000	19 700	5 800	3 750
89 000	184 000	32 500	5 800	3 650
95 000	156 000	27 500	5 400	3 200
145 000	265 000	47 500	5 400	3 250
78 000	123 000	21 700	5 400	3 550
111 000	193 000	34 500	5 400	3 450
97 000	162 000	28 500	5 200	3 050
147 000	275 000	49 500	5 200	3 050
81 000	132 000	23 300	5 100	3 400
116 000	208 000	37 000	5 100	3 250
101 000	174 000	30 500	4 900	2 850
153 000	300 000	53 000	4 900	2 850
83 000	137 000	24 000	4 850	3 300
121 000	223 000	39 500	4 850	3 150
86 000	146 000	25 000	4 600	3 150
125 000	237 000	41 500	4 600	3 000
125 000	237 000	41 500	4 450	2 650
188 000	400 000	71 000	4 450	2 700
89 000	155 000	26 500	4 400	3 050
129 000	250 000	43 500	4 400	2 850
129 000	250 000	43 500	4 250	2 500
195 000	425 000	74 000	4 250	2 700
111 000	210 000	35 500	4 200	2 800
143 000	290 000	50 000	4 200	2 750
131 000	260 000	44 500	4 100	2 410
197 000	440 000	76 000	4 100	2 450



# Needle roller bearings

Without inner ring  
Open



RNA49, RNA48

**Dimension table** (continued) · Dimensions in mm

Designation		X-life	Mass m ≈ g	Dimensions			
				F <sub>w</sub>	D	C	r min.
RNA4920	–	XL	1 150	115	140	40	1,1
–	RNA4822	XL	670	120	140	30	1
RNA4922	–	XL	1 240	125	150	40	1,1
–	RNA4824	XL	730	130	150	30	1
RNA4924	–	XL	1 860	135	165	45	1,1
–	RNA4826	XL	990	145	165	35	1,1
RNA4926	–	XL	2 210	150	180	50	1,5
–	RNA4828	XL	1 050	155	175	35	1,1
RNA4928	–	XL	2 350	160	190	50	1,5
–	RNA4830	XL	1 600	165	190	40	1,1
–	RNA4832	XL	1 700	175	200	40	1,1
–	RNA4834	XL	2 540	185	215	45	1,1
–	RNA4836	XL	2 680	195	225	45	1,1
–	RNA4838	XL	3 210	210	240	50	1,5
–	RNA4840	XL	3 350	220	250	50	1,5
–	RNA4844	XL	3 620	240	270	50	1,5
–	RNA4848	XL	5 400	265	300	60	2
–	RNA4852	XL	5 800	285	320	60	2
–	RNA4856	XL	9 300	305	350	69	2
–	RNA4860	XL	12 700	330	380	80	2,1
–	RNA4864	XL	13 400	350	400	80	2,1
–	RNA4868	XL	14 000	370	420	80	2,1
–	RNA4872	XL	14 800	390	440	80	2,1
–	RNA4876	XL	26 000	415	480	100	2,1

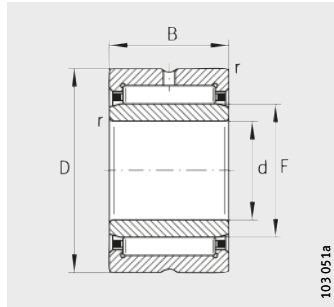


Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. $C_r$ N	stat. $C_{0r}$ N	$C_{ur}$ N	$n_G$ $\text{min}^{-1}$	$n_B$ $\text{min}^{-1}$
144 000	270 000	45 500	4 000	2 650
106 000	216 000	36 000	3 750	2 220
149 000	290 000	47 500	3 700	2 430
112 000	239 000	39 000	3 500	2 030
205 000	390 000	64 000	3 400	2 250
134 000	310 000	48 500	3 150	1 920
229 000	470 000	74 000	3 100	2 080
136 000	325 000	50 000	2 950	1 800
237 000	500 000	78 000	2 900	1 910
172 000	400 000	62 000	2 750	1 750
181 000	435 000	66 000	2 600	1 630
209 000	510 000	75 000	2 450	1 550
219 000	550 000	80 000	2 330	1 430
255 000	690 000	100 000	2 180	1 290
260 000	720 000	102 000	2 090	1 220
275 000	790 000	110 000	1 920	1 080
400 000	1 080 000	150 000	1 730	940
415 000	1 160 000	158 000	1 620	860
510 000	1 300 000	175 000	1 500	810
700 000	1 770 000	235 000	1 380	710
710 000	1 850 000	242 000	1 310	660
730 000	1 940 000	249 000	1 240	620
740 000	2 020 000	255 000	1 180	580
1 130 000	2 900 000	370 000	1 090	500

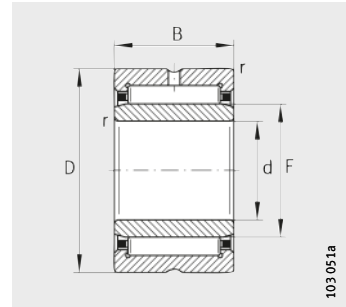


# Needle roller bearings

With inner ring  
Open



NKI ( $d \leq 7 \text{ mm}$ )

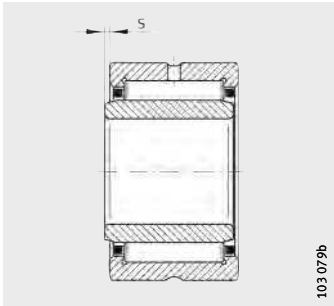


NKI ( $d \geq 9 \text{ mm}$ ), NKIS, NA49, NA69 ( $d \leq 30 \text{ mm}$ )

**Dimension table** - Dimensions in mm

Designation				X-life	Mass m $\approx$ g	Dimensions		
						d	F	D
NKI5/12-TV <sup>1)</sup>	-	-	-	XL	11,5	5	8	15
NKI5/16-TV <sup>1)</sup>	-	-	-	XL	15,3	5	8	15
NKI6/12-TV <sup>1)</sup>	-	-	-	XL	13,5	6	9	16
NKI6/16-TV <sup>1)</sup>	-	-	-	XL	17,4	6	9	16
NKI7/12-TV <sup>1)</sup>	-	-	-	XL	13,7	7	10	17
NKI7/16-TV <sup>1)</sup>	-	-	-	XL	18,2	7	10	17
NKI9/12	-	-	-	XL	16,6	9	12	19
NKI9/16	-	-	-	XL	21,9	9	12	19
NKI10/16	-	-	-	XL	29,4	10	14	22
NKI10/20	-	-	-	XL	37,1	10	14	22
-	NA4900	-	-	XL	23	10	14	22
NKI12/16	-	-	-	XL	33,3	12	16	24
NKI12/20	-	-	-	XL	41,9	12	16	24
-	NA4901	-	-	XL	26	12	16	24
-	-	NA6901	-	XL	46	12	16	24
NKI15/16	-	-	-	XL	38,8	15	19	27
NKI15/20	-	-	-	XL	48,7	15	19	27
-	NA4902	-	-	XL	34	15	20	28
-	-	NA6902	-	XL	63,6	15	20	28
-	-	-	NKIS15	XL	92	15	22	35
NKI17/16	-	-	-	XL	42,4	17	21	29
NKI17/20	-	-	-	XL	53,4	17	21	29
-	NA4903	-	-	XL	37	17	22	30
-	-	NA6903	-	XL	72	17	22	30
-	-	-	NKIS17	XL	98	17	24	37

<sup>1)</sup> With closing rings, without lubrication hole and groove.



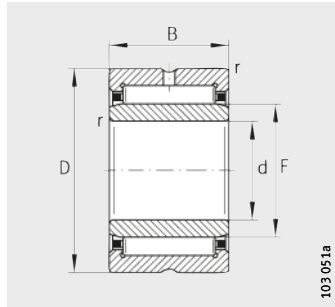
2) Axial displacement "s"

B	r min.	s <sup>2)</sup>	Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
			dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	C <sub>ur</sub> N	n <sub>G</sub> min <sup>-1</sup>	n <sub>B</sub> min <sup>-1</sup>
12	0,3	1,5	4 450	4 100	690	32 500	32 500
16	0,3	2	5 800	5 800	970	32 500	32 000
12	0,3	1,5	5 100	5 000	840	31 000	28 500
16	0,3	2	6 600	7 100	1 190	31 000	28 000
12	0,3	1,5	5 300	5 500	930	29 500	26 000
16	0,3	2	7 000	7 800	1 310	29 500	25 500
12	0,3	1,5	7 200	7 100	1 280	26 500	20 200
16	0,3	2	10 100	11 000	1 920	26 500	19 500
16	0,3	0,5	11 400	11 500	2 100	24 600	16 400
20	0,3	0,5	14 500	15 600	2 700	24 600	16 100
13	0,3	0,5	9 600	9 200	1 630	25 000	17 300
16	0,3	0,5	12 800	13 900	2 550	23 200	14 500
20	0,3	0,5	16 300	18 800	3 250	23 200	14 200
13	0,3	0,5	10 600	10 900	1 940	23 600	14 900
22	0,3	1	18 100	21 600	3 800	23 600	13 900
16	0,3	0,5	14 700	17 400	3 200	21 600	12 400
20	0,3	0,5	18 700	23 600	4 150	21 600	12 100
13	0,3	0,5	12 000	13 600	2 430	21 600	12 000
23	0,3	1	19 500	25 500	4 450	21 600	11 700
20	0,6	0,5	27 500	28 000	4 900	19 600	10 300
16	0,3	0,5	15 200	18 700	3 450	20 600	11 400
20	0,3	0,5	19 300	25 500	4 450	20 600	11 200
13	0,3	0,5	12 400	14 600	2 600	20 600	10 900
23	0,3	1	21 100	29 000	5 100	20 600	10 500
20	0,6	0,5	29 500	31 000	5 400	18 100	9 500

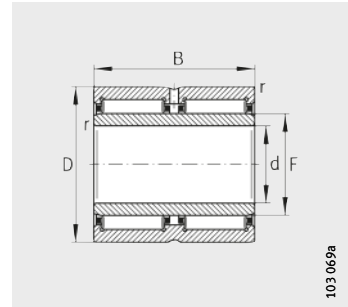


# Needle roller bearings

With inner ring  
Open



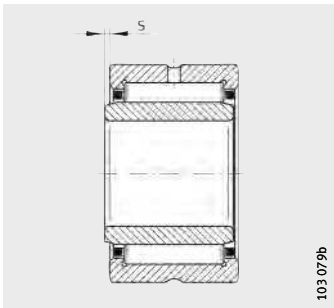
NKI, NKIS, NA49,  
NA69 ( $d \leq 30$  mm)



NA69..-ZW

**Dimension table** (continued) · Dimensions in mm

Designation				X-life	Mass m ≈ g	Dimensions		
						d	F	D
NKI20/16	–	–	–	XL	49	20	24	32
NKI20/20	–	–	–	XL	61	20	24	32
–	NA4904	–	–	XL	75,2	20	25	37
–	–	NA6904	–	XL	141	20	25	37
–	–	–	NKIS20	XL	129	20	28	42
NKI22/16	–	–	–	XL	52	22	26	34
NKI22/20	–	–	–	XL	65,4	22	26	34
–	NA49/22	–	–	XL	80	22	28	39
–	–	NA69/22	–	XL	150	22	28	39
NKI25/20-TV	–	–	–	XL	75,8	25	29	38
NKI25/30	–	–	–	XL	124	25	29	38
–	NA4905	–	–	XL	88	25	30	42
–	–	NA6905	–	XL	161	25	30	42
–	–	–	NKIS25	XL	162	25	32	47
NKI28/20-TV	–	–	–	XL	92,4	28	32	42
NKI28/30	–	–	–	XL	146	28	32	42
–	NA49/28	–	–	XL	97,7	28	32	45
–	–	NA69/28	–	XL	182	28	32	45
NKI30/20-TV	–	–	–	XL	108	30	35	45
NKI30/30-TV	–	–	–	XL	165	30	35	45
–	NA4906	–	–	XL	101	30	35	47
–	–	NA6906	–	XL	192	30	35	47
–	–	–	NKIS30	XL	184	30	37	52
NKI32/20	–	–	–	XL	118	32	37	47
NKI32/30	–	–	–	XL	180	32	37	47
–	NA49/32	–	–	XL	158	32	40	52
–	–	NA69/32-ZW	–	XL	288	32	40	52
NKI35/20-TV	–	–	–	XL	122	35	40	50
NKI35/30	–	–	–	XL	193	35	40	50
–	NA4907	–	–	XL	170	35	42	55
–	–	NA6907-ZW	–	XL	310	35	42	55
–	–	–	NKIS35	XL	220	35	43	58



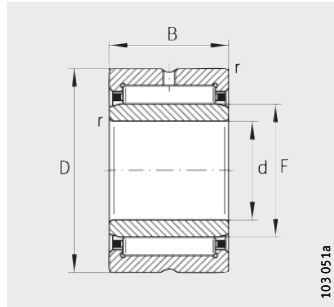
1) Axial displacement "s"

B	r min.	s <sup>1)</sup>	Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
			dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	C <sub>ur</sub> N	n <sub>G</sub> min <sup>-1</sup>	n <sub>B</sub> min <sup>-1</sup>
16	0,3	0,5	16 900	22 300	4 100	18 500	10 100
20	0,3	0,5	21 400	30 500	5 300	18 500	9 900
17	0,3	0,8	23 700	25 500	4 600	17 200	9 600
30	0,3	1	40 500	51 000	9 100	17 200	9 200
20	0,6	0,5	32 500	36 500	6 400	15 800	8 300
16	0,3	0,5	17 300	23 600	4 350	17 200	9 500
20	0,3	0,5	22 000	32 000	5 600	17 200	9 300
17	0,3	0,8	26 000	29 500	5 300	16 100	8 700
30	0,3	0,5	42 000	55 000	9 900	16 100	8 500
20	0,3	1	27 500	39 000	6 900	15 300	8 100
30	0,3	1,5	37 000	57 000	10 600	15 300	8 200
17	0,3	0,8	26 500	31 500	5 700	14 600	7 900
30	0,3	1	44 000	59 000	10 600	14 600	7 700
22	0,6	1	38 000	43 500	7 400	13 600	7 400
20	0,3	1	29 500	44 500	7 800	14 000	7 500
30	0,3	1,5	39 000	63 000	11 700	14 000	8 600
17	0,3	0,8	27 500	33 500	6 100	13 400	7 200
30	0,3	1	45 500	63 000	11 400	13 400	7 000
20	0,3	0,5	31 000	48 500	8 500	12 900	6 800
30	0,3	1	46 000	81 000	15 000	12 900	6 600
17	0,3	0,8	28 500	35 500	6 400	12 700	6 800
30	0,3	1	49 000	71 000	12 900	12 700	6 400
22	0,6	1	41 500	50 000	8 600	12 000	6 600
20	0,3	0,5	28 000	43 500	7 600	12 300	6 900
30	0,3	1	42 000	73 000	13 500	12 300	6 600
20	0,6	0,8	34 500	47 500	8 900	11 700	6 500
36	0,6	0,5	53 000	82 000	15 100	11 700	6 500
20	0,3	0,5	33 500	56 000	9 800	11 400	6 100
30	0,3	1	44 000	79 000	14 600	11 400	6 200
20	0,6	0,8	35 500	50 000	9 400	10 900	6 000
36	0,6	0,5	54 000	86 000	15 900	10 900	6 100
22	0,6	0,5	44 000	57 000	9 800	10 500	5 900

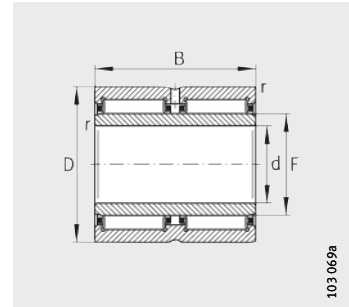


# Needle roller bearings

With inner ring  
Open



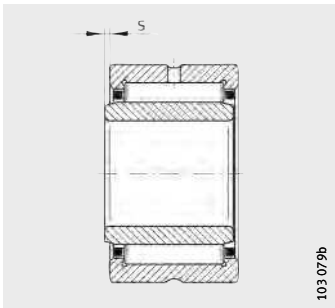
NKI, NKIS, NA49



NA69..-ZW

**Dimension table** (continued) · Dimensions in mm

Designation				X-life	Mass m ≈g	Dimensions		
						d	F	D
NKI38/20	–	–	–	XL	136	38	43	53
NKI38/30	–	–	–	XL	207	38	43	53
NKI40/20-TV	–	–	–	XL	136	40	45	55
NKI40/30-TV	–	–	–	XL	216	40	45	55
–	NA4908	–	–	XL	230	40	48	62
–	–	NA6908-ZW	–	XL	430	40	48	62
–	–	–	NKIS40	XL	281	40	50	65
NKI42/20	–	–	–	XL	148	42	47	57
NKI42/30	–	–	–	XL	222	42	47	57
NKI45/25-TV	–	–	–	XL	217	45	50	62
NKI45/35-TV	–	–	–	XL	308	45	50	62
–	NA4909	–	–	XL	271	45	52	68
–	–	NA6909-ZW	–	XL	495	45	52	68
–	–	–	NKIS45	XL	336	45	55	72
NKI50/25	–	–	–	XL	270	50	55	68
NKI50/35	–	–	–	XL	379	50	55	68
–	NA4910	–	–	XL	274	50	58	72
–	–	NA6910-ZW	–	XL	515	50	58	72
–	–	–	NKIS50	XL	518	50	60	80
NKI55/25-TV	–	–	–	XL	255	55	60	72
NKI55/35	–	–	–	XL	379	55	60	72
–	NA4911	–	–	XL	393	55	63	80
–	–	NA6911-ZW	–	XL	780	55	63	80
–	–	–	NKIS55	XL	558	55	65	85
NKI60/25	–	–	–	XL	394	60	68	82
NKI60/35	–	–	–	XL	553	60	68	82
–	NA4912	–	–	XL	426	60	68	85
–	–	NA6912-ZW	–	XL	808	60	68	85
–	–	–	NKIS60	XL	560	60	70	90



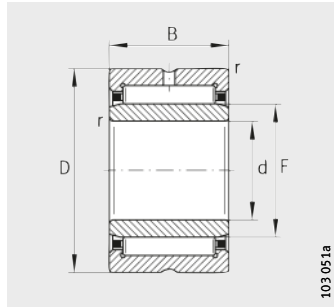
1) Axial displacement "s"

B	r min.	s <sup>1)</sup>	Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
			dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	C <sub>ur</sub> N	n <sub>G</sub> min <sup>-1</sup>	n <sub>B</sub> min <sup>-1</sup>
20	0,3	0,5	30 500	51 000	8 900	10 700	6 000
30	0,3	1	45 500	85 000	15 800	10 700	5 900
20	0,3	0,5	35 000	62 000	10 800	10 200	5 600
30	0,3	1	52 000	103 000	19 100	10 200	5 400
22	0,6	1	48 500	67 000	11 500	9 600	5 300
40	0,6	0,5	74 000	116 000	19 400	9 600	5 400
22	1	0,5	48 000	67 000	11 500	9 300	5 200
20	0,3	0,5	32 500	56 000	9 900	9 800	5 600
30	0,3	1	48 500	94 000	17 500	9 800	5 400
25	0,6	1,5	48 500	87 000	14 800	9 200	5 300
35	0,6	2	67 000	132 000	23 900	9 200	4 950
22	0,6	1	51 000	73 000	12 600	8 700	4 750
40	0,6	0,5	79 000	127 000	21 400	8 700	4 850
22	1	0,5	51 000	74 000	12 700	8 400	4 750
25	0,6	1,5	45 500	82 000	14 000	8 400	4 950
35	0,6	2	60 000	118 000	21 300	8 400	4 900
22	0,6	1	53 000	80 000	13 800	8 000	4 350
40	0,6	0,5	82 000	139 000	23 400	8 000	4 400
28	1,1	2	71 000	98 000	17 300	7 500	4 450
25	0,6	1,5	53 000	103 000	17 500	7 700	4 400
35	0,6	2	63 000	130 000	23 500	7 700	4 550
25	1	1,5	65 000	100 000	17 300	7 300	4 100
45	1	1,5	102 000	176 000	30 000	7 300	4 100
28	1,1	2	75 000	108 000	22 200	7 000	4 150
25	0,6	1	49 500	89 000	15 200	6 800	4 200
35	0,6	1	70 000	139 000	25 500	6 800	4 050
25	1	1,5	68 000	108 000	18 800	6 800	3 750
45	1	1,5	106 000	191 000	32 500	6 800	3 750
28	1,1	2	77 000	113 000	23 400	6 500	3 950

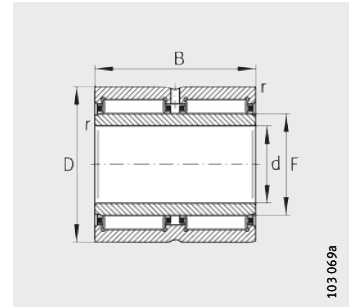


# Needle roller bearings

With inner ring  
Open



NKI, NKIS, NA49

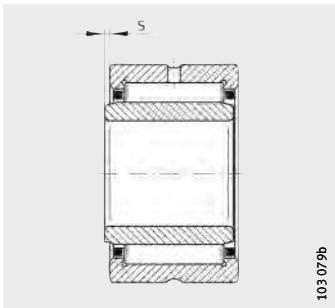


NA69..-ZW

**Dimension table** (continued) · Dimensions in mm

Designation				X-life	Mass m ≈ g	Dimensions		
						d	F	D
NKI65/25	–	–	–	XL	467	65	73	90
NKI65/35	–	–	–	XL	659	65	73	90
–	NA4913	–	–	XL	456	65	72	90
–	–	NA6913-ZW	–	XL	833	65	72	90
–	–	–	NKIS65	XL	641	65	75	95
NKI70/25	–	–	–	XL	521	70	80	95
NKI70/35	–	–	–	XL	737	70	80	95
–	NA4914	–	–	XL	728	70	80	100
–	–	NA6914-ZW	–	XL	1 340	70	80	100
NKI75/25	–	–	–	XL	641	75	85	105
NKI75/35	–	–	–	XL	908	75	85	105
–	NA4915	–	–	XL	775	75	85	105
–	–	NA6915-ZW	–	XL	1 450	75	85	105
NKI80/25	–	–	–	XL	677	80	90	110
NKI80/35	–	–	–	XL	959	80	90	110
–	NA4916	–	–	XL	878	80	90	110
–	–	NA6916-ZW	–	XL	1 522	80	90	110
NKI85/26	–	–	–	XL	743	85	95	115
NKI85/36	–	–	–	XL	1 040	85	95	115
–	NA4917	–	–	XL	1 250	85	100	120
–	–	NA6917-ZW	–	XL	2 200	85	100	120
NKI90/26	–	–	–	XL	778	90	100	120
NKI90/36	–	–	–	XL	1 090	90	100	120
–	NA4918	–	–	XL	1 312	90	105	125
–	–	NA6918-ZW	–	XL	2 310	90	105	125
NKI95/26	–	–	–	XL	816	95	105	125
NKI95/36	–	–	–	XL	1 145	95	105	125
–	NA4919	–	–	XL	1 371	95	110	130
–	–	NA6919-ZW	–	XL	2 500	95	110	130





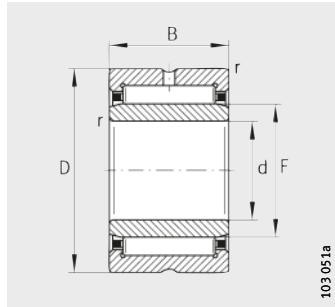
1) Axial displacement "s"

B	r min.	s <sup>1)</sup>	Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
			dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	C <sub>ur</sub> N	n <sub>G</sub> min <sup>-1</sup>	n <sub>B</sub> min <sup>-1</sup>
25	1	1	60 000	100 000	17 500	6 300	3 900
35	1	1	85 000	156 000	27 000	6 300	3 750
25	1	1,5	69 000	112 000	19 500	6 300	3 500
45	1	1,5	108 000	198 000	33 500	6 300	3 550
28	1,1	2	81 000	123 000	25 500	6 100	3 700
25	1	0,8	63 000	119 000	19 700	5 800	3 500
35	1	0,8	89 000	184 000	32 500	5 800	3 350
30	1	1,5	95 000	156 000	27 500	5 800	3 350
54	1	1	145 000	265 000	47 500	5 800	3 400
25	1	1	78 000	123 000	21 700	5 400	3 300
35	1	1	111 000	193 000	34 500	5 400	3 200
30	1	1,5	97 000	162 000	28 500	5 400	3 150
54	1	1	147 000	275 000	49 500	5 400	3 200
25	1	1	81 000	132 000	23 300	5 100	3 150
35	1	1	116 000	208 000	37 000	5 100	3 050
30	1	1,5	101 000	174 000	30 500	5 200	2 950
54	1	1	153 000	300 000	53 000	5 200	3 000
26	1	1,5	83 000	137 000	24 000	4 850	3 100
36	1	1,5	121 000	223 000	39 500	4 850	2 950
35	1,1	1	125 000	237 000	41 500	4 800	2 800
63	1,1	1	188 000	400 000	71 000	4 800	2 850
26	1	1,5	86 000	146 000	25 000	4 600	2 950
36	1	1,5	125 000	237 000	41 500	4 600	2 800
35	1,1	1	129 000	250 000	43 500	4 550	2 650
63	1,1	1	195 000	425 000	74 000	4 550	2 700
26	1	1,5	89 000	155 000	26 500	4 400	2 850
36	1	1,5	129 000	250 000	43 500	4 400	2 700
35	1,1	1	131 000	260 000	44 500	4 350	2 550
63	1,1	1	197 000	440 000	76 000	4 350	2 600

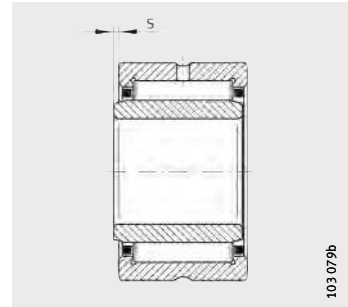


# Needle roller bearings

With inner ring  
Open



NKI, NA49, NA48



1) Axial displacement "s"

**Dimension table** (continued) · Dimensions in mm

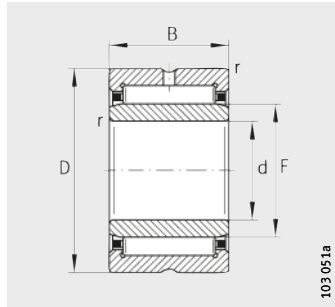
Designation			X-life	Mass m ≈g	Dimensions		
					d	F	D
NKI100/30	–	–	<b>XL</b>	990	<b>100</b>	110	130
NKI100/40	–	–	<b>XL</b>	1 330	<b>100</b>	110	130
–	<b>NA4920</b>	–	<b>XL</b>	1 900	<b>100</b>	115	140
–	<b>NA4922</b>	–	<b>XL</b>	2 070	<b>110</b>	125	150
–	–	<b>NA4822</b>	<b>XL</b>	1 080	<b>110</b>	120	140
–	<b>NA4924</b>	–	<b>XL</b>	2 860	<b>120</b>	135	165
–	–	<b>NA4824</b>	<b>XL</b>	1 170	<b>120</b>	130	150
–	<b>NA4926</b>	–	<b>XL</b>	3 900	<b>130</b>	150	180
–	–	<b>NA4826</b>	<b>XL</b>	1 810	<b>130</b>	145	165
–	<b>NA4928</b>	–	<b>XL</b>	4 150	<b>140</b>	160	190
–	–	<b>NA4828</b>	<b>XL</b>	1 920	<b>140</b>	155	175
–	–	<b>NA4830</b>	<b>XL</b>	2 720	<b>150</b>	165	190
–	–	<b>NA4832</b>	<b>XL</b>	2 890	<b>160</b>	175	200
–	–	<b>NA4834</b>	<b>XL</b>	3 960	<b>170</b>	185	215
–	–	<b>NA4836</b>	<b>XL</b>	4 200	<b>180</b>	195	225
–	–	<b>NA4838</b>	<b>XL</b>	5 610	<b>190</b>	210	240

B	r min.	s <sup>1)</sup>	Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
			dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	C <sub>ur</sub> N	n <sub>G</sub> min <sup>-1</sup>	n <sub>B</sub> min <sup>-1</sup>
30	1,1	1,5	111 000	210 000	35 500	4 200	2 650
40	1,1	2	143 000	290 000	50 000	4 200	2 600
40	1,1	2	144 000	270 000	45 500	4 100	2 600
40	1,1	2	149 000	290 000	47 500	3 750	2 400
30	1	0,8	106 000	216 000	36 000	3 900	2 300
45	1,1	2	205 000	390 000	64 000	3 450	2 200
30	1	0,8	112 000	239 000	39 000	3 650	2 090
50	1,5	1,5	229 000	470 000	74 000	3 150	2 080
35	1,1	1	134 000	310 000	48 500	3 300	2 000
50	1,5	1,5	237 000	500 000	78 000	2 950	1 920
35	1,1	1	136 000	325 000	50 000	3 100	1 870
40	1,1	1,5	172 000	400 000	62 000	2 900	1 810
40	1,1	1,5	181 000	435 000	66 000	2 700	1 680
45	1,1	1,5	209 000	510 000	75 000	2 550	1 610
45	1,1	1,5	219 000	550 000	80 000	2 420	1 490
50	1,5	1,5	255 000	690 000	100 000	2 280	1 350

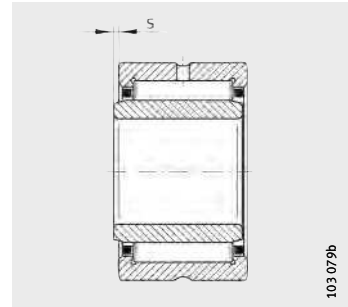


# Needle roller bearings

With inner ring  
Open



NA48



1) Axial displacement "s"

**Dimension table** (continued) · Dimensions in mm

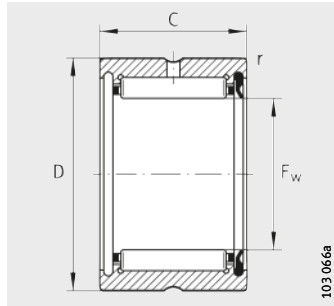
Designation	X-life	Mass m ≈g	Dimensions					
			d	F	D	B	r min.	s <sup>1)</sup>
NA4840	XL	5 840	200	220	250	50	1,5	1,5
NA4844	XL	6 380	220	240	270	50	1,5	1,5
NA4848	XL	10 000	240	265	300	60	2	2
NA4852	XL	10 600	260	285	320	60	2	2
NA4856	XL	15 300	280	305	350	69	2	2,5
NA4860	XL	21 800	300	330	380	80	2,1	2
NA4864	XL	23 000	320	350	400	80	2,1	2
NA4868	XL	24 200	340	370	420	80	2,1	2
NA4872	XL	25 600	360	390	440	80	2,1	2
NA4876	XL	42 600	380	415	480	100	2,1	2

Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
dyn. $C_r$ N	stat. $C_{0r}$ N	$C_{ur}$ N	$n_G$ $\text{min}^{-1}$	$n_B$ $\text{min}^{-1}$
260 000	720 000	102 000	2 150	1 250
275 000	790 000	110 000	1 980	1 110
400 000	1 080 000	150 000	1 780	960
415 000	1 160 000	158 000	1 660	870
510 000	1 300 000	175 000	1 540	840
700 000	1 770 000	235 000	1 420	720
710 000	1 850 000	242 000	1 340	670
730 000	1 940 000	249 000	1 270	620
740 000	2 020 000	255 000	1 210	590
1 130 000	2 900 000	370 000	1 130	510

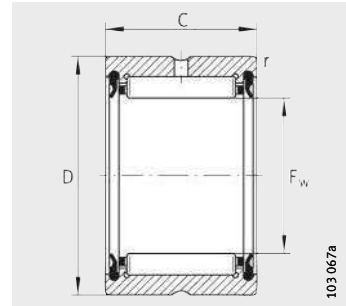


# Needle roller bearings

Without inner ring  
Sealed



RNA49...-RSR



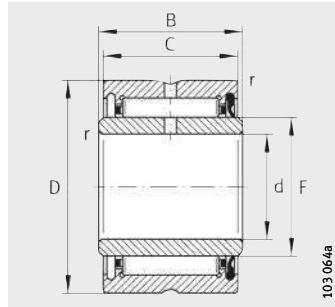
RNA49...-2RSR

**Dimension table** - Dimensions in mm

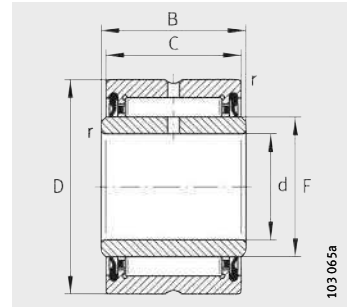
Designation			Mass m ≈ g	Dimensions				Basic load ratings		Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G grease</sub> min <sup>-1</sup>
				F <sub>w</sub>	D	C	r min.	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N		
RNA4900-RSR	RNA4900-2RSR	XL	16	<b>14</b>	22	13	0,3	7 700	6 900	1 360	13 000
RNA4901-RSR	RNA4901-2RSR	XL	18	<b>16</b>	24	13	0,3	8 600	8 300	1 630	12 000
RNA4902-RSR	RNA4902-2RSR	XL	21,5	<b>20</b>	28	13	0,3	9 700	10 300	2 040	10 000
RNA4903-RSR	RNA4903-2RSR	XL	23	<b>22</b>	30	13	0,3	10 000	11 000	2 180	9 000
RNA4904-RSR	RNA4904-2RSR	XL	56	<b>25</b>	37	17	0,3	19 500	19 900	3 750	7 500
RNA4905-RSR	RNA4905-2RSR	XL	60	<b>30</b>	42	17	0,3	21 800	24 200	4 550	6 500
RNA4906-RSR	RNA4906-2RSR	XL	69	<b>35</b>	47	17	0,3	23 900	28 500	5 400	5 500
RNA4907-RSR	RNA4907-2RSR	XL	107	<b>42</b>	55	20	0,6	29 500	39 500	7 200	4 800
RNA4908-RSR	RNA4908-2RSR	XL	154	<b>48</b>	62	22	0,6	41 000	53 000	8 800	4 200
RNA4909-RSR	RNA4909-2RSR	XL	157	<b>52</b>	68	22	0,6	43 000	59 000	9 700	3 900
RNA4910-RSR	RNA4910-2RSR	XL	160	<b>58</b>	72	22	0,6	45 000	64 000	10 600	3 500

# Needle roller bearings

With inner ring  
Sealed



NA49..-RSR

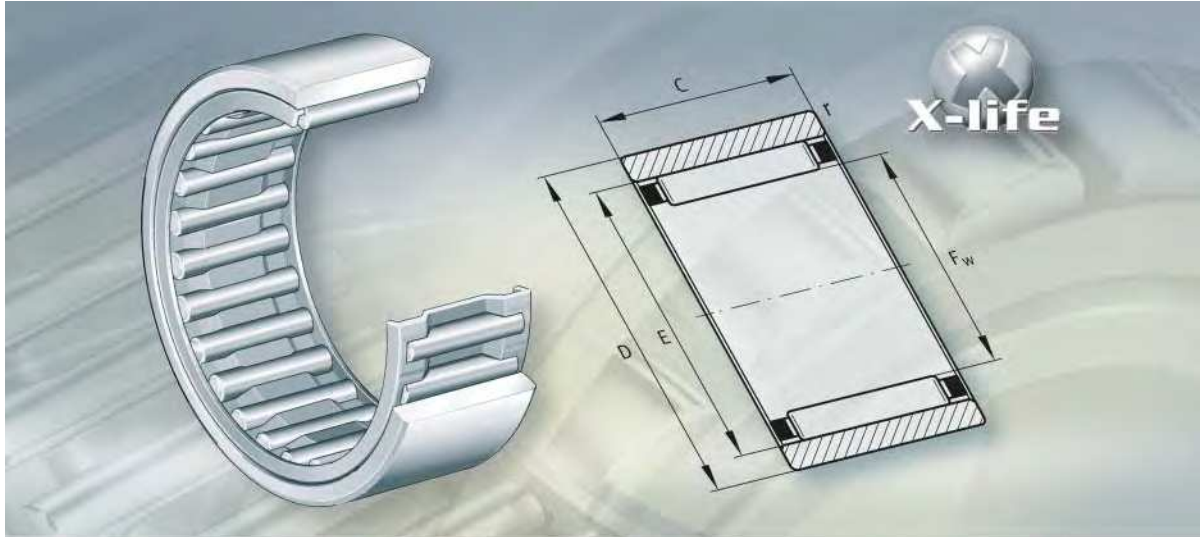


NA49..-2RSR

**Dimension table** · Dimensions in mm

Designation		X-life	Mass m ≈ g	Dimensions						Basic load ratings		Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G</sub> grease min <sup>-1</sup>
				d	F	D	C	B	r min.	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N		
NA4900-RSR	NA4900-2RSR	XL	24,5	10	14	22	13	14	0,3	7 700	6 900	1 360	13 000
NA4901-RSR	NA4901-2RSR	XL	27,5	12	16	24	13	14	0,3	8 600	8 300	1 630	12 000
NA4902-RSR	NA4902-2RSR	XL	37	15	20	28	13	14	0,3	9 700	10 300	2 040	10 000
NA4903-RSR	NA4903-2RSR	XL	40	17	22	30	13	14	0,3	10 000	11 000	2 180	9 000
NA4904-RSR	NA4904-2RSR	XL	80	20	25	37	17	18	0,3	19 500	19 900	3 750	7 500
NA4905-RSR	NA4905-2RSR	XL	89,5	25	30	42	17	18	0,3	21 800	24 200	4 550	6 500
NA4906-RSR	NA4906-2RSR	XL	104	30	35	47	17	18	0,3	23 900	28 500	5 400	5 500
NA4907-RSR	NA4907-2RSR	XL	175	35	42	55	20	21	0,6	29 500	39 500	7 200	4 800
NA4908-RSR	NA4908-2RSR	XL	252	40	48	62	22	23	0,6	41 000	53 000	8 800	4 200
NA4909-RSR	NA4909-2RSR	XL	290	45	52	68	22	23	0,6	43 000	59 000	9 700	3 900
NA4910-RSR	NA4910-2RSR	XL	295	50	58	72	22	23	0,6	45 000	64 000	10 600	3 500





## Needle roller bearings without ribs



# Needle roller bearings without ribs

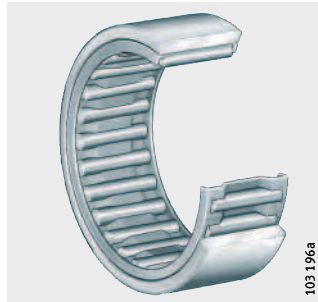
	Page
<b>Product overview</b>	Needle roller bearings without ribs ..... 738
<b>Features</b>	X-life ..... 739
	Needle roller bearings without inner ring..... 739
	Needle roller bearings with inner ring..... 739
	Sealing..... 739
	Lubrication ..... 739
	Sealing rings and wider inner rings ..... 740
	Operating temperature ..... 740
	Cages..... 740
	Suffixes..... 740
<b>Design and safety guidelines</b>	Minimum radial load ..... 741
	Design of bearing arrangements ..... 741
<b>Accuracy</b>	Radial internal clearance ..... 743
	Enveloping circle ..... 743
<b>Dimension tables</b>	Needle roller bearings without ribs, without inner ring..... 744
	Needle roller bearings without ribs, with inner ring..... 748



# Product overview Needle roller bearings without ribs

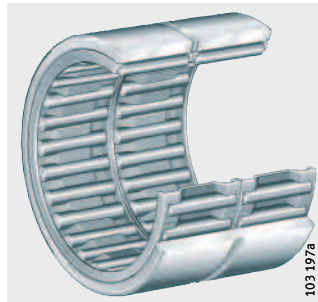
**Without inner ring**  
Single row

RNAO



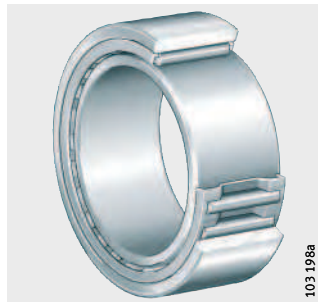
Double row

RNAO..-ZW-ASR1



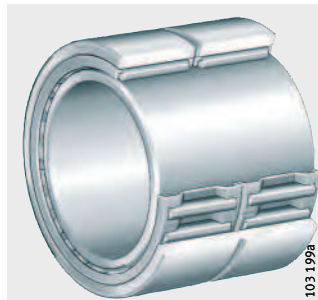
**With inner ring**  
Single row

NAO



Double row

NAO..-ZW-ASR1



# Needle roller bearings without ribs

**Features** These single or double row units comprise machined outer rings without ribs, needle roller and cage assemblies and removable inner rings. Since the bearings are not self-retaining, the outer ring, needle roller and cage assembly and inner ring can be fitted independently of each other.



Needle roller bearings without ribs are X-life bearings. In this design, the raceway surfaces are optimised. This gives higher load carrying capacity and longer rating life.

## Needle roller bearings without inner ring

Bearings without inner ring have particularly compact radial dimensions. However, they require a shaft raceway that is hardened and ground.

The needle roller and cage assembly can be fitted either together with the outer ring or with the shaft. It can also be subsequently slid between the outer ring and shaft.

## Needle roller bearings with inner ring

Bearings with an inner ring are used if the shaft is not configured as a rolling bearing raceway.

The needle roller and cage assembly can be fitted either together with the outer ring or with the inner ring. It can also be subsequently slid between the outer ring and inner ring.

## Displacement of the inner ring

The standard inner ring allows axial displacement within the values "s" stated in the dimension tables. Where larger displacements occur, the standard ring can be replaced by a wider inner ring IR. Inner rings: see pages starting page 776.

## Sealing

Needle roller bearings without ribs are not sealed.

## Lubrication

Open needle roller bearings without ribs can be lubricated with grease or oil. Double row bearings can be lubricated via a lubrication groove and lubrication hole in the outer ring and have the suffix ZW-ASR1.

Bearings with a lubrication hole in the inner ring have the suffix IS1.



# Needle roller bearings without ribs

## Sealing rings and wider inner rings

The bearings can be sealed against external influences using sealing rings of series G, GR and SD in combination with wider inner rings IR. The sealing rings and inner rings are matched to the needle roller bearings.

The outer surface of the inner rings can be used as the sliding surface for seal lips.

Sealing rings: see page 804, and TPI 128, Sealing rings, single lip and double lip.



Sealing rings must not be used as running surfaces for the cage.

## Operating temperature

Bearings with plastic cage can be used at operating temperatures from  $-20\text{ °C}$  to  $+120\text{ °C}$ .

## Cages

The cages are made from sheet steel or plastic. Bearings with a plastic cage have the suffix TV.



Before using bearings with plastic cages, the compatibility of the lubricant used with the cage material (PA66-GF/H) must be checked.

## Suffixes

Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
ASR1	Lubrication hole and lubrication groove in the outer ring, dependent on the size	Standard
IS1	Lubrication hole in the inner ring, dependent on the size	
TV	Bearing with cage made from glass fibre reinforced polyamide 66, dependent on the size	
ZW	Double row design, dependent on the size	

**Design and safety guidelines**  
**Minimum radial load**

In order to ensure operation without slippage, the bearings must be subjected to a minimum load  $F_{r,min}$  in a radial direction. This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways. In continuous operation, a minimum radial load of the order of  $C_r/P < 50$  is necessary.

**Design of bearing arrangements**  
**Shaft and housing tolerances**

Recommended shaft tolerances for bearings with an inner ring, see page 150.

For the design of shafts for bearings without an inner ring, see the section Raceway for bearings without inner ring and the associated table.

Recommended housing tolerances, see page 152.

**Mounting dimensions**

The dimension tables give the maximum value of the radius  $r_a$ , the diameters of the abutment shoulder  $d_a$ ,  $D_a$  and the dimension  $d_b$ ,  $D_b$  for axial guidance of the needle roller and cage assembly.

**Raceway for bearings without inner ring**

Where bearings without an inner ring are to be used, the rolling element raceway on the shaft must be hardened and ground, see table. The surface hardness of the raceway must be 670 HV + 170 HV, the hardening depth CHD or SHD must be sufficiently large.



The values in the tables are valid for housing tolerances up to K7. For tighter housing bores, the operating clearance should be checked by either calculation or measurement.

If the surface of the shaft raceway is produced to DIN 617, the basic load ratings  $C_r$  in the dimension tables must be reduced by 15%.

**Raceway design**

Shaft						Roughness max.	Roundness max.	Parallelism max.
Diameter Nominal dimension mm		Tolerance Operating clearance						
over	incl.	Small	Normal	Large				
–	65	k5	h5	g6	R <sub>a</sub> 0,1 (R <sub>z</sub> 0,4)	IT3	IT3	
65	80	k5	h5	f6				
80	120	k5	g5	f6	R <sub>a</sub> 0,15 (R <sub>z</sub> 0,63)			



# Needle roller bearings without ribs

## Axial guidance of needle roller and cage assemblies



The needle roller and cage assemblies must be axially guided on lateral, burr-free running surfaces, see dimension tables.

The axial running surfaces for the cage must be precision machined ( $R_a 2$ ) and resistant to wear. Note the mounting dimensions in the dimension tables.

## Replacement of inner rings



In needle roller bearings without ribs, the inner ring is not self-retaining.

The outer ring and the needle roller and cage assembly are matched to each other and must not be interchanged during fitting with components from other bearings of the same size.

In the standard bearings, the inner rings are matched to the enveloping circle tolerance F6 and can be interchanged with each other within the same accuracy class.

## Radial location

Needle roller bearings with an inner ring are radially located by means of a fit on the shaft and in the housing.

## Axial location

In order to prevent lateral creep of the bearing rings, they must be located by means of physical locking, *Figure 1*.

The abutment shoulders (shaft, housing) should be sufficiently high and perpendicular to the bearing axis. The transition from the bearing seat to the abutment shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509.

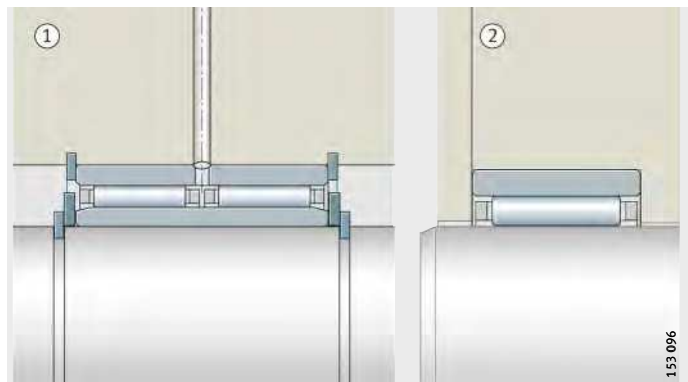
The minimum values for the chamfer dimensions  $r$  in the dimension tables must be observed.

The overlap between the snap rings and the end faces of the bearing rings must be sufficiently large, *Figure 1*.

Maximum inner ring chamfer dimensions to DIN 620-6 must be taken into consideration.

NAO..-ZW-ASR1  
RNAO

- ① Snap rings
- ② Abutment shoulders



*Figure 1*

Axial location of bearing rings

**Accuracy** The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620.

**Radial internal clearance** Bearings with inner ring have a radial internal clearance CN to DIN 620-4.

**Radial internal clearance**

Bore d mm		Radial internal clearance CN μm	
over	incl.	min.	max.
–	24	20	45
24	30	20	45
30	40	25	50
40	50	30	60
50	65	40	70
65	80	40	75
80	100	50	85
100	120	50	90

**Enveloping circle**

In the case of bearings without an inner ring, the dimension for the enveloping circle  $F_w$  is used instead of the radial internal clearance.

The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway.

For bearings before fitting, the enveloping circle  $F_w$  is in the tolerance zone F6.

Deviations for the tolerance zone F6: see table, page 168.

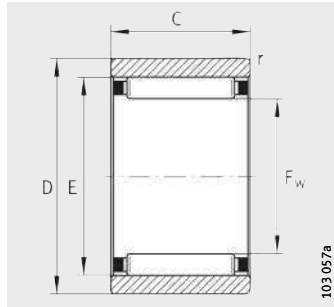


If the enveloping circle is to be in tolerance zone F6, the parts as delivered (outer ring/needle roller and cage assembly as a matched pair) must not be interchanged with other matched pairs.

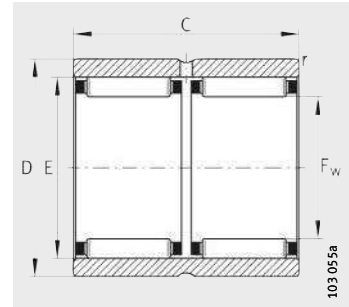


# Needle roller bearings without ribs

Without inner ring  
Open



RNAO

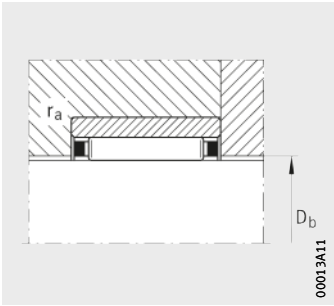


RNAO..-ZW-ASR1

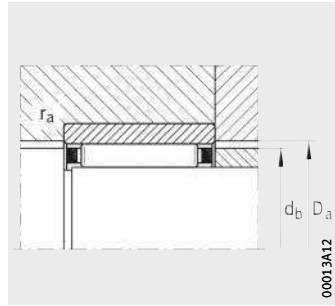
**Dimension table** - Dimensions in mm

Designation	X-life	Mass m ≈ g	Dimensions					Mounting dimensions	
			F <sub>w</sub>	D	C	E	r min.	D <sub>b</sub>	d <sub>b</sub>
RNA05X10X8-TV	XL	3	5	10	8	8	0,15	5,3	7,7
RNA06X13X8-TV	XL	6	6	13	8	9	0,3	6,3	8,7
RNA07X14X8-TV	XL	6	7	14	8	10	0,3	7,3	9,7
RNA08X15X10-TV	XL	8	8	15	10	11	0,3	8,3	10,7
RNA010X17X10-TV	XL	10	10	17	10	13	0,3	10,3	12,7
RNA012X22X12-TV	XL	19	12	22	12	18	0,3	12,3	17,6
RNA015X23X13	XL	20	15	23	13	19	0,3	15,4	18,6
RNA016X24X13	XL	21	16	28	12	20	0,3	16,4	19,6
RNA016X28X12	XL	32	16	28	12	22	0,3	16,4	21,6
RNA017X25X13	XL	22	17	25	13	21	0,3	17,4	20,6
RNA018X30X24-ZW-ASR1	XL	69	18	30	24	24	0,3	18,4	23,6
RNA020X28X13	XL	25	20	28	13	24	0,3	20,4	23,6
RNA020X28X26-ZW-ASR1	XL	50	20	28	26	24	0,3	20,4	23,6
RNA020X32X12	XL	38	20	32	12	26	0,3	20,4	25,6
RNA022X30X13	XL	27	22	30	13	26	0,3	22,4	25,6
RNA022X35X16	XL	59	22	35	16	29	0,3	22,4	28,4
RNA025X35X17	XL	53	25	35	17	29	0,3	25,6	28,4
RNA025X35X26-ZW-ASR1	XL	76	25	35	26	29	0,3	25,6	28,4
RNA025X37X16	XL	60	25	37	16	32	0,3	25,6	31,4
RNA030X40X17	XL	60	30	40	17	35	0,3	30,6	34,4
RNA030X42X16	XL	59	30	42	16	37	0,3	30,6	36,4
RNA030X42X32-ZW-ASR1	XL	137	30	42	32	37	0,3	30,6	36,4
RNA035X45X13	XL	53	35	45	13	40	0,3	35,6	39,4
RNA035X45X17	XL	69	35	45	17	40	0,3	35,6	39,4
RNA035X45X26-ZW-ASR1	XL	91	35	45	26	40	0,3	35,6	39,4
RNA035X47X16	XL	78	35	47	16	42	0,3	35,6	41,4
RNA035X47X18	XL	89	35	47	16	42	0,3	35,6	41,4
RNA035X47X32-ZW-ASR1	XL	156	35	47	32	42	0,3	35,6	41,4





Axial guidance of needle roller and cage assembly in housing



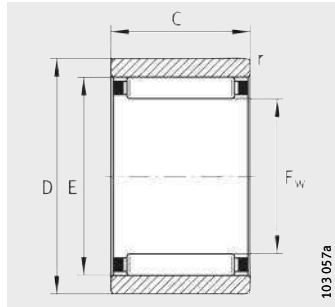
Axial guidance of needle roller and cage assembly on shaft

		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D <sub>a</sub>	r <sub>a</sub> max.	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub> N	n <sub>G</sub> min <sup>-1</sup>	n <sub>B</sub> min <sup>-1</sup>
		N	N			
8,3	0,1	2 650	1 920	295	39 000	53 000
9,3	0,3	2 950	2 280	355	36 500	48 500
10,3	0,3	3 250	2 650	410	34 500	41 500
11,3	0,3	4 450	4 100	690	32 500	35 500
13,3	0,3	5 300	5 500	930	29 500	28 000
18,3	0,3	11 300	9 900	1 740	26 000	19 700
19,3	0,3	9 700	10 900	1 760	22 900	15 000
20,3	0,3	10 100	11 800	1 890	23 600	16 800
22,3	0,3	13 000	12 500	2 210	22 900	15 900
21,3	0,3	11 700	14 600	2 240	22 900	15 200
24,5	0,3	24 800	30 000	5 300	21 800	14 000
24,3	0,3	11 100	14 300	2 310	21 300	13 700
24,3	0,3	19 000	28 500	4 600	21 300	13 700
26,5	0,3	15 100	16 200	2 850	20 900	12 700
26,3	0,3	11 800	15 900	2 550	20 400	12 400
29,5	0,3	22 600	25 500	4 200	19 200	11 200
29,5	0,3	16 800	26 000	4 250	18 100	11 000
29,5	0,3	21 900	37 000	5 900	18 100	11 200
32,5	0,3	23 800	28 000	4 650	17 200	10 000
35,5	0,3	22 100	34 000	5 300	15 100	8 800
37,5	0,3	26 000	33 500	5 500	14 600	8 500
37,5	0,3	45 000	67 000	11 100	14 600	8 500
40,5	0,3	18 300	28 000	4 450	13 100	7 800
40,5	0,3	23 500	38 500	6 100	13 100	7 700
40,5	0,3	31 500	56 000	8 900	13 100	7 800
42,5	0,3	27 500	37 500	6 200	12 700	7 500
42,5	0,3	31 000	43 000	7 400	12 700	7 400
42,5	0,3	47 500	75 000	12 400	12 700	7 500

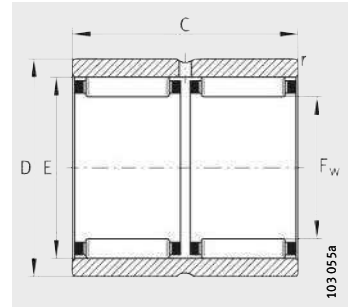


# Needle roller bearings without ribs

Without inner ring  
Open



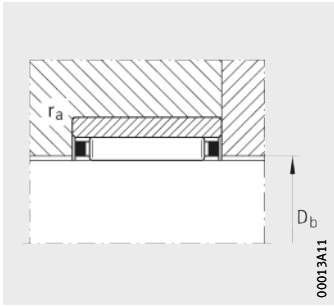
RNAO



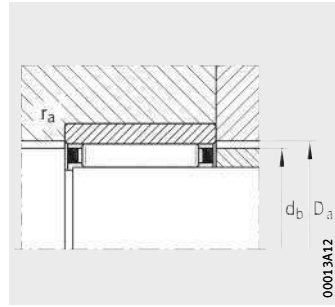
RNAO..-ZW-ASR1

Dimension table (continued) · Dimensions in mm

Designation	X-life	Mass m ≈ g	Dimensions					Mounting dimensions	
			F <sub>w</sub>	D	C	E	r min.	D <sub>b</sub>	d <sub>b</sub>
RNAO40X50X17	XL	74	40	50	17	45	0,3	40,6	44,4
RNAO40X50X34-ZW-ASR1	XL	152	40	50	34	45	0,3	40,6	44,4
RNAO40X55X20	XL	145	40	55	20	47	0,3	40,6	46,2
RNAO40X55X40-ZW-ASR1	XL	275	40	55	40	48	0,3	40,6	47,2
RNAO45X55X17	XL	83	45	55	17	50	0,3	45,6	49,2
RNAO45X62X40-ZW-ASR1	XL	377	45	62	40	53	0,3	45,6	52,2
RNAO50X62X20	XL	140	50	62	20	55	0,3	50,6	54,2
RNAO50X65X20	XL	168	50	65	20	58	0,3	50,6	57,2
RNAO50X65X40-ZW-ASR1	XL	355	50	65	40	58	0,6	50,6	57,2
RNAO55X68X20	XL	166	55	68	20	60	0,6	55,8	59,4
RNAO60X78X20	XL	255	60	78	20	68	1	60,8	67,2
RNAO60X78X40-ZW-ASR1	XL	435	60	78	40	68	1	60,8	67,2
RNAO65X85X30	XL	464	65	85	30	73	1	66	72,2
RNAO70X90X30	XL	499	70	90	30	78	1	71	77,2
RNAO80X100X30	XL	580	80	100	30	88	1	81	87,2
RNAO90X105X26	XL	373	90	105	26	98	1	91	97,2
RNAO90X110X30	XL	610	90	110	30	98	1	91	97,2
RNAO100X120X30	XL	694	100	120	30	108	1	101	107,2



Axial guidance of needle roller and cage assembly in housing



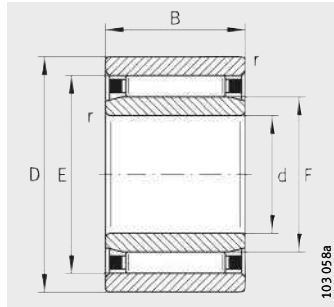
Axial guidance of needle roller and cage assembly on shaft

		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D <sub>a</sub>	r <sub>a</sub> max.	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	C <sub>ur</sub>	n <sub>G</sub> min <sup>-1</sup>	n <sub>B</sub> min <sup>-1</sup>
		N	N			
45,5	0,3	24 200	41 500	6 400	11 500	7 000
45,5	0,3	41 500	83 000	12 900	11 500	7 000
47,5	0,3	37 000	57 000	8 900	11 300	6 600
47,5	0,3	70 000	118 000	18 700	11 100	6 500
50,5	0,3	25 500	46 000	7 100	10 300	6 300
53,5	0,3	76 000	135 000	21 500	10 000	5 900
55,8	0,3	30 000	60 000	9 600	9 300	5 800
58,5	0,3	40 500	62 000	10 800	9 100	5 600
58,5	0,6	69 000	124 000	21 700	9 100	5 600
60,8	0,6	32 000	66 000	10 700	8 500	5 400
68,8	1	49 500	85 000	13 600	7 700	4 650
68,8	1	85 000	171 000	27 500	7 700	4 650
73,8	1	64 000	123 000	21 100	7 100	4 550
78,8	1	68 000	135 000	23 200	6 600	4 250
89	1	80 000	176 000	31 000	5 800	3 600
99	1	69 000	150 000	25 000	5 200	3 350
99	1	76 000	172 000	29 500	5 200	3 450
109	1	80 000	188 000	32 000	4 700	3 150

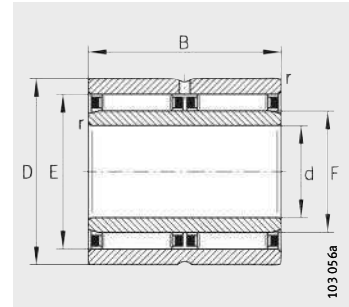


# Needle roller bearings without ribs

With inner ring  
Open



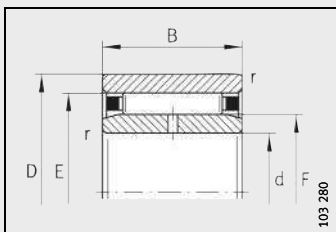
NAO



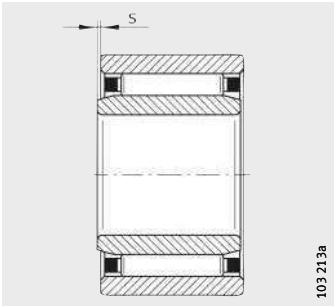
NAO..-ZW-ASR1

**Dimension table** - Dimensions in mm

Designation	X-life	Mass m ≈ g	Dimensions						
			d	D	B	F	E	r min.	s <sup>1)</sup>
NAO6X17X10-TV-IS1	XL	14	6	17	10	10	13	0,3	0,5
NAO9X22X12-TV	XL	23,5	9	22	12	12	18	0,3	0,5
NAO12X24X13	XL	30	12	24	13	16	20	0,3	0,5
NAO12X28X12-IS1	XL	40	12	28	12	16	22	0,3	0,5
NAO15X28X13	XL	29	15	28	13	20	24	0,3	0,5
NAO15X32X12-IS1	XL	50	15	32	12	20	26	0,3	0,5
NAO17X30X13	XL	42	17	30	13	22	26	0,3	0,5
NAO17X35X16	XL	78	17	35	16	22	29	0,3	0,5
NAO20X35X17	XL	76	20	35	17	25	29	0,3	0,5
NAO20X37X16	XL	82	20	37	16	25	32	0,3	0,5
NAO25X40X17	XL	88	25	40	17	30	35	0,3	0,8
NAO25X42X16-IS1	XL	86	25	42	16	30	37	0,3	0,8
NAO25X42X32-ZW-ASR1	XL	190	25	42	32	30	37	0,3	0,8
NAO30X45X17	XL	102	30	45	17	35	40	0,3	0,8
NAO30X45X26-ZW-ASR1	XL	157	30	45	26	35	40	0,3	0,8
NAO30X47X16	XL	109	30	47	16	35	42	0,3	0,8
NAO30X47X18	XL	119	30	47	18	35	42	0,3	0,8
NAO35X50X17	XL	113	35	50	17	40	45	0,3	0,8
NAO35X55X20	XL	190	35	55	20	40	47	0,3	0,8
NAO40X55X17	XL	127	40	55	17	45	50	0,3	0,8
NAO50X68X20-IS1	XL	230	50	68	20	55	60	0,6	1
NAO70X100X30	XL	850	70	100	30	80	88	1	1
NAO80X110X30	XL	920	80	110	30	90	98	1	1
NAO90X120X30	XL	1 044	90	120	30	100	108	1	1

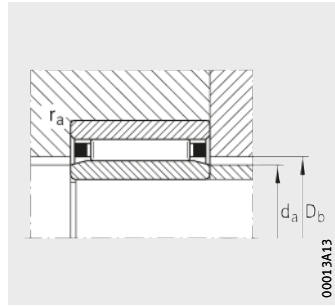


NAO..-IS1



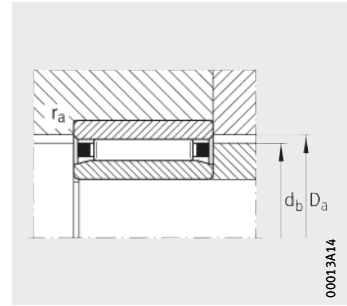
103 213a

1) Axial displacement "s"



00013A13

Axial guidance of needle roller and cage assembly in housing

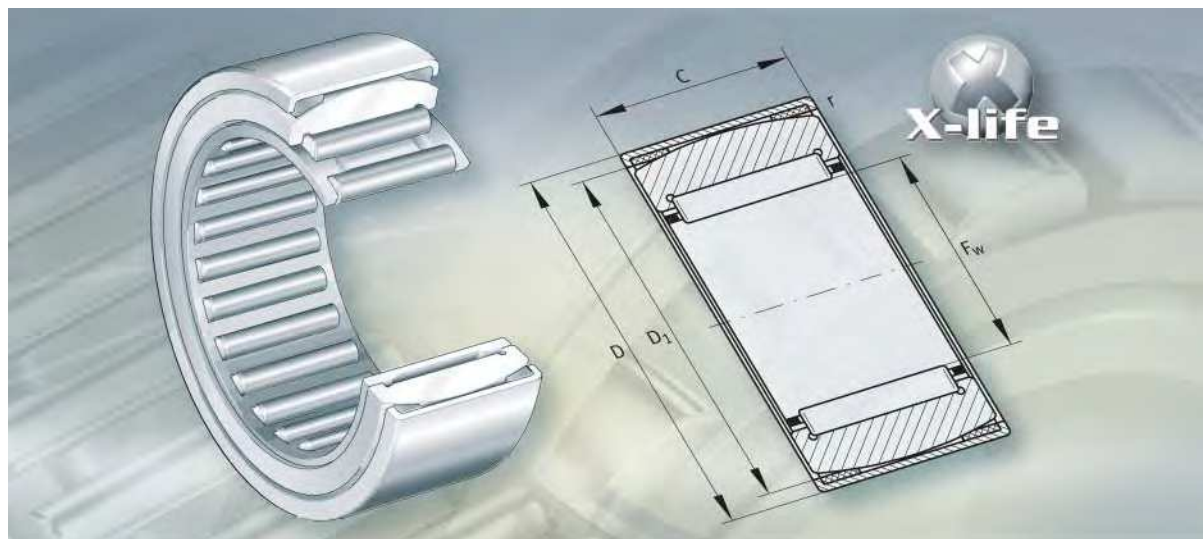


00013A14

Axial guidance of needle roller and cage assembly on shaft

Mounting dimensions					Basic load ratings		Fatigue limit load $C_{ur}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$d_a$	$D_b$	$d_b$	$D_a$	$r_a$ max.	dyn. $C_r$ N	stat. $C_{0r}$ N			
9,7	10,3	12,7	13,3	0,3	5 300	5 500	930	29 500	23 800
11,7	12,3	17,6	18,3	0,3	11 300	9 900	1 740	26 000	17 900
15,7	16,4	19,6	20,3	0,3	10 100	11 800	1 890	23 600	15 000
15,7	16,4	21,6	22,3	0,3	13 000	12 500	2 210	22 900	14 300
19,7	20,4	23,6	24,3	0,3	11 100	14 300	2 310	21 300	12 100
19,7	20,4	25,6	26,5	0,3	15 100	16 200	2 850	20 900	11 400
21,5	22,4	25,6	26,3	0,3	11 800	15 900	2 550	20 400	11 100
21,5	22,4	28,4	29,5	0,3	22 600	25 500	4 200	19 200	10 100
24,5	25,6	28,4	29,5	0,3	16 800	26 000	4 250	18 100	10 000
24,5	25,6	31,4	32,5	0,3	23 800	28 000	4 650	17 200	9 000
29,5	30,6	34,4	35,5	0,3	22 100	34 000	5 300	15 100	8 100
29,5	30,6	36,4	37,5	0,3	26 000	33 500	5 500	14 600	7 800
29,5	30,6	36,4	37,5	0,3	45 000	67 000	11 000	14 600	7 800
34,5	35,6	39,4	40,5	0,3	23 500	38 500	6 100	13 100	7 100
34,5	35,6	39,4	40,5	0,3	31 500	56 000	8 900	13 100	7 200
34,5	35,6	41,4	42,5	0,3	27 500	37 500	6 200	12 700	6 900
34,5	35,6	41,4	42,5	0,3	31 000	43 000	7 400	12 700	6 900
39,5	40,6	44,4	45,5	0,3	24 200	41 500	6 400	11 500	6 500
39,5	40,6	46,2	47,5	0,3	37 000	57 000	8 900	11 300	6 200
44,5	45,6	49,2	50,5	0,3	25 500	46 000	7 100	10 300	5 900
54,5	55,8	59,2	60,8	0,6	32 000	66 000	10 700	8 500	5 100
79,3	81	87,2	89	1	80 000	176 000	31 000	5 800	3 350
89,3	91	97,2	99	1	76 000	172 000	29 500	5 200	3 200
99,3	101	107,2	109	1	80 000	188 000	32 000	4 700	2 950





## Aligning needle roller bearings

# Aligning needle roller bearings

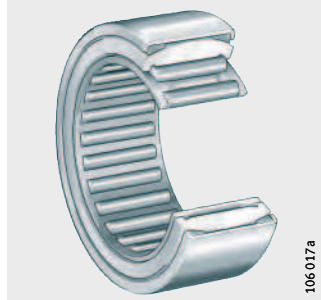
	Page
<b>Product overview</b>	Aligning needle roller bearings..... 752
<b>Features</b>	<b>X-life</b> ..... 753
	Compensation of misalignments..... 753
	Needle roller bearings without inner ring..... 753
	Needle roller bearings with inner ring..... 753
	Sealing..... 753
	Lubrication..... 753
	Operating temperature ..... 753
	Cages..... 753
<b>Design and safety guidelines</b>	Minimum radial load ..... 754
	Speeds..... 754
	Design of bearing arrangements ..... 754
<b>Accuracy</b>	Radial internal clearance ..... 755
	Enveloping circle ..... 755
<b>Dimension tables</b>	Aligning needle roller bearings, with and without inner ring..... 756



## Product overview    Aligning needle roller bearings

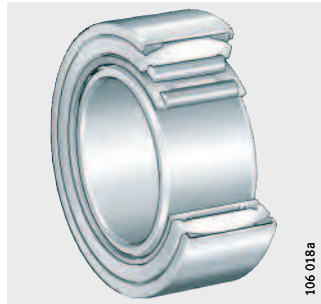
**Without inner ring**

RPNA



**With inner ring**

PNA





# Aligning needle roller bearings

**Features** The bearings comprise drawn outer cups, plastic support rings with a concave inner profile, outer rings with a spherical outside surface, needle roller and cage assemblies and removable inner rings.

**X-life** Aligning needle roller bearings are X-life bearings. These bearings have optimised raceway surfaces. This gives higher load carrying capacity and longer rating life.

**Compensation of misalignments** Due to the spherical outer ring and the concave support ring, aligning bearings can compensate static misalignments between the shaft and housing of up to 3°.



The bearings must not be used to support swivel or tumbling motion. During adjustment motion between the outer cup and the ring, a breakaway torque occurs. In order that adjustment motion can take place, the tolerances for the housing bore according to the table must be observed, see table, page 754.

**Needle roller bearings without inner ring** Bearings without inner ring have particularly compact radial dimensions. However, they require a shaft raceway that is hardened and ground.

**Needle roller bearings with inner ring** Bearings with an inner ring are used if the shaft is not configured as a rolling bearing raceway.

**Displacement of the inner ring** The standard inner ring allows axial displacement within the values “s” stated in the dimension tables. Where larger displacements occur, the standard ring can be replaced by a wider inner ring IR. Inner rings: see page 776.

**Sealing** Aligning needle roller bearings are not sealed.

**Lubrication** The open bearings can be lubricated with oil or grease.

**Operating temperature** The range of possible operating temperatures is from -20 °C to +100 °C, restricted by the plastic support rings.



**Cages** The cages are made from sheet steel.



# Aligning needle roller bearings

## Design and safety guidelines

### Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum load  $F_{r \min}$  in a radial direction. This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways. In continuous operation, a minimum radial load of the order of  $C_r/P < 50$  is necessary.

### Speeds

The limiting speeds  $n_G$  in the dimension tables are valid for oil lubrication.

With grease lubrication, the permissible value is 60% of the value in the table.

## Design of bearing arrangements

### Shaft and housing tolerances

Recommended shaft tolerances for bearings with an inner ring, see table, page 150.

For the design of shafts for bearings without an inner ring, see the section Raceway for bearings without inner ring and the associated tables.

Recommended housing tolerances, see table, page 152.

### Raceway for bearings without inner ring

Where bearings without an inner ring are to be used, the rolling element raceway on the shaft must be hardened and ground. The surface hardness of the raceway must be  $670 \text{ HV} + 170 \text{ HV}$ , the hardening depth CHD or SHD must be sufficiently large.



If the surface of the shaft raceway is produced to DIN 617, the basic load ratings  $C_r$  in the dimension tables must be reduced by 15%.

### Tolerances for shaft raceway and housing bore

Housing material	Shaft tolerance for bearings without inner ring	Bore tolerance
Steel or cast iron	h6	N6
Light metal		R6

### Surfaces for shaft raceway and housing bore

Surface	Shaft raceway for bearings without inner ring	Housing bore
Roughness max.	$R_a 0,1 (R_z 0,4)$	$R_a 0,8 (R_z 4)$
Roundness max.	IT3	IT 5/2
Parallelism max.	IT3	IT 5/2

**Radial and axial location** Aligning needle roller bearings are firmly seated in the housing bore. No further axial location is required. The bore can therefore be produced easily and economically.

**Replacement of inner rings**



In aligning needle roller bearings, the inner ring is not self-retaining. In the standard bearings, the inner rings are matched to the enveloping circle tolerance F6 and can be interchanged with each other within the same accuracy class.

**Installation with fitting mandrel**

Due to the drawn outer cup, the bearings must be fitted using a special pressing mandrel: see the section Drawn cup needle roller bearings, page 687. The marked side of the bearing should be in contact with the flange of the mandrel. A toroidal ring on the mandrel holds the bearing securely on the mandrel.

**Accuracy**

The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620, with the exception of the outside diameter and the width of the outer cup. The width has a tolerance of  $\pm 0,5$  mm.

**Radial internal clearance**

Bearings with inner ring have a radial internal clearance CN to DIN 620-4.

**Radial internal clearance**

Bore		Radial internal clearance	
d		CN	
mm		$\mu\text{m}$	
over	incl.	min.	max.
–	24	20	45
24	30	20	45
30	40	25	50
40	50	30	60

**Enveloping circle**

In the case of bearings without an inner ring, the dimension for the enveloping circle  $F_w$  is used instead of the radial internal clearance.

The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway.

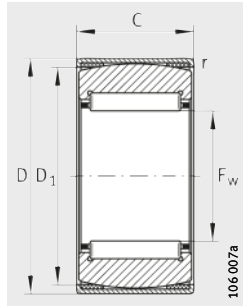
For bearings before fitting, the enveloping circle  $F_w$  is in the tolerance zone F6.

Deviations for the tolerance zone F6: see table, page 168.

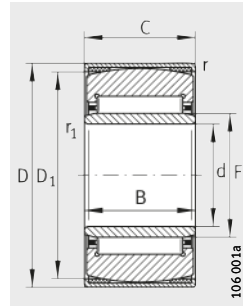


# Aligning needle roller bearings

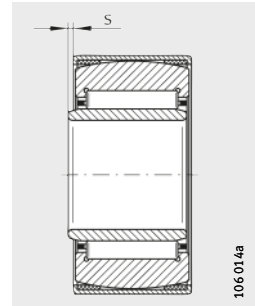
With or without inner ring



RPNA



PNA



1) Axial displacement "s"

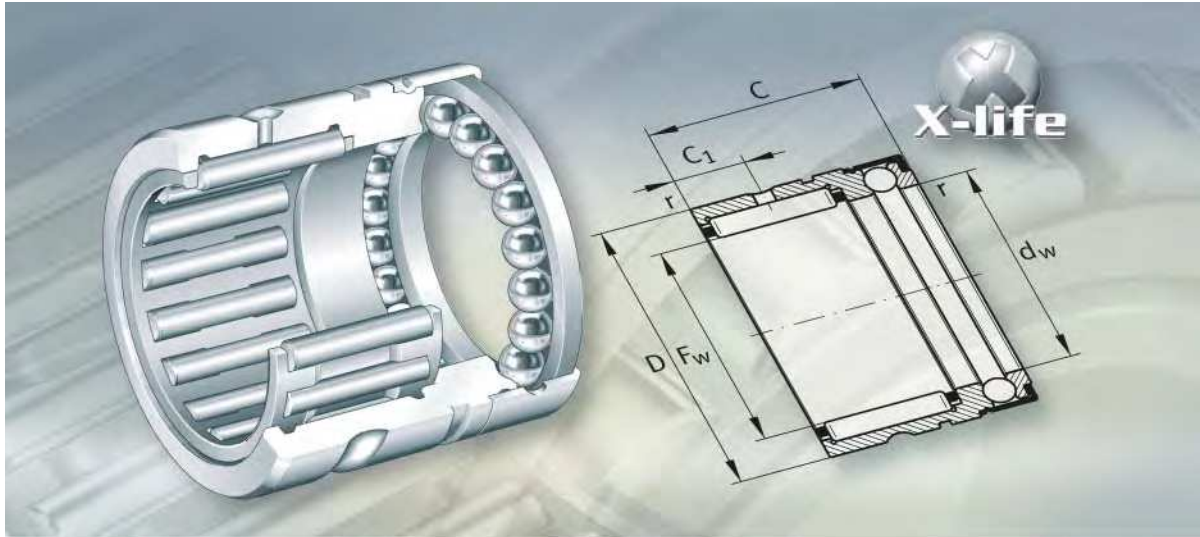
**Dimension table** - Dimensions in mm

Designation	X-life	Mass m ≈ g	Dimensions					Basic load ratings		Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>
			F <sub>w</sub>	D	C ±0,5	D <sub>1</sub>	r min.	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N		
RPNA15/28	XL	32	15	28	12	24,5	0,8	7 800	7 900	1 430	24 000
RPNA18/32	XL	52	18	32	16	27	0,8	14 100	16 200	3 000	22 000
RPNA20/35	XL	62	20	35	16	30,5	0,8	14 600	17 500	3 200	21 000
RPNA25/42	XL	109	25	42	20	36,5	0,8	21 300	30 500	5 300	18 000
RPNA28/44	XL	112	28	44	20	38,5	0,8	24 800	34 000	5 900	16 000
RPNA30/47	XL	125	30	47	20	42	0,8	25 500	36 000	6 300	15 000
RPNA35/52	XL	131	35	52	20	47,5	0,8	27 500	41 500	7 300	13 000
RPNA40/55	XL	141	40	55	20	50,5	0,8	29 500	47 000	8 300	11 000
RPNA45/62	XL	176	45	62	20	58	0,8	31 000	53 000	9 300	10 000

**Dimension table** - Dimensions in mm

Designation	X-life	Mass m ≈ g	Dimensions									Basic load ratings		Fatigue limit load C <sub>ur</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>
			d	F	D	C ±0,5	B	D <sub>1</sub>	r min.	r <sub>1</sub> min.	s <sup>1)</sup> min.	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N		
PNA12/28	XL	37	12	15	28	12	12	24,5	0,8	0,3	0,5	7 800	7 900	1 430	24 000
PNA15/32	XL	62	15	18	32	16	16	27	0,8	0,3	0,5	14 100	16 200	3 000	22 000
PNA17/35	XL	73	17	20	35	16	16	30,5	0,8	0,3	0,5	14 600	17 500	3 200	21 000
PNA20/42	XL	136	20	25	42	20	20	36,5	0,8	0,3	0,5	21 300	30 500	5 300	18 000
PNA22/44	XL	145	22	28	44	20	20	38,5	0,8	0,3	0,5	24 800	34 000	5 900	16 000
PNA25/47	XL	157	25	30	47	20	20	42	0,8	0,3	0,5	25 500	36 000	6 300	15 000
PNA30/52	XL	181	30	35	52	20	20	47,5	0,8	0,3	0,5	27 500	41 500	7 300	13 000
PNA35/55	XL	177	35	40	55	20	20	50,5	0,8	0,3	0,5	29 500	47 000	8 300	11 000
PNA40/62	XL	227	40	45	62	20	20	58	0,8	0,3	0,5	31 000	53 000	9 300	10 000





## Combined needle roller bearings

# Combined needle roller bearings

		Page
<b>Product overview</b>	Combined needle roller bearings .....	760
<b>Features</b>	<b>X-life</b> .....	761
	Needle roller/axial deep groove ball bearings .....	761
	Needle roller/axial cylindrical roller bearings .....	762
	Needle roller/angular contact ball bearings.....	762
	Operating temperature .....	762
	Cages.....	762
	Suffixes.....	762
<b>Design and safety guidelines</b>	Minimum radial load .....	763
	Support of axial forces.....	763
	Speeds.....	764
	Lubrication .....	764
	Design of bearing arrangements .....	765
<b>Accuracy</b>	Radial internal clearance .....	766
	Enveloping circle .....	766
<b>Dimension tables</b>	Needle roller/axial deep groove ball bearings without inner ring .....	768
	Needle roller/axial deep groove ball bearings without inner ring, with or without end cap.....	770
	Needle roller/axial cylindrical roller bearings without inner ring, with or without end cap.....	772
	Needle roller/angular contact ball bearings with inner ring.....	774

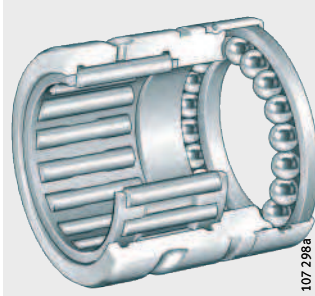


# Product overview Combined needle roller bearings

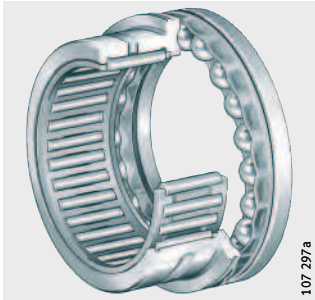
## Needle roller/ axial deep groove ball bearings

Without inner ring  
With or without end cap

NX, NX...-Z



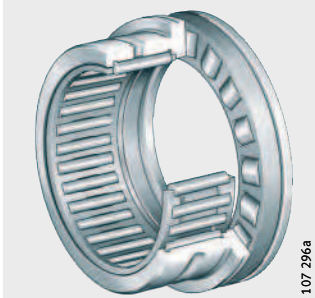
NKX, NKX...-Z



## Needle roller/ axial cylindrical roller bearings

Without inner ring  
With or without end cap

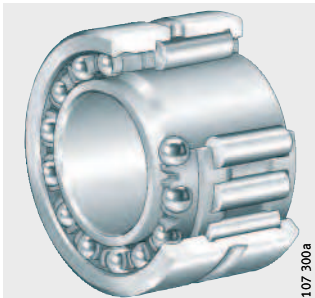
NKXR, NKXR...-Z



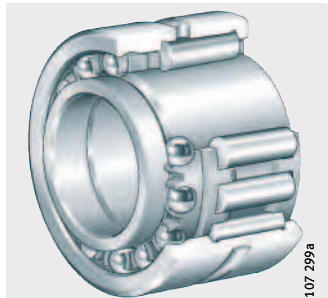
## Needle roller/angular contact ball bearings

With inner ring

NKIA



NKIB

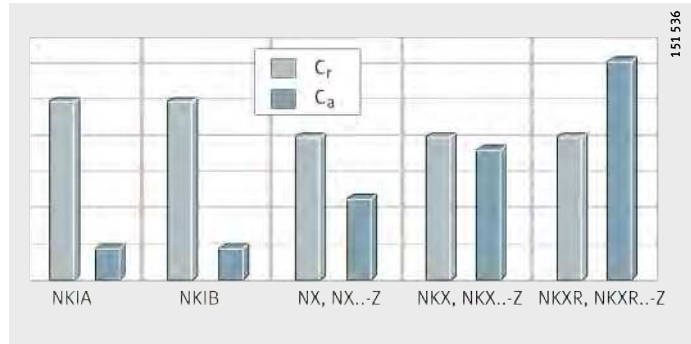




# Combined needle roller bearings

## Features

These series comprise radial needle roller bearings and a rolling bearing component capable of supporting axial loads. They can support high radial forces as well as axial forces in one direction, while NKIB can support axial forces from both directions, and are used as locating or semi-locating bearings, *Figure 1*.



$C_r$  = radial dynamic load carrying capacity  
 $C_a$  = axial dynamic load carrying capacity

*Figure 1*  
 Radial and axial dynamic load carrying capacity

## X-life

Combined needle roller bearings are X-life bearings. These bearings have optimised raceway surfaces. This gives higher load carrying capacity and longer rating life.

The bearings are available in the following designs:

- needle roller/axial deep groove ball bearings
- needle roller/axial cylindrical roller bearings
- needle roller/angular contact ball bearings.

## Needle roller/axial deep groove ball bearings

These series do not have an inner ring and are therefore particularly compact in a radial direction. However, they require a shaft raceway that is hardened and ground.

Bearings NX and NX...-Z have a full complement axial ball bearing component and end caps.

Series NKX and NKX...-Z have an axial bearing component comprising a ball and cage assembly with a sheet steel or plastic cage. NKX...-Z also has an end cap on the axial bearing component.

## Lubrication

For lubrication, the outer ring has a lubrication groove and lubrication holes.

NX and NKX are lubricated with oil.

The end cap in NX has lubrication holes.

NX...-Z and NKX...-Z are lubricated with grease. The axial bearing component is greased using a lithium complex soap grease to GA08. The end caps do not have lubrication holes.



## Combined needle roller bearings

### Needle roller/ axial cylindrical roller bearings

These bearings do not have an inner ring and are therefore particularly compact in a radial direction. However, they require a shaft raceway that is hardened and ground.

Series NKXR and NKXR..-Z have an axial bearing component comprising a roller and cage assembly with a plastic cage. NKXR..-Z also has an end cap on the axial bearing component.

#### Lubrication

For lubrication, the outer ring has a lubrication groove and lubrication holes.

NKXR is lubricated with oil.

NKXR..-Z is intended for grease lubrication. The axial bearing component is greased using a lithium complex soap grease to GA08. The end cap does not have lubrication holes.

### Needle roller/ angular contact ball bearings

Combined bearings NKIA and NKIB have an inner ring.

Series NKIA corresponds to DIN 5 429-2. It can support axial loads from one direction.

#### For alternating axial forces

NKIB has one narrow inner ring and one wide inner ring.

The axial bearing component has a plastic ball cage.

At the point where the inner rings join, there is a shoulder on both sides for guidance of the ball and cage assembly. As a result, these bearings are also suitable for supporting axial forces alternating in direction.

The bearings guide the shaft with an axial clearance of 0,08 mm to 0,25 mm.

#### Lubrication

NKIA and NKIB can be lubricated with grease or oil.

For lubrication, the outer ring has a lubrication groove and lubrication hole.

#### Operating temperature

They are suitable for operating temperatures from  $-20\text{ }^{\circ}\text{C}$  to  $+120\text{ }^{\circ}\text{C}$ .

#### Cages

The radial cages are made from sheet steel or plastic.

Bearings with a plastic cage have the suffix TV.

#### Suffixes

Suffixes for available designs: see table.

#### Available designs

Suffix	Description	Design
TV	Bearing with radial cage made from glass fibre reinforced polyamide 66	Standard
Z	Bearing with end cap Axial bearing component greased with lithium complex soap grease to GA08	

## Design and safety guidelines

### Minimum radial load

In order to ensure operation without slippage, the bearings must be subjected to a minimum load  $F_{r\min}$  in a radial direction. This applies in particular to high speed bearings since, if the radial load is insufficient or not present, damaging sliding motion may occur between the rolling elements and raceways. In continuous operation, a minimum radial load of the order of  $C_r/P < 50$  is necessary.

### Support of axial forces

The axial bearing component must be preloaded to 1% of the axial basic static load rating  $C_{0a}$ . The basic load ratings  $C_{0a}$  are stated in the dimension tables.

### Needle roller/axial deep groove ball bearings, needle roller/axial cylindrical roller bearings

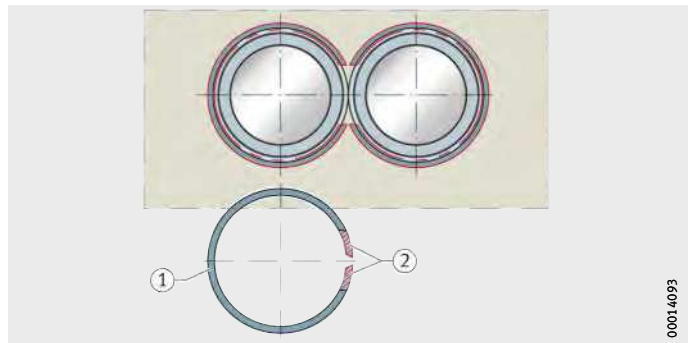
In order to support axial forces, the bearing must be abutted by means of snap rings on the outer ring or a housing shoulder. If there is little distance between the shaft centres, the snap rings should be shortened, *Figure 2*. Snap rings WR and SW are available from trade outlets.

If the bearings are to support axial forces from alternating directions, two bearings must be fitted opposed to each other. The unloaded bearing must be axially preloaded, for example by means of springs. This allows compensation of thermal expansion.

In order to avoid double fits on NKX and NKXR, the axial bearing component must be free in the housing (outside diameter  $D_1$  and  $D_2+0,5$  mm min.).

- ① Snap ring
- ② Shortened area

*Figure 2*  
Shortened snap rings



# Combined needle roller bearings

## Needle roller/ angular contact ball bearings

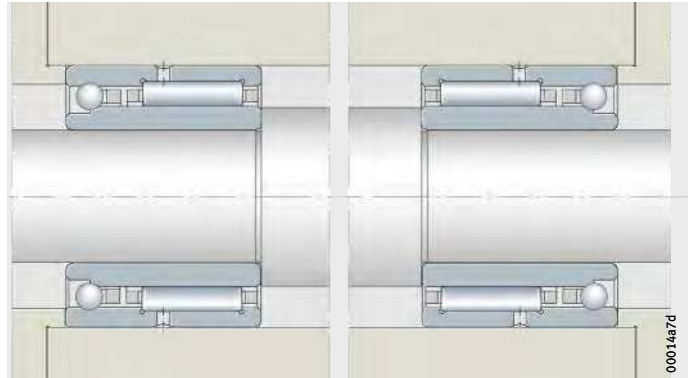
Series NKIA can support axial forces in one direction, while NKIB can support axial forces in both directions.

If bearings NKIA are to support axial forces from alternating directions, two bearings must be fitted opposed to each other, *Figure 3*.

In the case of NKIB, the wide and narrow inner ring must be axially clamped against each other. The narrow inner ring has a larger bore diameter. This results in an interference fit if a shaft tolerance k6 is used.

NKIA

*Figure 3*  
Two bearings adjusted  
against each other



## Axial static load safety factor



The axial load must not exceed 25% of the radial load.  
The axial static load safety factor  $S_0$  must be  $> 1,5$ .

## Speeds

The limiting speeds  $n_G$  in the dimension tables are valid for oil lubrication.  
With grease lubrication, the permissible value is 60% of the value in the table.  
The reference speed  $n_B$  for NKXR, NKXR..-Z, NKIA, NKIB is given in the dimension tables. In order to calculate the thermally safe operating speed  $n_{per}$ , NKXR(Z) must be regarded as axial bearings, while NKIA and NKIB must be regarded as radial bearings.

## Lubrication

In bearings with grease lubrication, the radial bearing component should be greased before initial operation using a grease of similar quality to that used in the axial bearing component.  
In order to determine the relubrication interval, values must be calculated separately for the axial and radial bearing components and the lower value should be used.

## Design of bearing arrangements

### Shaft and housing tolerances

Recommended shaft and housing tolerances are given in the following tables.

#### Mounting dimensions

As far as possible, the dimension tables give the maximum value of the radius  $r_a$  and the diameters of the abutment shoulders  $d_a$ .

#### Raceway for bearings without inner ring

Where bearings without an inner ring are to be used, the rolling element raceway on the shaft must be hardened and ground, see tables. The surface hardness of the raceway must be 670 HV + 170 HV, the hardening depth CHD or SHD must be sufficiently large.

If the shaft cannot be configured as a raceway, inner rings of series IR can be used. The inner rings must be ordered separately. Inner rings: see page 776.



For NKIA and NKIB, the shaft tolerance must not be greater than k6 and the bore tolerance must not be less than M6.

If the surface of the shaft raceway is produced to DIN 617, the basic load ratings  $C_r$  in the dimension tables must be reduced by 15%.

#### Tolerances for shaft raceway and housing bore

Series	Shaft tolerance		Bore tolerance
	For bearings without inner ring	For bearings with inner ring	
NKIA, NKIB	–	k6	M6
NX, NKX, NKXR	k6		K6, M6 (for rigid bearing arrangement)

#### Surfaces for shaft raceway and housing bore

Surface	Shaft raceway		Housing bore
	For bearings without inner ring	For bearings with inner ring	
Roughness max.	$R_{a0,1}$ ( $R_{z0,4}$ )	–	–
Roundness max.	IT3	IT 4/2	IT 5/2
Parallelism max.	IT3	IT 4	IT 4

#### Replacement of inner rings



Combined needle roller bearings are not self-retaining.

In the standard bearings of series NKIA and NKIB, the inner rings are matched to the enveloping circle tolerance F6 and can be interchanged with each other within the same accuracy class.



# Combined needle roller bearings

**Radial location** Bearings with an inner ring are radially located by means of a fit on the shaft and in the housing.

**Axial location** The abutment shoulders (shaft, housing) should be sufficiently high and perpendicular to the bearing axis. The transition from the bearing seat to the abutment shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. The minimum values for the chamfer dimensions  $r$  in the dimension tables must be observed.

The overlap between the snap rings and the end faces of the bearing rings must be sufficiently large.

Maximum inner ring chamfer dimensions to DIN 620-6 must be taken into consideration.



In order to prevent lateral creep of the bearing rings, they must be located by means of physical locking. For locating bearings and for bearings with a split inner ring, axial abutment of the bearing rings on both sides is particularly important.

**Accuracy** The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620. This excludes bearings NKIB, the bore  $d_1$  of the narrow inner ring and the width ( $-0,3$  mm) over both inner rings as well as bearings NKX and NKXR with diameters  $D_1, D_2$ .

**Radial internal clearance** Bearings with inner ring have a radial internal clearance CN to DIN 620-4.

**Radial internal clearance**

Bore $d$ mm		Radial internal clearance CN $\mu\text{m}$	
over	incl.	min.	max.
–	24	20	45
24	30	20	45
30	40	25	50
40	50	30	60
50	65	40	70
65	80	40	75
80	100	50	85

**Enveloping circle** In the case of bearings without an inner ring, the dimension for the enveloping circle  $F_w$  is used instead of the radial internal clearance.

The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway.

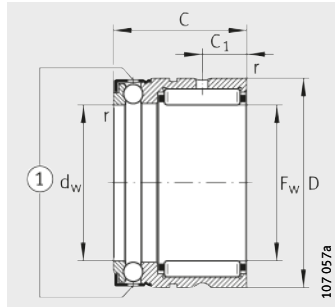
For bearings before fitting, the enveloping circle  $F_w$  is in the tolerance zone F6.

Deviations for the tolerance zone F6: see table, page 168.

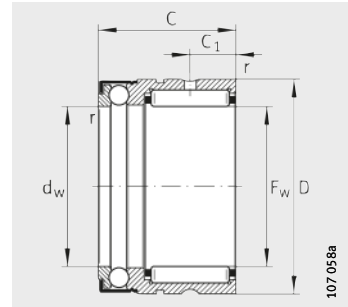


# Needle roller/ axial deep groove ball bearings

Without inner ring



NX  
① Oil holes

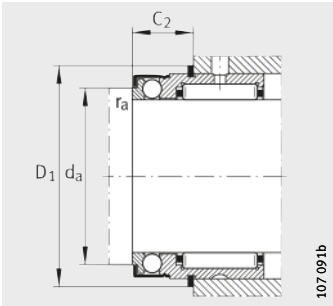


NX..-Z

**Dimension table** - Dimensions in mm

Designation				Dimensions						Mounting dimensions			
For oil lubrication	For grease lubrication	X-life	Mass m	F <sub>w</sub>	D	C	C <sub>1</sub>	d <sub>w</sub>	r	C <sub>2</sub>	D <sub>1</sub>	d <sub>a</sub>	r <sub>a</sub>
			≈ g			-0,25		E8	min.				max.
<b>NX7-TV</b>	<b>NX7-Z-TV</b>	<b>XL</b>	14	<b>7</b>	14	18	4,7	7	0,3	10	16,5	9,6	0,3
<b>NX10</b>	<b>NX10-Z</b>	<b>XL</b>	25	<b>10</b>	19	18	4,7	10	0,3	10	21,9	14,6	0,3
<b>NX12</b>	<b>NX12-Z</b>	<b>XL</b>	28	<b>12</b>	21	18	4,7	12	0,3	10	23,7	16,6	0,3
<b>NX15</b>	<b>NX15-Z</b>	<b>XL</b>	48	<b>15</b>	24	28	8	15	0,3	12,2	26,5	19	0,3
<b>NX17</b>	<b>NX17-Z</b>	<b>XL</b>	53	<b>17</b>	26	28	8	17	0,3	12,2	28,5	21	0,3
<b>NX20</b>	<b>NX20-Z</b>	<b>XL</b>	68	<b>20</b>	30	28	8	20	0,3	12,2	33,6	25	0,3
<b>NX25</b>	<b>NX25-Z</b>	<b>XL</b>	115	<b>25</b>	37	30	8	25	0,3	14,2	40,4	31,6	0,3
<b>NX30</b>	<b>NX30-Z</b>	<b>XL</b>	130	<b>30</b>	42	30	10	30	0,3	14,2	45,1	36,5	0,3
<b>NX35</b>	<b>NX35-Z</b>	<b>XL</b>	160	<b>35</b>	47	30	10	35	0,3	14,2	50,1	40,5	0,3





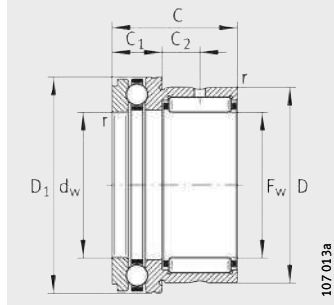
Mounting dimensions  
Snap ring in outer ring

Basic load ratings				Fatigue limit load		Limiting speed $n_G$ $\text{min}^{-1}$	Recommended inner rings Designation	Suitable snap rings
radial		axial		$C_{ur}$	$C_{ua}$			
dyn. $C_r$ N	stat. $C_{Or}$ N	dyn. $C_a$ N	stat. $C_{Oa}$ N	N	N			
3 250	2 650	3 150	4 300	410	190	15 000	–	<b>WR14, SW14</b>
5 000	3 700	4 600	7 200	720	320	11 000	<b>IR6X10X10-IS1</b>	<b>WR19, SW19</b>
5 400	4 300	4 850	8 200	830	365	9 500	<b>IR8X12X10-IS1</b>	<b>WR21, SW21</b>
12 100	12 700	5 600	10 400	2 320	460	8 000	<b>IR12X15X16</b>	<b>WR24, SW24</b>
13 500	15 000	5 800	11 500	2 750	510	7 500	<b>IR14X17X17</b>	<b>WR26, SW26</b>
14 600	17 500	7 000	14 700	3 200	650	6 500	<b>IR17X20X16</b>	<b>WR30, SW30</b>
16 800	22 400	11 100	24 300	4 150	1 080	4 900	<b>IR20X25X16-IS1</b>	<b>WR37, SW37</b>
25 500	36 000	11 700	28 000	6 300	1 230	4 300	<b>IR25X30X20</b>	<b>WR42, SW42</b>
27 500	41 500	12 400	32 500	7 300	1 440	3 700	<b>IR30X35X20</b>	<b>WR47, SW47</b>

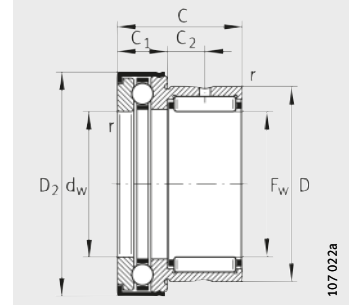


# Needle roller/ axial deep groove ball bearings

Without inner ring  
With or without end cap



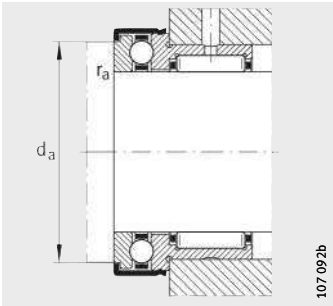
NKX



NKX..-Z

**Dimension table** - Dimensions in mm

Without end cap Designation	X-life	Mass m ≈g	With end cap Designation	X-life	Mass m ≈g	Dimensions					
						F <sub>w</sub>	D	D <sub>1</sub> max.	D <sub>2</sub> max.	C -0,25	C <sub>1</sub> -0,2
NKX10-TV	XL	34	NKX10-Z-TV	XL	36	10	19	24,1	25,2	23	9
NKX12	XL	38	NKX12-Z	XL	40	12	21	26,1	27,2	23	9
NKX15	XL	44	NKX15-Z	XL	47	15	24	28,1	29,2	23	9
NKX17	XL	53	NKX17-Z	XL	55	17	26	30,1	31,2	25	9
NKX20	XL	83	NKX20-Z	XL	90	20	30	35,1	36,2	30	10
NKX25	XL	125	NKX25-Z	XL	132	25	37	42,1	43,2	30	11
NKX30	XL	141	NKX30-Z	XL	148	30	42	47,1	48,2	30	11
NKX35	XL	163	NKX35-Z	XL	168	35	47	52,1	53,2	30	12
NKX40	XL	200	NKX40-Z	XL	208	40	52	60,1	61,2	32	13
NKX45	XL	252	NKX45-Z	XL	265	45	58	65,2	66,5	32	14
NKX50	XL	280	NKX50-Z	XL	300	50	62	70,2	71,5	35	14
NKX60	XL	360	NKX60-Z	XL	380	60	72	85,2	86,5	40	17
NKX70	XL	500	NKX70-Z	XL	520	70	85	95,2	96,5	40	18



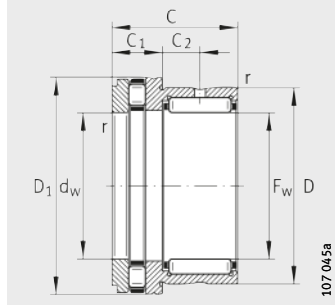
Mounting dimensions

			Mounting dimensions		Basic load ratings				Fatigue limit load		Limiting speed $n_G$ min <sup>-1</sup>	Recommended inner rings Designation
$C_2$	$d_w$	$r$	$d_a$	$r_a$	radial		axial		$C_{ur}$	$C_{ua}$		
	E8	min.		max.	dyn. $C_r$ N	stat. $C_{0r}$ N	dyn. $C_a$ N	stat. $C_{0a}$ N	N	N		
6,5	10	0,3	19,7	0,3	7 000	7 800	10 000	14 000	1 310	670	12 400	<b>IR7X10X16</b>
6,5	12	0,3	21,7	0,3	10 100	11 000	10 300	15 400	1 920	740	10 900	<b>IR9X12X16</b>
6,5	15	0,3	23,7	0,3	12 100	12 700	10 500	16 800	2 320	810	9 200	<b>IR12X15X16</b>
8	17	0,3	25,7	0,3	13 500	15 000	10 800	18 200	2 750	870	8 400	<b>IR14X17X17</b>
10,5	20	0,3	30,7	0,3	18 600	23 800	14 300	24 700	4 150	1 190	7 200	<b>IR17X20X20</b>
9,5	25	0,6	37,7	0,6	21 300	30 500	19 600	37 500	5 300	1 790	5 800	<b>IR20X25X20</b>
9,5	30	0,6	42,7	0,6	25 500	36 000	20 400	42 000	6 300	2 030	5 000	<b>IR25X30X20</b>
9	35	0,6	47,7	0,6	27 500	41 500	21 200	47 000	7 300	2 270	4 400	<b>IR30X35X20</b>
10	40	0,6	55,7	0,6	29 500	47 000	27 000	63 000	8 300	3 000	3 900	<b>IR35X40X20</b>
9	45	0,6	60,5	0,6	31 000	53 000	28 000	69 000	9 300	3 350	3 500	<b>IR40X45X20</b>
10	50	0,6	65,5	0,6	43 000	74 000	29 000	75 000	12 700	3 650	3 200	<b>IR45X50X25</b>
12	60	1	80,5	1	47 500	90 000	41 500	113 000	15 400	5 400	2 750	<b>IR50X60X25</b>
11	70	1	90,5	1	50 000	92 000	43 000	127 000	15 700	6 100	2 320	<b>IR60X70X25</b>

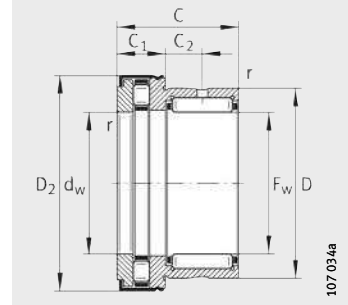


# Needle roller/ axial cylindrical roller bearings

Without inner ring  
With or without end cap



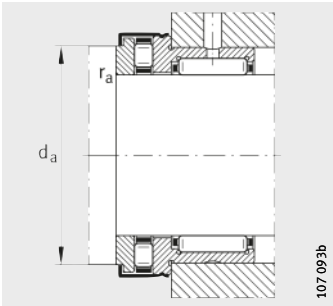
NKXR



NKXR...-Z

**Dimension table** - Dimensions in mm

Without end cap Designation	X-life	Mass m ≈ g	With end cap Designation	X-life	Mass m ≈ g	Dimensions					
						F <sub>w</sub>	D	D <sub>1</sub> max.	D <sub>2</sub> max.	C -0,25	C <sub>1</sub> -0,2
NKXR15	XL	42	NKXR15-Z	XL	45	15	24	28,1	29,2	23	9
NKXR17	XL	50	NKXR17-Z	XL	53	17	26	30,1	31,2	25	9
NKXR20	XL	80	NKXR20-Z	XL	84	20	30	35,1	36,2	30	10
NKXR25	XL	120	NKXR25-Z	XL	125	25	37	42,1	43,2	30	11
NKXR30	XL	135	NKXR30-Z	XL	141	30	42	47,1	48,2	30	11
NKXR35	XL	157	NKXR35-Z	XL	165	35	47	52,1	53,2	30	12
NKXR40	XL	204	NKXR40-Z	XL	214	40	52	60,1	61,2	32	13
NKXR45	XL	244	NKXR45-Z	XL	260	45	58	65,2	66,5	32	14
NKXR50	XL	268	NKXR50-Z	XL	288	50	62	70,2	71,5	35	14



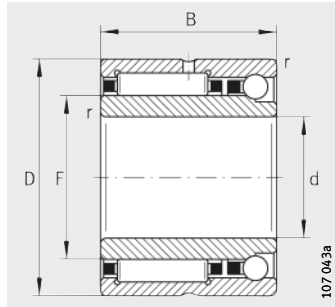
Mounting dimensions

C <sub>2</sub>	d <sub>w</sub>	r	Mounting dimensions		Basic load ratings				Fatigue limit load		Limiting speed n <sub>G</sub> min <sup>-1</sup>	Reference speed n <sub>B</sub> min <sup>-1</sup>	Recommended inner rings Designation
			d <sub>a</sub>	r <sub>a</sub>	radial		axial		C <sub>ur</sub>	C <sub>ua</sub>			
			min.	max.	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	dyn. C <sub>a</sub> N	stat. C <sub>0a</sub> N					
6,5	15	0,3	23,7	0,3	12 100	12 700	14 400	28 500	2 320	4 000	9 200	6 500	<b>IR12X15X16</b>
8	17	0,3	25,7	0,3	13 500	15 000	15 900	33 500	2 750	4 650	8 400	5 500	<b>IR14X17X17</b>
10,5	20	0,3	30,7	0,3	18 600	23 800	24 900	53 000	4 150	7 300	7 200	4 200	<b>IR17X20X20</b>
9,5	25	0,6	37,7	0,6	21 300	30 500	33 500	76 000	5 300	7 100	5 800	3 400	<b>IR20X25X20</b>
9,5	30	0,6	42,7	0,6	25 500	36 000	35 500	86 000	6 300	8 000	5 000	2 900	<b>IR25X30X20</b>
9	35	0,6	47,7	0,6	27 500	41 500	39 000	101 000	7 300	9 500	4 400	2 500	<b>IR30X35X20</b>
10	40	0,6	55,7	0,6	29 500	47 000	56 000	148 000	8 300	14 500	3 900	2 000	<b>IR35X40X20</b>
9	45	0,6	60,6	0,6	31 000	53 000	59 000	163 000	9 300	16 000	3 500	1 900	<b>IR40X45X20</b>
10	50	0,6	65,5	0,6	43 000	74 000	61 000	177 000	12 700	17 400	3 200	1 700	<b>IR45X50X25</b>

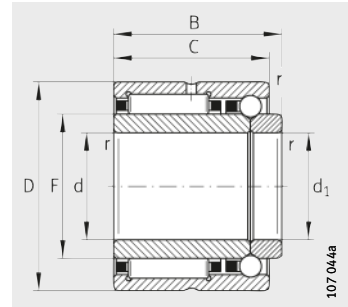


# Needle roller/angular contact ball bearings

With inner ring



NKIA  
Single direction



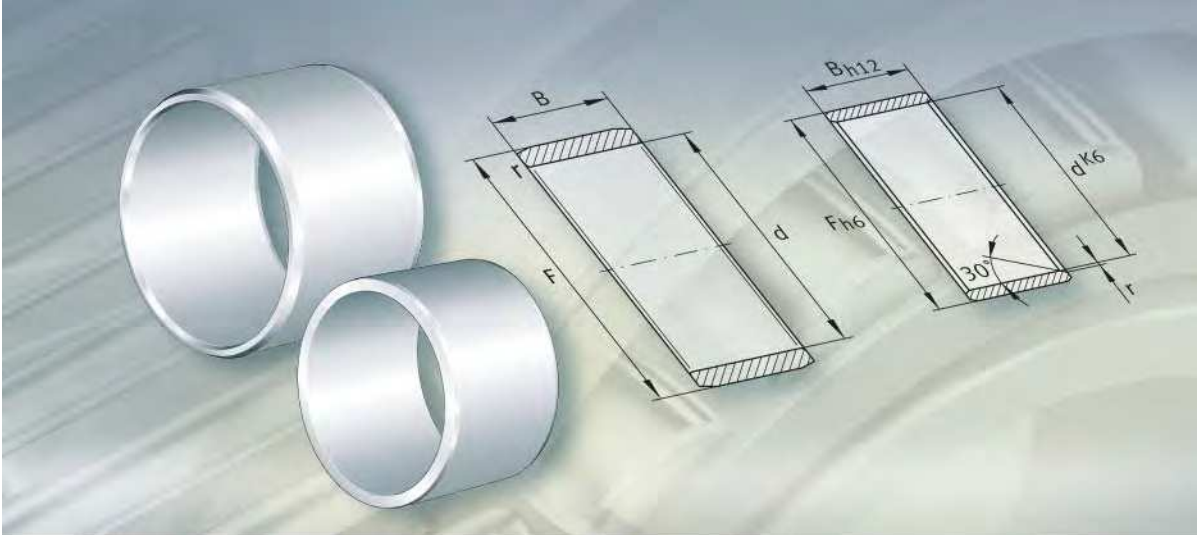
NKIB  
Double direction

**Dimension table** - Dimensions in mm

Designation	X-life	Mass m ≈g	Dimensions						Basic load ratings		
			d	F	D	B	C	r	radial		
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
NKIA5901	XL	40	12	16	24	16	–	0,3	8 600	8 300	
NKIB5901	XL	43	12	16	24	17,5	16	0,3	8 600	8 300	
NKIA5902	XL	50	15	20	28	18	–	0,3	12 000	13 600	
NKIB5902	XL	52	15	20	28	20	18	0,3	12 000	13 600	
NKIA5903	XL	56	17	22	30	18	–	0,3	12 400	14 600	
NKIB5903	XL	58	17	22	30	20	18	0,3	12 400	14 600	
NKIA5904	XL	103	20	25	37	23	–	0,3	23 700	25 500	
NKIB5904	XL	107	20	25	37	25	23	0,3	23 700	25 500	
NKIA59/22	XL	118	22	28	39	23	–	0,3	26 000	29 500	
NKIB59/22	XL	122	22	28	39	25	23	0,3	26 000	29 500	
NKIA5905	XL	130	25	30	42	23	–	0,3	26 500	31 500	
NKIB5905	XL	134	25	30	42	25	23	0,3	26 500	31 500	
NKIA5906	XL	147	30	35	47	23	–	0,3	28 500	35 500	
NKIB5906	XL	151	30	35	47	25	23	0,3	28 500	35 500	
NKIA5907	XL	243	35	42	55	27	–	0,6	35 500	50 000	
NKIB5907	XL	247	35	42	55	30	27	0,6	35 500	50 000	
NKIA5908	XL	315	40	48	62	30	–	0,6	48 500	67 000	
NKIB5908	XL	320	40	48	62	34	30	0,6	48 500	67 000	
NKIA5909	XL	375	45	52	68	30	–	0,6	51 000	73 000	
NKIB5909	XL	380	45	52	68	34	30	0,6	51 000	73 000	
NKIA5910	XL	380	50	58	72	30	–	0,6	53 000	80 000	
NKIB5910	XL	385	50	58	72	34	30	0,6	53 000	80 000	
NKIA5911	XL	550	55	63	80	34	–	1	65 000	100 000	
NKIB5911	XL	555	55	63	80	38	34	1	65 000	100 000	
NKIA5912	XL	590	60	68	85	34	–	1	68 000	108 000	
NKIB5912	XL	595	60	68	85	38	34	1	68 000	108 000	
NKIA5913	XL	635	65	72	90	34	–	1	69 000	112 000	
NKIB5913	XL	640	65	72	90	38	34	1	69 000	112 000	
NKIA5914	XL	980	70	80	100	40	–	1	95 000	156 000	
NKIB5914	XL	985	70	80	100	45	40	1	95 000	156 000	

axial		Fatigue limit load		Limiting speed	Reference speed
dyn. C <sub>a</sub>	stat. C <sub>0a</sub>	C <sub>ur</sub>	C <sub>ua</sub>	n <sub>G</sub>	n <sub>B</sub>
N	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
2 700	3 450	1 630	152	23 600	21 000
2 700	3 450	1 630	152	23 600	21 000
2 900	4 200	2 430	186	21 600	17 000
2 900	4 200	2 430	186	21 600	17 000
3 150	4 900	2 600	216	20 600	15 000
3 150	4 900	2 600	216	20 600	15 000
4 900	7 400	4 600	330	17 200	14 000
4 900	7 400	4 600	330	17 200	14 000
5 300	8 600	5 300	380	16 100	12 000
5 300	8 600	5 300	380	16 100	12 000
5 400	9 300	5 700	410	14 600	12 000
5 400	9 300	5 700	410	14 600	12 000
5 900	11 200	6 400	495	12 700	10 000
5 900	11 200	6 400	495	12 700	10 000
7 400	14 900	9 400	660	10 900	9 000
7 400	14 900	9 400	660	10 900	9 000
9 200	19 400	11 500	860	9 600	7 500
9 200	19 400	11 500	860	9 600	7 500
9 600	21 400	12 600	950	8 700	7 000
9 600	21 400	12 600	950	8 700	7 000
10 100	24 300	13 800	1 080	8 000	6 500
10 100	24 300	13 800	1 080	8 000	6 500
12 100	29 500	17 300	1 300	7 300	6 000
12 100	29 500	17 300	1 300	7 300	6 000
12 400	32 000	18 800	1 410	6 800	5 500
12 400	32 000	18 800	1 410	6 800	5 500
12 800	34 000	19 500	1 510	6 300	5 500
12 800	34 000	19 500	1 510	6 300	5 500
16 800	44 500	27 500	1 970	5 800	4 900
16 800	44 500	27 500	1 970	5 800	4 900





## Inner rings



# Inner rings

	Page
<b>Product overview</b>	
Inner rings.....	778
<b>Features</b>	
Precision machined raceway.....	779
Ground raceway.....	779
Machining allowance on raceway.....	779
Suffixes.....	780
<b>Design and safety guidelines</b>	
Design of bearing arrangements .....	780
<b>Accuracy</b>	
Normal tolerances .....	781
Radial internal clearance .....	781
<b>Dimension tables</b>	
Inner rings without lubrication hole.....	782
Inner rings with lubrication hole.....	786



# Product overview Inner rings

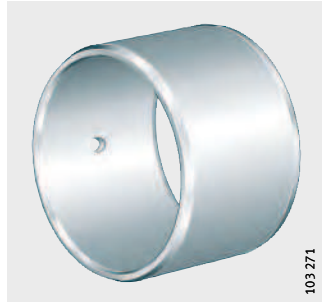
**Precision machined raceway**

IR



**With lubrication hole**

IR..IS1



**Ground raceway**

LR



# Inner rings

**Features** Inner rings are made from hardened rolling bearing steel and have precision machined or ground raceways.

They are used where:

- the shaft cannot be used as a raceway for needle roller and cage assemblies, drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end and needle roller bearings
- needle roller bearings must be combined with wider inner rings in order to allow larger axial displacements of the shaft in relation to the housing
- optimum running surfaces are required for seal lips.

## Precision machined raceway

Inner rings IR have a precision machined raceway.

Chamfers on the end faces allow easy insertion into the bearing and prevent damage to the seal lips of the bearing.

Inner rings are available with and without a lubrication hole.

Rings with a lubrication hole have the suffix IS1.

## Ground raceway

Inner rings LR have a ground raceway.

The end faces are turned and the edges are broken.

These rings have larger tolerances than the rings IR. They are thus suitable for applications that allow larger width tolerances and less demanding requirements for axial runout.

## Machining allowance on raceway

Inner rings are available as a special design with a machining allowance  $z$  on the raceway (suffix VGS). The size of the allowance is dependent on the raceway diameter, see table.

### Machining allowance

Raceway diameter		Machining allowance $z$ mm	Preground raceway diameter $F_{VGS}$
F mm over	incl.		
–	50	0,1	$F_{VGS} = F + z$ (tolerance h7)
50	80	0,15	
80	180	0,2	
180	250	0,25	
250	315	0,3	
315	400	0,35	
400	500	0,4	



# Inner rings

## Suffixes

Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
C3, C4	Radial internal clearance larger than normal	Special design, available by agreement
C2	Radial internal clearance smaller than normal	
EGS	Surface ground free from spiral marks for rotary shaft seals to DIN 3 760 and DIN 3 761	
IS1	With lubrication hole	
VGS	Machining allowance z on raceway <sup>1)</sup>	

<sup>1)</sup> See table Machining allowance, page 779.

## Design and safety guidelines

### Design of bearing arrangements

#### Axial location

In order to prevent lateral creep of the bearing rings, they must be located by means of physical locking.

The abutment shoulders (shaft, housing) should be sufficiently high and perpendicular to the bearing axis. The transition from the bearing seat to the abutment shoulder must be designed with rounding to DIN 5 418 or an undercut to DIN 509. The minimum values for the chamfer dimensions r in the dimension tables must be observed.

The overlap between the snap rings and the end faces of the bearing rings must be sufficiently large.

Maximum inner ring chamfer dimensions to DIN 620-6 must be taken into consideration.

**Accuracy**  
**Normal tolerances**

The dimensional and geometrical tolerances of inner rings IR correspond to tolerance class PN to DIN 620.

**Radial internal clearance**

When combined with INA needle roller bearings, inner rings have an internal clearance CN to DIN 620-4.

When combined with INA drawn cup needle roller bearings with open ends or closed end, inner rings have an internal clearance C2 to C3 to DIN 620-4, depending on the raceway diameter.

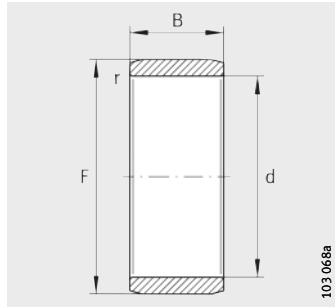
**Radial internal clearance**

Bore d mm		Radial internal clearance							
		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
-	24	0	25	20	45	35	60	50	75
24	30	0	25	20	45	35	60	50	75
30	40	5	30	25	50	45	70	60	85
40	50	5	35	30	60	50	80	70	100
50	65	10	40	40	70	60	90	80	110
65	80	10	45	40	75	65	100	90	125
80	100	15	50	50	85	75	110	105	140
100	120	15	55	50	90	85	125	125	165
120	140	15	60	60	105	100	145	145	190
140	160	20	70	70	120	115	165	165	215
160	180	25	75	75	125	120	170	170	220
180	200	35	90	90	145	140	195	195	250
200	225	45	105	105	165	160	220	220	280
225	250	45	110	110	175	170	235	235	300
250	280	55	125	125	195	190	260	260	330
280	315	55	130	130	205	200	275	275	350
315	355	65	145	145	225	225	305	305	385
355	400	100	190	190	280	280	370	370	460
400	450	110	210	210	310	310	410	410	510

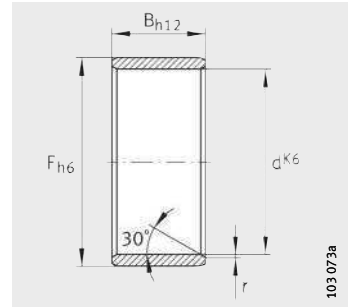


# Inner rings

Without lubrication hole



IR



LR

**Dimension table** - Dimensions in mm

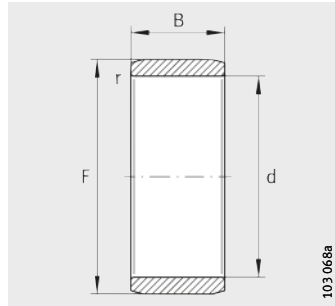
Designation	Mass m ≈g	Dimensions				Tolerance of raceway F μm		
		d	F	B	r	Tolerance		
						min.	upper	lower
IR5X8X12	2,8	5	8	12	0,3	-7	-23	
IR5X8X16	3,7	5	8	16	0,3	-7	-23	
IR6X9X12	3	6	9	12	0,3	-7	-23	
IR6X9X16	4,3	6	9	16	0,3	-7	-23	
IR7X10X10,5	3,1	7	10	10,5	0,3	-7	-23	
LR7X10X10,5	3,1	7	10	10,5	0,3	-	-	
IR7X10X12	3,6	7	10	12	0,3	-7	-23	
IR7X10X16	4,9	7	10	16	0,3	-7	-23	
IR8X12X10,5	5	8	12	10,5	0,3	-4	-18	
LR8X12X10,5	5	8	12	10,5	0,3	-	-	
IR8X12X12,5	5,9	8	12	12,5	0,3	-4	-18	
LR8X12X12,5	5	8	12	12,5	0,3	-	-	
IR9X12X12	4,4	9	12	12	0,3	-4	-18	
IR9X12X16	6	9	12	16	0,3	-4	-18	
IR10X13X12,5	5,2	10	13	12,5	0,3	-4	-18	
LR10X13X12,5	5,2	10	13	12,5	0,3	-	-	
IR10X14X13	7,4	10	14	13	0,3	-4	-18	
IR10X14X16	9,2	10	14	16	0,3	-4	-18	
IR10X14X20	11,5	10	14	20	0,3	-4	-18	
IR12X15X12	5,7	12	15	12	0,3	-4	-18	
IR12X15X12,5	6,1	12	15	12,5	0,3	-4	-18	
LR12X15X12,5	6,1	12	15	12,5	0,3	-	-	
IR12X15X16	7,6	12	15	16	0,3	-4	-18	
IR12X15X16,5	8,1	12	15	16,5	0,3	-4	-18	
LR12X15X16,5	8,1	12	15	16,5	0,3	-	-	
IR12X15X22,5	10,9	12	15	22,5	0,3	-4	-18	
LR12X15X22,5	10,9	12	15	22,5	0,3	-	-	
IR12X16X13	8,5	12	16	13	0,3	-4	-18	
IR12X16X16	10,7	12	16	16	0,3	-4	-18	
IR12X16X20	13,5	12	16	20	0,3	-4	-18	
IR12X16X22	14,9	12	16	22	0,3	-4	-18	
IR14X17X17	9,5	14	17	17	0,3	-4	-18	

**Dimension table** (continued) - Dimensions in mm

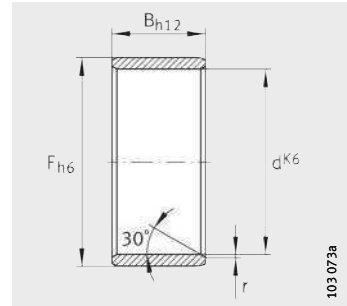
Designation	Mass m ≈g	Dimensions				Tolerance of raceway F μm		
		d	F	B	r	Tolerance		
						min.	upper	lower
LR15X18X12,5	7,2	15	18	12,5	0,3	-	-	
IR15X18X16	9,4	15	18	16	0,3	-4	-18	
IR15X18X16,5	9,8	15	18	16,5	0,3	-4	-18	
LR15X18X16,5	9,8	15	18	16,5	0,3	-	-	
IR15X19X16	12,9	15	19	16	0,3	0	-12	
IR15X19X20	16,3	15	19	20	0,3	0	-12	
IR15X20X13	13,5	15	20	13	0,3	0	-12	
IR15X20X23	24,4	15	20	23	0,3	0	-12	
IR17X20X16	10,6	17	20	16	0,3	0	-12	
IR17X20X16,5	11,1	17	20	16,5	0,3	0	-12	
LR17X20X16,5	11,1	17	20	16,5	0,3	-	-	
IR17X20X20	13,5	17	20	20	0,3	0	-12	
IR17X20X20,5	13,8	17	20	20,5	0,3	0	-12	
LR17X20X20,5	13,8	17	20	20,5	0,3	-	-	
IR17X20X30,5	20,6	17	20	30,5	0,3	0	-12	
LR17x20X30,5	20,6	17	20	30,5	0,3	-	-	
IR17X21X16	15	17	21	16	0,3	0	-12	
IR17X21X20	18	17	21	20	0,3	0	-12	
IR17X22X13	14,9	17	22	13	0,3	0	-12	
IR17X22X16	18,4	17	22	16	0,3	0	-12	
IR17X22X23	27,1	17	22	23	0,3	0	-12	
IR17X24X20	33,8	17	24	20	0,6	0	-12	

# Inner rings

Without lubrication hole



IR



LR

**Dimension table (continued) - Dimensions in mm**

Designation	Mass m ≈g	Dimensions				Tolerance of raceway F μm		
		d	F	B	r	Tolerance of raceway F μm		
						min.	upper	lower
IR20X24X16	15	20	24	16	0,3	0	-12	
IR20X24X20	21,3	20	24	20	0,3	0	-12	
LR20X25X12,5	16,3	20	25	12,5	0,3	-	-	
LR20X25X16,5	21,7	20	25	16,5	0,3	-	-	
IR20X25X17	25	20	25	17	0,3	0	-12	
IR20X25X20	27,5	20	25	20	0,3	0	-12	
IR20X25X20,5	27,4	20	25	20,5	0,3	0	-12	
LR20X25X20,5	27,4	20	25	20,5	0,3	-	-	
IR20X25X26,5	38	20	25	26,5	0,3	0	-12	
LR20X25X26,5	38	20	25	26,5	0,3	-	-	
IR20X25X30	40,4	20	25	30	0,3	0	-12	
IR20X25X38,5	52,5	20	25	38,5	0,3	0	-12	
LR20X25X38,5	52,5	20	25	38,5	0,3	-	-	
IR20X28X20	45,2	20	28	20	0,6	0	-12	
IR22X26X16	18,2	22	26	16	0,3	0	-12	
IR22X26X20	23	22	26	20	0,3	0	-12	
IR22X28X17	29,5	22	28	17	0,3	0	-12	
IR22X28X20	35	22	28	20	0,3	0	-12	
IR22X28X20,5	36	22	28	20,5	0,3	0	-12	
LR22X28X20,5	36	22	28	20,5	0,3	-	-	
IR22X28X30	54,4	22	28	30	0,3	0	-12	

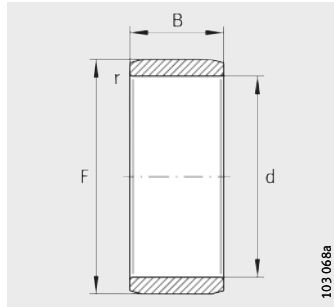
**Dimension table (continued) - Dimensions in mm**

Designation	Mass m ≈g	Dimensions				Tolerance of raceway F μm		
		d	F	B	r	Tolerance of raceway F μm		
						min.	upper	lower
IR25X29X20	25,9	25	29	20	0,3	0	-12	
IR25X29X30	39,3	25	29	30	0,3	0	-12	
LR25X30X12,5	20	25	30	12,5	0,3	-	-	
LR25X30X16,5	26,7	25	30	16,5	0,3	-	-	
IR25x30X17	27,4	25	30	17	0,3	0	-12	
IR25X30X20	32,8	25	30	20	0,3	0	-12	
IR25X30X20,5	33,4	25	30	20,5	0,3	0	-12	
LR25X30X20,5	33,4	25	30	20,5	0,3	-	-	
IR25X30X26,5	46	25	30	26,5	0,3	0	-12	
LR25X30X26,5	46	25	30	26,5	0,3	-	-	
IR25X30X30	53	25	30	30	0,3	0	-12	
IR25X30X32	56	25	30	32	0,3	0	-12	
IR25X30X38,5	64,5	25	30	38,5	0,3	0	-12	
LR25X30X38,5	64,5	25	30	38,5	0,3	-	-	
IR25X32X22	52,5	25	32	22	0,6	+5	-4	
IR28X32X17	24,5	28	32	17	0,3	+5	-4	
IR28X32X20	28,5	28	32	20	0,3	+5	-4	
IR28X32X30	43,5	28	32	30	0,3	+5	-4	
LR30x35X12,5	23,3	30	35	12,5	0,3	-	-	
IR30X35X13	25	30	35	13	0,3	+5	-4	
IR30X35X16	34	30	35	16	0,3	+5	-4	
LR30X35X16,5	31,4	30	35	16,5	0,3	-	-	
IR30X35X17	36	30	35	17	0,3	+5	-4	
IR30X35X20	39	30	35	20	0,3	+5	-4	
IR30X35X20,5	39,7	30	35	20,5	0,3	+5	-4	
LR30X35X20,5	39,7	30	35	20,5	0,3	-	-	
IR30X35X26	50,4	30	35	26	0,3	+5	-4	
IR30X35X30	58,5	30	35	30	0,3	+5	-4	
IR30X37X18	50	30	37	18	0,6	+5	-4	
IR30X37X22	61,6	30	37	22	0,6	+5	-4	
IR32X37X20	42	32	37	20	0,3	0	-9	
IR32x37X30	62	32	37	30	0,3	0	-9	
IR32X40X20	68	32	40	20	0,6	0	-9	
IR32X40X36	124	32	40	36	0,6	0	-9	
IR33X37X13	21,9	33	37	13	0,3	0	-9	

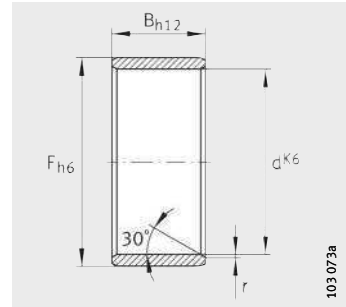


# Inner rings

Without lubrication hole



IR



LR

**Dimension table (continued) · Dimensions in mm**

Designation	Mass m ≈g	Dimensions				Tolerance of raceway F μm		
		d	F	B	r	Tolerance		
						min.	upper	lower
LR35X40X12,5	27,2	35	40	12,5	0,3	-	-	
LR35X40X16,5	37,4	35	40	16,5	0,3	-	-	
IR35X40X17	37,8	35	40	17	0,3	0	-9	
IR35X40X20	44,2	35	40	20	0,3	0	-9	
IR35X40X20,5	46,1	35	40	20,5	0,3	0	-9	
LR35X40X20,5	46,1	35	40	20,5	0,3	-	-	
IR35X40X30	67,1	35	40	30	0,3	0	-9	
IR35X42X36	117	35	42	36	0,6	0	-9	
IR35X43X22	82	35	43	22	0,6	0	-9	
IR38X43X20	48,1	38	43	20	0,3	0	-9	
IR38X43X30	73,6	38	43	30	0,3	0	-9	
LR40X45X16,5	41,4	40	45	16,5	0,3	-	-	
IR40X45X17	42,5	40	45	17	0,3	0	-9	
IR40X45X20	50,8	40	45	20	0,3	0	-9	
IR40X45X20,5	51,8	40	45	20,5	0,3	0	-9	
LR40X45X20,5	51,8	40	45	20,5	0,3	-	-	
IR40X45X30	84	40	45	30	0,3	0	-9	
IR40X48X22	91,6	40	48	22	0,6	0	-9	
IR40X48X40	170	40	48	40	0,6	0	-9	
IR40X50X22	118	40	50	22	1	0	-9	
IR42X47X20	52,8	42	47	20	0,3	-5	-19	
IR42X47X30	81	42	47	30	0,3	-5	-19	
LR45X50X20,5	58,8	45	50	20,5	0,3	-	-	
IR45X50X25	70,8	45	50	25	0,6	-5	-19	
IR45X50X25,5	75,1	45	50	25,5	0,3	-5	-19	
LR45X50X25,5	75,1	45	50	25,5	0,3	-	-	
IR45X50X35	101	45	50	35	0,6	-5	-19	
IR45X52X22	89	45	52	22	0,6	0	-11	
IR45X52X40	164	45	52	40	0,6	0	-11	
IR45X55X22	129	45	55	22	1	0	-11	
LR50X55X20,5	64,1	50	55	20,5	0,6	-	-	
IR50X55X25	78	50	55	25	0,6	0	-11	
IR50X55X35	112	50	55	35	0,6	0	-11	

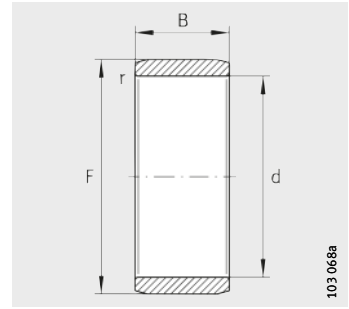
**Dimension table (continued) · Dimensions in mm**

Designation	Mass m ≈g	Dimensions				Tolerance of raceway F μm		
		d	F	B	r	Tolerance		
						min.	upper	lower
IR50X58X22	115	50	58	22	0,6	0	-11	
IR50X58X40	208	50	58	40	0,6	0	-11	
IR50X60X25	162	50	60	25	1	0	-11	
IR50X60X28	181	50	60	28	1,1	0	-11	
IR55X60X25	85,5	55	60	25	0,6	-10	-21	
IR55X60X35	121	55	60	35	0,6	-10	-21	
IR55X63X25	141	55	63	25	1	-10	-21	
IR55X63X45	256	55	63	45	1	-10	-21	
IR55X65X28	198	55	65	28	1,1	-10	-21	
IR60X68X25	152	60	68	25	1	-10	-21	
IR60X68X35	213	60	68	35	0,6	-10	-21	
IR60X68X45	276	60	68	45	1	-10	-21	
IR60X70X25	195	60	70	25	1	-10	-21	
IR60X70X28	215	60	70	28	1,1	-10	-21	
IR65X72X25	141	65	72	25	1	-10	-21	
IR65X72X45	259	65	72	45	1	-10	-21	
IR65X73X25	164	65	73	25	1	-10	-21	
IR65X73X35	231	65	73	35	1	-10	-21	
IR65X75X28	229	65	75	28	1,1	-10	-21	
IR70X80x25	221	70	80	25	1	-10	-26	
IR70X80X30	267	70	80	30	1	-10	-26	
IR70X80X35	312	70	80	35	1	-10	-26	
IR70X80X54	488	70	80	54	1	-10	-26	
IR75X85X25	238	75	85	25	1	-4	-17	
IR75X85X30	287	75	85	30	1	-4	-17	
IR75X85X35	336	75	85	35	1	-4	-17	
IR75X85X54	520	75	85	54	1	-4	-17	
IR80X90X25	253	80	90	25	1	-4	-17	
IR80X90X30	304	80	90	30	1	-4	-17	
IR80X90X35	355	80	90	35	1	-4	-17	
IR80X90X54	556	80	90	54	1	-4	-17	
IR85X95X26	277	85	95	26	1	-14	-27	
IR85X95X36	388	85	95	36	1	-14	-27	
IR85X100X35	582	85	100	35	1,1	-14	-27	
IR85X100X63	1054	85	100	63	1,1	-14	-27	



# Inner rings

Without lubrication hole



IR

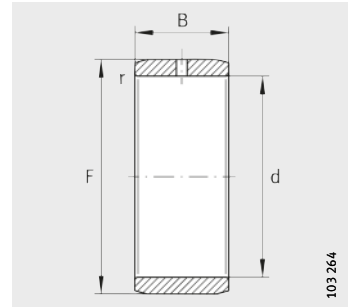
**Dimension table** (continued) - Dimensions in mm

Designation	Mass m ≈g	Dimensions				Tolerance of raceway F	
		d	F	B	r min.	μm	
						upper	lower
IR90X100X26	294	90	100	26	1	-14	-27
IR90X100X30	340	90	100	30	1	-14	-27
IR90X100X36	406	90	100	36	1	-14	-27
IR90X105X35	610	90	105	35	1,1	-14	-27
IR90X105X63	1 110	90	105	63	1,1	-14	-27
IR95X105X26	313	95	105	26	1	-14	-27
IR95X105X36	431	95	105	36	1	-14	-27
IR95X110X35	657	95	110	35	1,1	-14	-27
IR95X110X63	1 170	95	110	63	1,1	-14	-27
IR100X110X30	350	100	110	30	1,1	-14	-27
IR100X110X40	505	100	110	40	1,1	-14	-27
IR100X115X40	797	100	115	40	1,1	-14	-27
IR110X120X30	409	110	120	30	1	-14	-32
IR110X125X40	840	110	125	40	1,1	-7	-22
IR120X130X30	442	120	130	30	1	-7	-22
IR120X135X45	1 044	120	135	45	1,1	-7	-22
IR130X145X35	855	130	145	35	1,1	-17	-37
IR130X150X50	1 690	130	150	50	1,5	-17	-37
IR140X155X35	917	140	155	35	1,1	-17	-37
IR140X160X50	1 800	140	160	50	1,5	-17	-37
IR150X165X40	1 122	150	165	40	1,1	-27	-52
IR160X175X40	1 200	160	175	40	1,1	-27	-52
IR170X185X45	1 441	170	185	45	1,1	-25	-46
IR180X195X45	1 510	180	195	45	1,1	-25	-46
IR190X210X50	2 410	190	210	50	1,5	-40	-66
IR200X220X50	2 518	200	220	50	1,5	-40	-66
IR220X240X50	2 753	220	240	50	1,5	-55	-86
IR240X265X60	4 600	240	265	60	2	-55	-86
IR260X285X60	4 980	260	285	60	2	-69	-107
IR280X305X69	6 100	280	305	69	2	-69	-107
IR300X330X80	9 200	300	330	80	2,1	-69	-107
IR320X350X80	9 800	320	350	80	2,1	-83	-127
IR340X370X80	10 200	340	370	80	2,1	-83	-127
IR360X390X80	10 900	360	390	80	2,1	-128	-182
IR380X415X100	16 700	380	415	100	2,1	-122	-172



# Inner rings

With lubrication hole

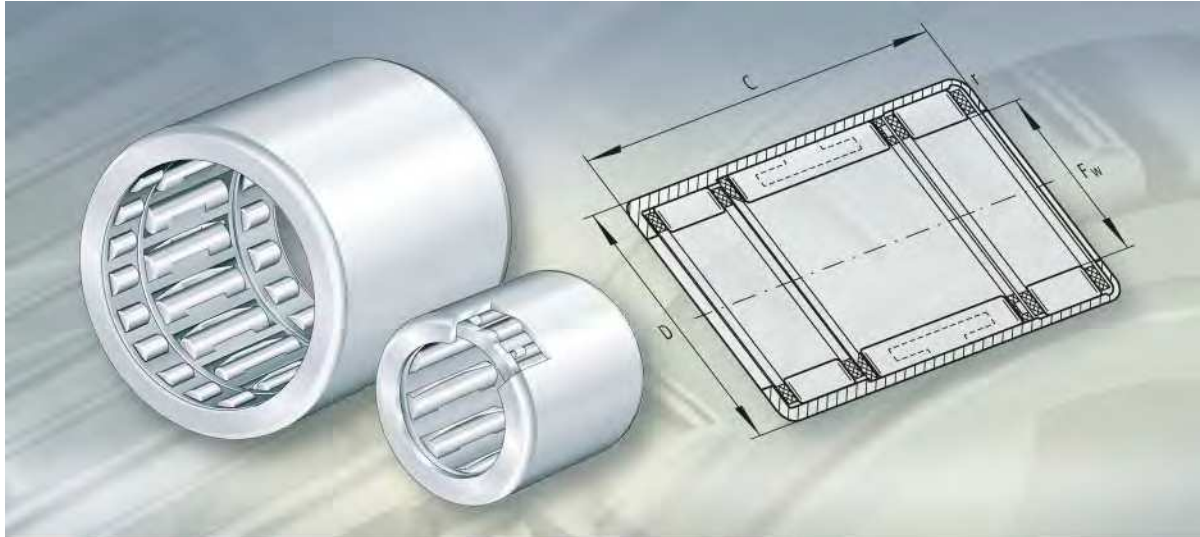


IR..-IS1

**Dimension table** - Dimensions in mm

Designation	Mass m ≈g	Dimensions				Tolerance of raceway F	
		d	F	B	r min.	μm	
						upper	lower
<b>IR6X10X10-IS1</b>	3,7	<b>6</b>	10	10	0,3	-7	-23
<b>IR8X12X10-IS1</b>	4,8	<b>8</b>	12	10	0,3	-4	-18
<b>IR10X14X12-IS1</b>	7,3	<b>10</b>	14	12	0,3	-4	-18
<b>IR12X16X12-IS1</b>	7,9	<b>12</b>	16	12	0,3	-4	-18
<b>IR15X20X12-IS1</b>	12,2	<b>15</b>	20	12	0,3	0	-12
<b>IR20X25X16-IS1</b>	24	<b>20</b>	25	16	0,3	0	-12
<b>IR25X30X16-IS1</b>	25,7	<b>25</b>	30	16	0,3	0	-12
<b>IR30X38X20-IS1</b>	77	<b>30</b>	38	20	0,6	+5	-4
<b>IR35X42X20-IS1</b>	63,9	<b>35</b>	42	20	0,6	0	-9
<b>IR40X50X20-IS1</b>	106	<b>40</b>	50	20	1	0	-9
<b>IR45X55X20-IS1</b>	117	<b>45</b>	55	20	1	0	-11
<b>IR50X55X20-IS1</b>	62,5	<b>50</b>	55	20	0,6	0	-11
<b>IR50X60X20-IS1</b>	128	<b>50</b>	60	20	1	0	-11





## Drawn cup roller clutches

# Drawn cup roller clutches

	Page
<b>Product overview</b>	Drawn cup roller clutches..... 790
<b>Features</b>	Drawn cup roller clutches without bearing arrangement..... 791
	Drawn cup roller clutches with bearing arrangement..... 792
	Sealing..... 792
	Lubrication ..... 792
	Operating temperature ..... 792
	Suffixes..... 792
<b>Design and safety guidelines</b>	Limiting load ..... 793
	Indexing frequency and indexing accuracy ..... 793
	Transmissible torque ..... 793
	Frictional torque and frictional energy ..... 794
	Speeds..... 795
	Housing design ..... 795
	Shaft design..... 798
	Axial location ..... 799
	Sealing of the bearing position ..... 799
	Lubrication ..... 799
	Retention for transport..... 800
	Fitting using pressing-in mandrel ..... 800
<b>Accuracy</b>	Enveloping circle ..... 800
<b>Dimension tables</b>	Drawn cup roller clutches without bearing arrangement, with and without knurling ..... 801
	Drawn cup roller clutches with bearing arrangement, with and without knurling ..... 802

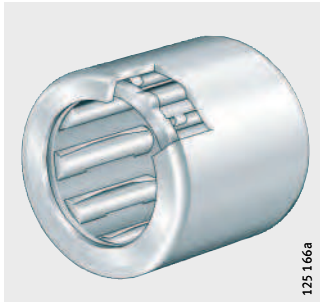


# Product overview Drawn cup roller clutches

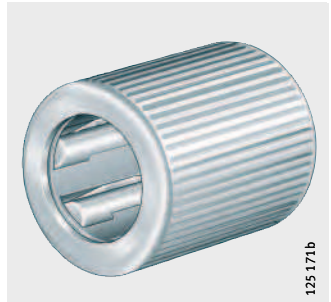
## Without bearing arrangement

With or without knurling  
With steel springs

HF

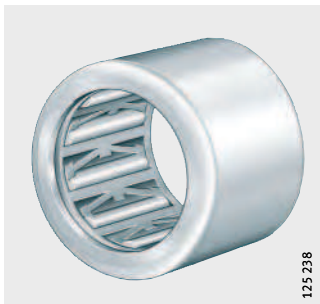


HF..-R



With or without knurling  
With plastic springs

HF..-KF



HF..-KF-R



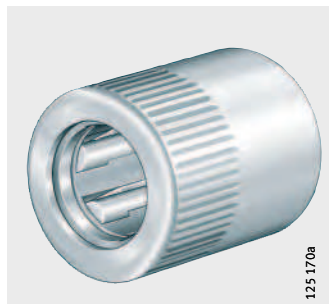
## With bearing arrangement

With or without knurling  
With steel springs

HFL

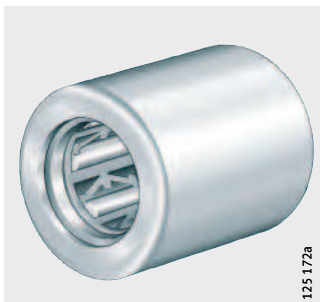


HFL..-R

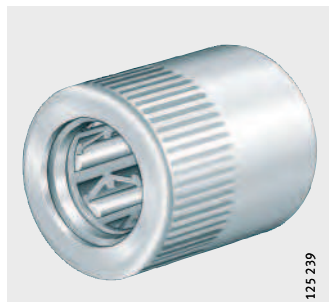


With or without knurling  
With plastic springs

HFL..-KF



HFL..-KF-R



# Drawn cup roller clutches

**Features** Drawn cup roller clutches are one-way clutches comprising thin-walled, drawn outer rings with a series of ramps on the inside diameter, plastic cages, pressure springs and needle rollers. They can transmit high torques in one direction and are particularly compact in a radial direction. The roller clutches are available with and without bearing arrangements.

Drawn cup roller clutches give very precise indexing, since the individual spring loading of the needle rollers ensures continuous contact between the shaft, needle rollers and ramps. They allow high indexing frequencies due to their low mass and the resulting low moment of inertia of the clamping elements. They also have a low overrunning frictional torque.

Drawn cup roller clutches can be used in various applications such as indexing clutches, back-stopping clutches and overrunning clutches. In these cases, the drawn cup roller clutch performs an overrunning or locking function.

## Drawn cup roller clutches without bearing arrangement

Roller clutches HF do not have a bearing arrangement and can only transmit torques.

Drawn cup roller clutches HF have steel pressure springs, while roller clutches HF..KF have plastic pressure springs.



In the case of drawn cup roller clutches without a bearing arrangement, concentricity to the shaft axis must be secured by additional rolling bearings or drawn cup roller clutches with a bearing arrangement must be used.

## With knurling

Roller clutches with a knurled outside surface have the suffix R and are suitable for use with plastic housings.

The knurling covers all or part of the length of the drawn cup.



## Drawn cup roller clutches

### Drawn cup roller clutches with bearing arrangement

Roller clutches HFL have an integral plain or rolling bearing arrangement and can support torques as well as radial forces.

Drawn cup roller clutches HFL have steel pressure springs, roller clutches HFL..KF have plastic pressure springs.

#### With knurling

Roller clutches with a knurled outside surface have the suffix R and are suitable for use with plastic housings.

The knurling covers all or part of the length of the drawn cup.

#### Sealing

Drawn cup roller clutches are supplied open on both sides.

#### Lubrication

The roller clutches are greased using a lithium soap grease to GA26. In many cases, the initial greasing is sufficient to last the operating life of the bearings.

For applications with oil lubrication, roller clutches are available without greasing. These roller clutches are coated with a preservative. Further information on lubrication: see page 799.

### Operating temperature



Drawn cup roller clutches are suitable for operating temperatures from  $-10\text{ °C}$  to  $+70\text{ °C}$ , restricted by the grease.

#### Suffixes

Suffixes for available designs: see table.

#### Available designs

Suffix	Description	Design
–	Steel pressure springs	Standard
KF	Plastic pressure springs	
R	Knurled outside surface	
RR	Drawn cup roller clutch with Corrotect® coating	Special design, available by agreement



## Design and safety guidelines



Drawn cup roller clutches should not be used if a malfunction could lead to personal injury.

New applications, especially those involving extreme conditions, should first be verified by tests.

Correct functioning can only be guaranteed if the concentricity error between the support bearing and the shaft can be kept to a low value.

## Limiting load



In the case of drawn cup roller clutches with plain bearings, the product of the actual speed  $n$  and the radial load  $F_r$  must not exceed the value stated for the limiting load  $(F_r \cdot n)_{\max}$ .

The operating limits are determined by the limiting speeds stated in the dimension tables and the permissible radial load.

## Indexing frequency and indexing accuracy

In order not to overload the roller clutch, the inertia of the entire system must be taken into consideration. The high indexing accuracy is due to the individual spring loading of the needle rollers, which ensures continuous contact between the shaft, needle rollers and clamping surface.

The indexing accuracy is influenced by the indexing frequency, lubrication, fitting tolerances, adjacent construction, elastic deformation of the adjacent parts and the drive method, either through the shaft or the housing. Optimum accuracy is achieved if the drive is via the shaft.

## Transmissible torque

Transmission of torque requires a rigid housing. The transmissible torque is therefore dependent on the shaft and housing material, the shaft hardness, the wall thickness of the housing and the shaft and housing tolerances.



When calculating the torque, the maximum drive torque and the moment of inertia of the masses during acceleration must be taken into consideration.



# Drawn cup roller clutches

## Frictional torque and frictional energy

### Rotating outer ring

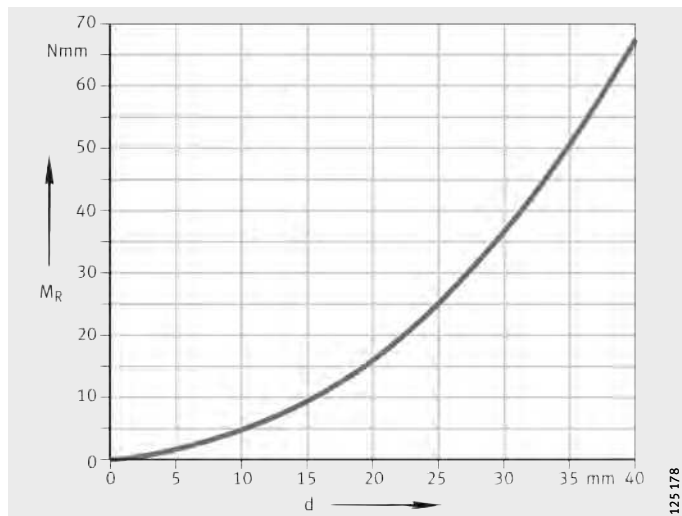
The frictional torque curve is shown in *Figure 1*.

The frictional energy during idling is dependent on whether the shaft or the outer ring is rotating, *Figure 2*.

If the outer ring rotates, the frictional energy increases with speed at first but then, due to the centrifugal force of the needle rollers, it decreases gradually towards zero. At this speed, there is no longer any frictional contact between the needle rollers and the shaft. Due to the increasing centrifugal force, the needle rollers lift from the shaft.

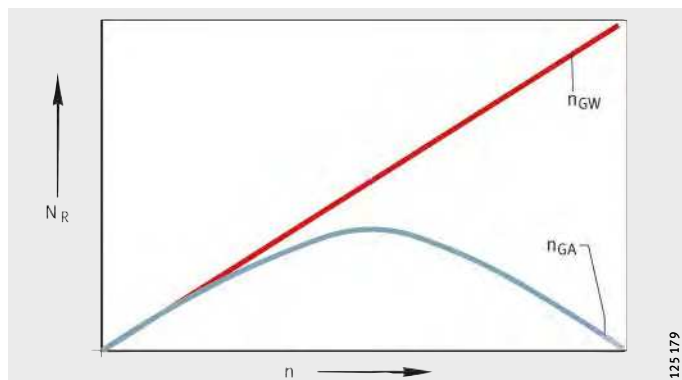
$M_R$  = frictional torque during idling  
 $d$  = shaft diameter

*Figure 1*  
 Frictional torque during idling, as a function of shaft diameter



$n$  = speed  
 $N_R$  = frictional torque during idling  
 $n_{GA}$  = limiting speed with rotating outer ring  
 $n_{GW}$  = limiting speed with rotating shaft

*Figure 2*  
 Frictional energy during idling, as a function of speed



## Speeds



The limiting speeds  $n_{GW}$  and  $n_{GA}$  in the dimension tables are valid for oil and grease lubrication.

The limiting speed  $n_{GW}$  is valid for a rotating shaft, while  $n_{GA}$  is valid for a rotating outer ring.

## Housing design Design of housing bore

The accuracy of the locating bore essentially determines the geometrical accuracy of the drawn cup and thus the functioning of the clutch.

Housing bores must be chamfered to 15°.

The bore tolerances should be produced in accordance with the table and should have a surface quality  $R_a 0,8$ .

The cylindricity tolerance of the housing bore in metal housings should be within the tolerance grade IT 5/2.

## Tolerances for housing bore

Series	Springs	Bore Housing material		
		Steel Cast iron	Light metal	Max. bore in plastic <sup>2)</sup>
HF, HFL	Steel	N6 (N7) <sup>1)</sup>	R6 (R7) <sup>1)</sup>	–
HF..-KF, HFL..-KF	Plastic	N7	R7	–
HF..-R, HFL..-R	Steel	–	–	D <sub>-0,05</sub>
HF..-KF-R, HFL..-KF-R	Plastic	–	–	D <sub>-0,05</sub>
HFL0606-KF-R, HFL0806-KF-R	Plastic	–	–	D <sub>-0,05</sub>

<sup>1)</sup> The values in brackets can be used if the actual torque is no more than 50% of the permissible torque  $M_{d\ per}$  (see dimension tables).

<sup>2)</sup> Guide values as a function of the plastic used.  
Outside diameter D: see dimension tables.



# Drawn cup roller clutches

## Minimum wall thickness for metal housings

For metal housings, the maximum transmissible torque is determined as a function of the diameter ratio  $Q_A$  to *Figure 3* (steel housing) or to *Figure 4*, page 797 (aluminium housing), see calculation examples.

Guide values for  $Q_{A \max}$  for steel and aluminium as housing materials are given in the table.

### Guide values

Housing material	Diameter ratio $Q_{A \max}$
Steel	0,8
Aluminium	0,6



The comparative stress  $\sigma_V$  must not exceed the yield stress of the housing material.

### Steel housing – calculation example

For drawn cup roller clutches HF0612, the maximum transmissible torque  $M_{d \text{ per max}}$  is determined as follows:

Drawn cup roller clutch	HF0612
Housing	Steel
Housing bore tolerance	N6, see table, page 795
Permissible housing stress ( $R_{p0,2}$ ) $\sigma_V$	450 N/mm <sup>2</sup>
Diameter ratio $Q_A$ of housing	0,9
Permissible torque $M_{d \text{ per}}$	see dimension table, page 801

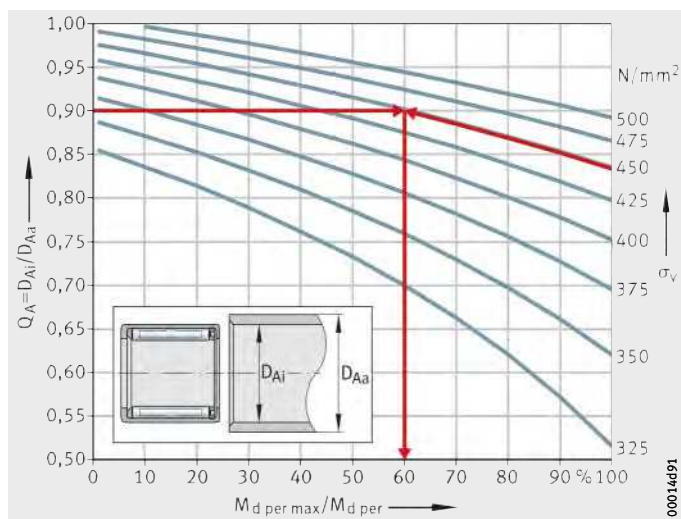
### Calculation

$$\begin{aligned}
 M_{d \text{ per max}} &= 60\% M_{d \text{ per}} \\
 &= 0,6 \cdot 1,76 \text{ Nm} \\
 &= 1,056 \text{ Nm}
 \end{aligned}$$

Modulus of elasticity  
 $E = 210\,000 \text{ N/mm}^2$

$\sigma_V$  = comparative stress  
 $M_{d \text{ per}}$  = permissible torque  
 (see dimension tables for values)  
 $M_{d \text{ per max}}$  = maximum transmissible torque  
 $Q_A$  = diameter ratio of housing  
 $D_{Ai}$  = housing bore  
 $D_{Aa}$  = housing outside diameter

*Figure 3*  
Steel housing

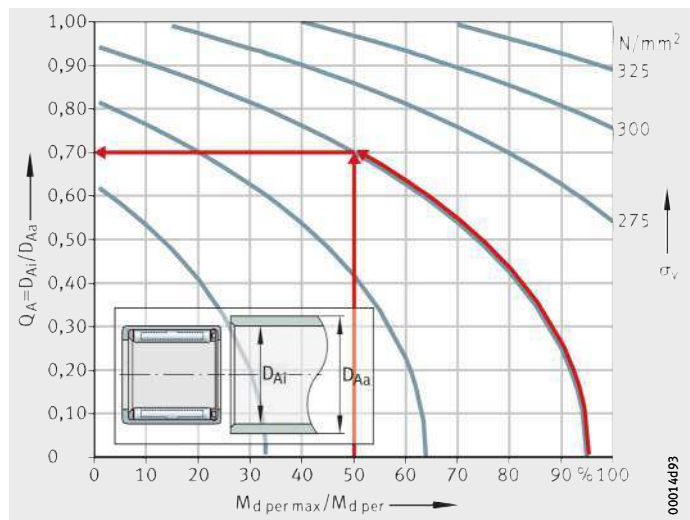


Aluminium housing – calculation example

For drawn cup roller clutch HF1616, the diameter ratio  $Q_A$  of the housing should be determined as follows:

Drawn cup roller clutch	HF1616
Housing	Aluminium
Housing bore tolerance	R6, see table, page 795
Permissible housing stress ( $R_{p0,2}$ ) $\sigma_v$	250 N/mm <sup>2</sup>
Maximum transmissible torque $M_{d \text{ per max}}$	10 Nm
giving $M_{d \text{ per max}}/M_{d \text{ per}}$	50%
Permissible torque $M_{d \text{ per}}$	see dimension table, page 801

**Diameter ratio**  $Q_A \leq 0,7 = D_{Ai} = \text{min. } 31,5$



Modulus of elasticity  
 $E = 70\,000 \text{ N/mm}^2$

- $\sigma_v$  = comparative stress
- $M_{d \text{ per}}$  = permissible torque  
(see dimension tables for values)
- $M_{d \text{ per max}}$  = maximum transmissible torque
- $Q_A$  = diameter ratio of housing
- $D_{Ai}$  = housing bore
- $D_{Aa}$  = housing outside diameter

Figure 4  
Aluminium housing

**Minimum wall thickness for plastic housing**



For plastic housings, drawn cup roller clutches with a partially or fully knurled outside surface should be used (suffix R). The guide value for the minimum wall thickness of plastic housings is:

$$s_{\text{min}} \geq D - F_w$$

- $s_{\text{min}}$  Minimum wall thickness mm
- $D$  Outside diameter of roller clutch mm
- $F_w$  Enveloping circle mm



# Drawn cup roller clutches

## Shaft design

The raceway on the shaft must be hardened and ground. The surface hardness of the raceway must be 670 HV + 170 HV and the hardening depth CHD or SHD must be sufficiently large ( $CHD \geq 0,3 \text{ mm}$ ).

The end face of the shaft must be chamfered to approx. 1 mm and 15°.

For design of the shaft, see table.

## Shaft tolerance

Series	Springs	Shaft			
		Tolerance	Roughness max.	Roundness max.	Parallelism max.
HF, HFL	Steel	$h5 (h6)^{1)}$	$R_a 0,4 (R_z 2)$	IT 3	IT 3
HF..-KF, HFL..-KF	Plastic	h8			
HF..-R, HFL..-R	Steel	$h5 (h6)^{1)}$			
HF..-KF-R, HFL..-KF-R	Plastic	h8			
HFL0606-KF-R, HFL0806-KF-R	Plastic	h9			

1) The values in brackets can be used if the actual torque is no more than 50% of the permissible torque  $M_{d \text{ per}}$  (see dimension tables).

**Axial location** Drawn cup roller clutches are pressed into the housing bore and require no further axial location (assuming compliance with the recommendations according to tables, page 795).

**Sealing of the bearing position** If there is a risk of contamination, sealing rings or series G or SD should be fitted. The sealing rings are matched to the dimensions of the drawn cup roller clutches and can be combined with wider inner rings of series IR.

**Lubrication** For general applications (mixed operation involving locking and overrunning), the Schaeffler initial greasing has proved effective. In order to ensure optimum function, it may be necessary to use different lubricants. The suitability of the lubricant must be verified by means of tests.

For applications in which one operating condition (overrunning or locking) is heavily predominant, a special greasing should be used. In this case, please consult Schaeffler Application Engineering.

It is not possible to calculate the grease operating life or lubrication interval for drawn cup roller clutches.



If relubrication is carried out, oil should be used for lubrication or a changeover to oil lubrication should generally be made.

At temperatures  $< -10\text{ °C}$  and speeds  $> 0,7 n_G$ , recommendations on lubrication should be requested.

For temperatures above  $+70\text{ °C}$ , oil lubrication should be used. The oil level should be such that, when the drawn cup roller clutch is stationary and the axis is horizontal, it is immersed approx.  $\frac{1}{3}$  in the oil bath.

Suitable oils are CL and CLP to DIN 51 517 or HL and HLP to DIN 51 524. Viscosity classes: see table.

**Viscosity classes**

Operating temperature	Viscosity class
+15 °C to +30 °C	ISO VG 10
+15 °C to +90 °C	ISO VG 32
+60 °C to +120 °C	ISO VG 100



# Drawn cup roller clutches

## Retention for transport

Drawn cup roller clutches are normally packed individually in the case of small quantities.

Where larger quantities are involved, drawn cup roller clutches are placed in a specific orientation in blister packaging and delivered in this form. The blister packaging serves to retain the parts in position during transport.

## Installation using a fitting mandrel

Drawn cup roller clutches should only be pressed into the locating bore using a special fitting mandrel, see Drawn cup needle roller bearings, page 687. Attention must be paid to the clamping direction of the roller clutch. The clamping direction is indicated by an arrow on the end face of the drawn cup.



Pressing-in forces must never be directed through the rolling elements. Roller clutches should not be tilted during fitting.

## Guidelines for fitting

Drawn cup roller clutches should be protected against dust, contaminants and moisture. Contaminants can impair the function and operating life of roller clutches.

## Accuracy

The thin-walled outer rings adopt the dimensional and geometrical accuracy of the housing bore.

## Enveloping circle

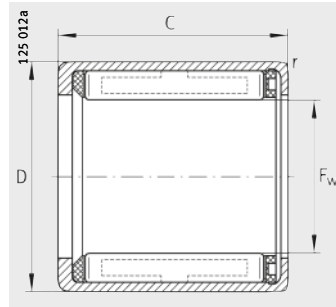
The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the outer raceway.

In drawn cup roller clutches with a rolling bearing arrangement, the enveloping circle  $F_w$  of the bearings once fitted (in the solid section ring gauge) is approximately in tolerance zone F8 (for values according to table Tolerances for housing bore, page 795, and table Shaft tolerance, page 798). Deviations for tolerance zone F8: see table, page 168.

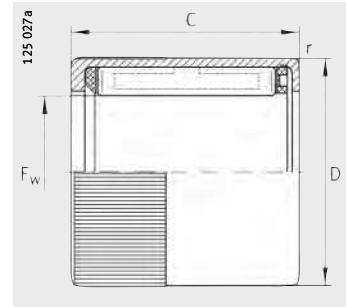


# Drawn cup roller clutches

Without bearing arrangement  
With or without knurling



HF, HF..-KF



HF..-R, HF..-KF-R  
With knurling

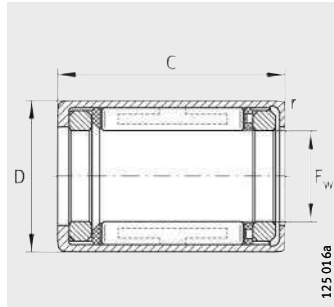
**Dimension table** · Dimensions in mm

Spring design		Mass m ≈g	Dimensions				Permissible torque M <sub>d per</sub> Nm	Limiting speeds		Drawn cup needle roller bearings for radial bearing arrangement Designation
Plastic springs Designation	Steel springs Designation		F <sub>w</sub>	D	C -0,3	r min.		n <sub>GW</sub> min <sup>-1</sup>	n <sub>GA</sub> min <sup>-1</sup>	
HF0306-KF	-	1	<b>3</b>	6,5	6	0,3	0,18	45 000	8 000	<b>HK0306-TV</b>
HF0306-KF-R	-	1	<b>3</b>	6,5	6	0,3	0,06	45 000	8 000	<b>HK0306-TV</b>
HF0406-KF	-	1	<b>4</b>	8	6	0,3	0,34	34 000	8 000	<b>HK0408</b>
HF0406-KF-R	-	1	<b>4</b>	8	6	0,3	0,1	34 000	8 000	<b>HK0408</b>
HF0612-KF	HF0612	3	<b>6</b>	10	12	0,3	1,76	23 000	13 000	<b>HK0608</b>
HF0612-KF-R	HF0612-R	3	<b>6</b>	10	12	0,3	0,6	23 000	13 000	<b>HK0608</b>
HF0812-KF	HF0812	3,5	<b>8</b>	12	12	0,3	3,15	17 000	12 000	<b>HK0808</b>
HF0812-KF-R	HF0812-R	3,5	<b>8</b>	12	12	0,3	1	17 000	12 000	<b>HK0808</b>
HF1012-KF	HF1012	4	<b>10</b>	14	12	0,3	5,3	14 000	11 000	<b>HK1010</b>
-	HF1216	11	<b>12</b>	18	16	0,3	12,2	11 000	8 000	<b>HK1212</b>
-	HF1416	13	<b>14</b>	20	16	0,3	17,3	9 500	8 000	<b>HK1412</b>
-	HF1616	14	<b>16</b>	22	16	0,3	20,5	8 500	7 500	<b>HK1612</b>
-	HF1816	16	<b>18</b>	24	16	0,3	24,1	7 500	7 500	<b>HK1812</b>
-	HF2016	17	<b>20</b>	26	16	0,3	28,5	7 000	6 500	<b>HK2010</b>
-	HF2520	30	<b>25</b>	32	20	0,3	66	5 500	5 500	<b>HK2512</b>
-	HF3020	36	<b>30</b>	37	20	0,3	90	4 500	4 500	<b>HK3012</b>
-	HF3520	40	<b>35</b>	42	20	0,3	121	3 900	3 900	<b>HK3512</b>

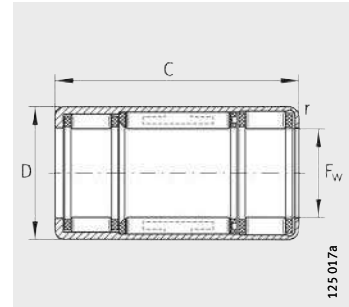


# Drawn cup roller clutches

With bearing arrangement  
With or without knurling



HFL, HFL..-KF, plain bearing arr.  
(HFL0308-KF, HFL0408-KF,  
HFL0615-KF, HFL0615)



HFL, HFL..-KF, rolling bearing arr.  
( $F_w \geq 8$  mm,  $C \geq 22$  mm),  
HFL0822-KF-R, HFL0822-R

**Dimension table** - Dimensions in mm

Spring design		Mass m	Dimensions				Permissible torque $M_d$ per Nm
Plastic springs	Steel springs		$F_w$	D	C	r	
Designation	Designation	$\approx g$			-0,3	min.	
<b>HFL0308-KF</b>	–	1,4	<b>3</b>	6,5	8	0,3	0,18
<b>HFL0308-KF-R</b>	–	1,4	<b>3</b>	6,5	8	0,3	0,06
<b>HFL0408-KF</b>	–	1,6	<b>4</b>	8	8	0,3	0,34
<b>HFL0408-KF-R</b>	–	1,6	<b>4</b>	8	8	0,3	0,1
<b>HFL0606-KF-R</b>	–	1	<b>6</b>	10	6	0,3	0,5
<b>HFL0615-KF</b>	<b>HFL0615</b>	4	<b>6</b>	10	15	0,3	1,76
<b>HFL0615-KF-R</b>	<b>HFL0615-R</b>	4	<b>6</b>	10	15	0,3	0,6
<b>HFL0806-KF-R</b>	–	2	<b>8</b>	12	6	0,3	0,7
<b>HFL0822-KF</b>	<b>HFL0822</b>	7	<b>8</b>	12	22	0,3	3,15
<b>HFL0822-KF-R</b>	<b>HFL0822-R</b>	7	<b>8</b>	12	22	0,3	1
–	<b>HFL1022</b>	8	<b>10</b>	14	22	0,3	5,3
–	<b>HFL1226</b>	18	<b>12</b>	18	26	0,3	12,2
–	<b>HFL1426</b>	20	<b>14</b>	20	26	0,3	17,3
–	<b>HFL1626</b>	22	<b>16</b>	22	26	0,3	20,5
–	<b>HFL1826</b>	25	<b>18</b>	24	26	0,3	24,1
–	<b>HFL2026</b>	27	<b>20</b>	26	26	0,3	28,5
–	<b>HFL2530</b>	44	<b>25</b>	32	30	0,3	66
–	<b>HFL3030</b>	51	<b>30</b>	37	30	0,3	90
–	<b>HFL3530</b>	58	<b>35</b>	42	30	0,3	121

1) Attention!

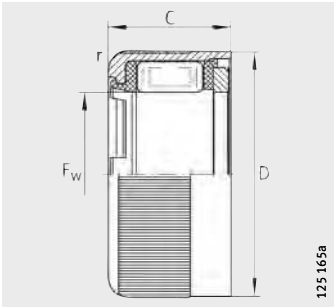
Drawn cup roller clutches with plain bearing arrangement:

During operation, the product of the actual speed  $n$  and the radial load  $F_r$  must not exceed the value stated for the limiting load  $(F_r \cdot n)_{max}$ .

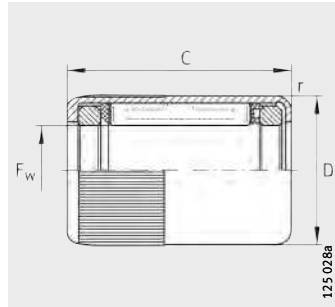
The operating limits are determined by the limiting speeds stated and the permissible radial load.

2) Drawn cup roller clutches with rolling bearing arrangement.

3) No arrow on end face.



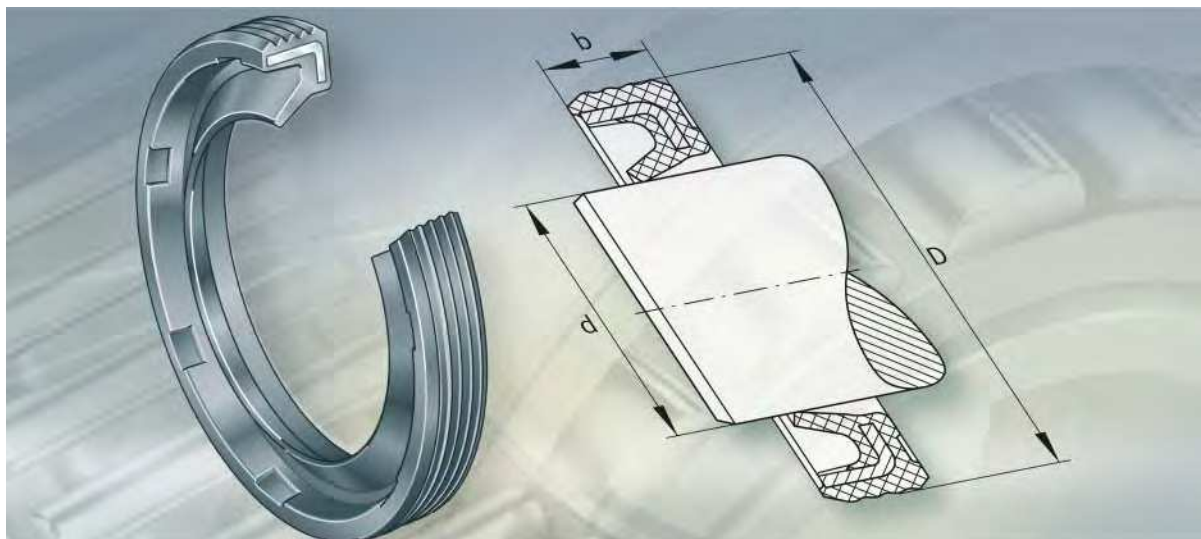
HFL0606-KF-R<sup>3)</sup>, HFL0806-KF-R<sup>3)</sup>



HFL0308-KF-R, HFL0408-KF-R,  
HFL0615-R, HFL0615-KF-R

Limiting speeds		Permissible radial load <sup>1)</sup> $F_{r \max}$	Limiting load $(F_r \cdot n)_{\max}^1$	Basic load ratings <sup>2)</sup>		Fatigue limit load $C_{Ur}$
$n_{GW}$ $\text{min}^{-1}$	$n_{GA}$ $\text{min}^{-1}$			dyn. $C_r$ N	stat. $C_{0r}$ N	
45 000	8 000	60	16 000	–	–	–
45 000	8 000	60	16 000	–	–	–
34 000	8 000	80	16 000	–	–	–
34 000	8 000	80	16 000	–	–	–
23 000	13 000	40	4 200	–	–	–
23 000	13 000	110	18 000	–	–	–
23 000	13 000	110	18 000	–	–	–
17 000	12 000	54	4 200	–	–	–
17 000	12 000	–	–	3 650	3 950	550
17 000	12 000	–	–	3 650	3 950	550
14 000	11 000	–	–	3 950	4 500	630
11 000	8 000	–	–	6 300	6 700	920
9 500	8 000	–	–	6 800	7 800	1 080
8 500	7 500	–	–	7 400	9 000	1 250
7 500	7 500	–	–	8 000	10 200	1 420
7 000	6 500	–	–	8 500	11 400	1 590
5 500	5 500	–	–	10 600	14 000	1 900
4 500	4 500	–	–	11 600	16 900	2 290
3 900	3 900	–	–	12 200	18 800	2 550





## Sealing rings

# Sealing rings

	Page
<b>Product overview</b>	
Sealing rings .....	806
<b>Features</b>	
Sealing rings, single lip .....	807
Sealing rings, double lip .....	807
Operating temperature .....	807
Suffixes .....	808
<b>Design and safety guidelines</b>	
Resistance and leakage .....	808
Sealing lip orientation .....	808
Shaft and housing design .....	809
<b>Dimension tables</b>	
Sealing rings .....	810



# Product overview   Sealing rings

## Single lip

Angled reinforcing ring encased  
in rubber



With external steel reinforcement



## Double lip



# Sealing rings

**Features** Sealing rings are designed as contact seals. They protect the bearing position against contamination, spray water and the excessive loss of grease. Sealing rings are matched to the small radial dimensions of drawn cup needle roller bearings and needle roller bearings. They are very easy to fit, since they are simply pressed into the housing bore. Sealing rings allow circumferential speeds at the seal lip of up to 10 m/s, depending on the surface quality of the shaft.

**Sealing rings, single lip** Sealing rings G and GR are single lip seals made from synthetic NBR elastomer (colour: green). The design GR is suitable for shaft diameters up to 7 mm as standard and has an external steel reinforcement for stiffening purposes. Sealing rings G are suitable for shaft diameters over 8 mm and have a rubber-encased steel reinforcement for stiffening purposes with a wave-shaped rubber profile. This provides good sealing on the outside diameter. At the same time, it also reduces the forces required for fitting.

**Sealing rings, double lip** Sealing rings SD have a contact lip and a non-contact dust shield lip facing the shaft (on the marked side). They comprise two plastic components. The seal carrier is made from reinforced polyamide (colour: black), while the seal lip area is made from thermoplastic PU elastomer (colour: green). Sealing rings SD can also be used as wipers on shafts with axial motion. Stroke speeds up to 3 m/s are possible, dependent on the condition of the shaft.

**Operating temperature** The permissible temperature is dependent on the interaction between the medium and the temperature and its effect on the sealing ring material. The suitability of the sealing rings should be checked by tests as extremes of operation are approached.



Sealing rings G and GR are suitable for operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+110\text{ }^{\circ}\text{C}$ , depending on the medium acting on the sealing ring.

Sealing rings SD are suitable for operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+100\text{ }^{\circ}\text{C}$ , depending on the medium acting on the sealing ring.



# Sealing rings

## Suffixes

Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
FPM	Sealing rings G and GR for temperatures from $-20\text{ }^{\circ}\text{C}$ to $+160\text{ }^{\circ}\text{C}$ or circumferential speeds up to 16 m/s	Special design, available by agreement
HNBR	Sealing rings G and GR for temperatures from $-30\text{ }^{\circ}\text{C}$ to $+140\text{ }^{\circ}\text{C}$ or circumferential speeds up to 12 m/s	

### Further information

Further information on sealing rings and the basic principles of sealing ring technology is given in TPI 128, Sealing rings, single lip and double lip.

## Design and safety guidelines

### Resistance and leakage

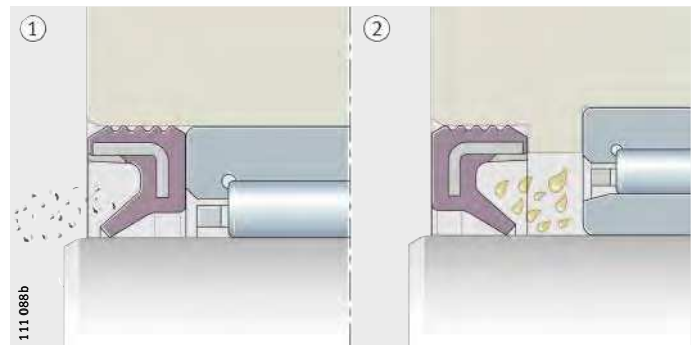
Sealing rings are resistant to undoped lubricants with a mineral oil base. For other media, please check the resistance of the sealing rings.

Low leakage rates are possible (grease or fluid film). The sealing effect is aided by a grease collar.

### Sealing lip orientation

In order to protect against dust and contamination, the seal lip should face outwards, *Figure 1* ①. In order to prevent egress of lubricant, the seal lip should face inwards, *Figure 1* ②.

- ① Seal lip facing outwards
- ② Seal lip facing inwards



*Figure 1*  
Sealing lip orientation



## Shaft and housing design

The sliding surface for the seal lips must be free from cracks and damage such as impact points, scratches, cracks, rust, raised areas.

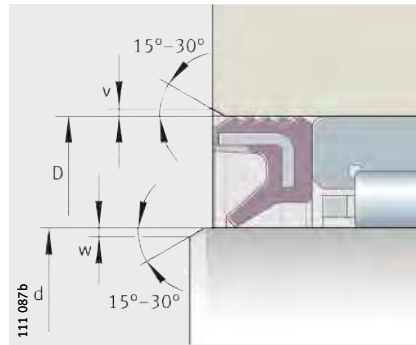
## Tolerances and surface quality

Sealing ring	Shaft movement	Bore tolerance	Shaft		
			Tolerance	Roughness	Hardness
G, GR, SD	Rotation only	G7 to R7	g7 to k7	$0,2 \leq R_a \leq 0,8$	55 HRC or 600 HV
SD	Axial motion			$R_a 0,3$	

In order to protect the sealing lips during fitting, the shaft ends and the housing bore should be chamfered in accordance with DIN 3 760, see table and *Figure 2*.

## Chamfer dimensions

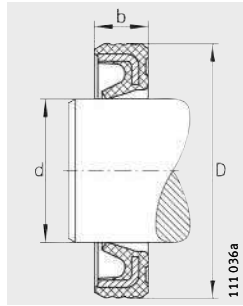
Chamfer	$D \leq 30 \text{ mm}$	$D > 30 \text{ mm}$	$d \leq 30 \text{ mm}$	$d > 30 \text{ mm}$
$v_{\min}$	0,3	1% of D	–	–
$w_{\min}$	–	–	0,3	0,5



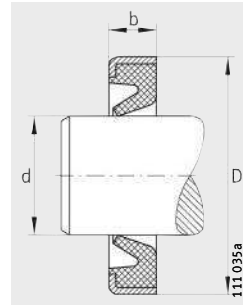
*Figure 2*  
Chamfers on housing bore and shaft end



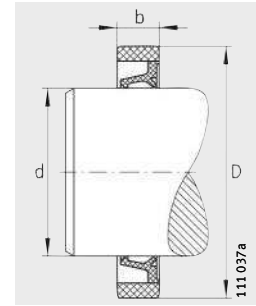
# Sealing rings



G



GR



SD

**Dimension table** · Dimensions in mm

Design			Designation			Mass		
G	GR	SD	d <sub>x</sub>	D <sub>x</sub>	b <sup>1)</sup>	G ≈g	GR ≈g	SD ≈g
–	■ <sup>2)</sup>	–	4	8	2	–	0,2	–
–	■ <sup>2)</sup>	–	5	9	2	–	0,2	–
–	■ <sup>2)</sup>	–	5	10	2	–	0,2	–
–	■ <sup>2)</sup>	–	6	10	2	–	0,2	–
–	■ <sup>2)</sup>	–	6	12	2	–	0,4	–
–	■ <sup>2)</sup>	–	7	11	2	–	0,3	–
–	■ <sup>2)</sup>	–	7	14	2	–	0,5	–
■ <sup>2)</sup>	4)	4)	8	12	3	0,4	–	–
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	8	15	3	0,7	–	0,3
■ <sup>2)</sup>	■ <sup>2)</sup>	4)	9	13	3	0,5	0,5	–
■ <sup>2)</sup>	4)	4)	9	16	3	0,7	–	–
■ <sup>2)</sup>	■ <sup>2)</sup>	4)	10	14	3	0,5	0,5	–
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	10	17	3	0,9	–	0,4
■ <sup>2)</sup>	■ <sup>2)</sup>	4)	12	16	3	0,6	0,6	–
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	12	18	3	0,9	–	–
■ <sup>2)</sup>	■ <sup>2)</sup>	■ <sup>2)</sup>	12	19	3	1	1	0,5
■ <sup>2)</sup>	4)	4)	13	19	3	0,9	–	–
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	14	20	3	1	1	0,5
■ <sup>2)</sup>	4)	4)	14	21	3	1,1	–	–
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	14	22	3	1,3	1,1	0,7
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	15	21	3	1	1	0,5
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	15	23	3	1,3	1,3	0,7
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	16	22	3	1,3	1,3	0,6
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	16	24	3	1,3	1,3	0,7
■ <sup>2)</sup>	4)	4)	16	25	3	1,6	–	–
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	17	23	3	1,3	1,3	0,6
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	17	25	3	1,5	–	0,8
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	18	24	3	1,2	–	0,6
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	18	26	4	1,8	–	1,1
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	19	27	4	2	–	1,1
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	20	26	4	1,8	1,8	0,8
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	20	28	4	2,1	2,1	1,1
■ <sup>2)</sup>	4)	4)	21	29	4	2,2	–	–
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	22	28	4	1,8	1,8	0,9
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	22	30	4	2,2	2,2	1,3

**Dimension table** (continued) · Dimensions in mm

Design			Designation			Mass		
G	GR	SD	d <sub>x</sub>	D <sub>x</sub>	b <sup>1)</sup>	G ≈g	GR ≈g	SD ≈g
■ <sup>2)</sup>	3)	4)	24	32	4	2,5	2,5	–
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	25	32	4	2,3	2,3	1,3
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	25	33	4	2,5	–	1,3
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	25	35	4	2,6	2,6	1,9
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	26	34	4	2,6	–	1,4
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	28	35	4	2,4	2,4	1,3
■ <sup>2)</sup>	3)	4)	28	37	4	3,1	3,1	–
■ <sup>2)</sup>	4)	4)	29	38	4	3,2	–	–
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	30	37	4	2,7	2,7	1,3
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	30	40	4	3,6	3,6	2,1
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	32	42	4	3,7	–	2,4
■ <sup>2)</sup>	4)	4)	32	45	4	5,1	–	–
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	35	42	4	3	4	1,5
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	35	45	4	4,1	4,1	2,5
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	37	47	4	4	–	2,7
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	38	48	4	4,4	–	2,8
■ <sup>2)</sup>	4)	■ <sup>2)</sup>	40	47	4	3,3	–	1,7
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	40	50	4	4,6	4,6	2,9
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	40	52	5	4,8	4,8	4,5
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	42	52	4	4,7	4,7	3
■ <sup>2)</sup>	4)	4)	43	53	4	4,8	–	–
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	45	52	4	3,8	3,8	1,9
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	45	55	4	5,2	5,2	3,2
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	50	58	4	4,5	4,5	2,4
■ <sup>2)</sup>	3)	■ <sup>2)</sup>	50	62	5	10,4	10,4	5,5
■ <sup>2)</sup>	3)	–	55	63	5	7,1	7,1	–
■ <sup>2)</sup>	3)	–	70	78	5	9	9	–
■ <sup>2)</sup>	4)	–	80	90	5	13,8	–	–

Special designs, available by agreement.

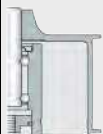
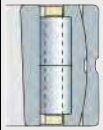
1) Width tolerance +0,1/–0,2.

2) ■ = standard range.

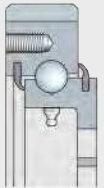
3) Please enquire on availability.

4) Available by agreement for economically viable batch sizes.





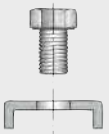
191 585



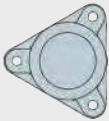
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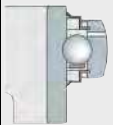
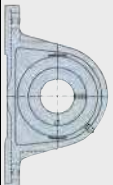
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191 569



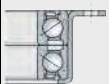
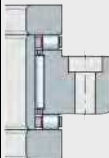
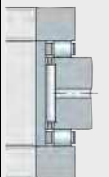
191 557



191 572



191 561




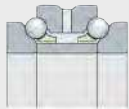



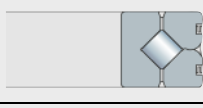
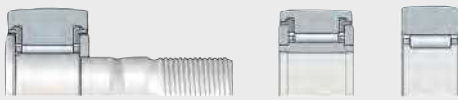
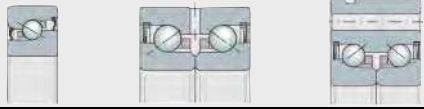


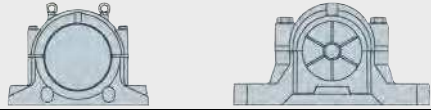





191 563

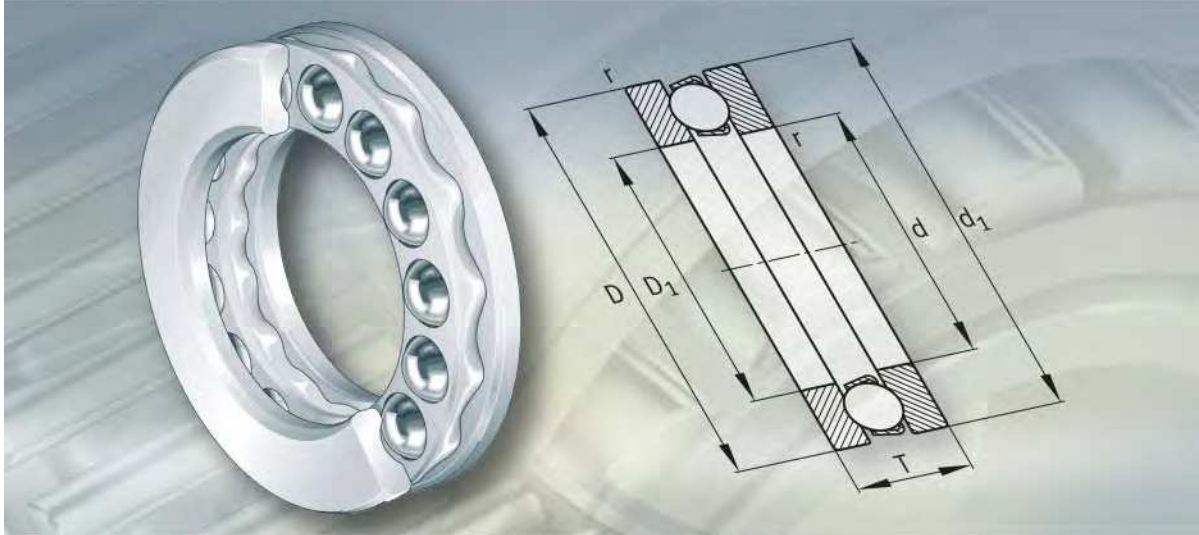


191 575



191 582

	<p><b>Axial deep groove ball bearings</b></p>
	<p><b>Axial angular contact ball bearings</b></p>
	<p><b>Axial cylindrical roller bearings</b></p>
	<p><b>Axial needle roller and cage assemblies</b></p>
	<p><b>Axial spherical roller bearings</b></p>
	<p><b>Crossed roller bearings</b></p>
	<p><b>Track rollers</b></p>
	<p><b>Bearings for screw drives</b></p>
	<p><b>High precision bearings for combined loads</b></p>
	<p><b>Insert bearings, housing units, idler sprocket units, idler pulley units</b></p>
	<p><b>Bearing housings</b></p>
	<p><b>Fasteners and retainers</b></p>
	<p><b>Rolling elements</b></p>
	<p><b>Arcanol rolling bearing greases</b></p>
	<p><b>Other products</b></p>
	<p><b>Market sectors</b></p>
	<p><b>Appendix</b></p>



**Axial deep groove ball bearings**



# Axial deep groove ball bearings

	Page
<b>Product overview</b>	Axial deep groove ball bearings ..... 816
<b>Features</b>	Single direction bearings ..... 817
	Double direction bearings..... 817
	Operating temperature ..... 817
	Cages ..... 818
	Suffixes..... 818
<b>Design and safety guidelines</b>	Equivalent dynamic bearing load ..... 818
	Equivalent static bearing load..... 818
	Minimum axial load ..... 819
	Speeds..... 819
	Design of bearing arrangements ..... 819
<b>Accuracy</b>	..... 819
<b>Dimension tables</b>	Axial deep groove ball bearings, single direction ..... 820
	Axial deep groove ball bearings, double direction ..... 836

# Product overview Axial deep groove ball bearings

## Single direction

With flat housing locating washer

511, 512, 513, 514



With spherical housing locating washer

With and without seating washer

532, 533



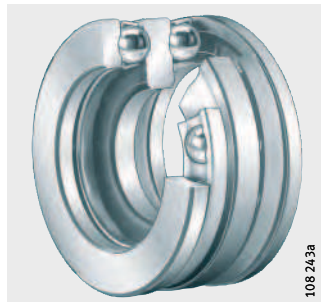
532 + U2, 533 + U3



## Double direction

With flat housing locating washers

522, 523



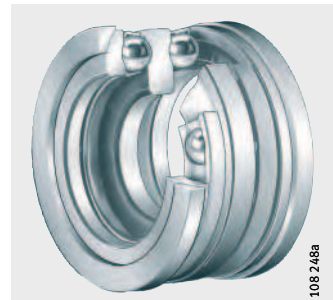
With spherical housing locating washers

With and without seating washers

542, 543



542 + U2, 543 + U3







# Axial deep groove ball bearings

**Features** Axial deep groove ball bearings comprise shaft locating washers, housing locating washers and ball and cage assemblies. The bearings are not self-retaining; the ball and cage assembly and bearing washers can therefore be fitted separately.

In addition to the series with flat washers, series are also available with spherical housing locating washers for the compensation of static angular misalignment. These designs are normally used in conjunction with seating washers.

Axial deep groove ball bearings are available in single and double direction designs. Both designs can support high axial forces but cannot be subjected to radial loads.

**Single direction bearings** Single direction axial deep groove ball bearings can support axial forces in one direction.

Bearings of series 511, 512, 513 and 514 have a flat housing locating washer. They do not permit angular misalignment or skewing between the shaft and housing.

**Angular adjustment facility** Bearings of series 532 and 533 have a spherical housing locating washer. With an appropriate housing design and in conjunction with seating washers U2 and U3, they allow angular adjustment and can therefore compensate static misalignments between the shaft and housing.

**Double direction bearings** Double direction axial deep groove ball bearings can support axial forces in both directions.

Bearings of series 522 and 523 have two flat housing locating washers and do not allow angular adjustment.

**Angular adjustment facility** Bearings of series 542 and 543 have spherical housing locating washers. With an appropriate housing design and in conjunction with seating washers U2 and U3, they allow angular adjustment and can therefore compensate static misalignments between the shaft and housing.

**Operating temperature** Axial deep groove ball bearings can be used at operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$ , restricted by the lubricant.

# Axial deep groove ball bearings

**Cages** Bearings with sheet steel cages do not have a cage suffix. Solid brass window cages are indicated by the suffix MP, see table Available designs.

The cage design as a function of the bore code is shown in table Cage and bore code.

**Cage and bore code**

Series	Sheet steel cage	Solid brass cage
	Bore code	
511	up to 28	from 30
512	up to 28	from 30
513	up to 20	from 22
514	up to 11	from 12
522	up to 28	from 30
523	up to 20	from 22
532	up to 28	from 30
533	up to 20	from 22
542	all	-
543	up to 20	22

## Suffixes

Suffixes for available designs: see table.

**Available designs**

Suffix	Description	Design
MP	Solid brass window cage, ball-guided	Standard
P5	Higher accuracy to tolerance class P5	Special design, available by agreement
P6	Higher accuracy to tolerance class P6	

## Design and safety guidelines



Axial deep groove ball bearings can support axial forces only.

### Equivalent dynamic bearing load

In this case:

$$P = F_a$$

$P$  N  
Equivalent dynamic bearing load  
 $F_a$  N  
Axial dynamic bearing load.

### Equivalent static bearing load

In this case:

$$P_0 = F_{0a}$$

$P_0$  N  
Equivalent static bearing load  
 $F_{0a}$  N  
Axial static bearing load.



## Minimum axial load

At higher speeds, detrimental sliding movements can occur between the rolling elements and the raceways due to centrifugal forces and gyroscopic moments. In order to avoid this, the bearings must be subjected to a minimum load  $F_{a\ min}$ . This can be achieved by means of preloading, for example using springs.

The minimum load factor A is given in the dimension tables. For  $n_{max}$ , the maximum operating speed must be used.

$$F_{a\ min} = 1000 \cdot A \cdot \left( \frac{n_{max}}{1000} \right)^2$$

$F_{a\ min}$	N
Minimum axial load	
A	–
Minimum load factor, see dimension table	
$n_{max}$	min <sup>-1</sup>
Maximum operating speed.	

## Speeds

ISO 15 312 does not give thermal reference speeds for these bearings.



The dimension tables only state the limiting speeds  $n_G$ . These values are for oil lubrication and must not be exceeded.

## Design of bearing arrangements Shaft and housing tolerances

For single direction bearings the shaft tolerance should be j6, for double direction bearings the shaft tolerance should be k6.

The tolerance of the locating bore is dependent on the running accuracy to be achieved. For normal running accuracy the tolerance should be in the tolerance zone E8, for high running accuracy it should be in the tolerance zone H6.

## Adjacent parts

The shoulders on the adjacent construction (shaft and housing) must be sufficiently high that the shaft and housing locating washers are supported over at least half their height.

The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

The maximum dimensions for the radii  $r_a$  and the diameters of the abutment surfaces  $d_a$ ,  $D_a$  are indicated in the dimension tables.

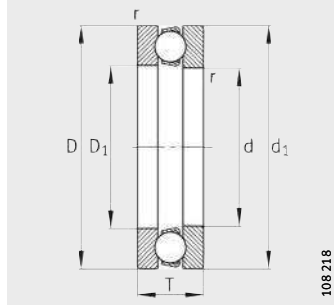
## Accuracy

The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620-3.

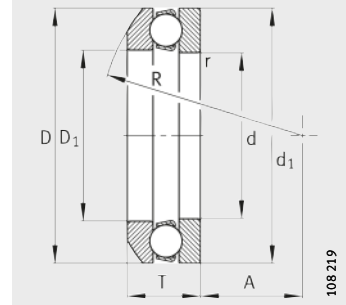
The main dimensions for single direction bearings and seating washers conform to ISO 104/DIN 711 and for double direction bearings to DIN 715.

# Axial deep groove ball bearings

Single direction



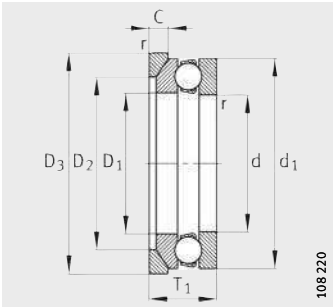
511, 512, 513, 514



532, 533  
Spherical housing locating washer

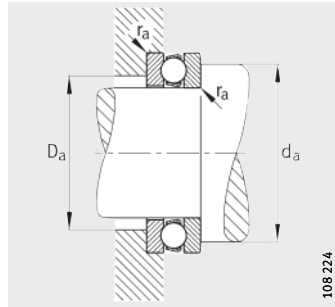
**Dimension table** - Dimensions in mm

Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D <sub>1</sub>	d <sub>1</sub>	r	R	A	D <sub>2</sub>
min.												
51100	-	0,018	-	10	24	9	11	24	0,3	-	-	-
51200	-	0,029	-	10	26	11	12	26	0,6	-	-	-
53200	-	0,028	-	10	26	11,6	12	26	0,6	22	8,5	-
53200	U200	0,028	0,01	10	26	11,6	12	26	0,6	22	8,5	18
51101	-	0,021	-	12	26	9	13	26	0,3	-	-	-
51201	-	0,032	-	12	28	11	14	28	0,6	-	-	-
53201	-	0,03	-	12	28	11,4	14	28	0,6	25	11,5	-
53201	U201	0,03	0,012	12	28	11,4	14	28	0,6	25	11,5	20
51102	-	0,024	-	15	28	9	16	28	0,3	-	-	-
51202	-	0,043	-	15	32	12	17	32	0,6	-	-	-
53202	-	0,046	-	15	32	13,3	17	32	0,6	28	12	-
53202	U202	0,046	0,014	15	32	13,3	17	32	0,6	28	12	24
51103	-	0,024	-	17	30	9	18	30	0,3	-	-	-
51203	-	0,05	-	17	35	12	19	35	0,6	-	-	-
53203	-	0,052	-	17	35	13,2	19	35	0,6	32	16	-
53203	U203	0,052	0,015	17	35	13,2	19	35	0,6	32	16	26
51104	-	0,037	-	20	35	10	21	35	0,3	-	-	-
51204	-	0,082	-	20	40	14	22	40	0,6	-	-	-
53204	-	0,081	-	20	40	14,7	22	40	0,6	36	18	-
53204	U204	0,081	0,021	20	40	14,7	22	40	0,6	36	18	30
51105	-	0,055	-	25	42	11	26	42	0,6	-	-	-
51205	-	0,114	-	25	47	15	27	47	0,6	-	-	-
53205	-	0,121	-	25	47	16,7	27	47	0,6	40	19	-
53205	U205	0,121	0,032	25	47	16,7	27	47	0,6	40	19	36
51305	-	0,154	-	25	52	18	27	52	1	-	-	-
53305	-	0,203	-	25	52	19,8	27	52	1	45	21	-
53305	U305	0,203	0,044	25	52	19,8	27	52	1	45	21	38
51405	-	0,295	-	25	60	24	27	60	1	-	-	-



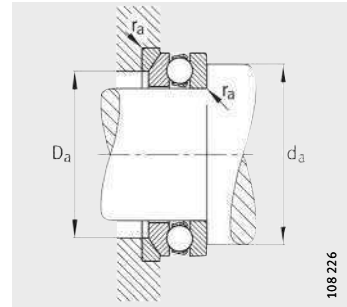
108 220

532, 533  
Spherical housing locating  
washer, seating washer U2, U3



108 224

Mounting dimensions



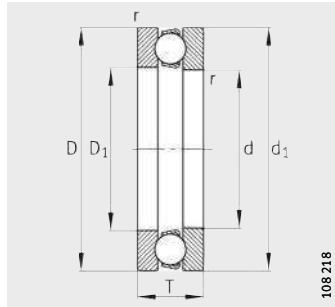
108 226

Mounting dimensions

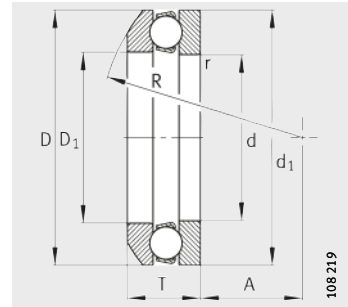
			Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ua}$ N	Minimum load factor A	Limiting speed $n_G$ $\text{min}^{-1}$
$D_3$	C	$T_1$	$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N			
-	-	-	18	16	0,3	10 000	14 000	620	0,001	13 000
-	-	-	20	16	0,6	12 700	17 000	760	0,002	11 000
-	-	-	20	18	0,6	12 700	17 000	760	0,002	11 000
28	3,5	13	20	18	0,6	12 700	17 000	760	0,002	11 000
-	-	-	20	18	0,3	10 400	15 300	690	0,001	13 000
-	-	-	22	18	0,6	13 200	19 000	840	0,002	10 000
-	-	-	22	20	0,6	13 200	19 000	840	0,002	10 000
30	3,5	13	22	20	0,6	13 200	19 000	840	0,002	10 000
-	-	-	23	20	0,3	10 600	16 600	750	0,002	12 000
-	-	-	25	22	0,6	16 600	25 000	1 100	0,004	9 000
-	-	-	25	24	0,6	16 600	25 000	1 100	0,004	9 000
35	4	15	25	24	0,6	16 600	25 000	1 100	0,004	9 000
-	-	-	25	22	0,3	11 400	19 600	870	0,002	11 000
-	-	-	28	24	0,6	17 300	27 500	1 210	0,004	8 500
-	-	-	28	26	0,6	17 300	27 500	1 210	0,004	8 500
38	4	15	28	26	0,6	17 300	27 500	1 210	0,004	8 500
-	-	-	29	26	0,3	15 000	26 500	1 180	0,004	9 500
-	-	-	32	28	0,6	22 400	37 500	1 660	0,01	7 500
-	-	-	32	30	0,6	22 400	37 500	1 660	0,01	7 500
42	5	17	32	30	0,6	22 400	37 500	1 660	0,01	7 500
-	-	-	35	32	0,6	18 000	35 500	1 570	0,006	9 000
-	-	-	38	34	0,6	28 000	50 000	2 220	0,01	6 700
-	-	-	38	36	0,6	28 000	50 000	2 220	0,013	6 700
50	5,5	19	38	36	0,6	28 000	50 000	2 220	0,013	6 700
-	-	-	41	36	1	34 500	55 000	2 450	0,019	5 300
-	-	-	41	38	1	34 500	55 000	2 450	0,019	5 300
55	6	22	41	38	1	34 500	55 000	2 450	0,019	5 300
-	-	-	46	39	1	45 500	67 000	2 950	0,032	4 500

# Axial deep groove ball bearings

Single direction



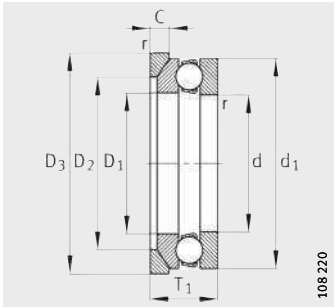
511, 512, 513, 514



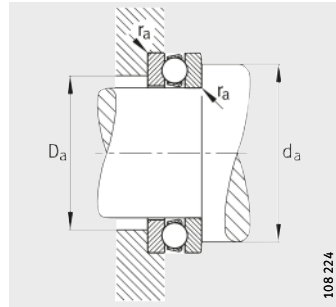
532, 533  
Spherical housing locating washer

**Dimension table (continued)** · Dimensions in mm

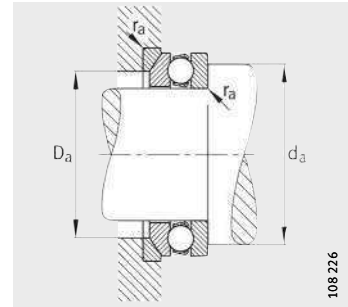
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D <sub>1</sub>	d <sub>1</sub>	r	R	A	D <sub>2</sub>
51106	–	0,063	–	30	47	11	32	47	0,6	–	–	–
51206	–	0,136	–	30	52	16	32	52	0,6	–	–	–
53206	–	0,147	–	30	52	17,8	32	52	0,6	45	22	–
53206	U206	0,147	0,038	30	52	17,8	32	52	0,6	45	22	42
51306	–	0,244	–	30	60	21	32	60	1	–	–	–
53306	–	0,303	–	30	60	22,6	32	60	1	50	22	–
53306	U306	0,303	0,056	30	60	22,6	32	60	1	50	22	45
51406	–	0,49	–	30	70	28	32	70	1	–	–	–
51107	–	0,08	–	35	52	12	37	52	0,6	–	–	–
51207	–	0,198	–	35	62	18	37	62	1	–	–	–
53207	–	0,265	–	35	62	19,9	37	62	1	50	24	–
53207	U207	0,265	0,057	35	62	19,9	37	62	1	50	24	48
51307	–	0,351	–	35	68	24	37	68	1	–	–	–
53307	–	0,437	–	35	68	25,6	37	68	1	56	24	–
53307	U307	0,437	0,083	35	68	25,6	37	68	1	56	24	52
51407	–	0,709	–	35	80	32	37	80	1,1	–	–	–
51108	–	0,114	–	40	60	13	42	60	0,6	–	–	–
51208	–	0,257	–	40	68	19	42	68	1	–	–	–
53208	–	0,259	–	40	68	20,3	42	68	1	56	28,5	–
53208	U208	0,259	0,071	40	68	20,3	42	68	1	56	28,5	55
51308	–	0,536	–	40	78	26	42	78	1	–	–	–
53308	–	0,561	–	40	78	28,5	42	78	1	64	28	–
53308	U308	0,561	0,12	40	78	28,5	42	78	1	64	28	60
51408	–	1,03	–	40	90	36	42	90	1,1	–	–	–
51109	–	0,087	–	45	65	14	47	65	0,6	–	–	–
51209	–	0,279	–	45	73	20	47	73	1	–	–	–
53209	–	0,278	–	45	73	21,3	47	73	1	56	26	–
53209	U209	0,278	0,088	45	73	21,3	47	73	1	56	26	60
51309	–	0,612	–	45	85	28	47	85	1	–	–	–
53309	–	0,783	–	45	85	30,1	47	85	1	64	25	–
53309	U309	0,783	0,173	45	85	30,1	47	85	1	64	25	65
51409	–	1,36	–	45	100	39	47	100	1,1	–	–	–



532, 533  
Spherical housing locating  
washer, seating washer U2, U3



Mounting dimensions

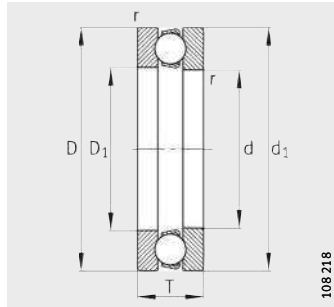


Mounting dimensions

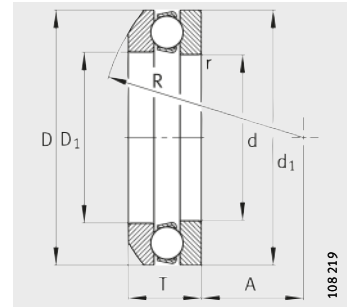
			Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ua}$ N	Minimum load factor A	Limiting speed $n_G$ $\text{min}^{-1}$
$D_3$	C	$T_1$	$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N			
-	-	-	40	37	0,6	19 000	40 000	1 770	0,009	8 000
-	-	-	43	39	0,6	25 000	46 500	2 040	0,01	6 300
-	-	-	43	42	0,6	25 000	46 500	2 040	0,01	6 300
55	5,5	20	43	42	0,6	25 000	46 500	2 040	0,01	6 300
-	-	-	48	42	1	38 000	65 500	2 850	0,028	5 000
-	-	-	48	45	1	38 000	65 500	2 850	0,028	5 000
62	7	25	48	45	1	38 000	65 500	2 850	0,028	5 000
-	-	-	54	46	1	69 500	112 000	5 000	0,075	3 800
-	-	-	45	42	0,6	20 000	46 500	2 060	0,011	7 500
-	-	-	51	46	1	35 500	67 000	3 000	0,028	5 300
-	-	-	51	48	1	35 500	67 000	3 000	0,028	5 300
65	7	22	51	48	1	35 500	67 000	3 000	0,028	5 300
-	-	-	55	48	1	50 000	88 000	3 900	0,05	4 500
-	-	-	55	52	1	50 000	88 000	3 900	0,05	4 500
72	7,5	28	55	52	1	50 000	88 000	3 900	0,05	4 500
-	-	-	62	53	1	76 500	127 000	5 600	0,11	3 600
-	-	-	52	48	0,6	27 000	63 000	2 750	0,02	6 300
-	-	-	57	51	1	46 500	98 000	4 300	0,05	4 800
-	-	-	57	55	1	46 500	98 000	4 300	0,05	4 800
72	7	23	57	55	1	46 500	98 000	4 300	0,05	4 800
-	-	-	63	55	1	61 000	112 000	5 000	0,08	4 000
-	-	-	63	60	1	61 000	112 000	5 000	0,08	4 000
82	8,5	31	63	60	1	61 000	112 000	5 000	0,08	4 000
-	-	-	70	60	1	96 500	170 000	7 500	0,18	3 400
-	-	-	57	53	0,6	28 000	69 500	3 050	0,024	6 000
-	-	-	62	56	1	39 000	80 000	3 550	0,043	4 800
-	-	-	62	60	1	39 000	80 000	3 550	0,043	4 800
78	7,5	24	62	60	1	39 000	80 000	3 550	0,043	4 800
-	-	-	69	61	1	75 000	140 000	6 300	0,12	3 600
-	-	-	69	65	1	75 000	140 000	6 300	0,12	3 600
90	10	33	69	65	1	75 000	140 000	6 300	0,12	3 600
-	-	-	78	67	1	122 000	220 000	9 800	0,3	3 000

# Axial deep groove ball bearings

Single direction



511, 512, 513, 514

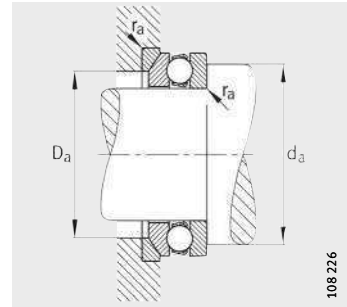
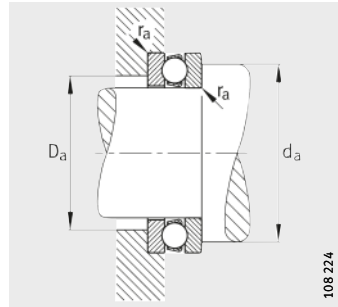
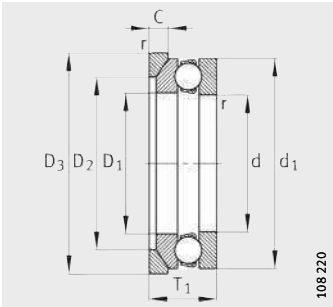


532, 533  
Spherical housing locating washer

**Dimension table** (continued) · Dimensions in mm

Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D <sub>1</sub>	d <sub>1</sub>	r	R	A	D <sub>2</sub>
									min.			
51110	–	0,151	–	50	70	14	52	70	0,6	–	–	–
51210	–	0,346	–	50	78	22	52	78	1	–	–	–
53210	–	0,341	–	50	78	23,5	52	78	1	64	32,5	–
53210	U210	0,341	0,098	50	78	23,5	52	78	1	64	32,5	62
51310	–	0,932	–	50	95	31	52	95	1,1	–	–	–
53310	–	0,97	–	50	95	34,3	52	95	1,1	72	28	–
53310	U310	0,97	0,225	50	95	34,3	52	95	1,1	72	28	72
51410	–	1,81	–	50	110	43	52	110	1,5	–	–	–
51111	–	0,208	–	55	78	16	57	78	0,6	–	–	–
51211	–	0,382	–	55	90	25	57	90	1	–	–	–
53211	–	0,609	–	55	90	27,3	57	90	1	72	35	–
53211	U211	0,609	0,152	55	90	27,3	57	90	1	72	35	72
51311	–	1,3	–	55	105	35	57	105	1,1	–	–	–
53311	–	1,38	–	55	105	39,3	57	105	1,1	80	30	–
53311	U311	1,38	0,277	55	105	39,3	57	105	1,1	80	30	80
51411	–	2,83	–	55	120	48	57	120	1,5	–	–	–
51112	–	0,278	–	60	85	17	62	85	1	–	–	–
51212	–	0,649	–	60	95	26	62	95	1	–	–	–
53212	–	0,655	–	60	95	28	62	95	1	72	32,5	–
53212	U212	0,655	0,165	60	95	28	62	95	1	72	32,5	78
51312	–	1,36	–	60	110	35	62	110	1,1	–	–	–
53312	–	1,41	–	60	110	38,3	62	110	1,1	90	41	–
53312	U312	1,41	0,31	60	110	38,3	62	110	1,1	90	41	85
51412-MP	–	3,51	–	60	130	51	62	130	1,5	–	–	–
51113	–	0,3	–	65	90	18	67	90	1	–	–	–
51213	–	0,684	–	65	100	27	67	100	1	–	–	–
53213	–	0,855	–	65	100	28,7	67	100	1	80	40	–
53213	U213	0,855	0,184	65	100	28,7	67	100	1	80	40	82
51313	–	1,39	–	65	115	36	67	115	1,1	–	–	–
53313	–	1,78	–	65	115	39,4	67	115	1,1	90	38,5	–
53313	U313	1,78	0,338	65	115	39,4	67	115	1,1	90	38,5	90
51413-MP	–	4,47	–	65	140	56	68	140	2	–	–	–





532, 533  
Spherical housing locating  
washer, seating washer U2, U3

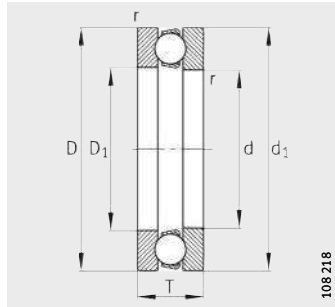
Mounting dimensions

Mounting dimensions

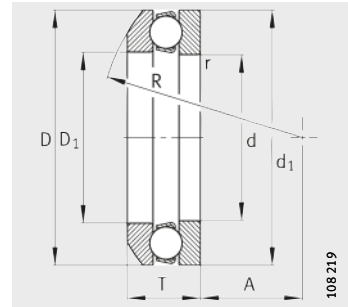
			Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ua}$ N	Minimum load factor A	Limiting speed $n_G$ min <sup>-1</sup>
$D_3$	C	$T_1$	$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N			
-	-	-	62	58	0,6	29 000	75 000	3 300	0,03	5 600
-	-	-	67	61	1	50 000	106 000	4 700	0,07	4 300
-	-	-	67	62	1	50 000	106 000	4 700	0,07	4 300
82	7,5	26	67	62	1	50 000	106 000	4 700	0,07	4 300
-	-	-	77	68	1	86 500	170 000	7 500	0,18	3 400
-	-	-	77	72	1	86 500	170 000	7 500	0,18	3 400
100	11	37	77	72	1	86 500	170 000	7 500	0,18	3 400
-	-	-	86	74	1,5	137 000	255 000	11 400	0,4	2 800
-	-	-	69	64	0,6	30 500	75 000	3 300	0,036	5 300
-	-	-	76	69	1	61 000	134 000	6 100	0,11	3 800
-	-	-	76	72	1	61 000	134 000	6 100	0,11	3 800
95	9	30	76	72	1	61 000	134 000	6 100	0,11	3 800
-	-	-	85	75	1	102 000	208 000	9 000	0,26	3 200
-	-	-	85	80	1	102 000	208 000	9 000	0,26	3 200
110	11,5	42	85	80	1	102 000	208 000	9 000	0,26	3 200
-	-	-	94	81	1,5	180 000	360 000	19 000	0,67	2 600
-	-	-	75	70	1	41 500	112 000	5 000	0,063	4 800
-	-	-	81	74	1	62 000	140 000	6 200	0,12	3 800
-	-	-	81	78	1	62 000	140 000	6 200	0,12	3 800
100	9	31	81	78	1	62 000	140 000	6 200	0,12	3 800
-	-	-	90	80	1	100 000	208 000	9 000	0,28	3 200
-	-	-	90	85	1	100 000	208 000	9 000	0,28	3 200
115	11,5	42	90	85	1	100 000	208 000	9 000	0,28	3 200
-	-	-	102	88	1,5	200 000	400 000	21 300	1	2 200
-	-	-	80	75	1	38 000	100 000	4 400	0,063	4 500
-	-	-	86	79	1	64 000	150 000	6 600	0,14	3 600
-	-	-	86	82	1	64 000	150 000	6 600	0,14	3 600
105	9	32	86	82	1	64 000	150 000	6 600	0,14	3 600
-	-	-	95	85	1	106 000	220 000	9 700	0,32	3 000
-	-	-	95	90	1	106 000	220 000	9 700	0,32	3 000
120	12,5	43	95	90	1	106 000	220 000	9 700	0,32	3 000
-	-	-	110	95	2	216 000	450 000	23 500	1,1	2 000

# Axial deep groove ball bearings

Single direction



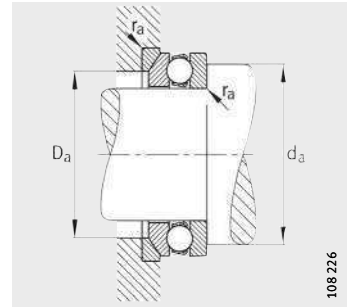
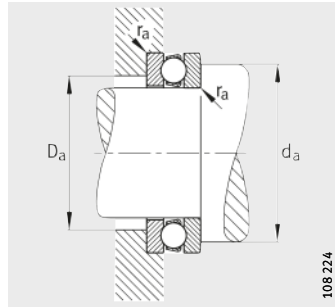
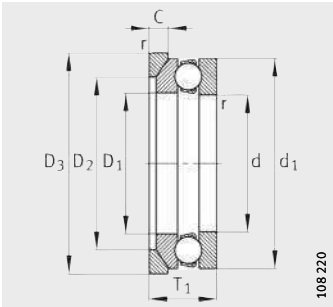
511, 512, 513, 514



532, 533  
Spherical housing locating washer

**Dimension table** (continued) · Dimensions in mm

Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing	Seating washer	d	D	T	D <sub>1</sub>	d <sub>1</sub>	r	R	A	D <sub>2</sub>
		≈kg	≈kg						min.			
51114	–	0,352	–	70	95	18	72	95	1	–	–	–
51214	–	0,727	–	70	105	27	72	105	1	–	–	–
53214	–	0,903	–	70	105	28,8	72	105	1	80	38	–
53214	U214	0,903	0,187	70	105	28,8	72	105	1	80	38	88
51314	–	1,9	–	70	125	40	72	125	1,1	–	–	–
53314	–	2,09	–	70	125	44,2	72	125	1,1	100	43	–
53314	U314	2,09	0,408	70	125	44,2	72	125	1,1	100	43	98
51414-MP	–	5,49	–	70	150	60	73	150	2	–	–	–
51115	–	0,365	–	75	100	19	77	100	1	–	–	–
51215	–	0,819	–	75	110	27	77	110	1	–	–	–
53215	–	1,01	–	75	110	28,3	77	110	1	90	49	–
53215	U215	1,01	0,21	75	110	28,3	77	110	1	90	49	92
51315	–	2,59	–	75	135	44	77	135	1,5	–	–	–
53315	–	3,19	–	75	135	48,1	77	135	1,5	100	37	–
53315	U315	3,19	0,544	75	135	48,1	77	135	1,5	100	37	105
51415-MP	–	6,82	–	75	160	65	78	160	2	–	–	–
51116	–	0,384	–	80	105	19	82	105	1	–	–	–
51216	–	0,908	–	80	115	28	82	115	1	–	–	–
53216	–	0,903	–	80	115	29,5	82	115	1	90	46	–
53216	U216	0,903	0,218	80	115	29,5	82	115	1	90	46	98
51316	–	2,69	–	80	140	44	82	140	1,5	–	–	–
53316	–	2,75	–	80	140	47,6	82	140	1,5	112	50	–
53316	U316	2,75	0,57	80	140	47,6	82	140	1,5	112	50	110
51416-MP	–	7,95	–	80	170	68	83	170	2,1	–	–	–
51117	–	0,404	–	85	110	19	87	110	1	–	–	–
51217	–	1,21	–	85	125	31	88	125	1	–	–	–
53217	–	1,22	–	85	125	33,1	88	125	1	100	52	–
53217	U217	1,22	0,29	85	125	33,1	88	125	1	100	52	105
51317	–	3,48	–	85	150	49	88	150	1,5	–	–	–
53317	–	3,51	–	85	150	53,1	88	150	1,5	112	43	–
53317	U317	3,51	0,803	85	150	53,1	88	150	1,5	112	43	115
51417-MP	–	9,3	–	85	180	72	88	177	2,1	–	–	–



532, 533  
Spherical housing locating  
washer, seating washer U2, U3

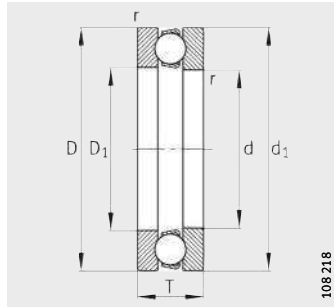
Mounting dimensions

Mounting dimensions

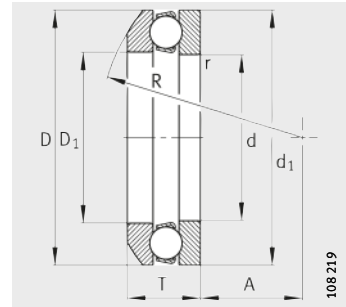
			Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ua}$ N	Minimum load factor A	Limiting speed $n_G$ min <sup>-1</sup>
$D_3$	C	$T_1$	$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N			
-	-	-	85	80	1	40 000	110 000	4 850	0,075	4 300
-	-	-	91	84	1	65 500	160 000	7 000	0,16	3 600
-	-	-	91	88	1	65 500	160 000	7 000	0,16	3 600
110	9	32	91	88	1	65 500	160 000	7 000	0,16	3 600
-	-	-	103	92	1	134 000	290 000	12 900	0,5	2 800
-	-	-	103	98	1	134 000	290 000	12 900	0,5	2 800
130	13	48	103	98	1	134 000	290 000	12 900	0,5	2 800
-	-	-	118	102	2	236 000	500 000	25 500	1,4	1 900
-	-	-	90	85	1	44 000	122 000	5 500	0,095	4 000
-	-	-	96	89	1	67 000	170 000	7 500	0,18	3 400
-	-	-	96	92	1	67 000	170 000	7 500	0,18	3 400
115	9,5	32	96	92	1	67 000	170 000	7 500	0,18	3 400
-	-	-	111	99	1,5	163 000	360 000	15 400	0,75	2 400
-	-	-	111	105	1,5	163 000	360 000	15 400	0,75	2 400
140	15	52	111	105	1,5	163 000	360 000	15 400	0,75	2 400
-	-	-	126	109	2	250 000	560 000	27 000	1,8	1 800
-	-	-	95	90	1	45 000	129 000	5 700	0,1	4 000
-	-	-	101	94	1	75 000	190 000	8 500	0,22	3 400
-	-	-	101	98	1	75 000	190 000	8 500	0,22	3 400
120	10	33	101	98	1	75 000	190 000	8 500	0,22	3 400
-	-	-	116	104	1,5	160 000	360 000	15 100	0,8	2 400
-	-	-	116	110	1,5	160 000	360 000	15 100	0,8	2 400
145	15	52	116	110	1,5	160 000	360 000	15 100	0,8	2 400
-	-	-	134	116	2,1	270 000	620 000	29 000	2,2	1 700
-	-	-	100	95	1	45 500	134 000	6 000	0,11	3 800
-	-	-	109	101	1	98 000	250 000	10 900	0,38	3 000
-	-	-	109	105	1	98 000	250 000	10 900	0,38	3 000
130	11	37	109	105	1	98 000	250 000	10 900	0,38	3 000
-	-	-	124	111	1,5	186 000	415 000	16 700	1,1	2 200
-	-	-	124	115	1,5	186 000	415 000	16 700	1,1	2 200
155	17,5	58	124	115	1,5	186 000	415 000	16 700	1,1	2 200
-	-	-	142	123	2,1	290 000	680 000	32 000	2,8	1 700

# Axial deep groove ball bearings

Single direction



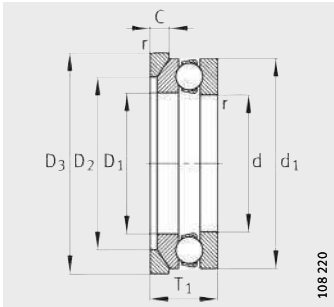
511, 512, 513, 514



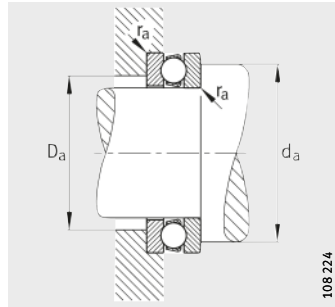
532, 533  
Spherical housing locating washer

**Dimension table** (continued) · Dimensions in mm

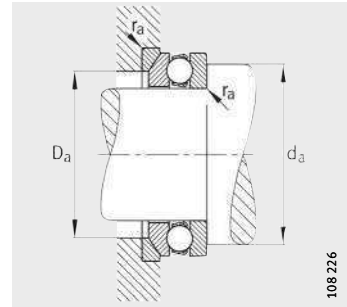
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D <sub>1</sub>	d <sub>1</sub>	r	R	A	D <sub>2</sub>
				min.								
51118	–	0,617	–	90	120	22	92	120	1	–	–	–
51218	–	1,66	–	90	135	35	93	135	1,1	–	–	–
53218	–	1,7	–	90	135	38,5	93	135	1,1	100	45	–
53218	U218	1,7	0,425	90	135	38,5	93	135	1,1	100	45	110
51318	–	3,75	–	90	155	50	93	155	1,5	–	–	–
53318	–	3,81	–	90	155	54,6	93	155	1,5	112	40	–
53318	U318	3,81	0,83	90	155	54,6	93	155	1,5	112	40	120
51418-MP	–	11,1	–	90	190	77	93	187	2,1	–	–	–
51120	–	1,26	–	100	135	25	102	135	1	–	–	–
51220	–	2,21	–	100	150	38	103	150	1,1	–	–	–
53220	–	2,23	–	100	150	40,9	103	150	1,1	112	52	–
53220	U220	2,23	0,507	100	150	40,9	103	150	1,1	112	52	125
51320	–	4,94	–	100	170	55	103	170	1,5	–	–	–
53320	–	4,99	–	100	170	59,2	103	170	1,5	125	46	–
53320	U320	4,99	0,95	100	170	59,2	103	170	1,5	125	46	135
51420-MP	–	14,8	–	100	210	85	103	205	3	–	–	–
51122	–	1,45	–	110	145	25	112	145	1	–	–	–
51222	–	2,28	–	110	160	38	113	160	1,1	–	–	–
53222	–	2,24	–	110	160	40,2	113	160	1,1	125	65	–
53222	U222	2,24	0,56	110	160	40,2	113	160	1,1	125	65	135
51322-MP	–	7,85	–	110	190	63	113	187	2	–	–	–
53322-MP	–	7,85	–	110	190	67,2	113	187	2	140	51	–
53322-MP	U322	7,85	1,28	110	190	67,2	113	187	2	140	51	150
51422-MP	–	19,9	–	110	230	95	113	225	3	–	–	–
51124	–	1,54	–	120	155	25	122	155	1	–	–	–
51224	–	2,66	–	120	170	39	123	170	1,1	–	–	–
53224	–	2,58	–	120	170	40,8	123	170	1,1	125	61	–
53224	U224	2,58	0,65	120	170	40,8	123	170	1,1	125	61	145
51324-MP	–	9,3	–	120	210	70	123	205	2,1	–	–	–
53324-MP	–	9,18	–	120	210	74,1	123	205	2,1	160	63	–
53324-MP	U324	9,18	2,02	120	210	74,1	123	205	2,1	160	63	165
51424-MP	–	25,1	–	120	250	102	123	245	4	–	–	–



532, 533  
Spherical housing locating  
washer, seating washer U2, U3



Mounting dimensions

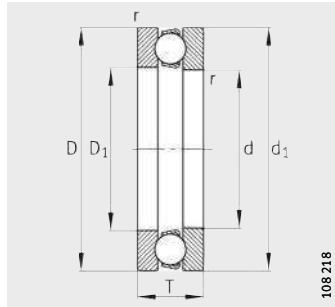


Mounting dimensions

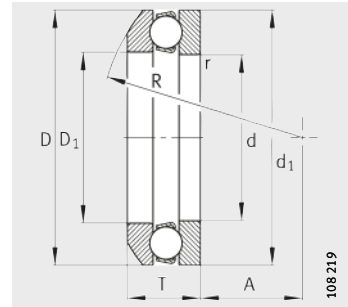
			Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ua}$ N	Minimum load factor A	Limiting speed $n_G$ min <sup>-1</sup>
$D_3$	C	$T_1$	$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N			
-	-	-	108	102	1	45 500	140 000	6 100	0,13	3 800
-	-	-	117	108	1	118 000	300 000	12 300	0,53	2 800
-	-	-	117	110	1	118 000	300 000	12 300	0,53	2 800
140	13,5	42	117	110	1	118 000	300 000	12 300	0,53	2 800
-	-	-	129	116	1,5	193 000	455 000	17 700	1,2	2 000
-	-	-	129	120	1,5	193 000	455 000	17 700	1,2	2 000
160	18	59	129	120	1,5	193 000	455 000	17 700	1,2	2 000
-	-	-	150	130	2,1	305 000	750 000	34 000	3,4	1 600
-	-	-	121	114	1	85 000	270 000	13 000	0,36	3 200
-	-	-	130	120	1	127 000	325 000	14 800	0,67	2 600
-	-	-	130	125	1	122 000	320 000	14 400	0,67	2 600
155	14	45	130	125	1	122 000	320 000	14 400	0,67	2 600
-	-	-	142	128	1,5	240 000	585 000	21 900	1,9	1 900
-	-	-	142	135	1,5	240 000	585 000	21 900	1,9	1 900
175	18	64	142	135	1,5	240 000	585 000	21 900	1,9	1 900
-	-	-	166	144	2,5	365 000	965 000	41 000	5,3	1 500
-	-	-	131	124	1	86 500	290 000	13 400	0,43	3 200
-	-	-	140	130	1	134 000	365 000	16 000	0,85	2 400
-	-	-	140	135	1	134 000	365 000	16 000	0,85	2 400
165	14	45	140	135	1	134 000	365 000	16 000	0,85	2 400
-	-	-	158	142	2	280 000	750 000	27 000	3	1 700
-	-	-	158	150	2	280 000	750 000	27 000	3	1 700
195	20,5	72	158	150	2	280 000	750 000	27 000	3	1 700
-	-	-	182	158	2,5	415 000	1 140 000	46 500	7,5	1 300
-	-	-	141	134	1	90 000	310 000	13 900	0,48	3 000
-	-	-	150	140	1	134 000	390 000	14 200	0,95	2 200
-	-	-	150	145	1	134 000	390 000	14 200	0,95	2 200
175	15	46	150	145	1	134 000	390 000	14 200	0,95	2 200
-	-	-	174	156	2,1	325 000	915 000	31 500	4,5	1 600
-	-	-	174	165	2,1	325 000	915 000	31 500	4,5	1 600
220	22	80	174	165	2,1	325 000	915 000	31 500	4,5	1 600
-	-	-	198	172	3	425 000	1 220 000	47 500	9	1 200

# Axial deep groove ball bearings

Single direction



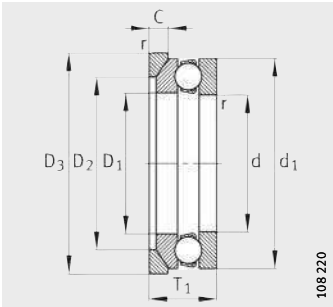
511, 512, 513



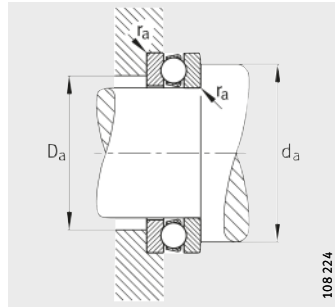
532, 533  
Spherical housing locating washer

**Dimension table** (continued) · Dimensions in mm

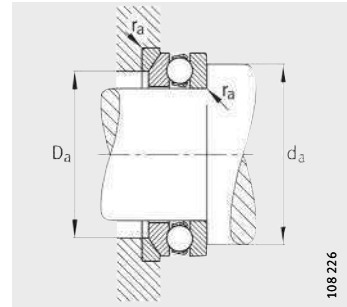
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D <sub>1</sub>	d <sub>1</sub>	r	R	A	D <sub>2</sub>
				min.								
51126	–	2,28	–	130	170	30	132	170	1	–	–	–
51226	–	3,96	–	130	190	45	133	187	1,5	–	–	–
53226	–	3,9	–	130	190	47,9	133	187	1,5	140	67	–
53226	U226	3,9	0,9	130	190	47,9	133	187	1,5	140	67	160
51326-MP	–	13	–	130	225	75	134	220	2,1	–	–	–
51128	–	2,51	–	140	180	31	142	178	1	–	–	–
51228	–	4,3	–	140	200	46	143	197	1,5	–	–	–
53228	–	4,25	–	140	200	48,6	143	197	1,5	160	87	–
53228	U228	4,25	1,22	140	200	48,6	143	197	1,5	160	87	170
51328-MP	–	15,6	–	140	240	80	144	235	2,1	–	–	–
51130-MP	–	2,17	–	150	190	31	152	188	1	–	–	–
51230-MP	–	6,08	–	150	215	50	153	212	1,5	–	–	–
53230-MP	–	5,95	–	150	215	53,3	153	212	1,5	160	79	–
53230-MP	U230	5,95	1,69	150	215	53,3	153	212	1,5	160	79	180
51330-MP	–	16,2	–	150	250	80	154	245	2,1	–	–	–
53330-MP	–	12,8	–	150	250	83,7	154	245	2,1	200	89,5	–
53330-MP	U330	12,8	3,1	150	250	83,7	154	245	2,1	200	89,5	200
51132-MP	–	2,29	–	160	200	31	162	198	1	–	–	–
51232-MP	–	6,53	–	160	225	51	163	222	1,5	–	–	–
53232-MP	–	6,45	–	160	225	54,7	163	222	1,5	160	74	–
53232-MP	U232	6,45	1,81	160	225	54,7	163	222	1,5	160	74	190
51332-MP	–	21,2	–	160	270	87	164	265	3	–	–	–
51134-MP	–	3,08	–	170	215	34	172	213	1,1	–	–	–
51234-MP	–	8,12	–	170	240	55	173	237	1,5	–	–	–
53234-MP	–	7,91	–	170	240	58,7	173	237	1,5	180	91	–
53234-MP	U234	7,91	2,14	170	240	58,7	173	237	1,5	180	91	200
51334-MP	–	22,2	–	170	280	87	174	275	3	–	–	–



532, 533  
Spherical housing locating  
washer, seating washer U2, U3



Mounting dimensions

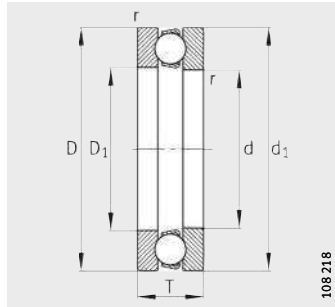


Mounting dimensions

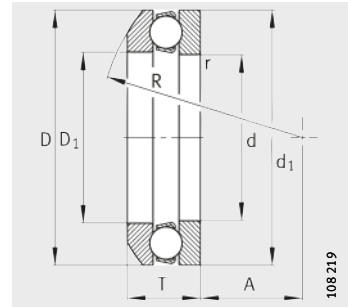
			Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ua}$ N	Minimum load factor A	Limiting speed $n_G$ $\text{min}^{-1}$
$D_3$	C	$T_1$	$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N			
-	-	-	154	146	1	112 000	390 000	17 200	0,75	2 800
-	-	-	166	154	1,5	183 000	540 000	18 900	1,7	1 900
-	-	-	166	160	1,5	183 000	540 000	18 900	1,7	1 900
195	17	53	166	160	1,5	183 000	540 000	18 900	1,7	1 900
-	-	-	187	168	2,1	360 000	1 060 000	35 000	6	1 500
-	-	-	164	156	1	112 000	400 000	16 900	0,85	2 600
-	-	-	176	164	1,5	190 000	570 000	19 200	1,9	1 900
-	-	-	176	170	1,5	190 000	570 000	19 200	1,9	1 900
210	17	55	176	170	1,5	190 000	570 000	19 200	1,9	1 900
-	-	-	200	180	2,1	405 000	1 250 000	40 000	8	1 400
-	-	-	174	166	1	110 000	400 000	16 700	0,9	2 400
-	-	-	189	176	1,5	236 000	735 000	24 200	2,8	1 800
-	-	-	189	180	1,5	236 000	735 000	24 200	2,8	1 800
225	20,5	60	189	180	1,5	236 000	735 000	24 200	2,8	1 800
-	-	-	210	190	2,1	415 000	1 340 000	41 500	9,5	1 400
-	-	-	210	200	2,1	415 000	1 340 000	41 500	9,5	1 400
260	26	92	210	200	2,1	415 000	1 340 000	41 500	9,5	1 400
-	-	-	184	176	1	112 000	430 000	17 200	1	2 200
-	-	-	199	186	1,5	240 000	765 000	24 700	3,2	1 700
-	-	-	199	190	1,5	240 000	765 000	24 700	3,2	1 700
235	21	61	199	190	1,5	240 000	765 000	24 700	3,2	1 700
-	-	-	226	204	2,5	465 000	1 560 000	47 000	13	1 200
-	-	-	197	188	1	132 000	500 000	19 400	1,4	2 000
-	-	-	212	198	1,5	285 000	930 000	28 500	4,5	1 600
-	-	-	212	200	1,5	285 000	930 000	28 500	4,5	1 600
250	21,5	65	212	200	1,5	285 000	930 000	28 500	4,5	1 600
-	-	-	236	214	2,5	465 000	1 560 000	46 000	13	1 200

# Axial deep groove ball bearings

Single direction



511, 512, 513

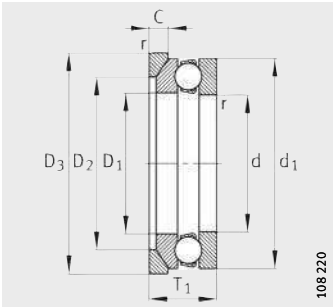


532  
Spherical housing  
locating washer

**Dimension table (continued)** · Dimensions in mm

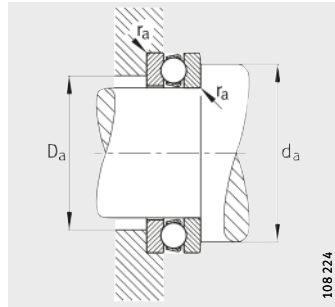
Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T	D <sub>1</sub>	d <sub>1</sub>	r	R	A	D <sub>2</sub>
51136-MP	–	3,06	–	180	225	34	183	222	1,1	–	–	–
51236-MP	–	8,56	–	180	250	56	183	245	1,5	–	–	–
53236-MP	–	8,19	–	180	250	58,2	183	245	1,5	200	112	–
53236-MP	U236	8,19	1,25	180	250	58,2	183	245	1,5	200	112	210
51336-MP	–	24,8	–	180	300	95	184	295	3	–	–	–
51138-MP	–	3,94	–	190	240	37	193	237	1,1	–	–	–
51238-MP	–	11,6	–	190	270	62	194	265	2	–	–	–
53238-MP	–	11,5	–	190	270	65,7	195	265	2	200	98	–
53238-MP	U238	11,5	2,65	190	270	65,7	195	265	2	200	98	230
51338-MP	–	31,9	–	190	320	105	195	315	4	–	–	–
51140-MP	–	4,12	–	200	250	37	203	247	1,1	–	–	–
51240-MP	–	12	–	200	280	62	204	275	2	–	–	–
51340-MP	–	40,9	–	200	340	110	205	335	4	–	–	–
51144-MP	–	4,54	–	220	270	37	223	267	1,1	–	–	–
51244-MP	–	13,1	–	220	300	63	224	295	2	–	–	–
51148-MP	–	7,41	–	240	300	45	243	297	1,5	–	–	–
51248-MP	–	22,9	–	240	340	78	244	335	2,1	–	–	–
51152-MP	–	7,89	–	260	320	45	263	317	1,5	–	–	–
51252-MP	–	24,8	–	260	360	79	264	355	2,1	–	–	–
51156-MP	–	12	–	280	350	53	283	347	1,5	–	–	–
51256-MP	–	23,7	–	280	380	80	284	375	2,1	–	–	–
51160-MP	–	17,1	–	300	380	62	304	376	2	–	–	–
51260-MP	–	41,8	–	300	420	95	304	415	3	–	–	–
51164-MP	–	18,5	–	320	400	63	324	396	2	–	–	–
51264-MP	–	44,6	–	320	440	95	325	435	3	–	–	–





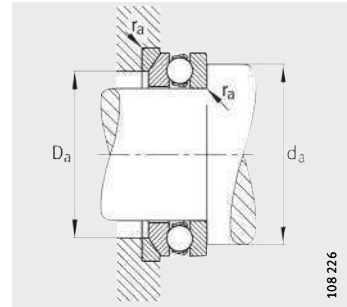
108 220

532  
Spherical housing locating  
washer, seating washer U2



108 224

Mounting dimensions



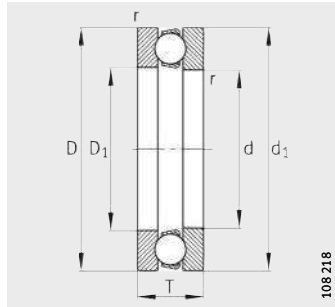
108 226

Mounting dimensions

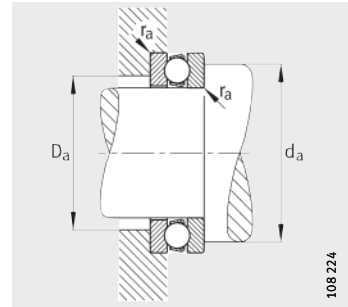
			Mounting dimensions			Basic load ratings		Fatigue limit load $C_{ua}$ N	Minimum load factor A	Limiting speed $n_G$ min <sup>-1</sup>
$D_3$	C	$T_1$	$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N			
-	-	-	207	198	1	134 000	530 000	20 100	1,5	2 000
-	-	-	222	208	1,5	305 000	1 040 000	31 500	5,3	1 600
-	-	-	222	210	1,5	305 000	1 040 000	31 500	5,3	1 600
260	21,5	66	222	210	1,5	305 000	1 040 000	31 500	5,3	1 600
-	-	-	252	228	2,5	520 000	1 830 000	52 000	18	1 100
-	-	-	220	210	1	170 000	655 000	23 200	2,4	1 800
-	-	-	238	222	2	335 000	1 160 000	34 500	7	1 500
-	-	-	238	230	2	335 000	1 160 000	34 500	7	1 500
280	23	73	238	230	2	335 000	1 160 000	34 500	7	1 500
-	-	-	268	242	3	600 000	2 200 000	61 000	26	1 000
-	-	-	230	220	1	170 000	655 000	22 700	2,4	1 800
-	-	-	248	232	2	340 000	1 220 000	35 000	8	1 400
-	-	-	284	256	3	620 000	2 400 000	65 000	30	950
-	-	-	250	240	1	176 000	735 000	24 500	3	1 700
-	-	-	268	252	2	355 000	1 340 000	36 500	9,5	1 300
-	-	-	276	264	1,5	232 000	965 000	31 000	5	1 600
-	-	-	300	280	2,1	465 000	1 860 000	48 000	18	1 100
-	-	-	296	284	1,5	236 000	1 020 000	31 500	5,6	1 500
-	-	-	320	300	2,1	490 000	2 040 000	52 000	22	1 000
-	-	-	322	308	1,5	315 000	1 340 000	40 500	10	1 300
-	-	-	340	320	2,1	490 000	2 160 000	53 000	24	950
-	-	-	348	332	2	365 000	1 600 000	46 000	14	1 200
-	-	-	372	348	2,5	585 000	2 700 000	63 000	38	850
-	-	-	368	352	2	375 000	1 700 000	47 500	16	1 100
-	-	-	392	368	2,5	600 000	2 800 000	64 000	43	850

# Axial deep groove ball bearings

Single direction



511, 512



Mounting dimensions

**Dimension table** (continued) · Dimensions in mm

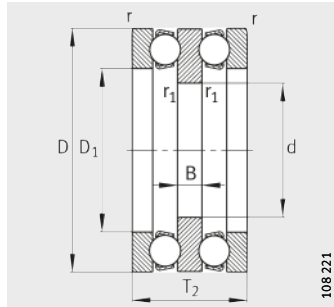
Designation	Mass m ≈kg	Dimensions					
		d	D	T	D <sub>1</sub>	d <sub>1</sub>	r min.
<b>51168-MP</b>	19,9	<b>340</b>	420	64	344	416	2
<b>51268-MP</b>	47,6	<b>340</b>	460	96	345	455	3
<b>51172-MP</b>	21,5	<b>360</b>	440	65	364	436	2
<b>51272-MP</b>	70,4	<b>360</b>	500	110	365	495	4
<b>51176-MP</b>	22,4	<b>380</b>	460	65	384	456	2
<b>51180-MP</b>	23,5	<b>400</b>	480	65	404	476	2
<b>51184-MP</b>	24,4	<b>420</b>	500	65	424	495	2
<b>51192-MP</b>	37,2	<b>460</b>	560	80	464	555	2,1
<b>511/500-MP</b>	44,9	<b>500</b>	600	80	505	595	2,1
<b>511/530-MP</b>	55,9	<b>530</b>	640	85	535	635	3
<b>511/560-MP</b>	58,8	<b>560</b>	670	85	565	665	3



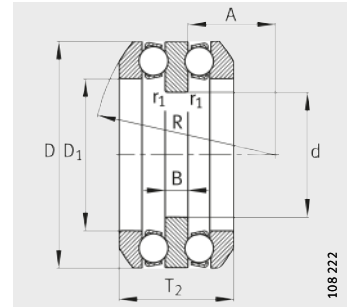
Mounting dimensions			Basic load ratings		Fatigue limit load $C_{Ua}$ N	Minimum load factor A	Limiting speed $n_G$ $\text{min}^{-1}$
$d_a$ min.	$D_a$ max.	$r_a$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N			
388	372	2	380 000	1 800 000	49 000	18	1 000
412	388	2,5	620 000	3 050 000	67 000	50	800
408	392	2	405 000	2 000 000	45 000	22	1 000
444	416	3	720 000	3 650 000	79 000	70	700
428	412	2	430 000	2 240 000	48 500	24	950
448	432	2	440 000	2 320 000	49 500	28	900
468	452	2	440 000	2 450 000	51 000	30	900
520	500	2,1	530 000	3 100 000	61 000	50	800
560	540	2,1	550 000	3 350 000	63 000	56	750
596	574	2,5	620 000	3 900 000	73 000	80	670
626	604	2,5	630 000	4 150 000	74 000	85	670

# Axial deep groove ball bearings

Double direction



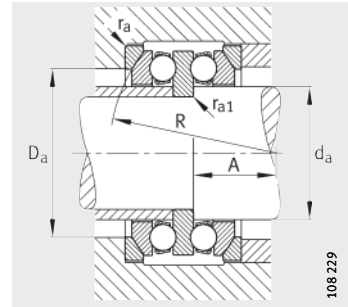
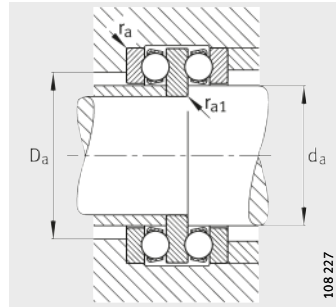
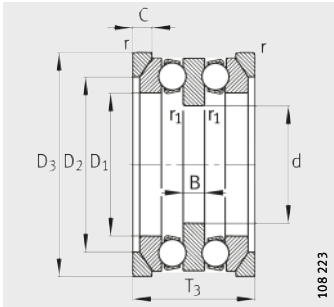
522, 523



542, 543  
Spherical housing locating washers

**Dimension table** - Dimensions in mm

Designation		Mass m		Dimensions								
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T <sub>2</sub>	D <sub>1</sub>	B	r min.	r <sub>1</sub> min.	R	
52202	-	0,076	-	10	32	22	17	5	0,6	0,3	-	
52204	-	0,145	-	15	40	26	22	6	0,6	0,3	-	
52205	-	0,215	-	20	47	28	27	7	0,6	0,3	-	
54205	-	0,221	-	20	47	31,4	27	7	0,6	0,3	40	
54205	U205	0,221	0,032	20	47	31,4	27	7	0,6	0,3	40	
52305	-	0,291	-	20	52	34	27	8	1	0,3	-	
54305	-	0,303	-	20	52	37,6	27	8	1	0,3	45	
54305	U305	0,303	0,044	20	52	37,6	27	8	1	0,3	45	
52206	-	0,236	-	25	52	29	32	7	0,6	0,3	-	
54206	-	0,269	-	25	52	32,6	32	7	0,6	0,3	45	
54206	U206	0,269	0,038	25	52	32,6	32	7	0,6	0,3	45	
52306	-	0,435	-	25	60	38	32	9	1	0,3	-	
54306	-	0,553	-	25	60	41,2	32	9	1	0,3	50	
54306	U306	0,553	0,056	25	60	41,2	32	9	1	0,3	50	
52207	-	0,371	-	30	62	34	37	8	1	0,3	-	
54207	-	0,749	-	30	62	37,8	37	8	1	0,3	50	
54207	U207	0,749	0,057	30	62	37,8	37	8	1	0,3	50	
52307	-	0,63	-	30	68	44	37	10	1	0,3	-	
54307	-	0,802	-	30	68	47,2	37	10	1	0,3	56	
54307	U307	0,802	0,083	30	68	47,2	37	10	1	0,3	56	
52208	-	0,509	-	30	68	36	42	9	1	0,6	-	
54208	-	0,513	-	30	68	38,6	42	9	1	0,6	56	
54208	U208	0,513	0,071	30	68	38,6	42	9	1	0,6	56	
52308	-	1,02	-	30	78	49	42	12	1	0,6	-	
52209	-	0,539	-	35	73	37	47	9	1	0,6	-	
54209	-	0,537	-	35	73	39,6	47	9	1	0,6	56	
54209	U209	0,537	0,088	35	73	39,6	47	9	1	0,6	56	
52309	-	1,15	-	35	85	52	47	12	1	0,6	-	
54309	-	2,15	-	35	85	56,2	47	12	1	0,6	64	
54309	U309	2,15	0,173	35	85	56,2	47	12	1	0,6	64	



542, 543  
Spherical housing locating  
washers, seating washers U2, U3

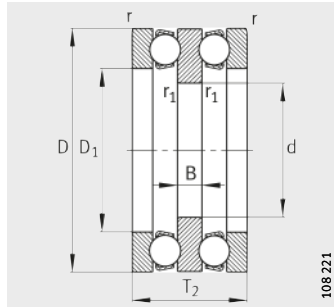
Mounting dimensions

Mounting dimensions

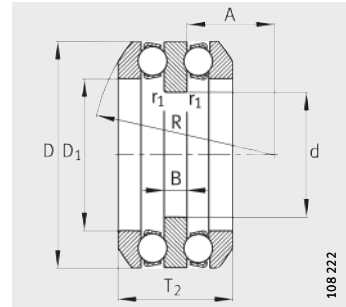
					Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ua}$ N	Minimum load factor A	Limiting speed $n_G$ $\text{min}^{-1}$
A	$D_2$	$D_3$	C	$T_3$	$d_a$	$D_a$ max.	$r_a$ max.	$r_{a1}$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N			
-	-	-	-	-	15	22	0,6	0,3	16 600	25 000	1 100	0,003	9 000
-	-	-	-	-	20	28	0,6	0,3	22 400	37 500	1 660	0,01	7 500
-	-	-	-	-	25	34	0,6	0,3	28 000	50 000	2 220	0,013	6 700
16,5	-	-	-	-	25	36	0,6	0,3	28 000	50 000	2 220	0,013	6 700
16,5	36	50	5,5	36	25	36	0,6	0,3	28 000	50 000	2 220	0,013	6 700
-	-	-	-	-	25	36	1	0,3	34 500	55 000	2 450	0,019	5 300
18	-	-	-	-	25	38	1	0,3	34 500	55 000	2 450	0,019	5 300
18	38	55	6	42	25	38	1	0,3	34 500	55 000	2 450	0,019	5 300
-	-	-	-	-	30	39	0,6	0,3	25 000	46 500	2 040	0,01	6 300
20	-	-	-	-	30	42	0,6	0,3	25 000	46 500	2 040	0,01	6 300
20	42	55	5,5	37	30	42	0,6	0,3	25 000	46 500	2 040	0,01	6 300
-	-	-	-	-	30	42	1	0,3	38 000	65 500	2 850	0,028	5 000
19,5	-	-	-	-	30	45	1	0,3	38 000	65 500	2 850	0,028	5 000
19,5	45	62	7	46	30	45	1	0,3	38 000	65 500	2 850	0,028	5 000
-	-	-	-	-	35	46	1	0,3	35 500	67 000	3 000	0,028	5 300
21	-	-	-	-	35	48	1	0,3	35 500	67 000	3 000	0,028	5 300
21	48	65	7	42	35	48	1	0,3	35 500	67 000	3 000	0,028	5 300
-	-	-	-	-	35	48	1	0,3	50 000	88 000	3 900	0,05	4 500
21	-	-	-	-	35	52	1	0,3	50 000	88 000	3 900	0,05	4 500
21	52	72	7,5	52	35	52	1	0,3	50 000	88 000	3 900	0,05	4 500
-	-	-	-	-	40	51	1	0,6	46 500	98 000	4 300	0,05	4 800
25	-	-	-	-	40	55	1	0,6	46 500	98 000	4 300	0,05	4 800
25	55	72	7	44	40	55	1	0,6	46 500	98 000	4 300	0,05	4 800
-	-	-	-	-	40	55	1	0,6	61 000	112 000	5 000	0,08	4 000
-	-	-	-	-	45	56	1	0,6	39 000	80 000	3 550	0,043	4 800
23	-	-	-	-	45	60	1	0,6	39 000	80 000	3 550	0,043	4 800
23	60	78	7,5	45	45	60	1	0,6	39 000	80 000	3 550	0,043	4 800
-	-	-	-	-	45	61	1	0,6	75 000	140 000	6 300	0,12	3 600
21	-	-	-	-	45	65	1	0,6	75 000	140 000	6 300	0,12	3 600
21	65	90	10	62	45	65	1	0,6	75 000	140 000	6 300	0,12	3 600

# Axial deep groove ball bearings

Double direction



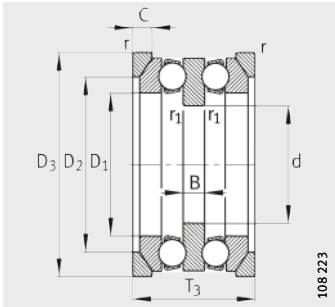
522, 523



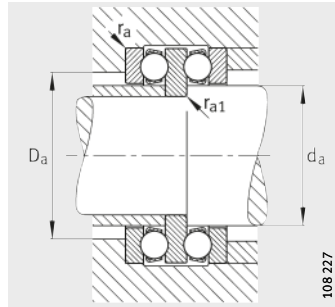
542, 543  
Spherical housing locating washers

**Dimension table** (continued) · Dimensions in mm

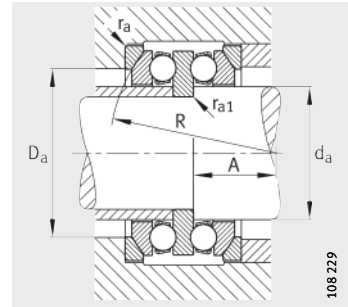
Designation		Mass m		Dimensions							
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T <sub>2</sub>	D <sub>1</sub>	B	r	r <sub>1</sub>	R
									min.	min.	
52210	–	0,635	–	40	78	39	52	9	1	0,6	–
54210	–	0,625	–	40	78	42	52	9	1	0,6	64
54210	U210	0,625	0,098	40	78	42	52	9	1	0,6	64
52310	–	1,76	–	40	95	58	52	14	1,1	0,6	–
54310	–	1,84	–	40	95	64,6	52	14	1,1	0,6	72
54310	U310	1,84	0,225	40	95	64,6	52	14	1,1	0,6	72
52211	–	0,571	–	45	90	45	57	10	1	0,6	–
54211	–	1,02	–	45	90	49,6	57	10	1	0,6	72
54211	U211	1,02	0,152	45	90	49,6	57	10	1	0,6	72
52311	–	2,37	–	45	105	64	57	15	1,1	0,6	–
54311	–	2,53	–	45	105	72,6	57	15	1,1	0,6	80
54311	U311	2,53	0,277	45	105	72,6	57	15	1,1	0,6	80
52212	–	1,12	–	50	95	46	62	10	1	0,6	–
54212	–	1,17	–	50	95	50	62	10	1	0,6	72
54212	U212	1,17	0,165	50	95	50	62	10	1	0,6	72
52312	–	2,49	–	50	110	64	62	15	1,1	0,6	–
54312	–	2,59	–	50	110	70,6	62	15	1,1	0,6	90
54312	U312	2,59	0,31	50	110	70,6	62	15	1,1	0,6	90
52213	–	1,19	–	55	100	47	67	10	1	0,6	–
52313	–	2,5	–	55	115	65	67	15	1,1	0,6	–
52214	–	1,3	–	55	105	47	72	10	1	1	–
52314	–	3,55	–	55	125	72	72	16	1,1	1	–
54314	–	3,77	–	55	125	80,4	72	16	1,1	1	100
54314	U314	3,77	0,408	55	125	80,4	72	16	1,1	1	100
52215	–	1,48	–	60	110	47	77	10	1	1	–
54215	–	1,87	–	60	110	49,6	77	10	1	1	90
54215	U215	1,87	0,21	60	110	49,6	77	10	1	1	90
52315	–	4,72	–	60	135	79	77	18	1,5	1	–
54315	–	5,92	–	60	135	87,2	77	18	1,5	1	100
54315	U315	5,92	0,544	60	135	87,2	77	18	1,5	1	100
52216	–	1,55	–	65	115	48	82	10	1	1	–
54216	–	1,6	–	65	115	51	82	10	1	1	90
54216	U216	1,6	0,218	65	115	51	82	10	1	1	90
52316	–	4,82	–	65	140	79	82	18	1,5	1	–
54316	–	4,93	–	65	140	86,2	82	18	1,5	1	112
54316	U316	4,93	0,57	65	140	86,2	82	18	1,5	1	112



108 223



108 227



108 229

542, 543  
Spherical housing locating  
washers, seating washers U2, U3

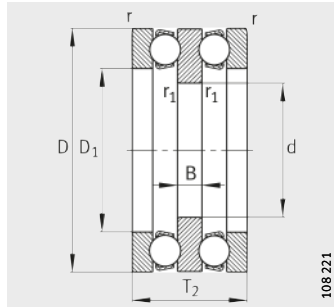
Mounting dimensions

Mounting dimensions

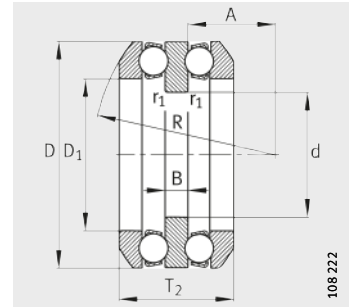
					Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ua}$ N	Minimum load factor A	Limiting speed $n_G$ $\text{min}^{-1}$
A	$D_2$	$D_3$	C	$T_3$	$d_a$	$D_a$ max.	$r_a$ max.	$r_{a1}$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N			
-	-	-	-	-	50	61	1	0,6	50 000	106 000	4 700	0,07	4 300
30,5	-	-	-	-	50	62	1	0,6	50 000	106 000	4 700	0,07	4 300
30,5	62	82	7,5	47	50	62	1	0,6	50 000	106 000	4 700	0,07	4 300
-	-	-	-	-	50	68	1	0,6	86 500	170 000	7 500	0,18	3 400
23	-	-	-	-	50	72	1	0,6	86 500	170 000	7 500	0,18	3 400
23	72	100	11	70	50	72	1	0,6	86 500	170 000	7 500	0,18	3 400
-	-	-	-	-	55	69	1	0,6	61 000	134 000	6 100	0,11	3 800
32,5	-	-	-	-	55	72	1	0,6	61 000	134 000	6 100	0,11	3 800
32,5	72	95	9	55	55	72	1	0,6	61 000	134 000	6 100	0,11	3 800
-	-	-	-	-	55	75	1	0,6	102 000	208 000	9 000	0,26	3 200
25,5	-	-	-	-	55	80	1	0,6	102 000	208 000	9 000	0,26	3 200
25,5	80	110	11,5	78	55	80	1	0,6	102 000	208 000	9 000	0,26	3 200
-	-	-	-	-	60	74	1	0,6	62 000	140 000	6 200	0,12	3 800
30,5	-	-	-	-	60	78	1	0,6	62 000	140 000	6 200	0,12	3 800
30,5	78	100	9	56	60	78	1	0,6	62 000	140 000	6 200	0,12	3 800
-	-	-	-	-	60	80	1	0,6	100 000	208 000	9 000	0,28	3 200
36,5	-	-	-	-	60	85	1	0,6	100 000	208 000	9 000	0,28	3 200
36,5	85	115	11,5	78	60	85	1	0,6	100 000	208 000	9 000	0,28	3 200
-	-	-	-	-	65	79	1	0,6	64 000	150 000	6 600	0,14	3 600
-	-	-	-	-	65	85	1	0,6	106 000	220 000	9 700	0,32	3 000
-	-	-	-	-	70	84	1	1	65 500	160 000	7 000	0,16	3 600
-	-	-	-	-	70	92	1	1	134 000	290 000	12 900	0,5	2 800
39	-	-	-	-	70	98	1	1	134 000	290 000	12 900	0,5	2 800
39	98	130	13	88	70	98	1	1	134 000	290 000	12 900	0,5	2 800
-	-	-	-	-	75	89	1	1	67 000	170 000	7 500	0,18	3 400
47,5	-	-	-	-	75	92	1	1	67 000	170 000	7 500	0,18	3 400
47,5	92	115	9,5	57	75	92	1	1	67 000	170 000	7 500	0,18	3 400
-	-	-	-	-	75	99	1,5	1	163 000	360 000	15 400	0,75	2 400
32,5	-	-	-	-	75	105	1,5	1	163 000	360 000	15 400	0,75	2 400
32,5	105	140	15	95	75	105	1,5	1	163 000	360 000	15 400	0,75	2 400
-	-	-	-	-	80	94	1	1	75 000	190 000	8 500	0,22	3 400
45	-	-	-	-	80	98	1	1	75 000	190 000	8 500	0,22	3 400
45	98	120	10	58	80	98	1	1	75 000	190 000	8 500	0,22	3 400
-	-	-	-	-	80	104	1,5	1	160 000	360 000	15 100	0,8	2 400
45,5	-	-	-	-	80	110	1,5	1	160 000	360 000	15 100	0,8	2 400
45,5	110	145	15	95	80	110	1,5	1	160 000	360 000	15 100	0,8	2 400

# Axial deep groove ball bearings

Double direction



522, 523

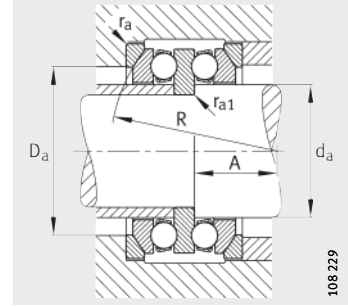
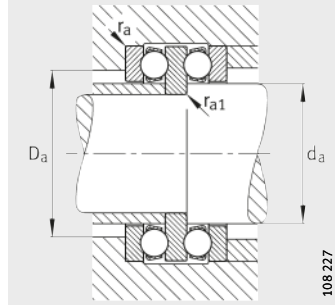
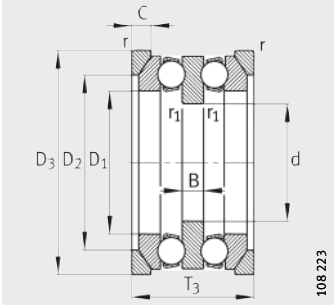


542, 543  
Spherical housing locating washers

**Dimension table** (continued) · Dimensions in mm

Designation		Mass m		Dimensions							
Bearing	Seating washer	Bearing ≈kg	Seating washer ≈kg	d	D	T <sub>2</sub>	D <sub>1</sub>	B	r min.	r <sub>1</sub> min.	R
52217	–	2,23	–	70	125	55	88	12	1	1	–
54217	–	2,25	–	70	125	59,2	88	12	1	1	100
54217	U217	2,25	0,29	70	125	59,2	88	12	1	1	100
52317	–	6,21	–	70	150	87	88	19	1,5	1	–
54317	–	6,27	–	70	150	95,2	88	19	1,5	1	112
54317	U317	6,27	0,803	70	150	95,2	88	19	1,5	1	112
52218	–	3,05	–	75	135	62	93	14	1,1	1	–
54218	–	3,11	–	75	135	69	93	14	1,1	1	100
54218	U218	3,11	0,425	75	135	69	93	14	1,1	1	100
52318	–	6,62	–	75	155	88	93	19	1,5	1	–
54318	–	6,74	–	75	155	97,2	93	19	1,5	1	112
54318	U318	6,74	0,83	75	155	97,2	93	19	1,5	1	112
52220	–	3,83	–	85	150	67	103	15	1,1	1	–
54220	–	3,87	–	85	150	72,8	103	15	1,1	1	112
54220	U220	3,87	0,507	85	150	72,8	103	15	1,1	1	112
52320	–	8,71	–	85	170	97	103	21	1,5	1	–
54320	–	8,81	–	85	170	105,4	103	21	1,5	1	125
54320	U320	8,81	0,95	85	170	105,4	103	21	1,5	1	125
52222	–	4,06	–	95	160	67	113	15	1,1	1	–
52322-MP	–	14	–	95	190	110	113	24	2	1	–
54322-MP	–	14	–	95	190	118,4	113	24	2	1	140
54322-MP	U322	14	1,28	95	190	118,4	113	24	2	1	140
52224	–	4,82	–	100	170	68	123	15	1,1	1,1	–
52324-MP	–	16,8	–	100	210	123	123	27	2,1	1,1	–
52226	–	7,26	–	110	190	80	133	18	1,5	1,1	–
52326-MP	–	22	–	110	225	130	134	30	2,1	1,1	–
52228	–	7,78	–	120	200	81	143	18	1,5	1,1	–
52328-MP	–	28,3	–	120	240	140	144	31	2,1	1,1	–
52230-MP	–	10,7	–	130	215	89	153	20	1,5	1,1	–
52330-MP	–	29,4	–	130	250	140	154	31	2,1	1,1	–
52232-MP	–	12,2	–	140	225	90	163	20	1,5	1,1	–
52234-MP	–	14	–	150	240	97	173	21	1,5	1,1	–





542, 543  
Spherical housing locating  
washers, seating washers U2, U3

Mounting dimensions

Mounting dimensions

					Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ua}$ N	Minimum load factor A	Limiting speed $n_G$ $\text{min}^{-1}$
A	$D_2$	$D_3$	C	$T_3$	$d_a$	$D_a$ max.	$r_a$ max.	$r_{a1}$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N			
-	-	-	-	-	85	101	1	1	98 000	250 000	10 900	0,38	3 000
49,5	-	-	-	-	85	105	1	1	98 000	250 000	10 900	0,38	3 000
49,5	105	130	11	67	85	105	1	1	98 000	250 000	10 900	0,38	3 000
-	-	-	-	-	85	111	1,5	1	186 000	415 000	16 700	1,1	2 200
39	-	-	-	-	85	115	1,5	1	186 000	415 000	16 700	1,1	2 200
39	115	155	17,5	105	85	115	1,5	1	186 000	415 000	16 700	1,1	2 200
-	-	-	-	-	90	108	1	1	118 000	300 000	12 300	0,53	2 800
42	-	-	-	-	90	110	1	1	118 000	300 000	12 300	0,53	2 800
42	110	140	13,5	76	90	110	1	1	118 000	300 000	12 300	0,53	2 800
-	-	-	-	-	90	116	1,5	1	193 000	455 000	17 700	1,2	2 000
36,5	-	-	-	-	90	120	1,5	1	193 000	455 000	17 700	1,2	2 000
36,5	120	160	18	106	90	120	1,5	1	193 000	455 000	17 700	1,2	2 000
-	-	-	-	-	100	120	1	1	122 000	320 000	14 400	0,67	2 600
49	-	-	-	-	100	125	1	1	122 000	320 000	14 400	0,67	2 600
49	125	155	14	81	100	125	1	1	122 000	320 000	14 400	0,67	2 600
-	-	-	-	-	100	128	1,5	1	240 000	585 000	21 900	1,9	1 900
42	-	-	-	-	100	135	1,5	1	240 000	585 000	21 900	1,9	1 900
42	135	175	18	115	100	135	1,5	1	240 000	585 000	21 900	1,9	1 900
-	-	-	-	-	110	130	1	1	134 000	365 000	16 000	0,85	2 400
-	-	-	-	-	110	142	2	1	280 000	750 000	27 000	3	1 700
47	-	-	-	-	110	150	2	1	280 000	750 000	27 000	3	1 700
47	150	195	20,5	128	110	150	2	1	280 000	750 000	27 000	3	1 700
-	-	-	-	-	120	140	1	1	134 000	390 000	14 200	0,95	2 200
-	-	-	-	-	120	156	2,1	1	325 000	915 000	31 500	4,5	1 600
-	-	-	-	-	130	154	1,5	1	183 000	540 000	18 900	1,7	1 900
-	-	-	-	-	130	168	2,1	1	360 000	1 060 000	35 000	6	1 500
-	-	-	-	-	140	164	1,5	1	190 000	570 000	19 200	1,9	1 900
-	-	-	-	-	140	180	2,1	1	405 000	1 250 000	40 000	8	1 400
-	-	-	-	-	150	176	1,5	1	236 000	735 000	24 200	2,8	1 800
-	-	-	-	-	150	190	2,1	1	415 000	1 340 000	41 500	9,5	1 400
-	-	-	-	-	160	186	1,5	1	240 000	765 000	24 700	3,2	1 700
-	-	-	-	-	170	198	1,5	1	285 000	930 000	28 500	4,5	1 600

**FAG**



**Axial angular contact ball bearings**

# Axial angular contact ball bearings



	Page
<b>Product overview</b>	Axial angular contact ball bearings ..... 844
<b>Features</b>	Operating temperature ..... 845
	Cages ..... 845
	Suffixes ..... 846
<b>Design and safety guidelines</b>	Operating life ..... 846
	Equivalent static bearing load ..... 847
	Static load safety factor ..... 847
	Speeds ..... 847
	Preload ..... 847
	Design of bearing arrangements ..... 848
<b>Accuracy</b>	..... 848
<b>Dimension tables</b>	Axial angular contact ball bearings, double direction ..... 850

## Product overview Axial angular contact ball bearings

**Double direction**

2344, 2347



108 242a

# Axial angular contact ball bearings



- Features** Double direction axial angular contact ball bearings are precision bearings without self-retention and with restricted tolerances to class SP. They comprise solid shaft locating washers, a spacer ring, a housing locating washer and ball and cage assemblies with solid brass cages. The bearing parts are matched to each other and can be fitted separately, but must not be interchanged with parts from bearings of the same size.
- A detailed description of axial angular contact ball bearings (calculation, lubrication, rigidity, machining tolerances of bearing seats) is given in Catalogue SP 1, Super Precision Bearings.
- High axial load carrying capacity** The contact angle is 60°. As a result, these highly rigid axial angular contact ball bearings can support high axial forces in both directions.
- The double direction precision bearings are therefore particularly suitable for precision spindle bearing arrangements in machine tools. In this case, the axial angular contact ball bearing is combined with a double row cylindrical roller bearing with a tapered bore, which supports the radial forces.
- Two designs** Axial angular contact ball bearings are available in two designs. Series 2344 can be fitted on the small diameter of the shaft taper and series 2347 on the large diameter.
- These series have the same nominal outside diameter as cylindrical roller bearings NN30..-AS-K. However, the outside diameter tolerance is designed to give a loose fit when the seats of the axial angular contact ball bearing and the cylindrical roller bearing are machined together.
- Sealing** Axial angular contact ball bearings are of an open design.
- Lubrication** The bearings can be lubricated with oil or grease. Higher speeds can be achieved with oil lubrication. In order to allow oil to flow between the two rows of balls, the housing locating washer has a lubrication groove and lubrication holes.
- At high speeds, overlubrication of the radial bearing can be prevented if the installation space is separated between the axial angular contact ball bearing and the cylindrical roller bearing.
- Operating temperature** Axial angular contact ball bearings can be used at operating temperatures from -30 °C to +150 °C, restricted by the lubricant.
- Cages** Each row of rolling elements has a ball-guided solid brass cage. The cage is indicated by the suffix M and, together with the lubrication, has a considerable influence on the speed suitability of the bearing.

# Axial angular contact ball bearings

## Suffixes

Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
M	Solid brass cage, ball-guided	Standard
SP	Restricted tolerance class SP	
UP	Restricted tolerance class UP	Special design, available by agreement

## Design and safety guidelines

### Operating life

High precision bearings must guide machine parts with high precision and support forces at very high speeds. They are selected predominantly from the perspectives of:

- accuracy
- rigidity
- running behaviour.

In order that they can fulfil these tasks for as long as possible, the bearings must run without wear. The precondition for this is the creation of a load-bearing hydrodynamic lubricant film at the contact points of the rolling contact partners. Under these conditions, rolling bearings will achieve their fatigue life in a large number of applications. If the design is appropriate to the fatigue life, the operating life of the bearing is normally restricted by the lubricant operating life.

The decisive factors for the operating life from the perspective of load are the Hertzian pressures occurring at the contacts and the bearing kinematics. For high performance assemblies, individual design with the aid of special calculation programs is therefore advisable.

Since failure as a result of fatigue plays no part in practice in the case of high precision bearings, calculation of the rating life  $L_{10}$  in accordance with DIN ISO 281 is not suitable as a means of determining the operating life.



### Equivalent static bearing load

Axial angular contact ball bearings, installed adjacent to a cylindrical roller bearing, support axial forces only:

$$P_0 = F_{0a}$$

$P_0$  N  
Equivalent static bearing load  
 $F_{0a}$  N  
Axial static bearing load.

### Static load safety factor

In order to achieve sufficiently smooth running of the bearings, a static load safety factor  $S_0 \cong 2,5$  is required:

$$S_0 = \frac{C_{0a}}{P_0}$$

$S_0$  –  
Static load safety factor  
 $C_{0a}$  N  
Basic static load rating, see dimension tables  
 $P_0$  N  
Equivalent static bearing load.

### Speeds

Double direction axial angular contact ball bearings are suitable for high speeds. Under certain circumstances, however, the high values may not be achieved if the cylindrical roller bearing arranged adjacent to the axial angular contact ball bearing is preloaded.



The limiting speeds  $n_G$  given in the dimension tables are valid for lubrication with grease or for minimal quantity lubrication with oil and must not be exceeded.

### Preload

The preload is determined by the spacer ring arranged between the two shaft locating washers.

# Axial angular contact ball bearings

## Design of bearing arrangements Shaft and housing tolerances

Guide values for the machining tolerances of the bearing seats: see Catalogue SP 1, Super Precision Bearings.

## Mounting dimensions

The maximum dimensions for the radii  $r_a$  and the diameters of the abutment surfaces  $d_a$ ,  $D_a$  are indicated in the dimension tables.

## Accuracy

The dimensional and geometrical tolerances correspond to tolerance class SP.

## Tolerances for shaft locating washer

Bore		Bore deviation		Variation	Wall thickness variation	Width deviation	
d mm		$\Delta_{dmp}$ $\mu\text{m}$		$V_{dp}$ $\mu\text{m}$	$S_i$ $\mu\text{m}$	$\Delta_{Hs}$ $\mu\text{m}$	
over	incl.						
18	30	0	-8	6	3	+50	-150
30	50	0	-10	8	3	+75	-200
50	80	0	-12	9	4	+100	-250
80	120	0	-15	11	4	+125	-300
120	180	0	-18	14	5	+150	-350
180	250	0	-22	17	5	+175	-400
250	315	0	-25	19	7	+200	-450
315	400	0	-30	22	7	+250	-600
400	500	0	-35	26	9	+300	-750

## Tolerances for housing locating washer

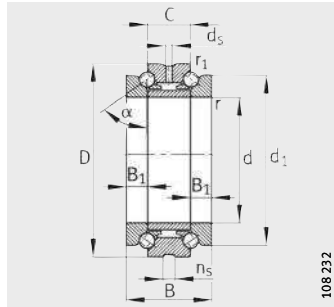
Outside diameter		Outside diameter deviation		Variation	Wall thickness variation
D mm		$\Delta_{Dmp}$ $\mu\text{m}$		$V_{Dp}$ $\mu\text{m}$	$S_e$ $\mu\text{m}$
over	incl.				
50	80	-24	-43	6	The wall thickness variation $S_e$ for the housing locating washer is identical to $S_i$ for the shaft locating washer.
80	120	-28	-50	8	
120	180	-33	-58	9	
180	250	-37	-66	10	
250	315	-41	-73	12	
315	400	-46	-82	13	
400	500	-50	-90	15	
500	630	-55	-99	16	



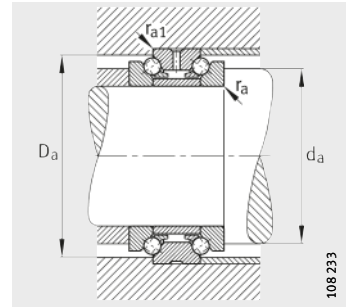


# Axial angular contact ball bearings

Double direction



2344, 2347  
Contact angle  $\alpha = 60^\circ$



Mounting dimensions

**Dimension table** - Dimensions in mm

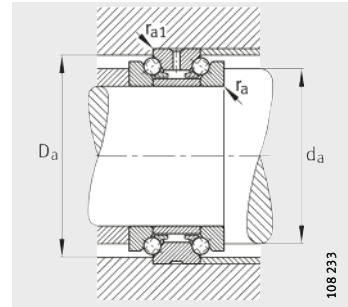
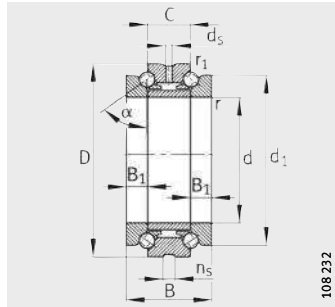
Designation	Mass m ≈kg	Dimensions							
		d	D	B	C	d <sub>1</sub>	B <sub>1</sub>	r	r <sub>1</sub>
								min.	min.
234406-M-SP	0,297	30	55	32	16	47	8	1	0,15
234706-M-SP	0,232	32	55	32	16	47	8	1	0,15
234407-M-SP	0,318	35	62	34	17	53	8,5	1	0,15
234707-M-SP	0,302	37	62	34	17	53	8,5	1	0,15
234408-M-SP	0,39	40	68	36	18	58,5	9	1	0,15
234708-M-SP	0,371	42	68	36	18	58,5	9	1	0,15
234409-M-SP	0,486	45	75	38	19	65	9,5	1	0,15
234709-M-SP	0,472	47	75	38	19	65	9,5	1	0,15
234410-M-SP	0,485	50	80	38	19	70	9,5	1	0,15
234710-M-SP	0,408	52	80	38	19	70	9,5	1	0,15
234411-M-SP	0,944	55	90	44	22	78	11	1,1	0,3
234711-M-SP	0,884	57	90	44	22	78	11	1,1	0,3
234412-M-SP	0,884	60	95	44	22	83	11	1,1	0,3
234712-M-SP	0,852	62	95	44	22	83	11	1,1	0,3
234413-M-SP	0,898	65	100	44	22	88	11	1,1	0,3
234713-M-SP	0,862	67	100	44	22	88	11	1,1	0,3
234414-M-SP	1,22	70	110	48	24	97	12	1,1	0,3
234714-M-SP	1,16	73	110	48	24	97	12	1,1	0,3
234415-M-SP	1,22	75	115	48	24	102	12	1,1	0,3
234715-M-SP	1,22	78	115	48	24	102	12	1,1	0,3
234416-M-SP	1,79	80	125	54	27	110	13,5	1,1	0,3
234716-M-SP	1,69	83	125	54	27	110	13,5	1,1	0,3
234417-M-SP	1,85	85	130	54	27	115	13,5	1,1	0,3
234717-M-SP	1,77	88	130	54	27	115	13,5	1,1	0,3
234418-M-SP	2,45	90	140	60	30	123	15	1,5	0,3
234718-M-SP	2,35	93	140	60	30	123	15	1,5	0,3
234419-M-SP	2,55	95	145	60	30	128	15	1,5	0,3
234719-M-SP	2,45	98	145	60	30	128	15	1,5	0,3
234420-M-SP	2,66	100	150	60	30	133	15	1,5	0,3
234720-M-SP	2,54	103	150	60	30	133	15	1,5	0,3
234421-M-SP	3,41	105	160	66	33	142	16,5	2	0,6
234721-M-SP	3,24	109	160	66	33	142	16,5	2	0,6



		Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ua}$ N	Limiting speeds	
$d_s$	$n_s$	$d_a$ h12	$D_a$ H12	$r_a$ max.	$r_{a1}$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N		$n_{G\ grease}$ $min^{-1}$	$n_{G\ oil}$ $min^{-1}$
3,2	4,8	40,5	50,5	1	0,15	15 300	36 000	3 250	11 000	16 000
3,2	4,8	40,5	50,5	1	0,15	15 300	36 000	3 250	11 000	16 000
3,2	4,8	46,5	57	1	0,15	18 900	47 000	4 250	9 500	14 000
3,2	4,8	46,5	57	1	0,15	18 900	47 000	4 250	9 500	14 000
3,2	4,8	51,5	63,5	1	0,15	22 900	59 000	5 300	8 500	12 000
3,2	4,8	51,5	63,5	1	0,15	22 900	59 000	5 300	8 500	12 000
3,2	4,8	57,5	70	1	0,15	25 000	67 000	6 000	7 500	10 000
3,2	4,8	57,5	70	1	0,15	25 000	67 000	6 000	7 500	10 000
3,2	4,8	62,5	75	1	0,15	26 000	72 000	6 500	7 000	9 500
3,2	4,8	62,5	75	1	0,15	26 000	72 000	6 500	7 000	9 500
3,2	6,5	69	84,5	1	0,3	36 500	99 000	8 900	6 300	8 500
3,2	6,5	69	84,5	1	0,3	36 500	99 000	8 900	6 300	8 500
3,2	6,5	74	89,5	1	0,3	36 000	98 000	8 900	6 000	8 000
3,2	6,5	74	89,5	1	0,3	36 000	98 000	8 900	6 000	8 000
3,2	6,5	79	94,5	1	0,3	38 500	111 000	10 000	5 600	7 500
3,2	6,5	79	94,5	1	0,3	38 500	111 000	10 000	5 600	7 500
3,2	6,5	86,5	103,5	1	0,3	46 000	134 000	12 100	5 300	7 000
3,2	6,5	86,5	103,5	1	0,3	46 000	134 000	12 100	5 300	7 000
3,2	6,5	91,5	108,5	1	0,3	47 500	144 000	12 900	5 000	6 700
3,2	6,5	91,5	108,5	1	0,3	47 500	144 000	12 900	5 000	6 700
3,2	6,5	98,5	117	1	0,3	56 000	175 000	15 500	4 500	6 000
3,2	6,5	98,5	117	1	0,3	56 000	175 000	15 500	4 500	6 000
4,8	9,5	103,5	122	1	0,3	57 000	181 000	15 600	4 500	6 000
4,8	9,5	103,5	122	1	0,3	57 000	181 000	15 600	4 500	6 000
4,8	9,5	110,5	130,5	1,5	0,3	66 000	213 000	17 700	4 000	5 300
4,8	9,5	110,5	130,5	1,5	0,3	66 000	213 000	17 700	4 000	5 300
4,8	9,5	115,5	135,5	1,5	0,3	66 000	219 000	17 900	4 000	5 300
4,8	9,5	115,5	135,5	1,5	0,3	66 000	219 000	17 900	4 000	5 300
4,8	9,5	120,5	140,5	1,5	0,3	67 000	226 000	18 100	3 800	5 000
4,8	9,5	120,5	140,5	1,5	0,3	67 000	226 000	18 100	3 800	5 000
4,8	9,5	128	150	2	0,6	74 000	250 000	19 500	3 600	4 800
4,8	9,5	128	150	2	0,6	74 000	250 000	19 500	3 600	4 800

# Axial angular contact ball bearings

Double direction



2344, 2347  
Contact angle  $\alpha = 60^\circ$

Mounting dimensions

Dimension table (continued) · Dimensions in mm

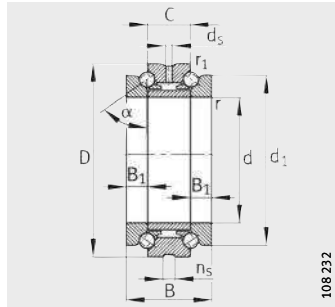
Designation	Mass m ≈kg	Dimensions							
		d	D	B	C	d <sub>1</sub>	B <sub>1</sub>	r	r <sub>1</sub>
								min.	min.
234422-M-SP	4,75	110	170	72	36	150	18	2	0,6
234722-M-SP	4,51	114	170	72	36	150	18	2	0,6
234424-M-SP	4,72	120	180	72	36	160	18	2	0,6
234724-M-SP	4,46	124	180	72	36	160	18	2	0,6
234426-M-SP	6,86	130	200	84	42	177	21	2	0,6
234726-M-SP	6,52	135	200	84	42	177	21	2	0,6
234428-M-SP	8,78	140	210	84	42	187	21	2,1	0,6
234728-M-SP	8,07	145	210	84	42	187	21	2,1	0,6
234430-M-SP	9,21	150	225	90	45	200	22,5	2,1	0,6
234730-M-SP	8,79	155	225	90	45	200	22,5	2,1	0,6
234432-M-SP	11,1	160	240	96	48	212	24	2,1	0,6
234732-M-SP	10,7	165	240	96	48	212	24	2,1	0,6
234434-M-SP	15,3	170	260	108	54	230	27	2,1	0,6
234734-M-SP	14,6	176	260	108	54	230	27	2,1	0,6
234436-M-SP	20,5	180	280	120	60	248	30	2,1	0,6
234736-M-SP	19,6	187	280	120	60	248	30	2,1	0,6
234438-M-SP	24,1	190	290	120	60	258	30	2,1	0,6
234738-M-SP	21,2	197	290	120	60	258	30	2,1	0,6
234440-M-SP	30,9	200	310	132	66	274	33	2,1	0,6
234740-M-SP	28,6	207	310	132	66	274	33	2,1	0,6
234444-M-SP	36,9	220	340	144	72	304	36	3	1,1
234744-M-SP	35,3	228	340	144	72	304	36	3	1,1
234448-M-SP	38,9	240	360	144	72	322	36	3	1,1
234748-M-SP	37,2	248	360	144	72	322	36	3	1,1
234452-M-SP	56,5	260	400	164	82	354	41	4	1,5
234752-M-SP	54,1	269	400	164	82	354	41	4	1,5
234456-M-SP	57,1	280	420	164	82	374	41	4	1,5
234756-M-SP	54,5	289	420	164	82	374	41	4	1,5
234460-M-SP	90,7	300	460	190	95	406	47,5	4	1,5
234760-M-SP	86,5	310	460	190	95	406	47,5	4	1,5
234464-M-SP	90,3	320	480	190	95	426	47,5	4	1,5
234764-M-SP	86,5	330	480	190	95	426	47,5	4	1,5



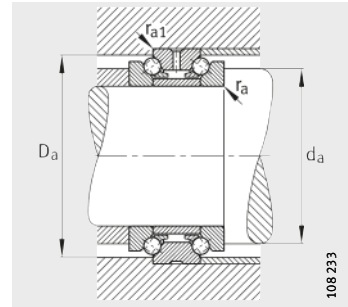
		Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ua}$ N	Limiting speeds	
$d_s$	$n_s$	$d_a$ h12	$D_a$ H12	$r_a$ max.	$r_{a1}$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N		$n_G$ grease $\text{min}^{-1}$	$n_G$ oil $\text{min}^{-1}$
4,8	9,5	134,5	160	2	0,6	98 000	325 000	24 400	3 400	4 500
4,8	9,5	134,5	160	2	0,6	98 000	325 000	24 400	3 400	4 500
4,8	9,5	144,5	170	2	0,6	101 000	345 000	25 000	3 200	4 300
4,8	9,5	144,5	170	2	0,6	101 000	345 000	25 000	3 200	4 300
6,3	12,2	159	188	2	0,6	128 000	440 000	30 500	2 800	3 800
6,3	12,2	159	188	2	0,6	128 000	440 000	30 500	2 800	3 800
6,3	12,2	169	198	2,1	0,6	132 000	470 000	31 500	2 600	3 600
6,3	12,2	169	198	2,1	0,6	132 000	470 000	31 500	2 600	3 600
8	15	181	211,5	2,1	0,6	142 000	520 000	34 000	2 600	3 600
8	15	181	211,5	2,1	0,6	142 000	520 000	34 000	2 600	3 600
8	15	192,5	226	2,1	0,6	168 000	600 000	38 000	2 400	3 400
8	15	192,5	226	2,1	0,6	168 000	600 000	38 000	2 400	3 400
8	15	206,5	245	2,1	0,6	207 000	740 000	45 500	2 200	3 200
8	15	206,5	245	2,1	0,6	207 000	740 000	45 500	2 200	3 200
8	15	221	263	2,1	0,6	235 000	840 000	49 500	2 000	3 000
8	15	221	263	2,1	0,6	235 000	840 000	49 500	2 000	3 000
8	15	231	273	2,1	0,6	244 000	900 000	52 000	1 900	2 800
8	15	231	273	2,1	0,6	244 000	900 000	52 000	1 900	2 800
8	15	245	291,5	2,1	0,6	285 000	1 060 000	59 000	1 800	2 600
8	15	245	291,5	2,1	0,6	285 000	1 060 000	59 000	1 800	2 600
9,5	17,7	269	318	2,5	1	340 000	1 330 000	71 000	1 600	2 200
9,5	17,7	269	318	2,5	1	340 000	1 330 000	71 000	1 600	2 200
9,5	17,7	289	338	2,5	1	350 000	1 420 000	73 000	1 500	2 000
9,5	17,7	289	338	2,5	1	350 000	1 420 000	73 000	1 500	2 000
9,5	17,7	317,5	374,5	3	1,5	400 000	1 680 000	83 000	1 400	1 900
9,5	17,7	317,5	374,5	3	1,5	400 000	1 680 000	83 000	1 400	1 900
9,5	17,7	337,5	394,5	3	1,5	415 000	1 790 000	86 000	1 300	1 800
9,5	17,7	337,5	394,5	3	1,5	415 000	1 790 000	86 000	1 300	1 800
9,5	17,7	366	428,5	3	1,5	480 000	2 170 000	99 000	1 200	1 700
9,5	17,7	366	428,5	3	1,5	480 000	2 170 000	99 000	1 200	1 700
9,5	17,7	386	448,5	3	1,5	495 000	2 310 000	103 000	1 200	1 700
9,5	17,7	386	448,5	3	1,5	495 000	2 310 000	103 000	1 200	1 700

# Axial angular contact ball bearings

Double direction



2344, 2347  
Contact angle  $\alpha = 60^\circ$



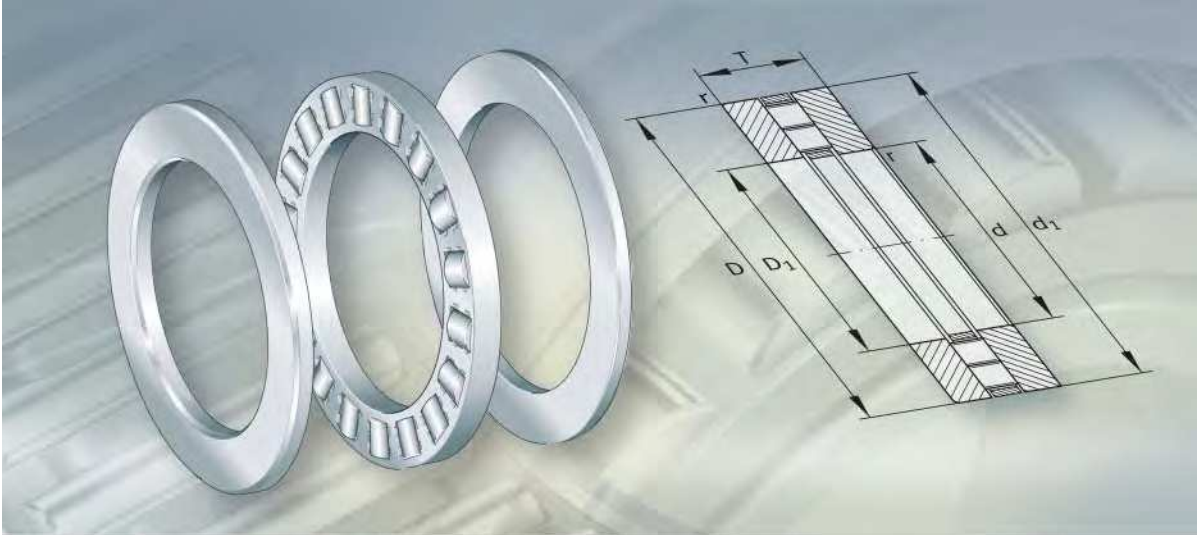
Mounting dimensions

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions							
		d	D	B	C	d <sub>1</sub>	B <sub>1</sub>	r min.	r <sub>1</sub> min.
<b>234468-M-SP</b>	122	<b>340</b>	520	212	106	459	53	4	1,5
<b>234768-M-SP</b>	117	<b>350</b>	520	212	106	459	53	4	1,5
<b>234472-M-SP</b>	128	<b>360</b>	540	212	106	479	53	4	1,5
<b>234772-M-SP</b>	123	<b>370</b>	540	212	106	479	53	4	1,5
<b>234476-M-SP</b>	133	<b>380</b>	560	212	106	499	53	4	1,5
<b>234776-M-SP</b>	128	<b>390</b>	560	212	106	499	53	4	1,5
<b>234480-M-SP</b>	198	<b>400</b>	600	236	118	532	59	5	2
<b>234780-M-SP</b>	187	<b>410</b>	600	236	118	532	59	5	2



		Mounting dimensions				Basic load ratings		Fatigue limit load $C_{ua}$ N	Limiting speeds	
$d_s$	$n_s$	$d_a$ h12	$D_a$ H12	$r_a$ max.	$r_{a1}$ max.	dyn. $C_a$ N	stat. $C_{0a}$ N		$n_G$ grease $\text{min}^{-1}$	$n_G$ oil $\text{min}^{-1}$
9,5	17,7	413	485,5	3	1,5	580 000	2 850 000	124 000	1 100	1 600
9,5	17,7	413	485,5	3	1,5	580 000	2 850 000	124 000	1 100	1 600
9,5	17,7	433	505,5	3	1,5	590 000	2 950 000	125 000	1 000	1 500
9,5	17,7	433	505,5	3	1,5	590 000	2 950 000	125 000	1 000	1 500
9,5	17,7	453	525,5	3	1,5	610 000	3 150 000	130 000	1 000	1 500
9,5	17,7	453	525,5	3	1,5	610 000	3 150 000	130 000	1 000	1 500
9,5	17,7	480	561,5	4	2	680 000	3 650 000	147 000	900	1 300
9,5	17,7	480	561,5	4	2	680 000	3 650 000	147 000	900	1 300



**Axial cylindrical roller bearings**  
**Axial cylindrical roller**  
**and cage assemblies**  
**Axial bearing washers**



# Axial cylindrical roller bearings, roller and cage assemblies, bearing washers

	Page
<b>Product overview</b>	
Axial cylindrical roller bearings, axial cylindrical roller and cage assemblies, axial bearing washers .....	858
<b>Features</b>	
Axial cylindrical roller bearings .....	859
Axial cylindrical roller and cage assemblies .....	859
Axial bearing washers.....	859
Operating temperature .....	860
Suffixes.....	860
<b>Design and safety guidelines</b>	
Design of adjacent parts .....	860
Tolerances for shafts and housing bores .....	861
Limiting speed.....	861
Minimum axial load.....	861
Orientation of washers .....	862
<b>Accuracy</b>	862
<b>Dimension tables</b>	
Axial cylindrical roller bearings, axial cylindrical roller and cage assemblies, axial bearing washers .....	864



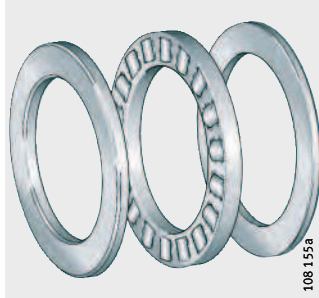
## Product overview

# Axial cylindrical roller bearings, roller and cage assemblies, axial bearing washers

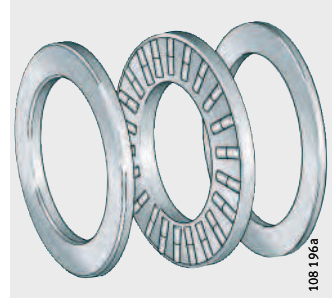
### Axial cylindrical roller bearings

Single row or double row

811, 812



893, 894



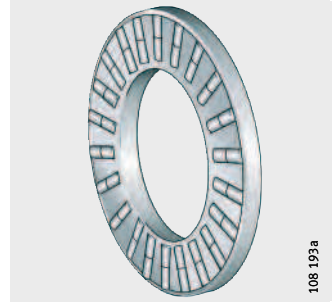
### Axial cylindrical roller and cage assemblies

Single row or double row

K811, K812



K893, K894



### Axial bearing washers

Housing locating washers

Shaft locating washers

GS811, GS812,  
GS893, GS894



WS811, WS812,  
WS893, WS894



### Bearing washer

LS



# Axial cylindrical roller bearings, roller and cage assemblies, axial bearing washers



## Features Axial cylindrical roller bearings

Axial cylindrical roller bearings comprise axial cylindrical roller and cage assemblies K, housing locating washers GS and shaft locating washers WS.

The bearings have very low axial section height, high load capacity, high rigidity and can support axial forces in one direction.

Bearings 811, 812 are single row bearings and conform to DIN 722/ISO 104, bearings 893, 894 are double row bearings and conform to DIN 616/ISO 104.

The cages are made from plastic or brass.

## Axial cylindrical roller and cage assemblies

The cage assemblies comprise axial cages and one or two rows of cylindrical rollers.

The diameter series 1, 2, 3, 4 correspond to DIN 616/ISO 104.

The cages are made from plastic or brass and are guided as standard on the shaft.

The cage assemblies have very low axial section height and high load carrying capacity. They can support axial forces in one direction. Radial forces must be supported by separate means.

Axial cage assemblies are combined with shaft or housing locating washers or are integrated directly in the adjacent construction. If they are used without axial bearing washers, the raceway must be produced as a rolling bearing raceway.

## Axial bearing washers Housing locating washers

Housing locating washers are centred on the housing and must be used if the adjacent construction cannot be used as a running surface. The bore diameter, outside diameter and running surface are precision machined.

The diameter series 1, 2, 3, 4 correspond to DIN 616/ISO 104.

## Shaft locating washers

Shaft locating washers are centred on the shaft and must be used if the adjacent construction cannot be used as a running surface.

The bore diameter, outside diameter and running surface are precision machined.

The diameter series 1, 2, 3, 4 correspond to DIN 616/ISO 104.

## Bearing washers

Bearing washers can be used as housing or shaft locating washers; they are used in applications where precise centring is not required. The bore and outside surface are turned, the running surface is ground.

Bearing washers can be used with axial cylindrical roller and cage assemblies K811 and axial needle roller and cage assemblies AXK.

# Axial cylindrical roller bearings, roller and cage assemblies, axial bearing washers

## Operating temperature

Axial cylindrical roller bearings and axial cylindrical roller and cage assemblies can be used at operating temperatures from  $-20\text{ °C}$  to  $+120\text{ °C}$ .

## Suffixes

Suffixes for available designs: see table.

## Available designs

Suffix	Description	Design
M <sup>1)</sup>	Brass cage	Standard
TV <sup>1)</sup>	Plastic cage made from glass fibre reinforced polyamide 66	
P5	High dimensional and geometrical accuracy	Special design <sup>2)</sup> , available by agreement

1) Depending on series and size.

2) For axial bearing washers GS, WS.

## Design and safety guidelines

### Design of adjacent parts

Axial bearing washers must always be fully supported on their entire abutment surface.

The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

The radial cage guidance surfaces must be precision machined and wear-resistant ( $R_{z4}$  ( $R_a0,8$ )).



If axial cylindrical roller and cage assemblies run directly on the adjacent construction, the running surfaces must be produced as rolling bearing raceways.

The surface hardness of the raceway must be  $670\text{ HV} + 170\text{ HV}$ , the hardening depth CHD or SHD must be sufficiently large.

## Tolerances for shafts and housing bores

Tolerances for shafts and housing bores: see table.



### Shaft and housing bore tolerances

Bearing component		Tolerance for	
		Shaft	Bore
K811, K812, K893, K894	Guided on shaft	h8	–
GS811, GS812, GS893, GS894	–	–	H9
WS811, WS812, WS893, WS894	–	h8	–
LS	As housing locating washer	Clear of shaft	H9
	As shaft locating washer	h8	Clear of housing

## Limiting speed



The limiting speeds  $n_G$  given in the product tables are valid for oil lubrication. With grease lubrication, the permissible value is 25% of the value given in the table.

## Minimum axial load

A minimum axial load  $F_{a \min}$  according to the formula must be applied.

$$F_{a \min} = 0,0005 \cdot C_{0a} + k_a \left( \frac{C_{0a} \cdot n}{10^8} \right)^2$$

$F_{a \min}$  Minimum axial load N  
 $k_a$  Factor for determining the minimum load, see table –  
 $C_{0a}$  Basic static load rating N  
 $n$  Speed.  $\text{min}^{-1}$

### Factor $k_a$

Series	Factor $k_a$
K811	1,4
K812	0,9
K893	0,7
K894	0,5

# Axial cylindrical roller bearings, roller and cage assemblies, axial bearing washers

## Orientation of washers



The axial bearing washers must be fitted with the raceway side facing the rolling elements.

On housing locating washers, the raceway side is indicated by the smaller chamfer on the outside diameter.

On shaft locating washers, the raceway side is indicated by the smaller chamfer on the bore diameter.

## Accuracy

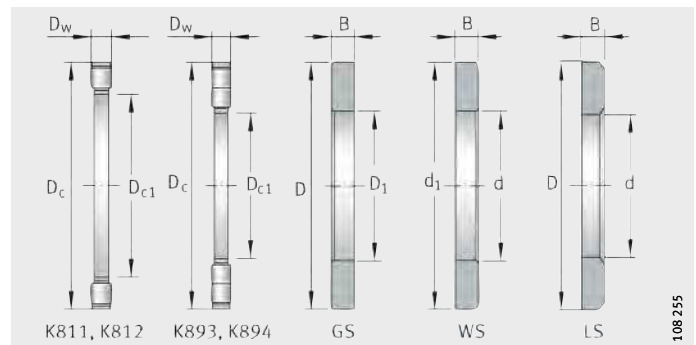
The dimensional and geometrical tolerances of axial bearing washers GS and WS are in accordance with tolerance class PN to DIN 620.

Tolerances for the bore and outside diameter as well as the width of the bearing components are shown in the table and *Figure 1*.

## Tolerances for bearing components

Bearing component	Tolerance for					
	Bore diameter		Outside diameter		Width	
K811, K812, K893, K894	$D_{c1}$	E11 <sup>1)</sup>	$D_c$	a13 <sup>1)</sup>	$D_w$	to DIN 5 402-1
GS811, GS812, GS893, GS894	$D_1$	–	D	to DIN 620	B	h11
WS811, WS812, WS893, WS894	d	to DIN 620	$d_1$	–	B	h11
LS	d	E12 <sup>1)</sup>	D	a12 <sup>1)</sup>	B	h11

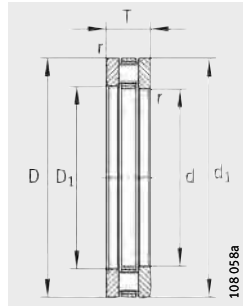
1) Deviation from mean diameter.



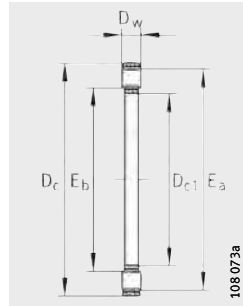
*Figure 1*  
Bearing components



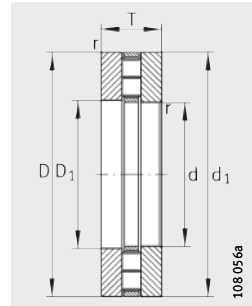
**Axial cylindrical roller bearings**  
**Axial cylindrical roller and cage assemblies**  
**Axial bearing washers**



811, 812



K811, K812

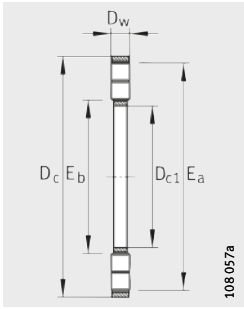


893, 894

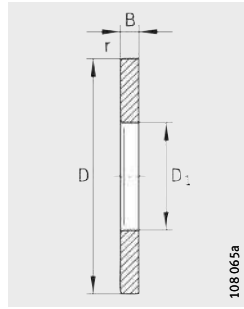
**Dimension table** - Dimensions in mm

Axial cylindrical roller bearings				Axial cylindrical roller and cage assemblies		Axial bearing washers				
Complete bearings				Mass m	Designation	Mass m	Housing locating washer	Shaft locating washer	Bearing washer	Mass m
Designation				≈kg		≈kg	Designation	Designation	Designation	≈kg
81102-TV	-	-	-	0,024	<b>K81102-TV</b>	0,006	<b>GS81102</b>	<b>WS81102</b>	<b>LS1528</b>	0,008
81103-TV	-	-	-	0,027	<b>K81103-TV</b>	0,009	<b>GS81103</b>	<b>WS81103</b>	<b>LS1730</b>	0,009
81104-TV	-	-	-	0,037	<b>K81104-TV</b>	0,013	<b>GS81104</b>	<b>WS81104</b>	<b>LS2035</b>	0,012
81105-TV	-	-	-	0,053	<b>K81105-TV</b>	0,015	<b>GS81105</b>	<b>WS81105</b>	<b>LS2542</b>	0,019
81106-TV	-	-	-	0,057	<b>K81106-TV</b>	0,017	<b>GS81106</b>	<b>WS81106</b>	<b>LS3047</b>	0,02
-	81206-TV	-	-	0,123	<b>K81206-TV</b>	0,033	<b>GS81206</b>	<b>WS81206</b>	-	0,045
-	-	89306-TV	-	0,24	<b>K89306-TV</b>	0,04	<b>GS89306</b>	<b>WS89306</b>	-	0,095
81107-TV	-	-	-	0,073	<b>K81107-TV</b>	0,019	<b>GS81107</b>	<b>WS81107</b>	<b>LS3552</b>	0,027
-	81207-TV	-	-	0,195	<b>K81207-TV</b>	0,043	<b>GS81207</b>	<b>WS81207</b>	-	0,076
-	-	89307-TV	-	0,34	<b>K89307-TV</b>	0,053	<b>GS89307</b>	<b>WS89307</b>	-	0,134
81108-TV	-	-	-	0,105	<b>K81108-TV</b>	0,031	<b>GS81108</b>	<b>WS81108</b>	<b>LS4060</b>	0,037
-	81208-TV	-	-	0,249	<b>K81208-TV</b>	0,081	<b>GS81208</b>	<b>WS81208</b>	-	0,084
-	-	89308-TV	-	0,484	<b>K89308-TV</b>	0,098	<b>GS89308</b>	<b>WS89308</b>	-	0,193
81109-TV	-	-	-	0,13	<b>K81109-TV</b>	0,035	<b>GS81109</b>	<b>WS81109</b>	<b>LS4565</b>	0,047
-	81209-TV	-	-	0,287	<b>K81209-TV</b>	0,085	<b>GS81209</b>	<b>WS81209</b>	-	0,101
-	-	89309-TV	-	0,615	<b>K89309-TV</b>	0,121	<b>GS89309</b>	<b>WS89309</b>	-	0,247
81110-TV	-	-	-	0,14	<b>K81110-TV</b>	0,038	<b>GS81110</b>	<b>WS81110</b>	<b>LS5070</b>	0,051
-	81210-TV	-	-	0,356	<b>K81210-TV</b>	0,098	<b>GS81210</b>	<b>WS81210</b>	-	0,129
-	-	89310-TV	-	0,887	<b>K89310-TV</b>	0,175	<b>GS89310</b>	<b>WS89310</b>	-	0,356
81111-TV	-	-	-	0,218	<b>K81111-TV</b>	0,045	<b>GS81111</b>	<b>WS81111</b>	<b>LS5578</b>	0,082
-	81211-TV	-	-	0,568	<b>K81211-TV</b>	0,166	<b>GS81211</b>	<b>WS81211</b>	-	0,201
-	-	89311-TV	-	1,18	<b>K89311-TV</b>	0,195	<b>GS89311</b>	<b>WS89311</b>	-	0,485
81112-TV	-	-	-	0,266	<b>K81112-TV</b>	0,082	<b>GS81112</b>	<b>WS81112</b>	<b>LS6085</b>	0,092
-	81212-TV	-	-	0,642	<b>K81212-TV</b>	0,176	<b>GS81212</b>	<b>WS81212</b>	-	0,233
-	-	89312-TV	-	1,26	<b>K89312-TV</b>	0,21	<b>GS89312</b>	<b>WS89312</b>	-	0,517
-	-	-	89412-TV	2,818	<b>K89412-TV</b>	0,538	<b>GS89412</b>	<b>WS89412</b>	-	1,115

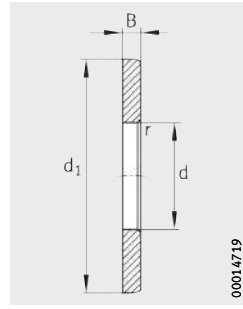




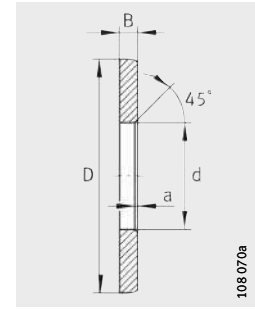
K893, K894



GS811, GS812,  
GS893, GS894



WS811, WS812,  
WS893, WS894

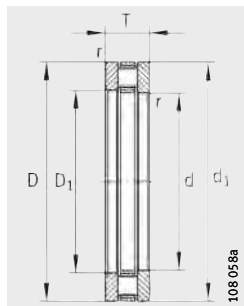


LS

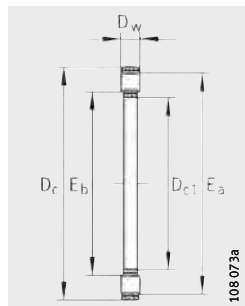


Dimensions									Raceway dimensions		Basic load ratings		Fatigue limit load $C_{ua}$ N	Limiting speed $n_G$ $\text{min}^{-1}$	Reference speed $n_B$ $\text{min}^{-1}$
$D_{c1}$ d	$D_1$	$D_c$ D	$d_1$	T	$D_w$	B	a r min.	$E_b$	$E_a$	dyn. $C_a$ N	stat. $C_{0a}$ N				
15	16	28	28	9	3,5	2,75	0,3	16	27	14 400	28 500	4 000	13 600	6 300	
17	18	30	30	9	3,5	2,75	0,3	18	29	15 900	33 500	4 650	12 400	5 400	
20	21	35	35	10	4,5	2,75	0,3	21	34	24 900	53 000	7 300	10 500	4 300	
25	26	42	42	11	5	3	0,6	26	41	33 500	76 000	7 100	8 600	3 500	
30	32	47	47	11	5	3	0,6	31	46	35 500	86 000	8 000	7 500	3 050	
30	32	52	52	16	7,5	4,25	0,6	31	50	64 000	141 000	14 100	7 100	2 650	
30	32	60	60	18	5,5	6,25	1	33	59	69 000	197 000	18 900	6 400	2 600	
35	37	52	52	12	5	3,5	0,6	36	51	39 000	101 000	9 500	6 600	2 600	
35	37	62	62	18	7,5	5,25	1	39	58	80 000	199 000	20 000	5 900	2 320	
35	37	68	68	20	6	7	1	38	67	80 000	237 000	23 200	5 600	2 390	
40	42	60	60	13	6	3,5	0,6	42	58	56 000	148 000	14 500	5 800	2 190	
40	42	68	68	19	9	5	1	43	66	107 000	265 000	23 300	5 200	1 860	
40	42	78	78	22	7	7,5	1	44	77	122 000	385 000	39 000	4 800	1 780	
45	47	65	65	14	6	4	0,6	47	63	59 000	163 000	16 000	5 300	1 970	
45	47	73	73	20	9	5,5	1	48	70	105 000	265 000	23 300	4 850	1 820	
45	47	85	85	24	7,5	8,25	1	49	83	139 000	445 000	44 500	4 400	1 620	
50	52	70	70	14	6	4	0,6	52	68	61 000	177 000	17 400	4 800	1 810	
50	52	78	78	22	9	6,5	1	53	75	117 000	315 000	27 500	4 450	1 550	
50	52	95	95	27	8	9,5	1,1	56	92	167 000	560 000	58 000	3 950	1 460	
55	57	78	78	16	6	5	0,6	57	77	90 000	300 000	31 000	4 300	1 330	
55	57	90	90	25	11	7	1	59	85	154 000	405 000	38 500	4 000	1 510	
55	57	105	105	30	9	10,5	1,1	61	103	184 000	600 000	52 000	3 600	1 490	
60	62	85	85	17	7,5	4,75	1	62	82	103 000	315 000	32 000	4 000	1 360	
60	62	95	95	26	11	7,5	1	64	91	172 000	480 000	45 500	3 700	1 300	
60	62	110	110	30	9	10,5	1,1	66	108	196 000	670 000	58 000	3 350	1 350	
60	62	130	130	42	14	14	1,5	65	126	390 000	1 220 000	121 000	3 000	1 080	

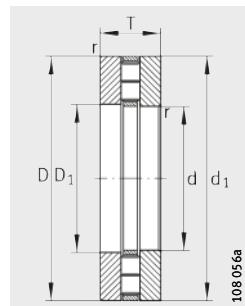
**Axial cylindrical roller bearings**  
**Axial cylindrical roller and cage assemblies**  
**Axial bearing washers**



811, 812



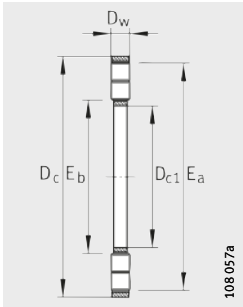
K811, K812



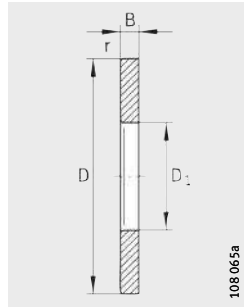
893, 894

**Dimension table** (continued) · Dimensions in mm

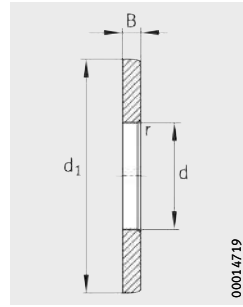
Axial cylindrical roller bearings					Axial cylindrical roller and cage assemblies		Axial bearing washers			
Complete bearings				Mass m	Designation	Mass m	Housing locating washer	Shaft locating washer	Bearing washer	Mass m
Designation				≈kg		≈kg	Designation	Designation	Designation	≈kg
81113-TV	-	-	-	0,31	K81113-TV	0,09	GS81113	WS81113	LS6590	0,11
-	81213-TV	-	-	0,721	K81213-TV	0,185	GS81213	WS81213	-	0,268
-	-	89313-TV	-	1,33	K89313-TV	0,21	GS89313	WS89313	-	0,535
-	-	-	89413-TV	3,52	K89413-TV	0,72	GS89413	WS89413	-	1,4
81114-TV	-	-	-	0,332	K81114-TV	0,092	GS81114	WS81114	LS7095	0,12
-	81214-TV	-	-	0,768	K81214-TV	0,212	GS81214	WS81214	-	0,278
-	-	89314-TV	-	1,82	K89314-TV	0,29	GS89314	WS89314	-	0,8
-	-	-	89414-TV	4,18	K89414-TV	0,76	GS89414	WS89414	-	1,73
81115-TV	-	-	-	0,393	K81115-TV	0,096	GS81115	WS81115	LS75100	0,136
-	81215-TV	-	-	0,8	K81215-TV	0,195	GS81215	WS81215	-	0,293
-	-	89315-TV	-	2,23	K89315-TV	0,375	GS89315	WS89315	-	0,97
-	-	-	89415-M	5,96	K89415-M	1,78	GS89415	WS89415	-	2,09
81116-TV	-	-	-	0,4	K81116-TV	0,095	GS81116	WS81116	LS80105	0,144
-	81216-TV	-	-	0,9	K81216-TV	0,234	GS81216	WS81216	-	0,333
-	-	89316-TV	-	2,37	K89316-TV	0,42	GS89316	WS89316	-	1,02
-	-	-	89416-M	7,04	K89416-M	2,04	GS89416	WS89416	-	2,5
81117-TV	-	-	-	0,42	K81117-TV	0,118	GS81117	WS81117	LS85110	0,151
-	81217-TV	-	-	1,26	K81217-TV	0,28	GS81217	WS81217	-	0,49
-	-	89317-M	-	3,39	K89317-M	0,93	GS89317	WS89317	-	1,23
-	-	-	89417-M	8,65	K89417-M	2,71	GS89417	WS89417	-	2,97
81118-TV	-	-	-	0,62	K81118-TV	0,15	GS81118	WS81118	LS90120	0,225
-	81218-TV	-	-	1,77	K81218-TV	0,54	GS81218	WS81218	-	0,614
-	-	89318-M	-	3,63	K89318-M	0,97	GS89318	WS89318	-	1,33
-	-	-	89418-M	9,94	K89418-M	3,04	GS89418	WS89418	-	3,45
81120-TV	-	-	-	0,95	K81120-TV	0,25	GS81120	WS81120	LS100135	0,35
-	81220-TV	-	-	2,2	K81220-TV	0,6	GS81220	WS81220	-	0,8
-	-	89320-M	-	4,56	K89320-M	1,18	GS89320	WS89320	-	1,69
-	-	-	89420-M	13,4	K89420-M	3,92	GS89420	WS89420	-	4,75



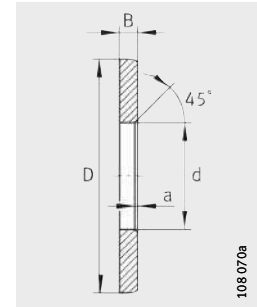
K893, K894



GS811, GS812,  
GS893, GS894



WS811, WS812,  
WS893, WS894

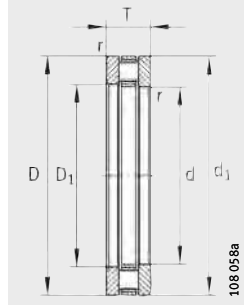


LS

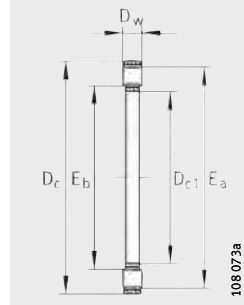


Dimensions								Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D <sub>c1</sub>	D <sub>1</sub>	D <sub>c</sub>	d <sub>1</sub>	T	D <sub>w</sub>	B	a	E <sub>b</sub>	E <sub>a</sub>	dyn. C <sub>a</sub>	stat. C <sub>0a</sub>	C <sub>ua</sub>	n <sub>G</sub>	n <sub>B</sub>
d		D					min.			N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
65	67	90	90	18	7,5	5,25	1	67	87	107 000	340 000	34 000	3 700	1 260
65	67	100	100	27	11	8	1	69	96	177 000	500 000	48 000	3 450	1 240
65	67	115	115	30	9	10,5	1,1	71	113	194 000	670 000	58 000	3 200	1 330
65	68	140	140	45	15	15	2	70	135	445 000	1 410 000	139 000	2 800	1 000
70	72	95	95	18	7,5	5,25	1	72	92	111 000	365 000	36 500	3 500	1 170
70	72	105	105	27	11	8	1	74	102	187 000	550 000	53 000	3 250	1 130
70	72	125	125	34	10	12	1,1	76	123	239 000	830 000	74 000	2 950	1 200
70	73	150	150	48	16	16	2	76	147	475 000	1 500 000	148 000	2 650	1 000
75	77	100	100	19	7,5	5,75	1	78	97	107 000	350 000	35 500	3 300	1 190
75	77	110	110	27	11	8	1	79	106	172 000	500 000	48 000	3 100	1 210
75	77	135	135	36	11	12,5	1,5	81	132	285 000	1 010 000	92 000	2 750	1 080
75	78	160	160	51	17	17	2	82	156	500 000	1 580 000	150 000	2 400	1 000
80	82	105	105	19	7,5	5,75	1	83	102	106 000	350 000	35 500	3 100	1 170
80	82	115	115	28	11	8,5	1	84	112	201 000	630 000	60 000	2 900	990
80	82	140	140	36	11	12,5	1,5	86	137	305 000	1 110 000	100 000	2 600	990
80	83	170	170	54	18	18	2,1	88	165	560 000	1 770 000	169 000	2 260	950
85	87	110	110	19	7,5	5,75	1	87	108	112 000	385 000	39 000	2 950	1 070
85	88	125	125	31	12	9,5	1	90	119	217 000	660 000	64 000	2 750	1 060
85	88	150	150	39	12	13,5	1,5	93	146	325 000	1 140 000	104 000	2 400	1 030
85	88	180	180	58	19	19,5	2,1	93	175	620 000	1 980 000	188 000	2 130	900
90	92	120	120	22	9	6,5	1	93	117	141 000	465 000	40 000	2 750	1 070
90	93	135	135	35	14	10,5	1,1	95	129	290 000	890 000	88 000	2 550	910
90	93	155	155	39	12	13,5	1,5	98	151	335 000	1 200 000	108 000	2 310	980
90	93	190	190	60	20	20	2,1	99	185	680 000	2 200 000	207 000	2 010	850
100	102	135	135	25	11	7	1	104	131	199 000	650 000	59 000	2 460	920
100	103	150	150	38	15	11,5	1,1	107	142	340 000	1 080 000	104 000	2 300	840
100	103	170	170	42	13	14,5	1,5	109	166	380 000	1 400 000	122 000	2 090	910
100	103	210	210	67	22	22,5	3	111	205	850 000	2 850 000	265 000	1 810	720

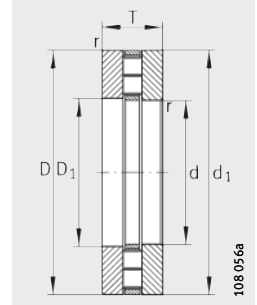
**Axial cylindrical roller bearings**  
**Axial cylindrical roller and cage assemblies**  
**Axial bearing washers**



811, 812



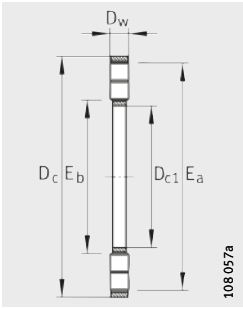
K811, K812



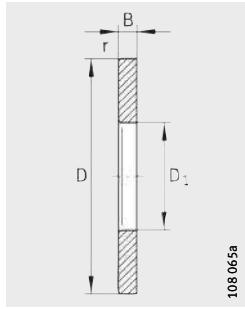
893, 894

**Dimension table (continued) · Dimensions in mm**

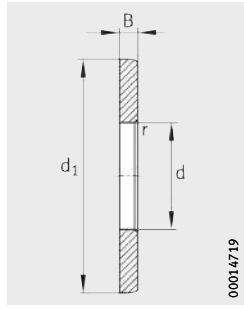
Axial cylindrical roller bearings				Axial cylindrical roller and cage assemblies		Axial bearing washers				
Complete bearings				Mass m	Designation	Mass m	Housing locating washer	Shaft locating washer	Bearing washer	Mass m
Designation				≈kg		≈kg	Designation	Designation	Designation	≈kg
81122-TV	-	-	-	1,04	K81122-TV	0,27	GS81122	WS81122	LS110145	0,385
-	81222-TV	-	-	2,29	K81222-TV	0,53	GS81222	WS81222	-	0,88
-	-	89322-M	-	6,7	K89322-M	1,83	GS89322	WS89322	-	2,44
-	-	-	89422-M	17,4	K89422-M	5,11	GS89422	WS89422	-	6,15
81124-TV	-	-	-	1,12	K81124-TV	0,29	GS81124	WS81124	LS120155	0,415
-	81224-TV	-	-	2,54	K81224-TV	0,58	GS81224	WS81224	-	0,98
-	-	89324-M	-	9,44	K89324-M	2,64	GS89324	WS89324	-	3,4
-	-	-	89424-M	21,9	K89424-M	6,37	GS89424	WS89424	-	7,7
81126-TV	-	-	-	1,67	K81126-TV	0,38	GS81126	WS81126	LS130170	0,643
-	81226-TV	-	-	3,98	K81226-TV	0,92	GS81226	WS81226	-	1,53
-	-	89326-M	-	11,2	K89326-M	2,09	GS89326	WS89326	-	4,045
-	-	-	89426-M	27,1	K89426-M	7,96	GS89426	WS89426	-	9,5
81128-TV	-	-	-	1,9	K81128-TV	0,4	GS81128	WS81128	LS140180	0,749
-	81228-M	-	-	5,07	K81228-M	1,8	GS81228	WS81228	-	1,635
-	-	89328-M	-	13,2	K89328-M	2,57	GS89328	WS89328	-	4,8
-	-	-	89428-M	29,8	K89428-M	8,53	GS89428	WS89428	-	10,6
81130-TV	-	-	-	2,2	K81130-TV	0,43	GS81130	WS81130	LS150190	0,796
-	81230-M	-	-	7,17	K81230-M	2,81	GS81230	WS81230	-	2,18
-	-	89330-M	-	13,9	K89330-M	3,75	GS89330	WS89330	-	5,06
-	-	-	89430-M	35,4	K89430-M	10,4	GS89430	WS89430	-	12,5
81132-TV	-	-	-	2,12	K81132-TV	0,44	GS81132	WS81132	LS160200	0,842
-	81232-M	-	-	7,6	K81232-M	3,01	GS81232	WS81232	-	2,3
-	-	-	89432-M	42	K89432-M	12,4	GS89432	WS89432	-	14,8
81134-TV	-	-	-	2,41	K81134-TV	0,66	GS81134	WS81134	-	1,1
-	81234-M	-	-	9,3	K81234-M	3,5	GS81234	WS81234	-	2,9
-	-	-	89434-M	51,9	K89434-M	14,9	GS89434	WS89434	-	18,5



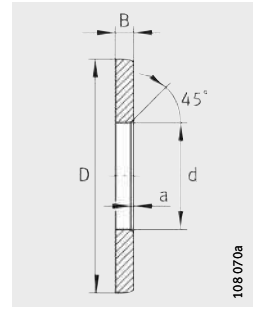
K893, K894



GS811, GS812,  
GS893, GS894



WS811, WS812,  
WS893, WS894



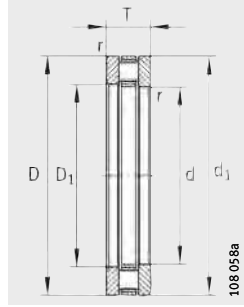
LS



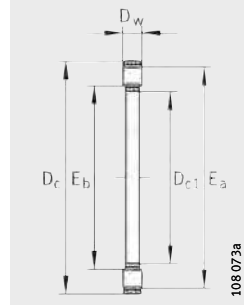
Dimensions

D <sub>c1</sub> d	D <sub>1</sub>	D <sub>c</sub> D	d <sub>1</sub>	T	D <sub>w</sub>	B	a r min.	Raceway dimensions		Basic load ratings		Fatigue limit load C <sub>ua</sub> N	Limiting speed n <sub>G</sub> min <sup>-1</sup>	Reference speed n <sub>B</sub> min <sup>-1</sup>
								E <sub>b</sub>	E <sub>a</sub>	dyn. C <sub>a</sub> N	stat. C <sub>0a</sub> N			
110	112	145	145	25	11	7	1	114	141	207 000	700 000	62 000	2 260	850
110	113	160	160	38	15	11,5	1,1	117	152	325 000	1 030 000	98 000	2 130	860
110	113	190	190	48	15	16,5	2	120	185	500 000	1 870 000	166 000	1 890	790
110	113	230	230	73	24	24,5	3	121	223	1 000 000	3 400 000	315 000	1 660	640
120	122	155	155	25	11	7	1	124	151	214 000	760 000	65 000	2 100	780
120	123	170	170	39	15	12	1,1	127	162	340 000	1 120 000	104 000	1 990	790
120	123	210	210	54	17	18,5	2,1	132	205	640 000	2 420 000	210 000	1 710	690
120	123	250	250	78	26	26	4	133	243	1 160 000	4 000 000	370 000	1 520	580
130	132	170	170	30	12	9	1	135	165	250 000	900 000	79 000	1 930	760
130	133	190	187	45	19	13	1,5	137	181	480 000	1 520 000	143 000	1 800	710
130	134	225	225	58	18	20	2,1	141	219	710 000	2 700 000	237 000	1 590	650
130	134	270	270	85	28	28,5	4	145	263	1 330 000	4 600 000	405 000	1 400	530
140	142	180	178	31	12	9,5	1	145	175	260 000	960 000	83 000	1 800	710
140	143	200	197	46	19	13,5	1,5	151	195	455 000	1 450 000	133 000	1 700	730
140	144	240	240	60	19	20,5	2,1	152	234	820 000	3 200 000	275 000	1 490	570
140	144	280	280	85	28	28,5	4	155	273	1 380 000	4 950 000	430 000	1 340	490
150	152	190	188	31	12	9,5	1	155	185	270 000	1 020 000	86 000	1 700	660
150	153	215	212	50	21	14,5	1,5	162	210	590 000	1 940 000	175 000	1 540	650
150	154	250	250	60	19	20,5	2,1	162	244	840 000	3 350 000	285 000	1 410	510
150	154	300	300	90	30	30	4	167	293	1 570 000	5 700 000	495 000	1 240	445
160	162	200	198	31	12	9,5	1	165	195	260 000	990 000	82 000	1 600	670
160	163	225	222	51	21	15	1,5	171	219	600 000	2 030 000	181 000	1 470	610
160	164	320	320	95	32	31,5	5	179	313	1 780 000	6 500 000	560 000	1 160	410
170	172	215	213	34	14	10	1,1	176	209	360 000	1 380 000	116 000	1 500	570
170	173	240	237	55	22	16,5	1,5	184	233	680 000	2 340 000	207 000	1 370	600
170	174	340	340	103	34	34,5	5	191	333	1 990 000	7 400 000	640 000	1 090	375

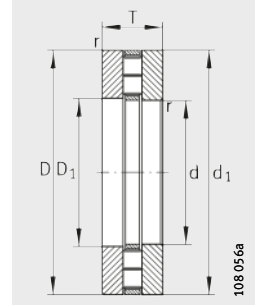
**Axial cylindrical roller bearings**  
**Axial cylindrical roller and cage assemblies**  
**Axial bearing washers**



811, 812



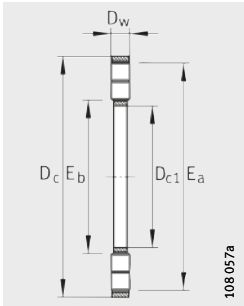
K811, K812



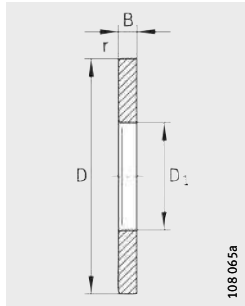
893, 894

**Dimension table (continued) · Dimensions in mm**

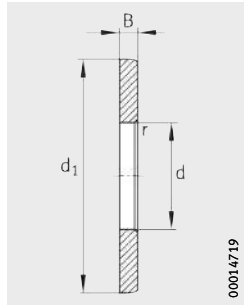
Axial cylindrical roller bearings				Axial cylindrical roller and cage assemblies		Axial bearing washers		
Complete bearings			Mass m	Designation	Mass m	Housing locating washer	Shaft locating washer	Mass m
Designation			≈kg		≈kg	Designation	Designation	≈kg
<b>81136-M</b>	–	–	3,3	<b>K81136-M</b>	1,46	<b>GS81136</b>	<b>WS81136</b>	1,12
–	<b>81236-M</b>	–	9,9	<b>K81236-M</b>	3,67	<b>GS81236</b>	<b>WS81236</b>	3,13
–	–	<b>89436-M</b>	60	<b>K89436-M</b>	17,6	<b>GS89436</b>	<b>WS89436</b>	21,3
<b>81138-M</b>	–	–	4,74	<b>K81138-M</b>	1,84	<b>GS81138</b>	<b>WS81138</b>	1,45
–	<b>81238-M</b>	–	12,8	<b>K81238-M</b>	5,17	<b>GS81238</b>	<b>WS81238</b>	3,835
–	–	<b>89438-M</b>	72,1	<b>K89438-M</b>	20,9	<b>GS89438</b>	<b>WS89438</b>	25,6
<b>81140-M</b>	–	–	4,95	<b>K81140-M</b>	1,93	<b>GS81140</b>	<b>WS81140</b>	1,51
–	<b>81240-M</b>	–	14,2	<b>K81240-M</b>	5,4	<b>GS81240</b>	<b>WS81240</b>	4,41
–	–	<b>89440-M</b>	82,6	<b>K89440-M</b>	24	<b>GS89440</b>	<b>WS89440</b>	29,3
<b>81144-M</b>	–	–	5,22	<b>K81144-M</b>	2,04	<b>GS81144</b>	<b>WS81144</b>	1,59
–	<b>81244-M</b>	–	15,3	<b>K81244-M</b>	5,8	<b>GS81244</b>	<b>WS81244</b>	4,75
–	–	<b>89444-M</b>	90,1	<b>K89444-M</b>	25,7	<b>GS89444</b>	<b>WS89444</b>	32,2
<b>81148-M</b>	–	–	8,45	<b>K81148-M</b>	3,32	<b>GS81148</b>	<b>WS81148</b>	2,57
–	<b>81248-M</b>	–	26,2	<b>K81248-M</b>	9,94	<b>GS81248</b>	<b>WS81248</b>	8,15
–	–	<b>89448-M</b>	95,9	<b>K89448-M</b>	27,3	<b>GS89448</b>	<b>WS89448</b>	34,3
<b>81152-M</b>	–	–	9,08	<b>K81152-M</b>	3,55	<b>GS81152</b>	<b>WS81152</b>	2,765
–	<b>81252-M</b>	–	28,6	<b>K81252-M</b>	10,8	<b>GS81252</b>	<b>WS81252</b>	8,9
–	–	<b>89452-M</b>	125	<b>K89452-M</b>	36,8	<b>GS89452</b>	<b>WS89452</b>	44,25
<b>81156-M</b>	–	–	12,6	<b>K81156-M</b>	5,31	<b>GS81156</b>	<b>WS81156</b>	3,65
–	<b>81256-M</b>	–	31	<b>K81256-M</b>	11,5	<b>GS81256</b>	<b>WS81256</b>	9,75
–	–	<b>89456-M</b>	159	<b>K89456-M</b>	47,5	<b>GS89456</b>	<b>WS89456</b>	55,6
<b>81160-M</b>	–	–	19,4	<b>K81160-M</b>	7,6	<b>GS81160</b>	<b>WS81160</b>	5,92
–	<b>81260-M</b>	–	48,25	<b>K81260-M</b>	17,8	<b>GS81260</b>	<b>WS81260</b>	15,2
–	–	<b>89460-M</b>	170	<b>K89460-M</b>	49,8	<b>GS89460</b>	<b>WS89460</b>	60,15
<b>81164-M</b>	–	–	20,7	<b>K81164-M</b>	8,04	<b>GS81164</b>	<b>WS81164</b>	6,35
–	–	<b>89464-M</b>	203	<b>K89464-M</b>	80,3	<b>GS89464</b>	<b>WS89464</b>	61,5



K893, K894



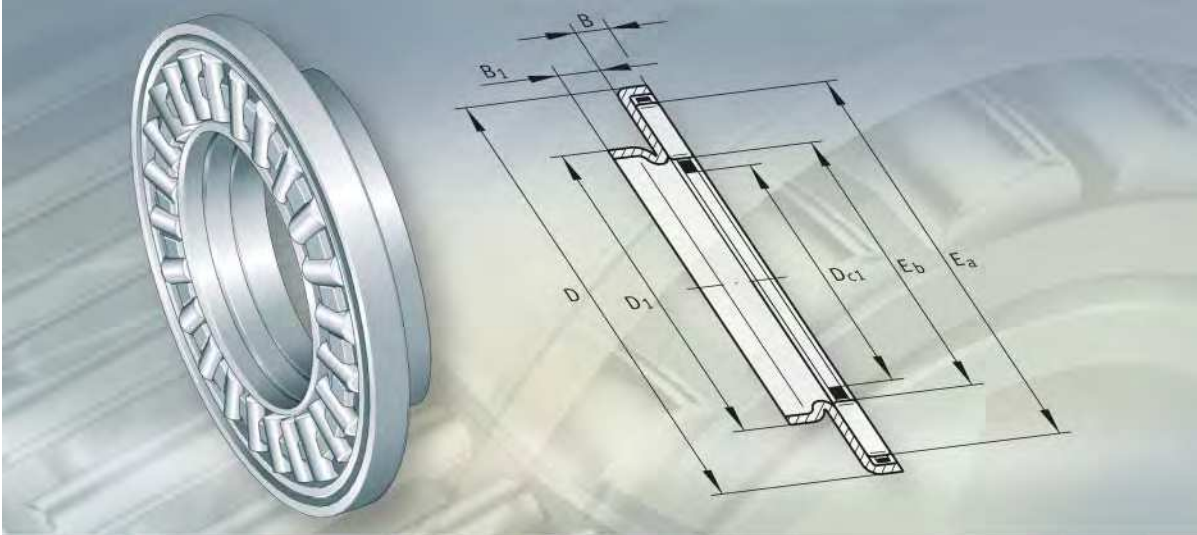
GS811, GS812,  
GS893, GS894



WS811, WS812,  
WS893, WS894



Dimensions								Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
D <sub>c1</sub>	D <sub>1</sub>	D <sub>c</sub>	d <sub>1</sub>	T	D <sub>w</sub>	B	r	E <sub>b</sub>	E <sub>a</sub>	dyn. C <sub>a</sub>	stat. C <sub>0a</sub>	C <sub>ua</sub>	n <sub>G</sub>	n <sub>B</sub>
d		D					min.			N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
180	183	225	222	34	14	10	1,1	186	220	340 000	1 300 000	107 000	1 420	590
180	183	250	247	56	22	17	1,5	194	243	690 000	2 440 000	213 000	1 310	580
180	184	360	360	109	36	36,5	5	200	351	2 210 000	8 200 000	690 000	1 040	360
190	193	240	237	37	15	11	1,1	198	234	385 000	1 500 000	123 000	1 330	570
190	194	270	267	62	26	18	2	205	263	880 000	3 000 000	270 000	1 220	530
190	195	380	380	115	38	38,5	5	212	371	2 450 000	9 200 000	770 000	990	330
200	203	250	247	37	15	11	1,1	208	244	390 000	1 550 000	125 000	1 270	530
200	204	280	277	62	26	18	2	215	273	900 000	3 150 000	280 000	1 170	485
200	205	400	400	122	40	41	5	224	391	2 700 000	10 200 000	840 000	940	315
220	223	270	267	37	15	11	1,1	228	264	420 000	1 730 000	137 000	1 170	470
220	224	300	297	63	26	18,5	2	236	294	940 000	3 450 000	295 000	1 080	435
220	225	420	420	122	40	41	6	244	411	2 900 000	11 500 000	940 000	870	270
240	243	300	297	45	18	13,5	1,5	253	294	600 000	2 500 000	199 000	1 050	440
240	244	340	335	78	32	23	2,1	263	333	1 370 000	5 000 000	425 000	960	395
240	245	440	440	122	40	41	6	264	431	3 000 000	12 200 000	980 000	830	250
260	263	320	317	45	18	13,5	1,5	272	314	620 000	2 650 000	205 000	980	390
260	264	360	355	79	32	23,5	2,1	281	351	1 440 000	5 400 000	455 000	910	355
260	265	480	480	132	44	44	6	286	468	3 600 000	14 700 000	1 150 000	760	224
280	283	350	347	53	22	15,5	1,5	294	344	860 000	3 650 000	285 000	900	345
280	284	380	375	80	32	24	2,1	301	371	1 460 000	5 600 000	465 000	850	335
280	285	520	520	145	48	48,5	6	309	508	4 200 000	17 600 000	1 360 000	700	199
300	304	380	376	62	25	18,5	2	316	372	1 060 000	4 500 000	355 000	840	330
300	304	420	415	95	38	28,5	3	329	412	1 930 000	7 300 000	600 000	780	305
300	305	540	540	145	48	48,5	6	329	528	4 350 000	18 500 000	1 420 000	670	188
320	324	400	396	63	25	19	2	336	392	1 100 000	4 750 000	370 000	790	290
320	325	580	575	155	68	43,5	7,5	343	566	5 500 000	19 900 000	1 430 000	630	185



**Axial needle roller and cage assemblies**  
**Axial bearing washers**  
**Axial needle roller bearings**



# Axial needle roller and cage assemblies, washers, axial needle roller bearings

	Page
<b>Product overview</b>	
	Axial needle roller and cage assemblies, axial bearing washers, axial needle roller bearings..... 874
<b>Features</b>	
	Axial needle roller and cage assemblies..... 875
	Axial bearing washers..... 875
	Axial needle roller bearings ..... 875
	Operating temperature ..... 875
	Cages ..... 875
	Suffixes..... 875
	Other products ..... 875
<b>Design and safety guidelines</b>	
	Running surfaces..... 876
	Tolerances for shafts and housing bores ..... 876
	Speeds..... 876
	Minimum axial load..... 877
	Orientation of washers ..... 877
<b>Accuracy</b>	
	Tolerances of bearing components..... 877
<b>Dimension tables</b>	
	Axial needle roller and cage assemblies, axial bearing washers..... 878
	Axial needle roller bearings with centring spigot..... 880



# Product overview **Axial needle roller and cage assemblies, washers, axial needle roller bearings**

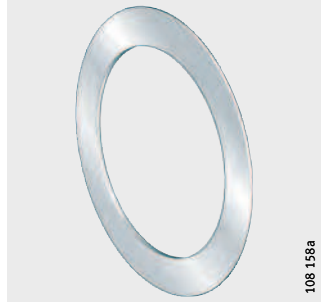
## **Axial needle roller and cage assemblies**

AXK



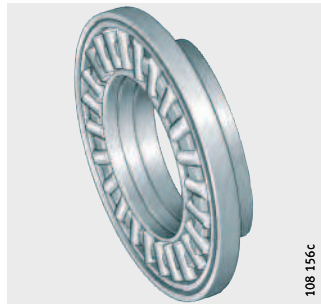
## **Axial bearing washers**

AS



## **Axial needle roller bearings** With centring spigot

AXW



## **Other products**

AX



# Axial needle roller and cage assemblies, washers, axial needle roller bearings



## Features

### Axial needle roller and cage assemblies

Axial needle roller and cage assemblies AXK correspond to DIN 5 405-2. They comprise plastic or metal axial cages with integral needle rollers and have a very low axial section height.

The cage assemblies can support high axial forces in one direction. Radial loads must be supported by separate means.

Axial needle roller and cage assemblies require hardened and ground running surfaces as a raceway.

### Axial bearing washers

Axial bearing washers AS are punched, through hardened, polished and suitable for use as shaft or housing locating washers.

They correspond to DIN 5 405-3 and are suitable for use with axial needle roller and cage assemblies AXK.

These washers are suitable for use where the adjacent machine part is unhardened but is sufficiently rigid and geometrically accurate.

### Axial needle roller bearings

Axial needle roller bearings AXW are units comprising axial needle roller and cage assemblies AXK and axial bearing washers with centring spigot. They can be combined with drawn cup needle roller bearings and machined needle roller bearings.

The running surface for the needle roller and cage assembly must be hardened and ground.

### Operating temperature

Needle roller and cage assemblies and needle roller bearings with plastic cage are suitable for operating temperatures from  $-20\text{ }^{\circ}\text{C}$  to  $+120\text{ }^{\circ}\text{C}$ .

### Cages

Case assemblies with a plastic cage have the suffix TV.

### Suffixes

Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
TV	Plastic cage made from glass fibre reinforced polyamide 66	Standard
RR	Corrosion-resistant design, with Corrotect <sup>®</sup> coating	Special design, available by agreement

### Other products

Axial needle roller bearings are available in a special range with two raceways in various sizes. Please contact us for further information.

# Axial needle roller and cage assemblies, washers, axial needle roller bearings

## Design and safety guidelines

Axial bearing washers AS must always be fully supported on their entire abutment surface.

The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

## Running surfaces

Radial cage running surfaces should be precision machined and resistant to wear,  $R_a0,8$  ( $R_z4$ ).

Raceways for axial needle roller and cage assemblies should be precision machined and resistant to wear:

- raceway hardness 58 HRC to 64 HRC
- hardening depth  $SHD \geq 140 \cdot D_W/R_{p0,2}$ 
  - $R_{ht}$ , hardening depth in mm
  - $D_W$ , rolling element diameter in mm
  - $R_{p0,2}$ , proof stress in  $N/mm^2$
- roughness  $R_a0,2$  ( $R_z1$ )
- raceway dimensions  $E_a$  and  $E_b$  according to the dimension table must be observed
- runout tolerances to ISO tolerance grade IT 5, for special requirements IT 4, in relation to the inside diameter of the cage assemblies ( $D_{c1}$ ).

## Tolerances for shafts and housing bores

If axial needle roller bearings AXW are combined with drawn cup needle roller bearings or machined needle roller bearings, the same tolerances must be selected for the housing bore on the centring spigot as for the radial bearings.

### Housing bore and shaft tolerances

Bearing component		Shaft tolerance	Bore tolerance
AXK	Guided on shaft	h8	–
AS	As housing locating washer	Clear of shaft	H9
	As shaft locating washer	h8	Clear of housing

## Speeds



The limiting speeds  $n_G$  given in the dimension tables for AXK and AXW are valid for oil lubrication.

With grease lubrication, the permissible value is 25% of the value given in the table. Higher speeds may be possible by agreement.

## Minimum axial load

A minimum axial load  $F_{a \min}$  according to the formula must be applied.

$$F_{a \min} = 0,0005 \cdot C_{0a} + k_a \left( \frac{C_{0a} \cdot n}{10^8} \right)^2$$

$F_{a \min}$  Minimum axial load N  
 $k_a$  Factor for determining the minimum load;  $k_a = 3$  –  
 $C_{0a}$  Basic static load rating, axial N  
 $n$  Speed.  $\text{min}^{-1}$

## Orientation of washers

Axial bearing washers AS are suitable as raceways on both sides.

### Accuracy

### Tolerances for bearing components

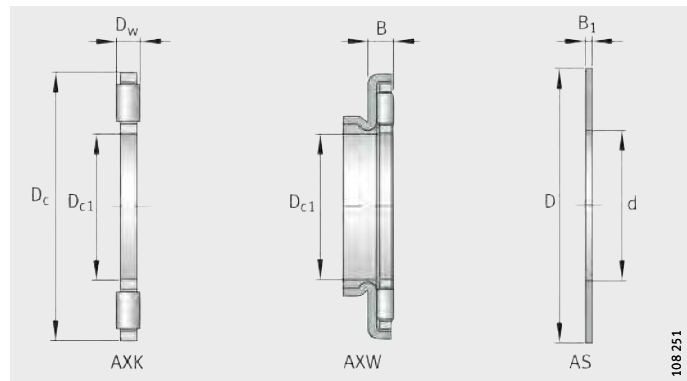
Tolerances for bearing components: see table and *Figure 1*.

The diameter sort tolerance of the needle rollers in the axial needle roller and cage assembly AXK is 2  $\mu\text{m}$ .

Axial bearing washers AS match themselves to the accuracy of the mating surface. They are flat under a minimum concentric load of 200 N.

### Tolerances

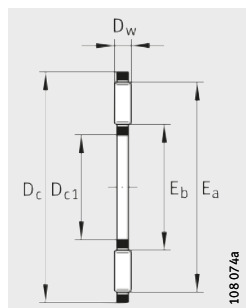
Series	Bore		Outside diameter		Height	
		Tolerance		Tolerance		Tolerance
AXK	$D_{c1}$	E12	$D_c$	c13	$D_w$	$-0,01 \text{ mm}$
AXW	$D_{c1}$	E12	–	–	B	$-0,2 \text{ mm}$
AS	d	E13	D	e13	$B_1$	$\pm 0,05 \text{ mm}$



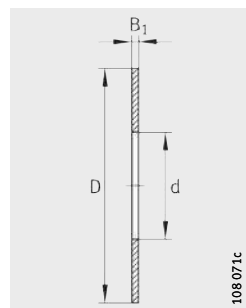
*Figure 1*  
Bearing components

# Axial needle roller and cage assemblies

## Axial bearing washers



AXK



AS

**Dimension table** - Dimensions in mm

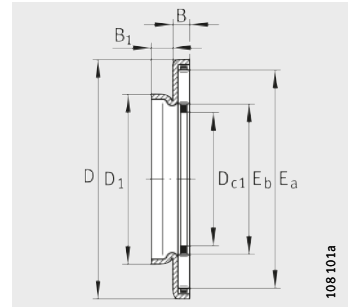
Axial needle roller and cage assemblies		Axial bearing washers		Dimensions			
Designation	Mass m ≈g	Designation	Mass m ≈g	D <sub>c1</sub> /d	D <sub>c</sub> /D	D <sub>w</sub>	B <sub>1</sub>
AXK0414-TV	0,7	AS0414	1	4	14	2	1
AXK0515-TV	0,8	AS0515	1	5	15	2	1
AXK0619-TV	1	AS0619	2	6	19	2	1
AXK0821-TV	2	AS0821	2	8	21	2	1
AXK1024	3	AS1024	3	10	24	2	1
AXK1226	3	AS1226	3	12	26	2	1
AXK1528	4	AS1528	3	15	28	2	1
AXK1730	4	AS1730	4	17	30	2	1
AXK2035	5	AS2035	5	20	35	2	1
AXK2542	7	AS2542	7	25	42	2	1
AXK3047	8	AS3047	8	30	47	2	1
AXK3552	10	AS3552	9	35	52	2	1
AXK4060	16	AS4060	12	40	60	3	1
AXK4565	18	AS4565	13	45	65	3	1
AXK5070	20	AS5070	14	50	70	3	1
AXK5578	28	AS5578	18	55	78	3	1
AXK6085	33	AS6085	22	60	85	3	1
AXK6590	35	AS6590	24	65	90	3	1
AXK7095	60	AS7095	25	70	95	4	1
AXK75100	61	AS75100	27	75	100	4	1
AXK80105	63	AS80105	28	80	105	4	1
AXK85110	67	AS85110	29	85	110	4	1
AXK90120	86	AS90120	39	90	120	4	1
AXK100135	104	AS100135	50	100	135	4	1
AXK110145	122	AS110145	55	110	145	4	1
AXK120155	131	AS120155	59	120	155	4	1
AXK130170	205	AS130170	65	130	170	5	1
AXK140180	219	AS140180	79	140	180	5	1
AXK150190	232	AS150190	84	150	190	5	1
AXK160200	246	AS160200	89	160	200	5	1



Raceway dimensions		Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
E <sub>b</sub>	E <sub>a</sub>	dyn. C <sub>a</sub> N	stat. C <sub>0a</sub> N	C <sub>ua</sub> N	n <sub>G</sub> min <sup>-1</sup>	n <sub>B</sub> min <sup>-1</sup>
5	13	4 400	8 000	940	21 500	14 900
6	14	4 750	9 200	1 070	20 600	13 000
7	18	6 800	15 500	1 580	18 900	10 800
9	20	7 800	19 400	1 970	17 800	8 800
12	23	9 200	25 500	2 500	16 900	7 400
14	25	9 900	29 000	2 850	15 200	6 500
17	27	11 300	36 000	3 600	13 200	5 100
19	29	11 900	39 500	3 950	12 100	4 600
22	34	13 100	46 500	4 750	10 500	4 350
29	41	14 700	58 000	5 900	8 400	3 850
34	46	16 300	70 000	7 100	7 300	3 200
39	51	17 800	81 000	8 300	6 500	2 800
45	58	28 000	114 000	11 800	5 600	2 440
50	63	30 000	128 000	13 300	5 100	2 170
55	68	32 000	143 000	14 800	4 700	1 950
60	76	38 000	186 000	20 300	4 250	1 780
65	83	44 500	234 000	26 500	3 900	1 590
70	88	46 500	255 000	28 500	3 650	1 470
74	93	54 000	255 000	26 500	3 450	1 430
79	98	55 000	265 000	28 000	3 250	1 350
84	103	56 000	280 000	29 500	3 100	1 280
89	108	58 000	290 000	30 500	2 950	1 220
94	118	73 000	405 000	44 500	2 700	1 120
105	133	91 000	560 000	58 000	2 420	980
115	143	97 000	620 000	63 000	2 230	890
125	153	102 000	680 000	68 000	2 070	810
136	167	133 000	840 000	75 000	1 900	760
146	177	138 000	900 000	79 000	1 780	710
156	187	143 000	960 000	82 000	1 680	660
166	197	148 000	1 020 000	86 000	1 590	620

# Axial needle roller bearings

With centring spigot



AXW

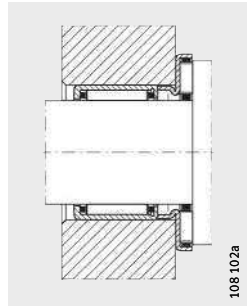
**Dimension table** - Dimensions in mm

Designation	Mass m  ≈g	Dimensions					Raceway dimensions		Basic load ratings		Fatigue limit load $C_{ua}$  N	Limiting speed $n_G$  $\text{min}^{-1}$	Reference speed $n_B$  $\text{min}^{-1}$
		$D_{c1}$	$D_1$	D	B	$B_1$	$E_b$	$E_a$	dyn. $C_a$  N	stat. $C_{0a}$  N			
<b>AXW10</b>	8,3	<b>10</b>	14	27	3,2	3	12	23	9 200	25 500	2 500	16 900	8 300
<b>AXW12</b>	9,1	<b>12</b>	16	29	3,2	3	14	25	9 900	29 000	2 850	15 200	7 300
<b>AXW15</b>	10	<b>15</b>	21	31	3,2	3,5	17	27	11 300	36 000	3 600	13 200	5 800
<b>AXW17</b>	11	<b>17</b>	23	33	3,2	3,5	19	29	11 900	39 500	3 950	12 100	5 300
<b>AXW20</b>	14	<b>20</b>	26	38	3,2	3,5	22	34	13 100	46 500	4 750	10 500	4 900
<b>AXW25</b>	20	<b>25</b>	32	45	3,2	4	29	41	14 700	58 000	5 900	8 400	4 250
<b>AXW30</b>	22	<b>30</b>	37	50	3,2	4	34	46	16 300	70 000	7 100	7 300	3 600
<b>AXW35</b>	27	<b>35</b>	42	55	3,2	4	39	51	17 800	81 000	8 300	6 500	3 100
<b>AXW40</b>	39	<b>40</b>	47	63	4,2	4	45	58	28 000	114 000	11 800	5 600	2 700
<b>AXW45</b>	43	<b>45</b>	52	68	4,2	4	50	63	30 000	128 000	13 300	5 100	2 400
<b>AXW50</b>	49	<b>50</b>	58	73	4,2	4,5	55	68	32 000	143 000	14 800	4 700	2 160

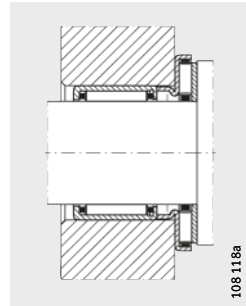
<sup>1)</sup> Dimensions for axial bearing washers AS, for drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end and needle roller bearings: see corresponding product section.



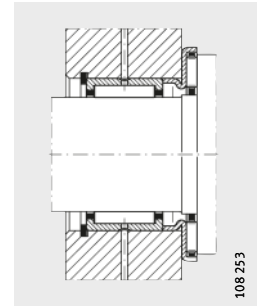
Combination with radial needle roller bearings



AXW with HK



AXW with AS and HK

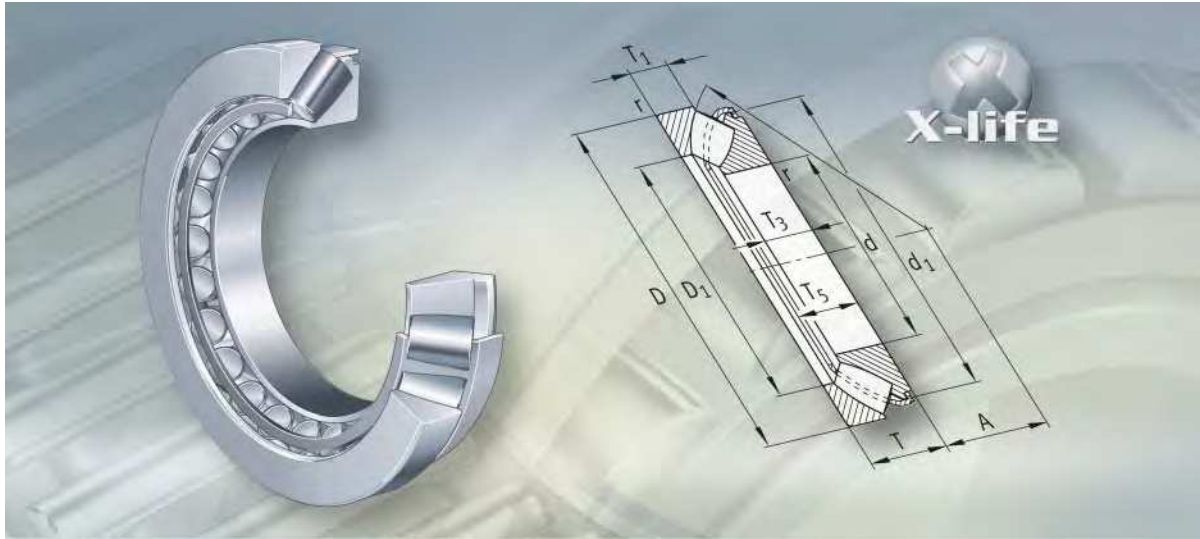


AXW with NK, NKS, RNA49, RNA69

**Combination with drawn cup needle roller bearings with open ends, drawn cup needle roller bearings with closed end and with needle roller bearings**

Designation

AS	HK	HK..-RS	BK	NK, NKS, RNA49, RNA69 Needle roller bearings <sup>1)</sup>	NKI, NKIS, NA49, NA69 Needle roller bearings <sup>1)</sup>
AS1024 –	HK1010, HK1012 HK1015	– –	BK1010, BK1012 BK1015	NK7/10-TV NK7/12-TV	– –
AS1226 –	HK1210 –	– –	BK1210 –	NK9/12-TV NK9/16-TV	NKI6/12-TV NKI6/16-TV
AS1528 –	HK1512, HK1516 HK1522-ZW	HK1514-RS –	BK1512, BK1516 –	– –	– –
AS1730	HK1712	–	–	NK15/16, NK15/20	–
AS2035 – –	HK2012, HK2016 HK2020 HK2030-ZW	HK2018-RS – –	BK2016 BK2020 –	NK18/16, NK18/20 – –	– – –
AS2542 – –	HK2512, HK2516 HK2520, HK2526 HK2538-ZW	HK2518-RS – –	– BK2520, BK2526 BK2538-ZW	NK24/16, NK24/20 NKS20 –	NKI20/16 NKI20/20 –
AS3047 – –	HK3012, HK3016 HK3020, HK3026 HK3038-ZW	HK3018-RS – –	BK3012, BK3016 BK3020, BK3026 BK3038-ZW	NK28/20, NK28/30 NKS 24 RNA4904, RNA6904	NA4904 NA6904 –
AS3552 – –	HK3512, HK3516 HK3520 –	HK3518-RS – –	– BK3520 –	NK32/20-TV, NK32/30 NKS28 RNA4905, RNA6905	NKIS20, NA4905 NA6905 NKI28/20-TV, NKI28/30
AS4060 – – –	HK4012, HK4016 HK4020 – –	HK4018-RS – – –	– BK4020 – –	NK37/20, NK37/30 NKS32 RNA4906, RNA6906 –	NKIS25, NA4906 NA6906 NKI32/20 NKI32/30
AS4565 – –	HK4516, HK4520 – –	HK4518-RS – –	BK4520 – –	NK42/20, NK42/30 NKS37 RNA49/32, RNA69/32-ZW	NKIS30 NA49/32 NA69/32-ZW
AS5070	HK5020, HK5025	HK5022-RS	–	NKS43	NKIS35



## Axial spherical roller bearings

# Axial spherical roller bearings

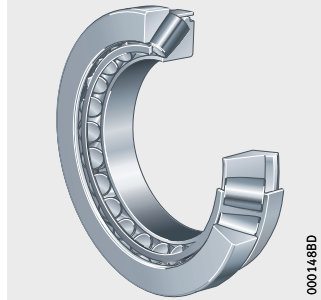
	Page
<b>Product overview</b>	Axial spherical roller bearings ..... 884
<b>Features</b>	X-life ..... 885
	Axial and radial load capacity ..... 885
	Compensation of angular misalignments ..... 885
	Sealing..... 886
	Lubrication ..... 886
	Operating temperature ..... 886
	Cages..... 886
	Suffixes..... 886
<b>Design and safety guidelines</b>	Equivalent dynamic bearing load ..... 887
	Equivalent static bearing load..... 887
	Static load safety factor ..... 887
	Minimum axial load ..... 888
	Speeds..... 888
	Design of bearing arrangements ..... 889
<b>Accuracy</b>	..... 889
<b>Dimension tables</b>	Axial spherical roller bearings..... 890



# Product overview Axial spherical roller bearings

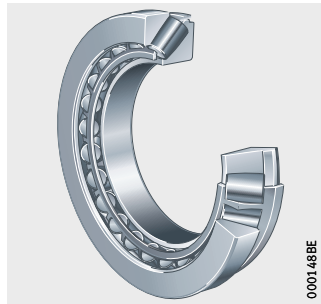
## Increased capacity design With sheet metal cage

293..-E1, 294..-E1



000148BD

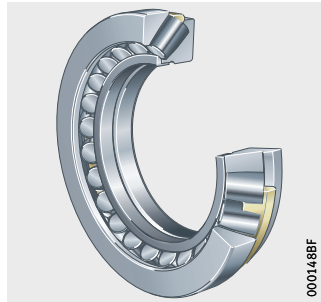
293..-E, 294..-E



000148BE

## With solid cage

292..-E, 293..-E, 294..-E



000148BF

# Axial spherical roller bearings

**Features** Axial spherical roller bearings are single row, self-aligning roller bearings. They comprise solid shaft and housing locating washers and asymmetrical barrel rollers with cages. The cage holds together the roller and cage assembly and the shaft locating washer. The bearings can be dismantled. As a result, the bearing components can be fitted separately.

**X-life** Axial spherical roller bearings of the series 293..-E1 and 294..-E1 are of X-life quality. These bearings are indicated in the dimension tables.

The bearings have an internal construction that gives increased basic load ratings as well as a precise contact geometry between the guidance rib and the end of the roller for improved kinematics. Friction and wear are reduced as a result of optimum lubricant film formation and a new cage design with improved guidance of the rollers and lubricant. Optimised osculation conditions give more uniform distribution of pressure between the rollers and raceways. Due to the increased axial load carrying capacity and reduced bearing temperature under the same operating conditions, the rating life is significantly improved.



## Axial and radial load capacity

Axial spherical roller bearings can support very high axial loads and allow relatively high speeds. Since the raceways are inclined relative to the bearing axis, the bearings can also support radial loads, see Radial load, page 887.

## Compensation of angular misalignments

Axial spherical roller bearings can be swivelled about their central position by a few degrees, see table. As a result, they permit skewing between the housing and shaft locating washer and can thus compensate misalignments, shaft deflections and housing deformations.

The adjustment angles given in the table are permissible under the following conditions:

- $P \text{ or } P_0 \leq 0,05 \cdot C_{0a}$
- the angular deviation is constant (static angular misalignment)
- the rotating component is the shaft locating washer.

The lower values are valid for large bearings.

## Permissible skewing

Series	Permissible skewing <sup>1)</sup>
292..-E	1° to 1,5°
293..-E1(-E)	1,5° to 2,5°
294..-E1(-E)	2° to 3°

<sup>1)</sup> If the rotating component is the housing locating washer or the shaft locating washer undergoes tumbling motion, the angular adjustment facility is smaller.

# Axial spherical roller bearings

**Sealing** Axial spherical roller bearings are not sealed.

**Lubrication** The bearings are not greased. They are generally lubricated using oil. In some cases, lubrication with greases containing EP additives is also possible. Adequate supply to the contact points between the rollers and guidance rib is best achieved if the bearings are completely filled with grease.

**Operating temperature** Axial spherical roller bearings can be used at operating temperatures from  $-30\text{ °C}$  to  $+200\text{ °C}$ , restricted by the lubricant.

**Cages** The standard cages for axial spherical roller bearings are shown in the table.  
Bearings with the suffix MB have a solid brass cage that is guided on the shaft locating washer. The other bearings have sheet steel cages and do not have a cage suffix.

**Cage and bore code**

Series	Sheet steel cage Bore code	Solid brass cage
292..-E	–	All
293..-E1	All	–
294..-E1	All	–
293..-E	up to 64	from 68
294..-E	up to 68	from 72

**Suffixes** Suffixes for available designs: see table.

**Available designs**

Suffix	Description	Design
E, E1	Increased capacity design	Standard
MB	Solid brass cage	

**Design and  
safety guidelines**  
**Equivalent  
dynamic bearing load**

For bearings under dynamic loading, the following applies:

$$P = F_a + 1,2 \cdot F_r$$

$P$  N  
Equivalent dynamic bearing load for combined load  
 $F_a$  N  
Axial dynamic bearing load  
 $F_r$  N  
Radial dynamic bearing load.



**Radial load**



The radial bearing load must not exceed 55% of the axial load:  
 $F_r \leq 0,55 \cdot F_a$ .

**Equivalent  
static bearing load**

For bearings under static loading, the following applies:

$$P_0 = F_{0a} + 2,7 \cdot F_{0r}$$

$P_0$  N  
Equivalent static bearing load for combined load  
 $F_{0a}$  N  
Axial static bearing load  
 $F_{0r}$  N  
Radial static bearing load.

**Radial load**



The radial bearing load must not exceed 55% of the axial load:  
 $F_{0r} \leq 0,55 \cdot F_{0a}$ .

**Static load safety factor**

For the static load safety factor  $S_0$ , the following values must be observed:

**Static load safety factor**

Static load safety factor $S_0$	Conditions
$S_0 \geq 8$	Axial support by the abutment shoulders in accordance with the bearing tables ( $d_a$ and $D_a$ )
$S_0 \geq 6$	Full axial support of the housing and shaft locating washers by the entire mating surface, dimensions $D_1$ and $d_1$ , see dimension tables
$S_0 \geq 4$	Full axial support, dimensions $D_1$ and $d_1$ , see dimension tables, together with good radial support of the housing locating washer (housing tolerance K7)

# Axial spherical roller bearings

## Minimum axial load

A minimum axial load  $F_{a \min}$  according to the formula must be applied:

$$F_{a \min} = 0,0005 \cdot C_{0a} + k_a \left( \frac{C_{0a} \cdot n}{10^8} \right)^2$$

$F_{a \min}$  Minimum axial load N  
 $C_{0a}$  Basic static load rating N  
 $k_a$  Factor for determining the minimum load, see table –  
 $n$  Maximum speed.  $\text{min}^{-1}$

### Factor $k_a$

Series	Factor $k_a$
292..-E	0,6
293..-E1(-E)	0,9
294..-E1(-E)	0,7

### Speeds



The limiting speeds  $n_G$  given in the dimension tables must not be exceeded. The values are for oil lubrication.

The reference speeds  $n_B$  were calculated according to ISO 15 312.



## Design of bearing arrangements

### Shaft and housing tolerances

The tolerances for the shaft and locating bore must be selected in accordance with the table.

#### Shaft and housing tolerances

Adjacent part	Load type	Operating conditions	Tolerance
Shaft	Combined load	Point load for shaft locating washer	j6
		Circumferential load for shaft locating washer, shaft diameter up to 200 mm	j6 (k6)
		Circumferential load for shaft locating washer, shaft diameter from 200 mm	k6 (m6)
Housing	Axial load	Normal load	E8
		High load	G7
	Combined load	Point load for housing locating washer	H7
		Circumf. load for housing locating washer	K7



#### Adjacent parts

The runout tolerances of the abutment shoulders should be to IT5 or better. The abutment shoulders should be rigid, flat and perpendicular to the axis of rotation.

A recess of diameter  $D_{b \min}$  must be provided above the housing locating washer in the housing bore, see dimension tables. Otherwise, the rollers will foul the housing when the shaft swivels.



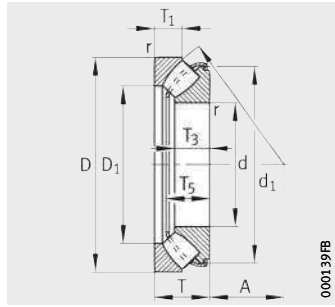
Due to the new internal construction of the E1 design, attention must be paid to the mounting dimensions. This also applies to the design of the spacer sleeve on the shaft locating washer (dimensions  $d_b, d_{b1}$ ).

#### Accuracy

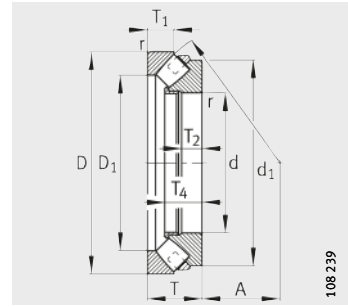
The main dimensions of the bearings conform to ISO 104 and DIN 728. The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620-3.

The section height tolerance for axial spherical roller bearings of the E1 design is restricted by up to 70% compared with the standard.

# Axial spherical roller bearings



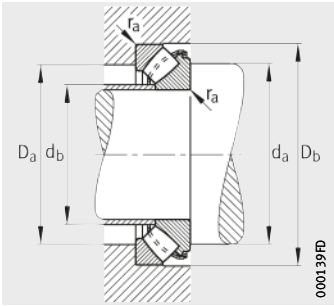
293...-E1, 294...-E1



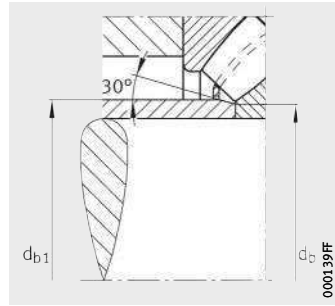
292...-E-MB

**Dimension table** - Dimensions in mm

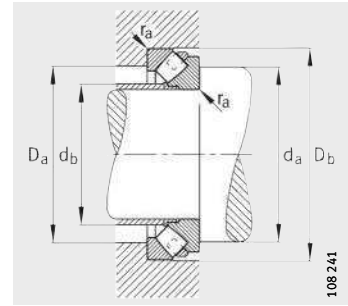
Designation	X-life	Mass ≈kg	Dimensions												
			d	D	T	D <sub>1</sub>	d <sub>1</sub>	r min.	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub> ≈	A	
29412-E1	XL	2,5	60	130	42	85,5	116,5	1,5	21	-	27	-	37,5	38	
29413-E1	XL	3,1	65	140	45	91,5	125,2	2	22	-	29,5	-	40,5	42	
29414-E1	XL	3,8	70	150	48	99	133,8	2	23,8	-	31	-	42,5	44,8	
29415-E1	XL	4,6	75	160	51	105,5	142,3	2	24,5	-	33,5	-	46	47	
29416-E1	XL	5,5	80	170	54	112,5	150,9	2,1	26,5	-	35	-	48,5	50	
29317-E1	XL	2,7	85	150	39	109,5	138,5	1,5	20	-	24,5	-	34,5	50	
29417-E1	XL	6,5	85	180	58	121	159,3	2,1	28	-	37	-	51	54	
29318-E1	XL	2,8	90	155	39	115	142,3	1,5	19,5	-	24,5	-	34,5	52	
29418-E1	XL	7,5	90	190	60	127,5	167,7	2,1	28,5	-	39	-	54	56	
29320-E1	XL	3,6	100	170	42	127,5	156	1,5	20,5	-	26,2	-	37,5	58	
29420-E1	XL	10,1	100	210	67	141,5	184,5	3	32	-	43	-	59,5	62	
29322-E1	XL	5,2	110	190	48	140	175,6	2	24,8	-	30,3	-	42	64	
29422-E1	XL	12,8	110	230	73	155,5	201,9	3	34,7	-	47	-	64,5	69	
29324-E1	XL	7,2	120	210	54	154	192,6	2,1	27	-	34	-	48	70	
29424-E1	XL	15,9	120	250	78	171	218,4	4	36,5	-	50,5	-	70	74	
29326-E1	XL	8,8	130	225	58	165,5	207,9	2,1	30,1	-	36,7	-	50,5	76	
29426-E1	XL	21	130	270	85	184,5	240	4	40,9	-	54	-	75	81	
29328-E1	XL	10,3	140	240	60	177	220,6	2,1	30	-	38,5	-	53,5	82	
29428-E1	XL	22,1	140	280	85	194,5	251,1	4	41	-	54	-	74,5	86	
29330-E1	XL	10,5	150	250	60	190	228,4	2,1	28	-	38	-	54,5	87	
29430-E1	XL	27,2	150	300	90	207,5	267,4	4	43,4	-	58	-	80,5	92	
29332-E1	XL	14	160	270	67	203	248	3	33	-	42	-	59,5	92	
29432-E1	XL	32,1	160	320	95	223,5	283,5	5	45,5	-	60,5	-	84,5	99	
29334-E1	XL	14,2	170	280	67	215	255,7	3	30,5	-	42,2	-	60,5	96	
29434-E1	XL	39,6	170	340	103	236	305	5	50	-	65,5	-	89,5	104	
29336-E1	XL	18,4	180	300	73	227	274,5	3	35,5	-	46	-	64,5	103	
29436-E1	XL	47,6	180	360	109	250	315,5	5	53	-	69,5	-	96	110	
29338-E1	XL	22,3	190	320	78	243,5	290,1	4	36	-	49	-	70	110	
29438-E	-	54,9	190	380	115	268	340	5	55	41	73	-	94	117	
29240-E-MB	-	8,15	200	280	48	236	265	2	24	17	29	45	-	108	
29340-E1	XL	27,3	200	340	85	257	308,8	4	40	-	53,5	-	75,5	116	
29440-E	-	64,7	200	400	122	282	360	5	59	44	77	-	99	122	



Mounting dimensions  
293...-E1, 294...-E1



Mounting dimensions  
293...-E1, 294...-E1

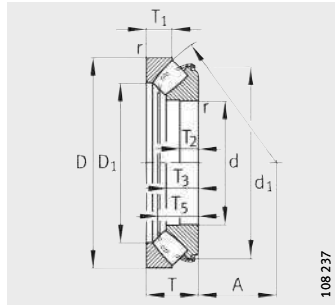


Mounting dimensions  
292...-E-MB

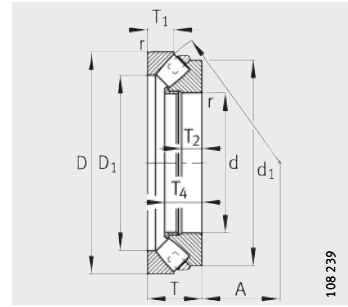


Mounting dimensions						Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
da	Da	D <sub>b</sub>	db	db <sub>1</sub>	ra	dyn. C <sub>a</sub>	stat. C <sub>0a</sub>	C <sub>ua</sub>	n <sub>G</sub>	n <sub>B</sub>
min.	max.	min.	max.	max.	max.	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
95	107	133	67	-	1,5	420 000	970 000	116 000	6 000	2 750
100	115	143	72	-	2	495 000	1 160 000	137 000	5 300	2 550
110	124	153	78,5	-	2	550 000	1 290 000	151 000	5 000	2 420
115	132	163	82,5	-	2	650 000	1 540 000	176 000	4 800	2 230
125	141	173	88	-	2	720 000	1 720 000	196 000	4 500	2 120
120	129	153	92	-	1,5	420 000	1 110 000	146 000	4 800	2 270
130	150	183	94	-	2	800 000	1 910 000	220 000	4 000	2 010
125	135	158	97	-	1,5	420 000	1 130 000	152 000	4 800	2 160
135	158	193	99,5	-	2	880 000	2 130 000	241 000	4 000	1 910
135	148	173	107	-	1,5	495 000	1 340 000	181 000	4 300	1 970
150	175	214	110,5	-	2,5	1 060 000	2 600 000	285 000	3 400	1 740
150	165	193	120	-	2	620 000	1 760 000	217 000	3 600	1 850
165	192	234	121	129	2,5	1 260 000	3 150 000	345 000	3 000	1 600
165	182	213	129	-	2	800 000	2 210 000	270 000	3 400	1 710
180	210	254	132	142	3	1 460 000	3 700 000	390 000	2 800	1 470
180	195	228	139	143	2	900 000	2 600 000	300 000	3 000	1 590
195	227	275	143	153	3	1 700 000	4 350 000	450 000	2 600	1 360
190	208	244	149	154	2	1 010 000	2 900 000	340 000	2 800	1 500
205	237	285	154	162	3	1 710 000	4 500 000	495 000	2 600	1 300
195	220	254	159	163	2	1 020 000	2 900 000	360 000	2 600	1 410
220	253	306	164	175	3	2 000 000	5 300 000	560 000	2 200	1 190
215	236	274	170	176	2,5	1 220 000	3 550 000	420 000	2 600	1 330
235	271	326	176	189	4	2 240 000	6 000 000	630 000	2 200	1 090
220	247	284	180	188	2,5	1 220 000	3 500 000	435 000	2 400	1 260
250	288	346	186	199	4	2 550 000	6 900 000	700 000	2 000	1 030
235	263	304	190	195	2,5	1 460 000	4 300 000	495 000	2 200	1 170
265	305	366	197	210	4	2 850 000	7 700 000	770 000	1 800	940
250	281	325	201	211	3	1 680 000	4 850 000	580 000	2 200	1 090
275	322	386	214	-	4	2 320 000	7 500 000	470 000	1 200	970
235	258	284	211	-	2	655 000	2 650 000	152 000	2 000	1 260
265	298	348	213	224	3	1 900 000	5 600 000	640 000	2 000	1 030
290	338	406	225	-	4	2 550 000	8 500 000	510 000	1 100	920

# Axial spherical roller bearings



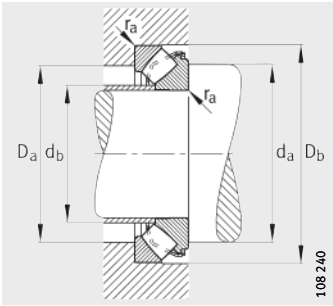
293...-E, 294...-E



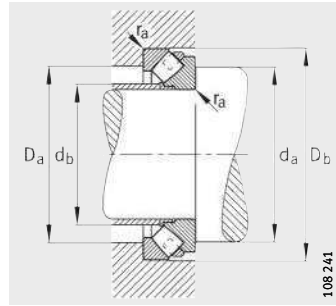
292...-E-MB, 293...-E-MB, 294...-E-MB

**Dimension table** (continued) · Dimensions in mm

Designation	Mass ≈kg	Dimensions											
		d	D	T	D <sub>1</sub>	d <sub>1</sub>	r min.	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	A
<b>29244-E-MB</b>	9,18	<b>220</b>	300	48	254	285	2	24	17	30	35	–	117
<b>29344-E</b>	29,9	<b>220</b>	360	85	279	330	4	41	31	53	–	71	125
<b>29444-E</b>	67,4	<b>220</b>	420	122	303	375	6	58	44	76,5	–	99	132
<b>29248-E-MB</b>	16,1	<b>240</b>	340	60	282	320	2,1	30	22	38	44	–	130
<b>29348-E</b>	32,5	<b>240</b>	380	85	299	350	4	41	31	53	–	71	135
<b>29448-E</b>	73,5	<b>240</b>	440	122	321	400	6	59	44	78	–	99	142
<b>29252-E-MB</b>	17	<b>260</b>	360	60	302	340	2,1	30	22	38	44	–	139
<b>29352-E</b>	45,2	<b>260</b>	420	95	327	385	5	45	34	61	–	79	148
<b>29452-E</b>	93,6	<b>260</b>	480	132	353	435	6	64	48	83	–	107	154
<b>29256-E-MB</b>	19,2	<b>280</b>	380	60	322	360	2,1	30	22	38	44	–	150
<b>29356-E</b>	48,8	<b>280</b>	440	95	346	405	5	46	34	61	–	79	158
<b>29456-E</b>	121	<b>280</b>	520	145	380	470	6	68	52	92	–	118	166
<b>29260-E-MB</b>	28,6	<b>300</b>	420	73	353	395	3	38	26	44	51	–	162
<b>29360-E</b>	66,4	<b>300</b>	480	109	378	440	5	50	39	69	–	90	168
<b>29460-E</b>	129	<b>300</b>	540	145	398	490	6	70	52	93	–	118	175
<b>29264-E-MB</b>	30,3	<b>320</b>	440	73	372	415	3	38	26	44,5	51	–	172
<b>29364-E</b>	71	<b>320</b>	500	109	396	465	5	53	39	68	–	90	180
<b>29464-E</b>	158	<b>320</b>	580	155	432	525	7,5	75	56	97	–	126	191
<b>29268-E-MB</b>	32	<b>340</b>	460	73	391	435	3	37	26	45	52	–	183
<b>29368-E-MB</b>	98,9	<b>340</b>	540	122	426	500	5	59	44	75	–	–	192
<b>29468-E</b>	200	<b>340</b>	620	170	458	560	7,5	82	61	106	–	138	201
<b>29272-E-MB</b>	46,5	<b>360</b>	500	85	423	475	4	44	31	51	59	–	194
<b>29372-E-MB</b>	103	<b>360</b>	560	122	446	520	5	59	44	75	86	–	202
<b>29472-E-MB</b>	219	<b>360</b>	640	170	475	580	7,5	82	61	108	121	–	210
<b>29276-E-MB</b>	48,4	<b>380</b>	520	85	440	490	4	42	31	53	81	–	202
<b>29376-E-MB</b>	132	<b>380</b>	600	132	474	555	6	63	48	83	94	–	216
<b>29476-E-MB</b>	248	<b>380</b>	670	175	500	610	7,5	85	63	111	124	–	230
<b>29280-E-MB</b>	51,2	<b>400</b>	540	85	460	510	4	42	31	53,5	62	–	212
<b>29380-E-MB</b>	137	<b>400</b>	620	132	493	575	6	64	48	83	94	–	225
<b>29480-E-MB</b>	294	<b>400</b>	710	185	530	645	7,5	89	67	117	131	–	236
<b>29284-E-MB</b>	73,4	<b>420</b>	580	95	489	550	5	46	34	60,5	70	–	225
<b>29384-E-MB</b>	157	<b>420</b>	650	140	520	600	6	68	50	85	97	–	235
<b>29484-E-MB</b>	305	<b>420</b>	730	185	550	665	7,5	89	67	117	132	–	244



Mounting dimensions  
293...-E, 294...-E

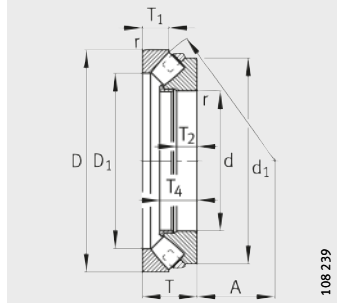


Mounting dimensions  
292...-E-MB, 293...-E-MB,  
294...-E-MB

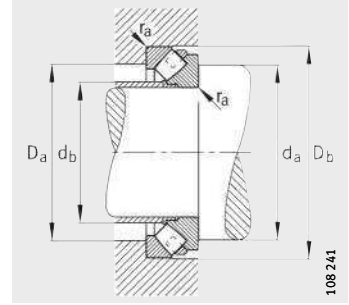


Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$D_b$	$d_b$	$r_a$	dyn. $C_a$	stat. $C_{0a}$	$C_{ua}$	$n_G$	$n_B$
min.	max.	min.	max.	max.	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>
260	277	304	229	2	720 000	3 150 000	173 000	2 000	1 130
285	316	368	235	3	1 560 000	5 600 000	335 000	1 400	980
310	360	428	243	5	2 600 000	8 500 000	520 000	1 100	860
285	311	344	251	2,1	1 040 000	4 500 000	249 000	1 700	1 040
300	337	390	256	3	1 630 000	6 100 000	355 000	1 400	890
330	381	448	265	5	2 700 000	9 500 000	570 000	1 100	790
305	331	365	272	2,1	1 060 000	4 750 000	260 000	1 700	960
330	372	430	277	4	2 040 000	7 650 000	445 000	1 200	810
360	419	488	291	5	3 100 000	11 000 000	650 000	1 000	730
325	351	385	291	2,1	1 120 000	5 100 000	270 000	1 500	890
350	394	450	298	4	2 120 000	8 300 000	470 000	1 200	750
390	446	530	310	5	3 650 000	12 900 000	750 000	900	670
355	386	426	317	2,5	1 430 000	6 550 000	345 000	1 400	830
380	429	490	320	4	2 550 000	9 650 000	540 000	1 100	700
410	471	550	326	5	3 900 000	14 000 000	810 000	900	620
375	406	450	336	2,5	1 500 000	6 950 000	360 000	1 300	770
400	449	510	340	4	2 650 000	10 600 000	580 000	1 100	660
435	507	590	354	6	4 300 000	15 600 000	890 000	800	590
395	427	470	353	2,5	1 560 000	7 350 000	385 000	1 300	730
430	484	550	364	4	3 250 000	12 900 000	700 000	950	600
465	541	630	373	6	5 200 000	19 000 000	1 070 000	750	530
420	461	510	380	3	1 900 000	8 800 000	455 000	1 200	700
450	504	572	384	4	3 350 000	13 400 000	720 000	900	570
485	560	650	391	6	5 400 000	20 400 000	1 130 000	750	495
440	480	530	395	3	2 080 000	9 650 000	495 000	1 100	650
480	538	612	404	5	3 900 000	16 000 000	860 000	850	530
510	587	682	415	6	5 850 000	22 400 000	1 220 000	700	465
460	500	550	415	3	2 120 000	10 200 000	510 000	1 100	610
500	557	634	424	5	4 000 000	16 600 000	880 000	850	510
540	622	722	441	6	6 400 000	25 000 000	1 330 000	670	440
490	534	590	437	4	2 650 000	12 500 000	620 000	1 000	580
525	585	664	447	5	4 300 000	18 000 000	940 000	800	475
560	643	742	455	6	6 700 000	26 000 000	1 390 000	630	420

# Axial spherical roller bearings



292...E-MB, 293...E-MB,  
294...E-MB



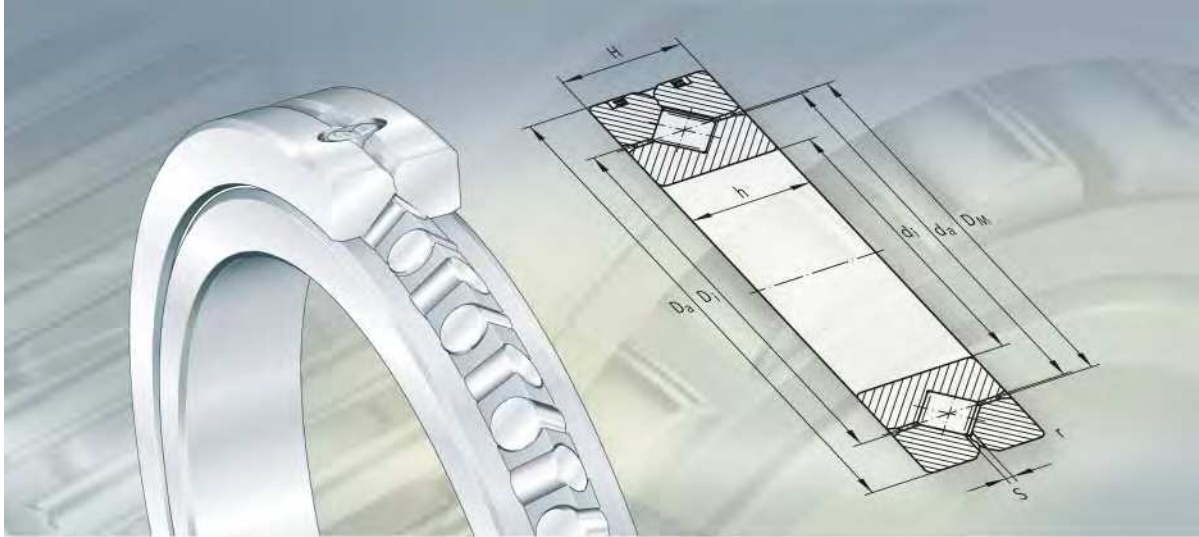
Mounting dimensions  
292...E-MB, 293...E-MB,  
294...E-MB

**Dimension table (continued)** · Dimensions in mm

Designation	Mass ≈kg	Dimensions										
		d	D	T	D <sub>1</sub>	d <sub>1</sub>	r min.	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	A
29288-E-MB	74	440	600	95	506	570	5	49	34	61	70	235
29388-E-MB	176	440	680	145	548	630	6	70	52	87	100	245
29488-E-MB	393	440	780	206	585	710	9,5	100	74	128	144	260
29292-E-MB	76,3	460	620	95	528	590	5	46	34	61	70	245
29392-E-MB	203	460	710	150	567	660	6	72	54	94,5	108	257
29492-E-MB	407	460	800	206	605	730	9,5	100	74	128	144	272
29296-E-MB	90,9	480	650	103	556	620	5	55	37	62	71	259
29396-E-MB	208	480	730	150	587	675	6	72	54	94	107	270
29496-E-MB	511	480	850	224	630	770	9,5	108	81	142	159	280
292/500-E-MB	93,5	500	670	103	574	640	5	55	37	63	72	268
293/500-E-MB	216	500	750	150	610	700	6	74	54	92	105	280
294/500-E-MB	525	500	870	224	654	790	9,5	107	81	142	160	290
292/530-E-MB	110	530	710	109	612	675	5	57	39	64	74	288
293/530-E-MB	266	530	800	160	646	745	7,5	76	58	101,5	116	295
294/530-E-MB	621	530	920	236	690	840	9,5	114	85	150,5	169	309
292/560-E-MB	131	560	750	115	642	715	5	60	41	71	111	302
294/560-E-MB	733	560	980	250	729	890	12	120	90	163	182	328
292/600-E-MB	154	600	800	122	688	760	5	65	44	71,5	82	321
294/600-E-MB	839	600	1030	258	782	940	12	127	93	162	182	347
292/630-E-MB	195	630	850	132	724	805	6	67	48	82	94	338
294/630-E-MB	1030	630	1090	280	820	995	12	136	101	176,5	198	365
292/670-E-MB	228	670	900	140	773	855	6	74	50	81	93	364
294/710-E-MB	1420	710	1220	308	916	1115	15	150	111	198	221	415
292/750-E-MB	299	750	1000	150	861	955	6	81	54	88	100	406
293/750-E-MB	716	750	1120	224	909	1045	9,5	108	81	140	159	415
292/800-E-MB	341	800	1060	155	915	1010	7,5	81	56	96	110	426
293/800-E-MB	801	800	1180	230	961	1100	9,5	112	83	145,5	165	440
293/850-E-MB	933	850	1250	243	1021	1165	12	118	87	152	173	468



Mounting dimensions					Basic load ratings		Fatigue limit load	Limiting speed	Reference speed
$d_a$	$D_a$	$D_b$	$d_b$	$r_a$	dyn. $C_a$	stat. $C_{0a}$	$C_{ua}$	$n_G$	$n_B$
min.	max.	min.	max.	max.	N	N	N	$\text{min}^{-1}$	$\text{min}^{-1}$
510	554	610	458	4	2 650 000	13 400 000	660 000	1 000	550
548	614	695	470	5	4 550 000	19 000 000	990 000	750	460
595	684	794	486	8	7 650 000	30 000 000	1 570 000	600	395
530	575	632	477	4	2 700 000	13 400 000	660 000	950	530
575	638	726	487	5	5 000 000	21 200 000	1 120 000	700	440
615	704	815	502	8	7 800 000	31 000 000	1 620 000	600	380
555	603	662	508	4	2 800 000	14 600 000	700 000	900	510
593	660	746	507	5	5 200 000	22 400 000	1 160 000	700	410
645	744	865	521	8	9 300 000	36 500 000	1 920 000	530	350
575	622	682	527	4	2 900 000	15 300 000	740 000	900	490
615	683	768	532	5	5 100 000	22 800 000	1 160 000	700	400
670	765	886	542	8	9 300 000	37 500 000	1 930 000	530	340
611	661	722	560	4	3 100 000	16 300 000	770 000	850	465
650	724	818	561	6	6 000 000	26 500 000	1 350 000	630	375
700	810	937	573	8	10 200 000	41 500 000	2 160 000	500	320
645	697	762	586	4	3 650 000	19 300 000	910 000	800	435
750	860	997	606	10	11 800 000	49 000 000	2 480 000	480	290
690	744	814	633	4	3 800 000	20 400 000	960 000	750	410
800	900	1 055	653	10	12 200 000	52 000 000	2 600 000	450	275
730	789	864	657	5	4 800 000	25 500 000	1 180 000	670	375
840	960	1 115	681	10	14 000 000	58 500 000	2 850 000	430	260
775	836	915	710	5	4 900 000	26 000 000	1 190 000	630	365
925	1 073	1 250	768	12	17 300 000	75 000 000	3 600 000	400	224
863	930	1 017	798	5	5 600 000	32 000 000	1 410 000	600	325
915	1 015	1 142	795	8	10 800 000	51 000 000	2 420 000	450	255
918	987	1 078	837	6	6 550 000	37 500 000	1 640 000	530	295
970	1 070	1 202	842	8	11 800 000	57 000 000	2 700 000	450	232
1 028	1 137	1 273	896	10	12 900 000	64 000 000	2 900 000	430	215



## Crossed roller bearings



# Crossed roller bearings

	Page
<b>Product overview</b>	Crossed roller bearings..... 898
<b>Features</b>	For axial, radial and moment loads ..... 899
	Circumferential speed..... 900
	Sealing..... 900
	Lubrication ..... 900
	Operating temperature ..... 900
	Suffixes..... 900
<b>Design and safety guidelines</b>	Static load carrying capacity ..... 900
	Checking the static load carrying capacity ..... 901
	Application factors ..... 904
	Safety factors ..... 904
	Dynamic load carrying capacity..... 904
	Determining the basic rating life ..... 905
	Static load carrying capacity of fixing screws..... 907
	Checking the static load carrying capacity of the screws ..... 908
	Checking the dynamic load carrying capacity of the screws..... 908
	Shaft and housing tolerances ..... 909
	Location using clamping rings..... 910
	Fixing screws..... 912
	Securing of screws..... 912
	Fitting of crossed roller bearings ..... 914
	Checking the function..... 916
<b>Accuracy</b>	..... 916
<b>Dimension tables</b>	Crossed roller bearings..... 918



# Product overview **Crossed roller bearings**

**Dimension series 18**



# Crossed roller bearings

## Features

Crossed roller bearings SX are bearings for high precision applications, whose dimensions conform to ISO dimension series 18 to DIN 616. They comprise outer rings, inner rings, rolling elements and plastic spacers. The outer ring is split and is held together by three retaining rings.

Crossed roller bearings are very rigid, have high running accuracy and are supplied with normal clearance, low clearance or preload. Preloaded bearings have the suffix VSP.

The bearing outer rings are easily fixed to the adjacent construction using clamping rings.

Crossed roller bearings are also available in a corrosion-resistant version with the special coating Corrotect®.

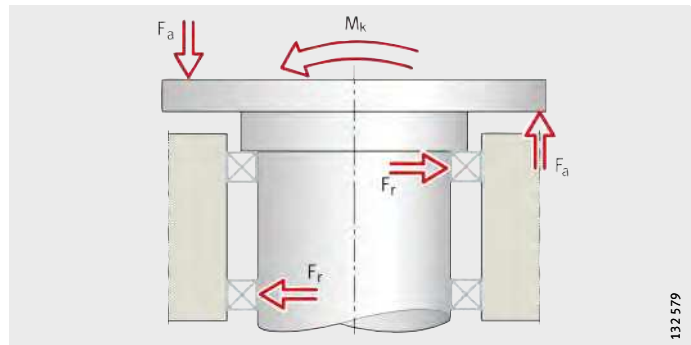
## For axial, radial and moment loads

Due to the X arrangement of the cylindrical rollers, these bearings can support axial forces from both directions as well as radial forces, tilting moment loads and any combination of loads by means of a single bearing position. As a result, designs involving two bearing positions can be reduced to a single bearing position, *Figure 1* and *Figure 2*.



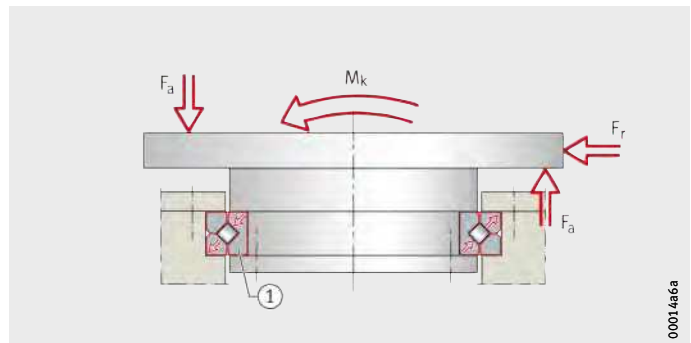
$F_a$  = axial dynamic bearing load  
 $F_r$  = radial dynamic bearing load  
 $M_k$  = dynamic tilting moment load

*Figure 1*  
 Bearing arrangement with two bearing positions



① Crossed roller bearing SX

*Figure 2*  
 Bearing arrangement with one crossed roller bearing



# Crossed roller bearings

## Circumferential speed

The circumferential speed is dependent on the bearing (normal clearance or preloaded) and on the lubrication (grease or oil), see table.

### Circumferential speed

Normal clearance	Preload	Circumferential speed
Oil lubrication	–	up to 8 m/s ( $n \cdot D_M = 152\,800$ )
Grease lubrication	–	up to 4 m/s ( $n \cdot D_M = 76\,400$ )
–	Oil lubrication	up to 4 m/s ( $n \cdot D_M = 76\,400$ )
–	Grease lubrication	up to 2 m/s ( $n \cdot D_M = 38\,200$ )

## Sealing

The bearings are of an open design. The sealing arrangement can be designed anywhere within the adjacent construction.

## Lubrication

SX bearings do not have an oil-based preservative but are greased; they can be lubricated using oil, see also publication KSX.

For grease lubrication, a high quality lithium soap grease DIN 51 825–KP2N–20 is suitable, for example Arcanol LOAD150 or LOAD220.

For oil lubrication, oils of type CLP to DIN 51 517 or HLP to DIN 51 524 of viscosity classes ISO-VG 10 to 100 have proved effective.

## Operating temperature

Crossed roller bearings are suitable for operating temperatures from  $-30\text{ °C}$  to  $+80\text{ °C}$ .

## Suffixes

Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
RR	Corrosion-resistant design, with Corrotect <sup>®</sup> coating	Special design, available by agreement
RLO	Low clearance	Standard
VSP	Preloaded	

## Design and safety guidelines

### Static load carrying capacity

Crossed roller bearings that undergo rotary motion only infrequently, undergo slow swivel motion, rotate only slowly or are subjected to load while stationary are dimensioned on the basis of their static load carrying capacity.

The size of a statically loaded bearing can therefore be checked in approximate terms using the basic static load ratings  $C_0$  and the static limiting load diagrams.

## Checking the static load carrying capacity

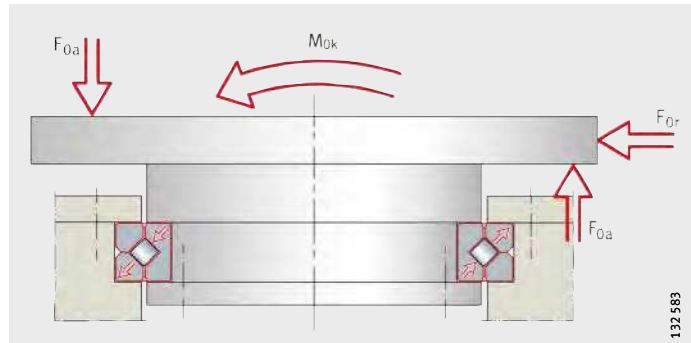


It can be checked in approximate terms if the load arrangement is present and all the requirements relating to clamping rings, location, fitting and lubrication are fulfilled, *Figure 3*.

Where load arrangements are more complex or the conditions are not fulfilled, please contact us.

$F_{0a}$  = axial static bearing load  
 $F_{0r}$  = radial static bearing load  
 $M_{0k}$  = static tilting moment load

*Figure 3*  
Load arrangement



In order to check the static load carrying capacity, the following equivalent static operating values must be determined:

- the equivalent static bearing load  $F_{0q}$
- the equivalent static tilting moment load  $M_{0q}$ .

Checking is possible for applications with or without radial load.

### Determining the equivalent static bearing load without radial load

If only axial and tilting moment loads are present, the following apply:

$$F_{0q} \triangleq F_{0a} \cdot f_A \cdot f_S$$

$$M_{0q} \triangleq M_{0k} \cdot f_A \cdot f_S$$

$F_{0q}$  Equivalent axial bearing load (static) kN

$F_{0a}$  Axial static bearing load kN

$f_A$  Application factor, see table, page 904 –

$f_S$  Factor for additional safety, see Safety factors, page 904 –

$M_{0q}$  Equivalent tilting moment load (static) kNm

$M_{0k}$  Static tilting moment load. kNm

The values  $F_{0q}$  and  $M_{0q}$  are used to determine the load point in the static limiting load diagram Raceway, see dimension tables.

In addition to the raceway, the dimensioning of the fixing screws must also be checked.

The static limiting load diagrams for the raceway and the fixing screws are indicated in the dimension tables.



The load point must be below the raceway curve.

# Crossed roller bearings

## Determining the equivalent static bearing load with radial load



Radial loads can only be taken into consideration if the radial load  $F_{0r}$  is smaller than the basic static radial load rating  $C_{0r}$ , according to dimension table.

The equivalent static bearing load with radial load is determined as follows:

- Calculate the parameter for load eccentricity  $\epsilon$  using the formula
- Determine the static radial load factor  $f_{0r}$ . To do this:
  - determine the ratio  $F_{0r}/F_{0a}$  in *Figure 4* or *Figure 5*, page 903
  - based on the ratio  $F_{0r}/F_{0a}$  and  $\epsilon$ , determine the static radial load factor  $f_{0r}$  from *Figure 4* or *Figure 5*, page 903
- Determine the application factor  $f_A$ , see table, page 904, and the safety factor  $f_S$  if necessary
- Calculate the equivalent axial bearing load  $F_{0q}$  and equivalent tilting moment load  $M_{0q}$  according to the formulae
- Based on the values  $F_{0q}$  and  $M_{0q}$ , determine the load point in the static limiting load diagram Raceway, see dimension tables.



The load point must be below the raceway curve.

$$\epsilon = \frac{2000 \cdot M_{0k}}{F_{0a} \cdot D_M}$$

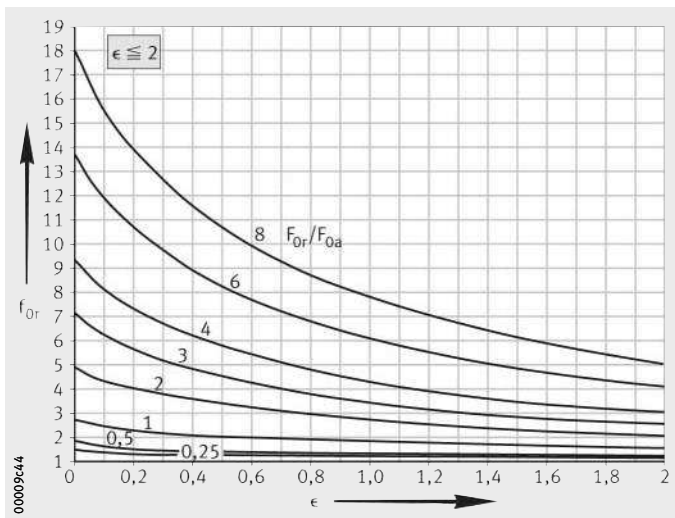
$$F_{0q} = F_{0a} \cdot f_A \cdot f_S \cdot f_{0r}$$

$$M_{0q} = M_{0k} \cdot f_A \cdot f_S \cdot f_{0r}$$

$\epsilon$	–
Load eccentricity parameter	
$M_{0k}$	kNm
Static tilting moment load	
$F_{0a}$	kN
Axial static bearing load	
$D_M$	mm
Rolling element pitch circle diameter, see dimension table	
$F_{0q}$	kN
Equivalent bearing load (static)	
$f_A$	–
Application factor, see table, page 904	
$f_S$	–
Factor for additional safety, see Safety factors, page 904	
$f_{0r}$	–
Static radial load factor, <i>Figure 4</i> or <i>Figure 5</i> , page 903	
$M_{0q}$	kNm
Equivalent tilting moment load (static).	

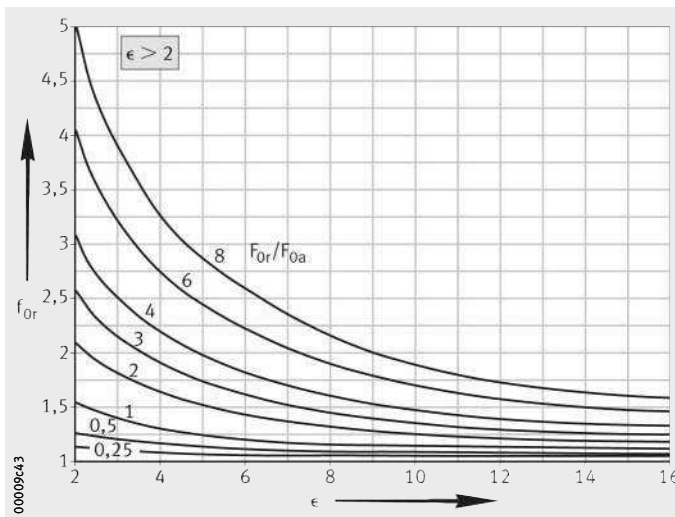
$f_{0r}$  = static radial load factor  
 $\epsilon$  = load eccentricity parameter;  $\epsilon \leq 2$

Figure 4  
 Static radial load factor



$f_{0r}$  = static radial load factor  
 $\epsilon$  = load eccentricity parameter;  $\epsilon > 2$

Figure 5  
 Static radial load factor



# Crossed roller bearings

## Application factors

The application factors  $f_A$  in the table are empirical values. They take account of the most important requirements, for example the type and severity of operation, rigidity or running accuracy. If the precise requirements of an application are known, the values may be altered accordingly.



Application factors  $< 1$  must not be used.

A large proportion of applications can be statically calculated using the factor 1, for example in the case of bearings for gearboxes and rotary tables.

In addition to static calculation, the rating life should also always be checked, see Dynamic load carrying capacity.

## Application factors $f_A$

Application	Operating and requirement criteria	Application factor $f_A$
Robots	Rigidity	1,25
Antennae	Accuracy	1,5
Machine tools	Accuracy	1,5
Measuring equipment	Smooth running	2
Medical equipment	Smooth running	1,5

## Safety factors

The factor for additional safety is  $f_S = 1$ .

It is not normally necessary to factor in any additional safety in calculation.



In special cases, such as approval specifications, internal specifications, requirements stipulated by inspection bodies etc., the appropriate safety factors must be applied.

## Dynamic load carrying capacity

Dynamically loaded crossed roller bearings, i.e. bearings that undergo predominantly rotary motion, are dimensioned in accordance with their dynamic load carrying capacity.

The size of a dynamically loaded bearing can therefore be checked in approximate terms using the basic dynamic load ratings  $C$  and the basic rating life  $L$  or  $L_h$ .



## Determining the basic rating life

The life formulae for  $L$  and  $L_h$  are only valid:

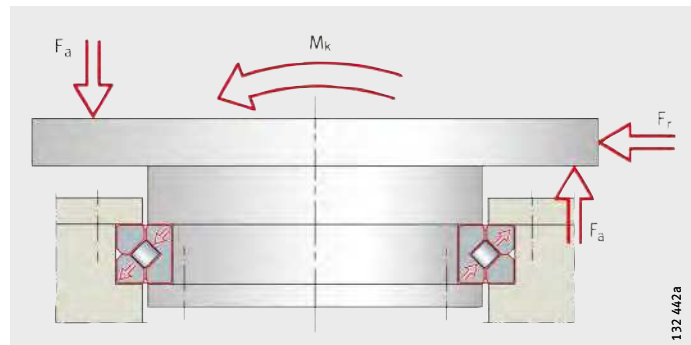
- with a load arrangement in accordance with *Figure 6*
- if all the requirements are fulfilled in relation to location (the bearing rings must be rigid or firmly connected to the adjacent construction), fitting, lubrication and sealing
- if the load and speed can be regarded as constant during operation. If the load and speed are not constant, equivalent operating values can be determined that will result in the same fatigue conditions as the actual loads, see Equivalent operating values, page 51
- if the load ratio is  $F_r/F_a \leq 8$ .



For more complex load arrangements, a ratio  $F_r/F_a > 8$  or if the stated conditions are not fulfilled, please contact us.

$F_a$  = axial dynamic bearing load  
 $F_r$  = radial dynamic bearing load  
 $M_k$  = dynamic tilting moment load

*Figure 6*  
Load arrangement



## Determining the rating life for bearings subjected to combined loads

For bearings subjected to combined loads, bearings with axial, radial and tilting moment loads, the rating life  $L$  and  $L_h$  is determined as follows:

- Calculate the parameter for load eccentricity  $\epsilon$ , see formula page 906
  - Determine the ratio of the radial dynamic bearing load  $F_r$  to the axial dynamic bearing load  $F_a$  ( $F_r/F_a$ )
  - Based on the values for  $\epsilon$  and the ratio  $F_r/F_a$ , determine the dynamic load factor  $k_F$ , *Figure 7*, page 907
  - Calculate the equivalent dynamic axial bearing load  $P_{axial} = k_F \cdot F_a$ , see formula page 906
  - Enter the equivalent dynamic axial bearing load  $P_{axial}$  and the basic dynamic axial load rating  $C_a$  in the rating life formulae for  $L$  or  $L_h$  and calculate the rating life, see formula page 906
- If swivel operation is present, enter the calculated operating speed  $n$  according to the formula in the rating life formula  $L_h$ , see formula page 906.

# Crossed roller bearings

## Determining the basic rating life for bearings subjected to radial loads only

For slewing rings subjected to radial loads only, the following values are entered in the rating life formulae L and L<sub>10</sub>:

- instead of the equivalent dynamic axial bearing load P<sub>axial</sub>, the equivalent dynamic radial bearing load P<sub>radial</sub> (i.e. F<sub>r</sub>)
  - P<sub>radial</sub> = F<sub>r</sub>
- the basic dynamic radial load rating C<sub>r</sub>.

$$\epsilon = \frac{2000 \cdot M_k}{F_a \cdot D_M}$$

$$P_{axial} = k_F \cdot F_a$$

$$L_{10} = \left( \frac{C_a}{P_{axial}} \right)^p \text{ or } L_{10} = \left( \frac{C_r}{P_{radial}} \right)^p$$

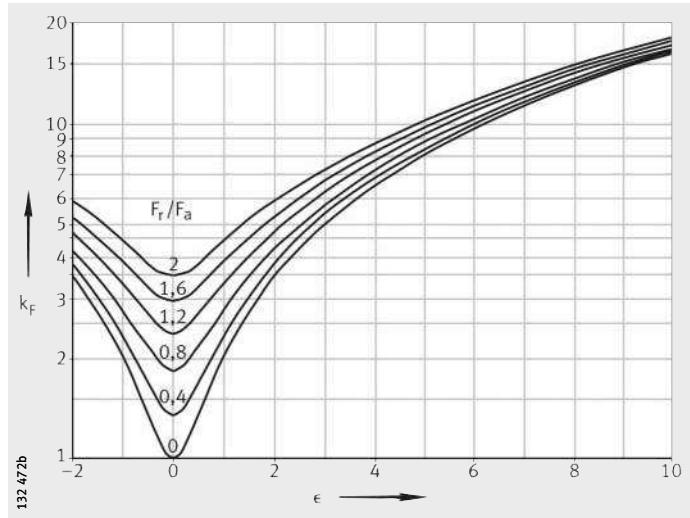
$$L_{10h} = \frac{16666}{n} \cdot \left( \frac{C_a}{P_{axial}} \right)^p \text{ or } L_{10h} = \frac{16666}{n} \cdot \left( \frac{C_r}{P_{radial}} \right)^p$$

$$n = n_{osc} \cdot \frac{\gamma}{90^\circ}$$

ε	–
Load eccentricity parameter	
M <sub>k</sub>	kNm
Dynamic tilting moment load	
F <sub>a</sub>	kN
Axial dynamic bearing load	
D <sub>M</sub>	mm
Rolling element pitch circle diameter, see dimension table	
P <sub>axial</sub>	kN
Equivalent dynamic axial bearing load.	
For bearings subjected to radial load only, enter P <sub>radial</sub>	
k <sub>F</sub>	–
Dynamic load factor, <i>Figure 7</i> , page 907	
L <sub>10</sub>	10 <sup>6</sup> revolutions
Basic rating life in millions of revolutions	
C <sub>a</sub> , C <sub>r</sub>	kN
Basic dynamic axial or radial load rating, see dimension table.	
For bearings subjected to radial load only, enter C <sub>r</sub>	
p	–
Life exponent for crossed roller bearings: p = 10/3	
L <sub>10h</sub>	h
Basic rating life in operating hours	
n	min <sup>-1</sup>
Operating speed	
n <sub>osc</sub>	min <sup>-1</sup>
Frequency of to and fro movement	
γ	°
Half of swivel angle	
P <sub>radial</sub>	kN
Equivalent dynamic radial bearing load	
F <sub>r</sub>	kN
Radial dynamic bearing load.	

$k_F$  = dynamic load factor  
 $\epsilon$  = load eccentricity parameter

Figure 7  
 Dynamic load factor



### Load carrying capacity of fixing screws

In addition to the raceway, the load carrying capacity of the fixing screws must also be checked. This is based on the information in the section Checking the static load carrying capacity, page 901.

The load carrying capacity of the fixing screws can be checked if the following conditions are fulfilled:

- the criteria in the section Checking the static load carrying capacity, page 901
- the screws are tightened as specified using a torque wrench – screw tightening factor  $\alpha_A = 1,6$  tightening torques, see tables, page 912 and page 913
- the permissible contact pressure is not exceeded
- screws of the recommended size, quantity and grade are used.

### Indicator of load carrying capacity

The load carrying capacity of the screws is described by:

- the curves in the limiting load diagrams for fixing screws in the dimension tables
- the maximum permissible radial load  $F_{r\text{per}}$  (friction locking).

The screw curves are shown in the static limiting load diagrams for fixing screws. The curves are based on screws of grade 10.9, tightened to 90% of their proof stress including the torsion content.

If screws of grade 8.8 or 12.9 are used, the equivalent static loads  $F_{0q}$  and  $M_{0q}$ , see Static load carrying capacity, page 901, must be converted using the following factors:

- grade 8.8 ( $F_{0q} \times 1,65$ ,  $M_{0q} \times 1,65$ )
- grade 12.9 ( $F_{0q} \times 0,8$ ,  $M_{0q} \times 0,8$ ).

# Crossed roller bearings

## Checking the static load carrying capacity of the screws

For applications with and without radial load



The static load carrying capacity of the screw is limited by its proof stress.

The equivalent static bearing loads  $F_{0q}$  and  $M_{0q}$  must be determined.

The values for  $F_{0q}$  and  $M_{0q}$  are then used to determine the load point in the static limiting load diagram Fixing screws. Diagrams, see page 918 and page 920.

The load point must be below the appropriate screw curve.

## Radial load and static load carrying capacity of the screws

If radial loads occur in uncentred bearing rings, the screw connections must prevent displacement of the bearing rings on the adjacent construction.

In order to check this:

- multiply the radial bearing load by an application factor  $f_A$ , see table, page 904
- compare the values determined with the maximum permissible radial load  $F_{r\text{ per}}$



The maximum permissible radial load  $F_{r\text{ per}}$  on the fixing screws is dependent on their friction locking and not on the radial load carrying capacity of the bearing.

If the radial load on the bearing is higher than the friction locking of the fixing screws or very high radial loads are present ( $F_r/F_a > 4$ ), please contact us.

## Checking the dynamic load carrying capacity of the screws

Dynamic load carrying capacity

The dynamic load carrying capacity of the screws corresponds to the fatigue strength of the screw.

Based on the dynamic loads present, the equivalent loads  $F_{0q}$  and  $M_{0q}$  are determined.

Instead of the application factor  $f_A$ , the operating load must always be increased by the following factor:

- grade 8.8 (factor 1,8)
- grade 10.9 (factor 1,6)
- grade 12.9 (factor 1,5).

The load carrying capacity must then be checked in the static limiting load diagram Fixing screws, see dimension table.



The load point must be below the appropriate screw curve.

## Shaft and housing tolerances

For normal applications, sufficient tolerances are K7 for the housing and h7 for the shaft, see tables.

In precision applications, the bearing seat in the housing should be designed to tolerance K6 and the bearing seat on the shaft to h6, see tables.

### Fitting tolerances for the shaft

Nominal dimension range		Nominal deviations			
>	≅	h6		h7	
		upper $\mu\text{m}$	lower $\mu\text{m}$	upper $\mu\text{m}$	lower $\mu\text{m}$
65	80	0	-19	0	-30
80	100	0	-22	0	-35
100	120	0	-22	0	-35
120	140	0	-25	0	-40
140	160	0	-25	0	-40
160	180	0	-25	0	-40
180	200	0	-29	0	-46
200	225	0	-29	0	-46
225	250	0	-29	0	-46
250	280	0	-32	0	-52
280	315	0	-32	0	-52
315	355	0	-36	0	-57
355	400	0	-36	0	-57
400	450	0	-40	0	-63
450	500	0	-40	0	-63



### Fitting tolerances for the housing bore

Nominal dimension range		Nominal deviations			
>	≅	K6		K7	
		upper $\mu\text{m}$	lower $\mu\text{m}$	upper $\mu\text{m}$	lower $\mu\text{m}$
80	100	+4	-18	+10	-25
100	120	+4	-18	+10	-25
120	140	+4	-21	+12	-28
140	160	+4	-21	+12	-28
160	180	+4	-21	+12	-28
180	200	+5	-24	+13	-33
200	225	+5	-24	+13	-33
225	250	+5	-24	+13	-33
250	280	+5	-27	+16	-36
280	315	+5	-27	+16	-36
315	355	+7	-29	+17	-40
355	400	+7	-29	+17	-40
400	450	+8	-32	+18	-45
450	500	+8	-32	+18	-45
500	560	0	-44	0	-70
560	630	0	-44	0	-70

# Crossed roller bearings

## Location using clamping rings

For location of crossed roller bearings SX, clamping rings have proved effective, *Figure 8*, page 911.



Bearing rings must always be rigidly and uniformly supported over their entire circumference and width.

The thickness of the clamping rings and mounting flanges must not be less than the minimum thickness.

Counterbores to DIN 74, type J, for screws to DIN 6 912 are permissible. For deeper counterbores, the thickness of the clamping rings must be increased by the additional counterbore depth.

Mounting dimensions: see table, page 911 and *Figure 8*, page 911.

Minimum strength of clamping rings: see Minimum strength of clamping rings.

## Bearing seat depth

In order that the clamping rings retain the bearing securely, the bearing seat depth  $t$  must be in accordance with the specification, see table, page 911 and *Figure 8*, page 911.



The depth of the bearing seat influences the bearing clearance and the rotational resistance.

Preloaded bearings (suffix VSP) have a considerably higher rotational resistance.

If particular requirements for rotational resistance apply, the depth  $t$  must be produced to match the relevant height of the bearing ring. It has proved effective to tolerance the depth  $t$  to deviations that are the same as or further restricted compared to the dimension  $h$  in the dimension tables. For safety, internal tests should in any case be carried out.

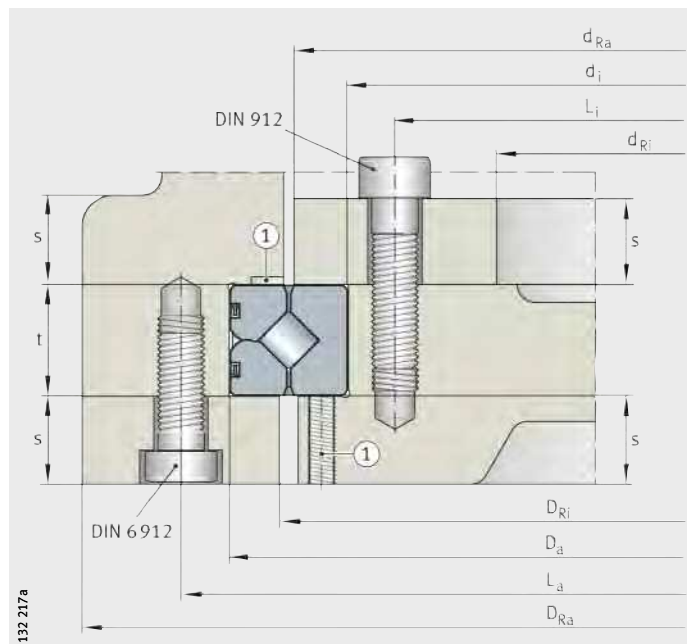
## Minimum strength of clamping rings

For screws of grade 10.9, the minimum strength under the screw heads or nuts must be  $500 \text{ N/mm}^2$ . Seating washers are not necessary for these screws.

For fixing screws of grade 12.9, the minimum strength must be not less than  $850 \text{ N/mm}^2$ , otherwise quenched and tempered seating washers under the screw heads or quenched and tempered nuts must be used.

## Mounting dimensions

Designation	Mounting dimensions									
	$d_i$ h7 (h6)	$D_a$ K7 (K6)	t	s min.	$d_{Ra}$	$d_{Ri}$	$D_{Ri}$	$D_{Ra}$	$L_i$ max.	$L_a$ min.
<b>SX011814</b>	70	90	$10_{-0,015}^{-0,005}$	8	78	42	82	118	60	100
<b>SX011818</b>	90	115	$13_{-0,020}^{-0,005}$	10	100	61	104	144	80	125
<b>SX011820</b>	100	125	$13_{-0,020}^{-0,005}$	10	110	71	114	154	90	135
<b>SX011824</b>	120	150	$16_{-0,025}^{-0,005}$	12	132	84	138	186	108	162
<b>SX011828</b>	140	175	$18_{-0,030}^{-0,005}$	14	154	94	160	221	124	191
<b>SX011832</b>	160	200	$20_{-0,05}^{-0,02}$	15	177	111	183	249	144	216
<b>SX011836</b>	180	225	$22_{-0,05}^{-0,02}$	17	199	121	205	284	160	245
<b>SX011840</b>	200	250	$24_{-0,06}^{-0,02}$	18	221	139	229	311	180	270
<b>SX011848</b>	240	300	$28_{-0,06}^{-0,02}$	21	269	166	274	374	216	324
<b>SX011860</b>	300	380	$38_{-0,10}^{-0,04}$	29	335	201	345	479	268	412
<b>SX011868</b>	340	420	$38_{-0,10}^{-0,04}$	29	375	241	385	519	308	452
<b>SX011880</b>	400	500	$46_{-0,10}^{-0,04}$	35	445	275	455	625	360	540
<b>SX0118/500</b>	500	620	$56_{-0,10}^{-0,04}$	42	554	350	566	700	452	668



① Slots, threaded extraction holes or similar for dismantling purposes

*Figure 8*  
Clamping rings, bearing seat depth,  
mounting dimensions

# Crossed roller bearings

## Fixing screws

For location of the bearing rings or clamping rings, screws of grade 10.9 are suitable, see table.



Any deviations from the recommended size, grade and quantity of screws will considerably reduce the load carrying capacity and operating life of the bearings.

For screws of grade 12.9, the minimum strength of the clamping rings must be achieved or quenched and tempered seating washers must be used.

## Fixing screws

Crossed roller bearing	Fixing screws Grade 10.9		Tightening torque
	Size	Quantity	$M_A$ Nm
<b>SX011814</b>	M5	18	7
<b>SX011818</b>	M5	24	7
<b>SX011820</b>	M5	24	7
<b>SX011824</b>	M6	24	11,7
<b>SX011828</b>	M8	24	27,8
<b>SX011832</b>	M8	24	27,8
<b>SX011836</b>	M10	24	55,6
<b>SX011840</b>	M10	24	55,6
<b>SX011848</b>	M12	24	98,4
<b>SX011860</b>	M16	24	247
<b>SX011868</b>	M16	24	247
<b>SX011880</b>	M20	24	481
<b>SX0118/500</b>	M24	24	831

## Securing of screws

Normally, the screws are adequately secured by the correct preload. If regular shock loads or vibrations occur, however, additional securing of the screws may be necessary.



Not every method of securing screws is suitable for crossed roller bearings.

Never use spring washers or split washers.

General information on securing of screws is given in DIN 25 201, and securing by means of adhesive in particular is described in DIN 25 203, issued 1992.

If these are to be used, please consult the relevant companies.



**Tightening torques  $M_A$   
for the torque-controlled tightening  
of socket headless screws**

Fixing screw	Clamping cross-section $A_s$ mm <sup>2</sup>	Core cross-section $A_{d3}$ mm <sup>2</sup>	Tightening torque $M_A$ <sup>1)</sup> in Nm for grade		
			8.8	10.9	12.9
M4	8,78	7,75	2,25	3,31	3,87
M5	14,2	12,7	4,61	6,77	7,92
M6	20,1	17,9	7,8	11,5	13,4
M8	36,6	32,8	19,1	28	32,8
M10	58	52,3	38	55,8	65,3
M12	84,3	76,2	66,5	97,7	114
M14	115	105	107	156	183
M16	157	144	168	246	288
M18	192	175	229	336	394
M20	245	225	327	481	562
M22	303	282	450	661	773
M24	353	324	565	830	972

<sup>1)</sup>  $M_A$  according to VDI Guideline 2 230 (July 1986) for  $\mu_K = 0,08$  and  $\mu_G = 0,12$ .

**Assembly preload forces  $F_M$   
for the torque-controlled tightening  
of socket headless screws**

Fixing screw	Clamping cross-section $A_s$ mm <sup>2</sup>	Core cross-section $A_{d3}$ mm <sup>2</sup>	Assembly preload force $F_M$ <sup>1)</sup> in kN for grade		
			8.8	10.9	12.9
M4	8,78	7,75	4,05	5,95	6,96
M5	14,2	12,7	6,63	9,74	11,4
M6	20,1	17,9	9,36	13,7	16,1
M8	36,6	32,8	17,2	25,2	29,5
M10	58	52,3	27,3	40,2	47
M12	84,3	76,2	39,9	58,5	68,5
M14	115	105	54,7	80,4	94,1
M16	157	144	75,3	111	129
M18	192	175	91,6	134	157
M20	245	225	118	173	202
M22	303	282	147	216	253
M24	353	324	169	249	291

<sup>1)</sup>  $F_M$  according to VDI Guideline 2 230 (July 1986) for  $\mu_G = 0,12$ .



# Crossed roller bearings

## Fitting of crossed roller bearings

The bores and edges of the adjacent components must be free from burrs. The support surfaces for the bearing rings must be clean.

The bearing seating and locating surfaces for the bearing rings on the adjacent construction must be lightly oiled or greased.

Lightly oil the thread of the fixing screws in order to prevent varying friction factors (do not oil or grease screws that will be secured by means of adhesive).



Ensure that all adjacent components and lubrication ducts are free from cleaning agents, solvents and washing emulsions. The bearing seating surfaces can rust or the raceway system can become contaminated.

Apply assembly forces only to the bearing ring to be fitted; never direct forces through the rolling elements or seals.

Avoid direct blows on the bearing rings in all cases.

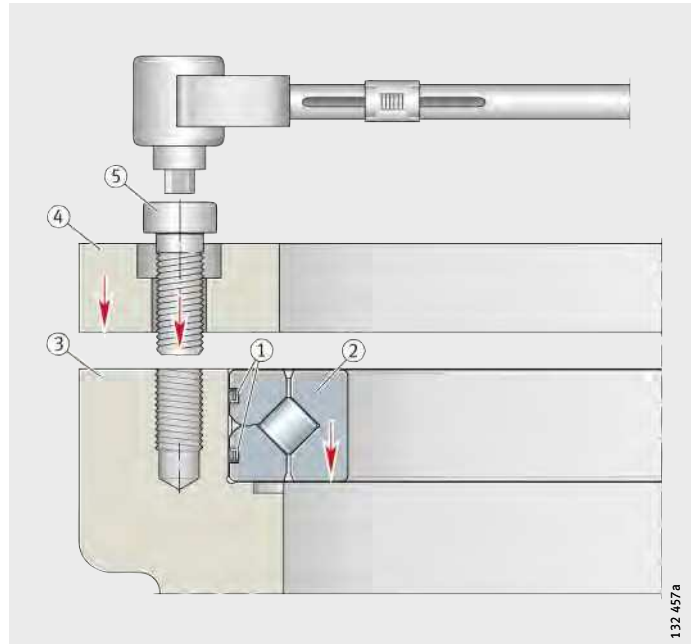
Locate the bearing rings consecutively and without application of any external load.

The outer ring is split and is held together by three retaining rings ①, *Figure 9*, page 915 . Never apply tensile loads to the retaining rings.

## Locating the external bearing ring

Fitting of the ring, *Figure 9*:

- Insert or press the bearing ② into the external adjacent construction ③ with the outer ring first
- Position the external clamping ring ④
- Insert the fixing screws ⑤ in the clamping ring and tighten in steps up to the specified tightening torque  $M_A$ 
  - tighten the screws in a crosswise sequence in order to prevent unacceptable fluctuations in the screw tensioning forces
  - tightening torques  $M_A$  for fixing screws, see tables, page 913.



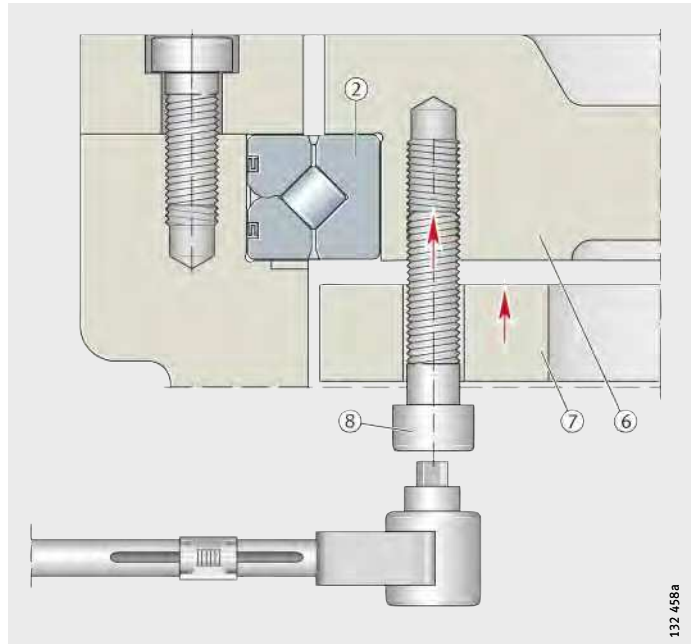
*Figure 9*  
Locating the external bearing ring

# Crossed roller bearings

## Locating the internal bearing ring

Fitting of the ring, *Figure 10*:

- Insert the bearing ② into the internal adjacent construction ⑥
- Position the internal clamping ring ⑦
- Insert the fixing screws ⑧ in the clamping ring and tighten in steps up to the specified tightening torque  $M_A$ 
  - tighten the screws in a crosswise sequence in order to prevent unacceptable fluctuations in the screw tensioning forces.



*Figure 10*  
Locating the internal bearing ring

## Checking operation

Once assembly is complete, the operation of the fitted crossed roller bearing must be checked.



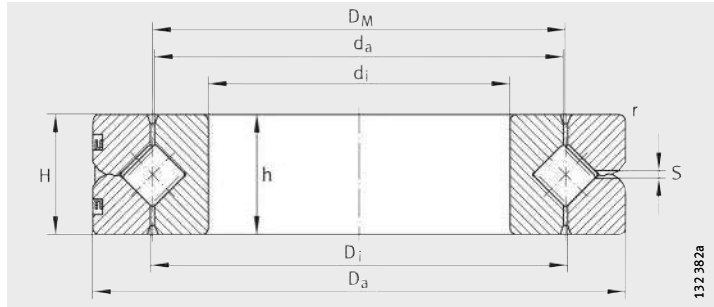
If the bearing runs irregularly or roughly, or the temperature in the bearing shows an unusual increase, dismantle and check the bearing and reassemble the bearing in accordance with the fitting guidelines described.

## Accuracy

The dimensional and geometrical tolerances are based on DIN 620-2 and DIN 620-3 and are within the range P6 to P5. The main dimensions conform to DIN 616, dimension series 18.



# Crossed roller bearings



SX

**Dimension table** - Dimensions in mm

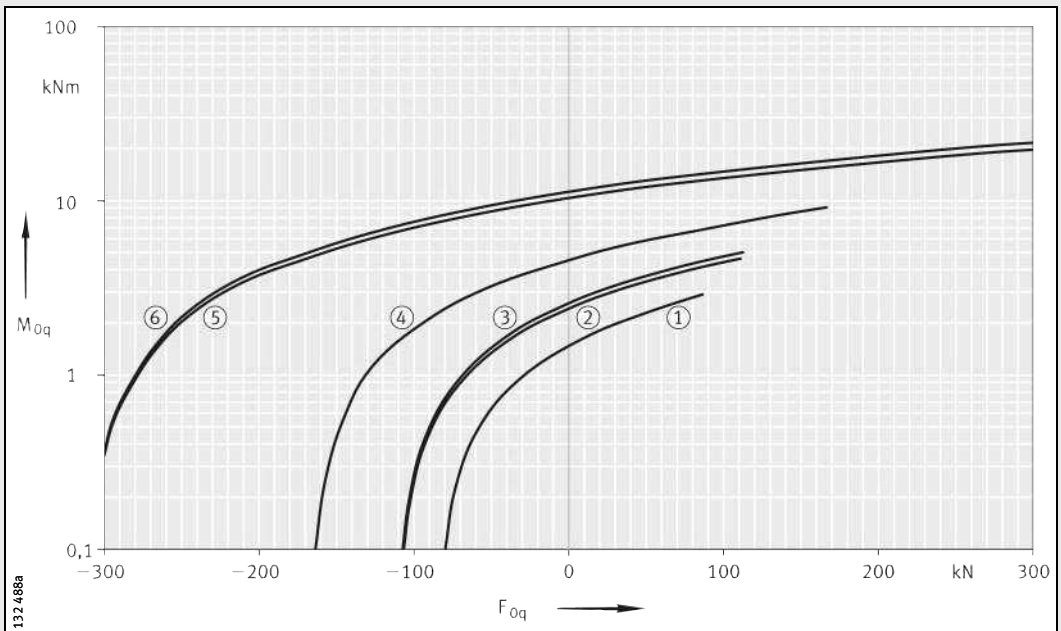
Designation	Position <sup>1)</sup>	Mass m ≈kg	Dimensions									Running accuracy	
			D <sub>M</sub>	d <sub>i</sub> K6	D <sub>a</sub> h6	H <sup>2)</sup>	h <sup>2)</sup> E8	d <sub>a</sub>	D <sub>i</sub>	r min.	S <sup>3)</sup>	radial	axial
<b>SX011814</b>	①	0,3	80	70 <sup>+0,004</sup> <sub>-0,015</sub>	90	10±0,10	10 <sub>-0,01</sub>	79,5	80,5	0,6	1,2	0,010	0,010
<b>SX011818</b>	②	0,4	102	90 <sup>+0,004</sup> <sub>-0,018</sub>	115	13±0,12	13 <sub>-0,01</sub>	101,5	102,5	1	1,2	0,010	0,010
<b>SX011820</b>	③	0,5	112	100 <sup>+0,004</sup> <sub>-0,018</sub>	125	13±0,12	13 <sub>-0,01</sub>	111,5	112,5	1	1,2	0,010	0,010
<b>SX011824</b>	④	0,8	135	120 <sup>+0,004</sup> <sub>-0,018</sub>	150	16±0,12	16 <sub>-0,01</sub>	134,4	135,5	1	1,5	0,010	0,010
<b>SX011828</b>	⑤	1,1	157	140 <sup>+0,004</sup> <sub>-0,021</sub>	175	18±0,12	18 <sub>-0,01</sub>	156,3	157,7	1,1	1,5	0,015	0,010
<b>SX011832</b>	⑥	1,7	180	160 <sup>+0,004</sup> <sub>-0,021</sub>	200	20±0,12	20 <sub>-0,025</sub>	179,2	180,8	1,1	1,5	0,015	0,010

1) Curve in the static limiting load load diagram for the raceway and fixing screws.

2) H: section height of bearing,  
h: height of individual ring.

3) Lubrication hole: 3 holes spaced evenly about the circumference.

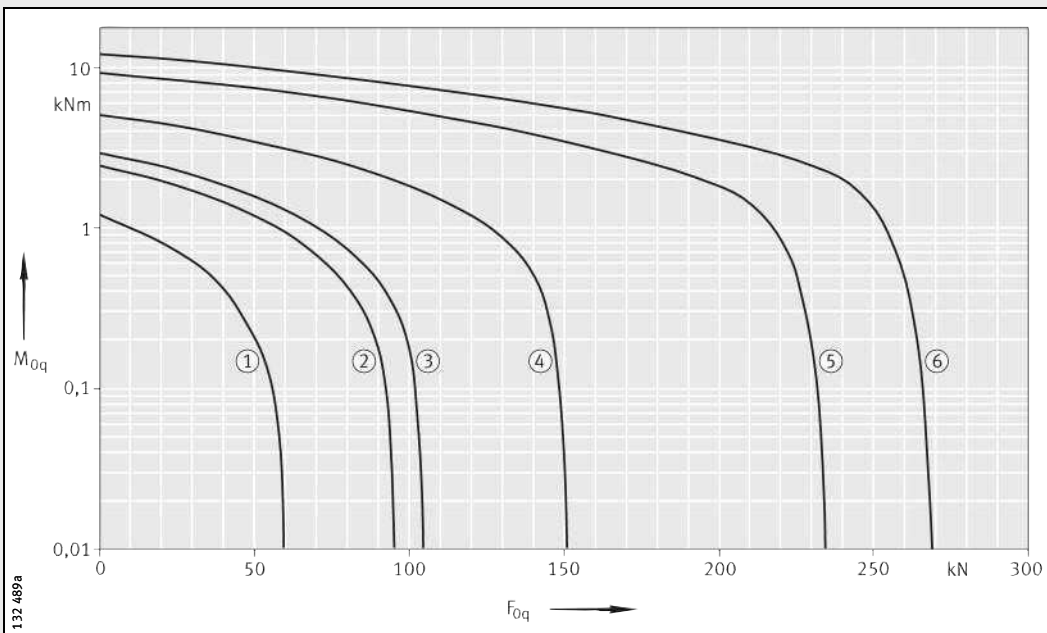
4) Basic load ratings, radial: for radial loads only.



Static limiting load diagram for fixing screws – compressive load

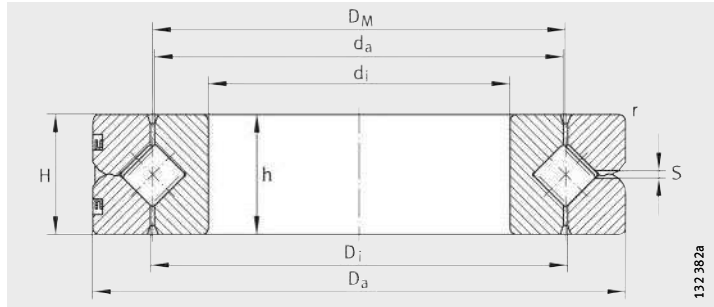


Normal clearance				Low clearance RLO		Preload VSP		Basic load ratings				Limiting speeds				Dimensions identical to ISO dimension series 18
Radial clearance		Axial tilting clearance		Radial clearance	Pre-load			axial		radial <sup>(4)</sup>		With normal clearance		With preload		
min.	max.	min.	max.					dyn. C <sub>a</sub>	stat. C <sub>0a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	η <sub>G</sub> oil	η <sub>G</sub> grease	η <sub>G</sub> oil	η <sub>G</sub> grease	
min.	max.	min.	max.	max.	max.	min.	max.	kN	kN	kN	kN	min <sup>-1</sup>	min <sup>-1</sup>	min <sup>-1</sup>	min <sup>-1</sup>	
0,003	0,015	0,006	0,03	0,003	0,006	0,003	0,015	15,4	51	11	20,4	1 910	955	955	475	618 14
0,003	0,015	0,006	0,03	0,003	0,006	0,003	0,015	25,5	91	18,3	36,5	1 500	750	750	375	618 18
0,005	0,020	0,010	0,04	0,004	0,008	0,005	0,020	27	102	19,4	40,5	1 360	680	680	340	818 20
0,005	0,020	0,010	0,04	0,004	0,008	0,005	0,020	38	146	27	59	1 130	565	565	280	618 24
0,005	0,020	0,010	0,04	0,004	0,008	0,005	0,020	63	240	45	96	975	485	485	240	618 28
0,005	0,020	0,010	0,04	0,004	0,008	0,005	0,020	68	275	48,5	111	850	425	425	210	618 32



Static limiting load diagram for raceway – compressive load

# Crossed roller bearings

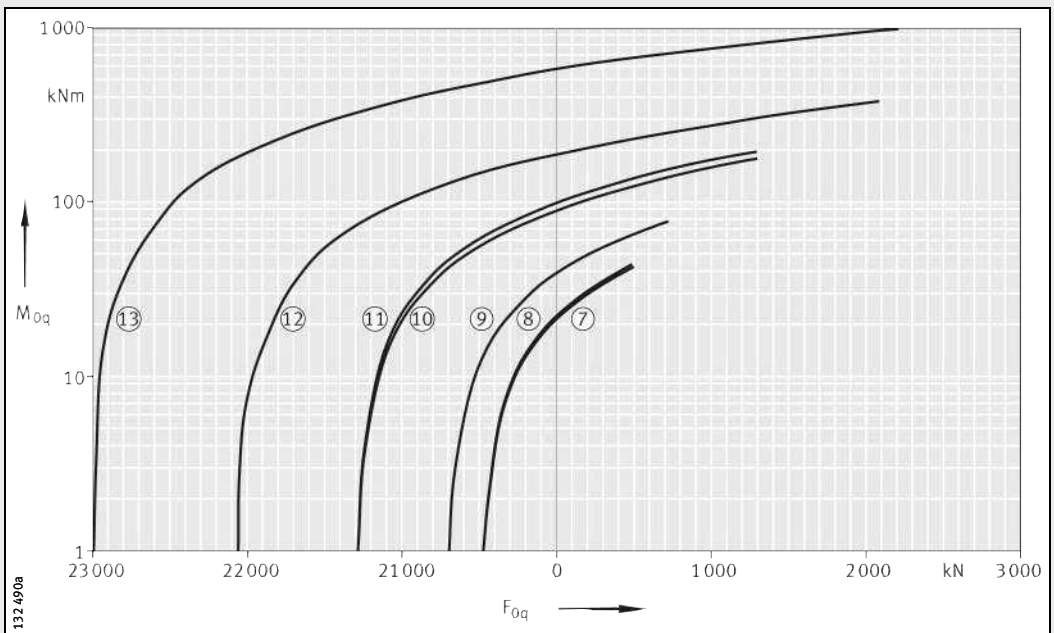


SX

Dimension table (continued) · Dimensions in mm

Designation	Position <sup>1)</sup>	Mass m ≈kg	Dimensions								Running accuracy		
			D <sub>M</sub>	d <sub>i</sub> K6	D <sub>a</sub> h6	H <sup>2)</sup>	h <sup>2)</sup> E8	d <sub>a</sub>	D <sub>i</sub>	r min.	S <sup>3)</sup>	radial	axial
<b>SX011836</b>	⑦	2,3	202	<b>180</b> <sup>+0,004</sup> <sub>-0,021</sub>	225 <sub>-0,029</sub>	22±0,13	22 <sub>-0,025</sub>	201,2	202,8	1,1	2	0,015	0,010
<b>SX011840</b>	⑧	3,1	225	<b>200</b> <sup>+0,004</sup> <sub>-0,024</sub>	250 <sub>-0,029</sub>	24±0,13	24 <sub>-0,025</sub>	224,2	225,8	1,5	2	0,015	0,010
<b>SX011848</b>	⑨	5,3	270	<b>240</b> <sup>+0,005</sup> <sub>-0,024</sub>	300 <sub>-0,032</sub>	28±0,13	28 <sub>-0,025</sub>	269,2	270,8	2	2	0,020	0,010
<b>SX011860</b>	⑩	12	340	<b>300</b> <sup>+0,005</sup> <sub>-0,027</sub>	380 <sub>-0,036</sub>	38±0,14	38 <sub>-0,05</sub>	339,2	340,8	2,1	2,5	0,020	0,010
<b>SX011868</b>	⑪	13,5	380	<b>340</b> <sup>+0,007</sup> <sub>-0,029</sub>	420 <sub>-0,040</sub>	38±0,14	38 <sub>-0,05</sub>	379,2	380,8	2,1	2,5	0,025	0,010
<b>SX011880</b>	⑫	24	450	<b>400</b> <sup>+0,007</sup> <sub>-0,029</sub>	500 <sub>-0,040</sub>	46±0,15	46 <sub>-0,05</sub>	449	451	2,1	2,5	0,030	0,010
<b>SX0118/500</b>	⑬	44	560	<b>500</b> <sup>+0,008</sup> <sub>-0,032</sub>	620 <sub>-0,044</sub>	56±0,16	56 <sub>-0,05</sub>	558,8	561,2	3	2,5	0,040	0,010

- 1) Curve in the static limiting load load diagram for the raceway and fixing screws.
- 2) H: section height of bearing,  
h: height of individual ring.
- 3) Lubrication hole: 3 holes spaced evenly about the circumference.
- 4) Basic load ratings, radial: for radial loads only.

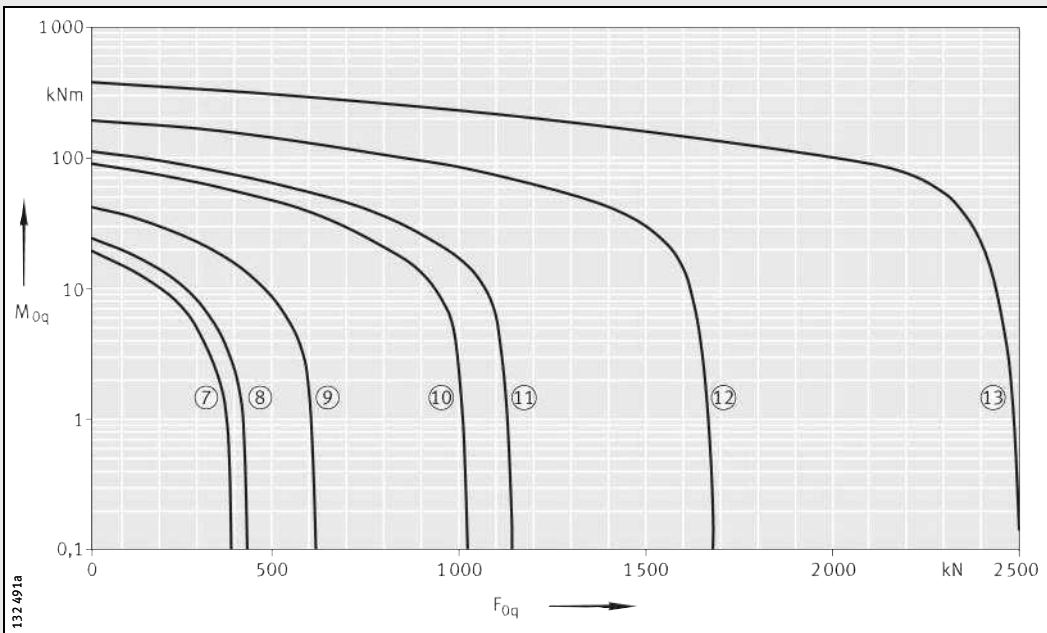


Static limiting load diagram for fixing screws – compressive load



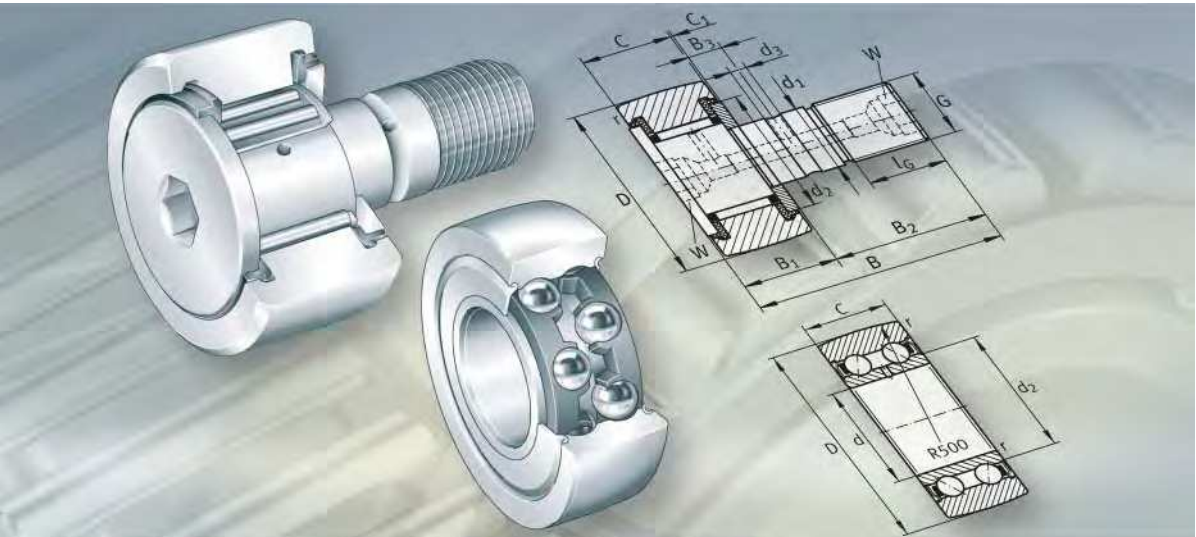


Normal clearance				Low clearance RLO		Preload VSP		Basic load ratings				Limiting speeds				Dimensions identical to ISO dimension series 18
Radial clearance		Axial tilting clearance		Radial clearance	Pre-load	min.	max.	axial		radial <sup>4)</sup>		With normal clearance		With preload		
min.	max.	min.	max.					max.	max.	dyn. C <sub>a</sub>	stat. C <sub>0a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	n <sub>G</sub> oil	n <sub>G</sub> grease	
min.	max.	min.	max.	max.	max.	min.	max.	kN	kN	kN	kN	min <sup>-1</sup>	min <sup>-1</sup>	min <sup>-1</sup>	min <sup>-1</sup>	
0,005	0,025	0,010	0,05	0,005	0,010	0,005	0,025	96	380	69	153	755	375	375	185	618 36
0,005	0,025	0,010	0,05	0,005	0,010	0,005	0,025	102	425	72	170	680	340	340	170	618 40
0,010	0,030	0,020	0,06	0,005	0,010	0,005	0,025	148	640	105	255	565	280	280	140	618 48
0,010	0,040	0,020	0,08	0,005	0,010	0,005	0,025	243	1 070	173	425	450	225	225	110	618 60
0,010	0,040	0,020	0,08	0,005	0,010	0,005	0,025	260	1 220	185	485	400	200	200	100	618 68
0,010	0,050	0,020	0,10	0,005	0,010	0,005	0,025	385	1 800	275	720	340	170	170	85	618 80
0,015	0,060	0,030	0,12	0,006	0,012	0,005	0,030	560	2 750	395	1 100	275	135	135	65	618/500



Static limiting load diagram for raceway – compressive load





## Track rollers

- Yoke type track rollers
- Stud type track rollers
- Ball bearing track rollers

# Track rollers

## **Yoke type track rollers** ..... **926**

Yoke type track rollers are ready-to-fit needle and cylindrical roller bearings with a particularly thick-walled outer ring and are used in applications such as cam gears, bed ways, conveying equipment and linear guidance systems. In addition to high radial loads, they can also support axial loads which are due, for example, to slight misalignment defects, skewed running or brief contact running impacts.

Yoke type track rollers are available with and without axial guidance of the outer ring and in both sealed and open versions.

The outside surface of the outer rings is crowned and corresponds in the majority of designs to the optimised INA profile. These bearings have lower Hertzian pressure, reduced edge load under tilting and reduced wear of the mating track, giving a longer operating life of the mating track.

Yoke type track rollers are mounted on a shaft or stud and are supplied with or without an inner ring.

---

## **Stud type track rollers** ..... **926**

Stud type track rollers correspond in their design to yoke type track rollers with axial guidance but, in place of the inner ring, they have a heavy-section roller stud. The stud has a fixing thread and, in most cases, a hexagonal socket on both ends. It is also available with a shrink-fitted eccentric collar. Due to the eccentric collar, the outside surface of the outer ring can be adjusted to match the mating track on the adjacent construction.

Stud type track rollers are available with labyrinth, gap or contact seals.

The outside surface of the outer rings is crowned and corresponds in the majority of designs to the optimised INA profile.

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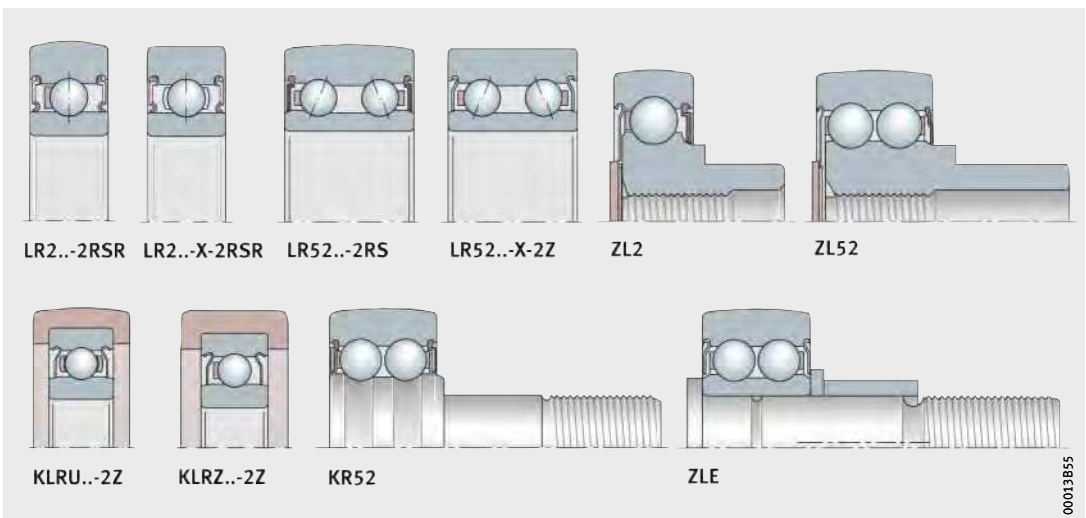
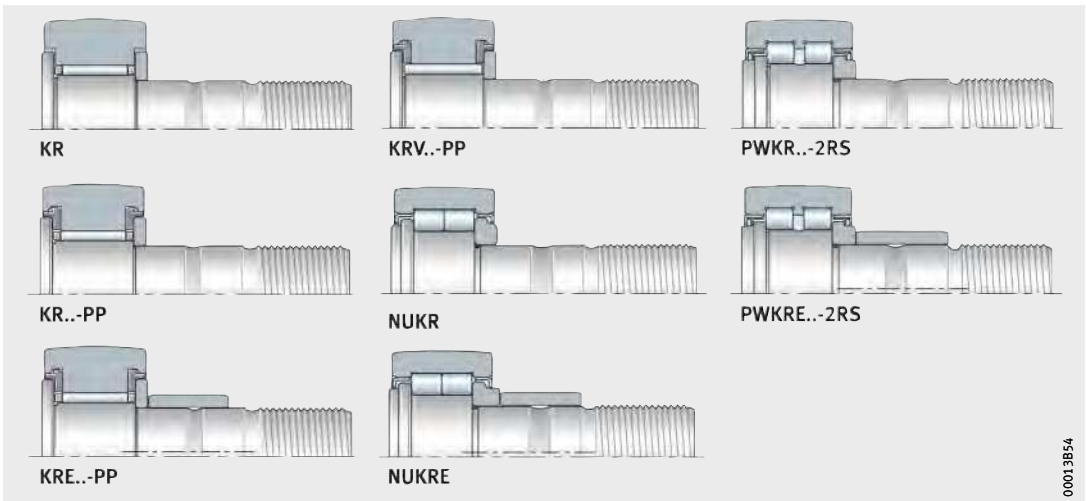
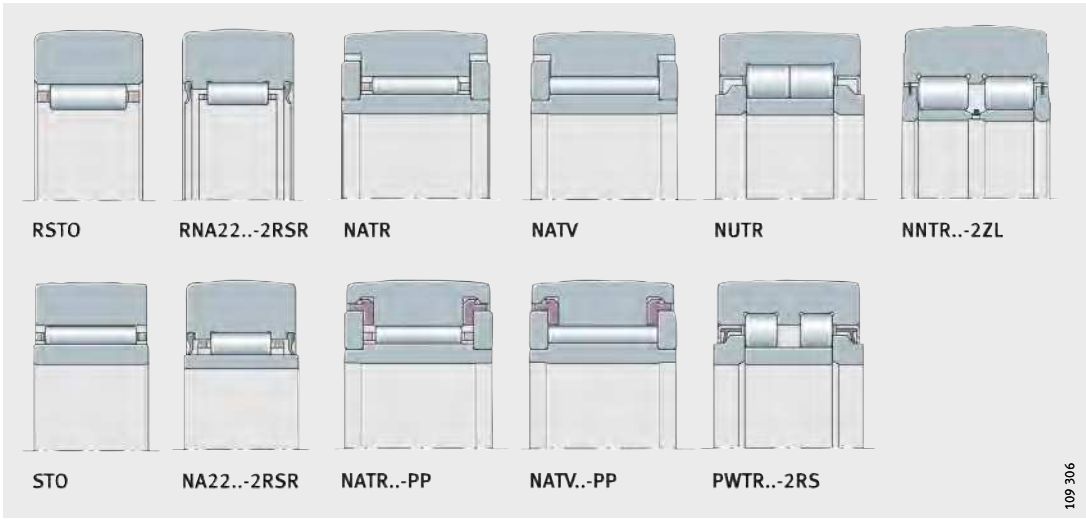
## **Ball bearing track rollers** ..... **984**

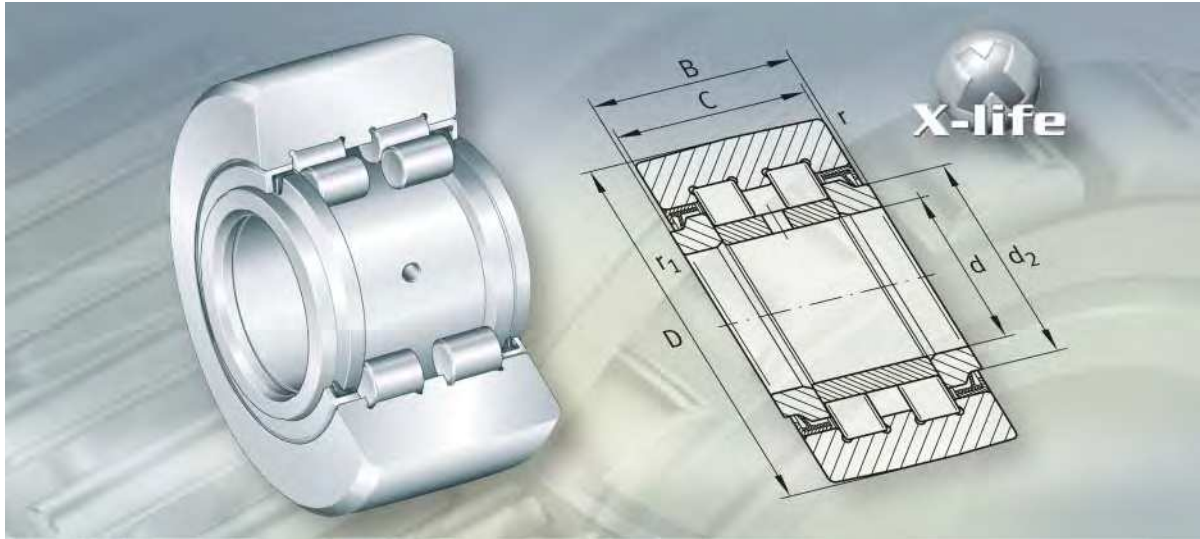
Ball bearing track rollers correspond in their design to deep groove or angular contact ball bearings but have thick-walled outer rings with a crowned outside surface. They can support high radial forces as well as axial forces in both directions. The bearings are sealed.

Ball bearing track rollers are available with and without a stud and with a plastic tyre.

Track rollers without a stud are mounted on a shaft or stud.

Track rollers with a plastic tyre are used if the bearings are required to run with particularly low noise.





**Yoke type track rollers**  
**Stud type track rollers**

# Yoke type track rollers, stud type track rollers

		Page
<b>Product overview</b>	Yoke type track rollers .....	930
<b>Features</b>	<b>X-life</b> .....	932
	Outside surface profile of the outer ring .....	932
	Yoke type track rollers without inner ring.....	933
	Yoke type track rollers with inner ring.....	933
	Operating temperature .....	935
	Suffixes.....	935
<b>Product overview</b>	Stud type track rollers.....	936
<b>Features</b>	<b>X-life</b> .....	938
	Outside surface profile of the outer ring .....	938
	Stud type track rollers without eccentric collar .....	939
	Stud type track rollers with eccentric collar .....	940
	Operating temperature .....	941
	Suffixes.....	941



# Yoke type track rollers, stud type track rollers

	Page
<b>Design and safety guidelines</b>	
Optimised INA profile.....	942
Installation as yoke or stud type track roller.....	944
Permissible radial load under dynamic loading.....	944
Permissible radial load under static loading .....	944
Load carrying capacity and life .....	944
Operating life.....	946
Static load safety factor .....	946
Minimum load .....	946
Skewed running.....	947
Tilting.....	947
Speeds .....	948
Frictional torque .....	948
Displacement resistance.....	949
Two contact zones in track rollers.....	950
Central lubrication adapter for stud type track rollers.....	951
Adjacent construction for yoke type track rollers.....	955
Adjacent construction for stud type track rollers .....	957
Design of mating track .....	958
Fitting.....	964
Anti-corrosion protection by Corrotect® coating.....	970
<b>Accuracy</b>	
Radial internal clearance.....	971



	Page
<b>Dimension tables</b>	
Yoke type track rollers, without axial guidance, open .....	972
Yoke type track rollers, without axial guidance, sealed .....	973
Yoke type track rollers, with axial guidance, gap seal or axial plain washer .....	974
Yoke type track rollers, with axial guidance, sealed .....	975
Needle roller stud type track rollers, with axial guidance, open or sealed .....	978
Cylindrical roller stud type track rollers, with axial guidance ....	982



# Product overview Yoke type track rollers

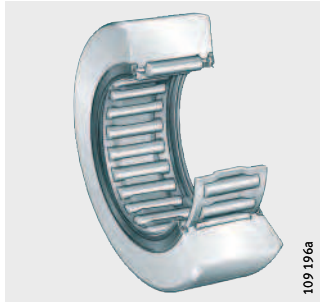
**Without axial guidance**  
Without inner ring

RSTO



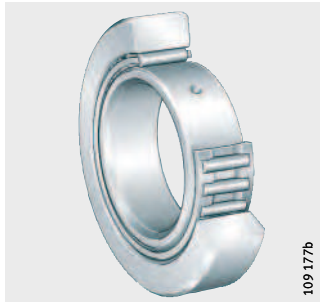
Lip seals

RNA22...-2RSR



**With inner ring**

STO



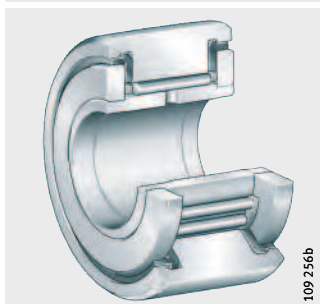
Lip seals

NA22...-2RSR

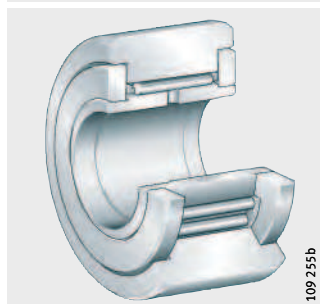


**With axial guidance**  
**With cage**  
 Plastic axial plain washers  
 or gap seals

NATR...-PP

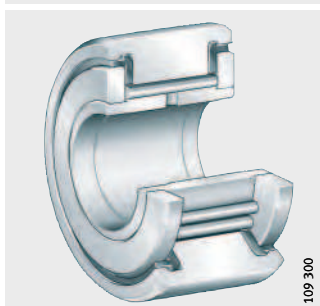


NATR

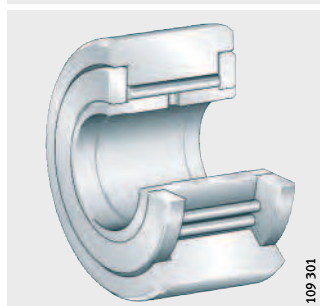


**Full complement**  
**needle roller set**  
 Plastic axial plain washers  
 or gap seals

NATV...-PP

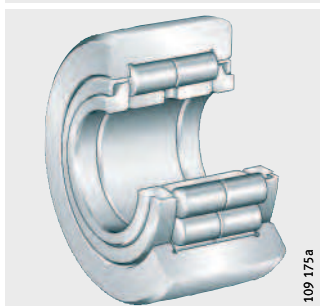


NATV



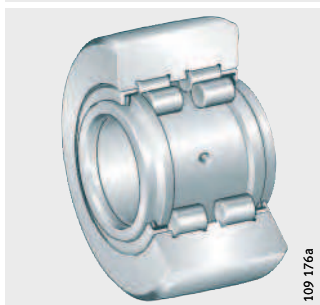
**Full complement**  
**cylindrical roller set**  
 Labyrinth seals

NUTR

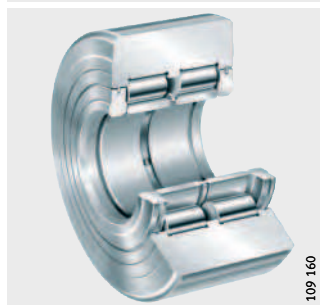


**Full complement**  
**cylindrical roller set,**  
**with central rib**  
 Protected lip seals or  
 sealing shields with lamellar ring

PWTR...-2RS



NNTR...-2ZL



# Yoke type track rollers

## Features

Yoke type track rollers are single or double row units mounted on shafts or studs. They comprise thick-walled outer rings with a profiled outside surface and needle roller and cage assemblies or full complement needle roller or cylindrical roller sets.

Yoke type track rollers can support high radial loads as well as axial loads arising from slight misalignment and skewed running; they are suitable for applications such as cam gears, bed ways and conveying equipment.

The bearings are available with and without an inner ring and in both sealed and open versions.

## X-life

Series PWTR is supplied as an X-life design.

Due to a modified material and the optimised raceway geometry of the outer rings, the basic rating life has been increased by up to 30%.

The static and dynamic load carrying capacity has also been increased. At the same time, the stress placed on the mating track has been reduced as a result of the optimised lateral surface profile and its improved surface quality.

Due to these measures, highly robust bearing arrangements with an extended operating life can be achieved.

## Outside surface profile of the outer ring

Yoke type track rollers with a crowned outside surface are predominantly used in practice since they are often inclined in relation to the mating track and edge stresses must be avoided.

The radius of curvature of the outside surface is  $R = 500 \text{ mm}$ . In the case of NNTR..-2ZL, the radius is indicated in the dimension table.

The series NATR..-PP, NATV..-PP, NUTR and PWTR..-2RS have an outside surface with the optimised INA profile.

In yoke type track rollers with this curvature profile (*Figure 1*, page 942 to *Figure 5*, page 943):

- the Hertzian pressure is lower
- edge loading under tilting is lower
- wear of the mating track is reduced
- the operating life of the mating track is extended.

**Yoke type track rollers without inner ring**

Yoke type track rollers RSTO and RNA22..-2RSR do not have an inner ring. They are particularly compact but require a hardened and ground raceway on the shaft or stud.

Series RSTO is not self-retaining. This means that the outer ring and the needle roller and cage assembly can be fitted independently of each other.

**With cage, axial guidance of outer ring**

In RSTO and RNA22..-2RSR, the rolling elements are guided by a cage. These designs do not have axial guidance of the outer ring. Axial guidance of the outer ring and needle roller and cage assembly must be provided in the adjacent component; see section Adjacent construction for yoke type track rollers, page 955.

**Sealing**

RSTO is not sealed, series RNA22..-2RSR has lip seals on both sides.

**Lubrication**

The bearings are greased with a lithium complex soap grease to GA08.

**Yoke type track rollers with inner ring**

These yoke type track rollers are used if the shaft or stud does not have a hardened and ground raceway.

STO is not self-retaining. This means that the outer ring, needle roller and cage assembly and inner ring can be fitted independently of each other.

**With cage, with full complement needle roller or cylindrical roller set**

The series STO, NA22..-2RSR, NATR and NATR..-PP have a cage. The series NATV and NATV..-PP have a full complement needle roller set, while yoke type track rollers NUTR, PWTR..-2RS and NNTR..-2ZL have a full complement cylindrical roller set.

Bearings without a cage have the largest possible number of rolling elements and therefore have particularly high load carrying capacity. Due to the kinematic conditions, however, the speeds achievable with these bearings are somewhat lower than those achievable with the cage-guided yoke type track rollers.

**Axial guidance of outer ring**

STO and NA22..-2RSR do not have axial guidance of the outer ring. This must be provided in the adjacent construction; see section Adjacent construction for yoke type track rollers, page 955.

In NATR and NATV, axial guidance is provided by contact washers and axial plain washers. In NUTR, the outer ring is guided by the rolling elements, in PWTR..-2RS and NNTR..-2ZL it is guided by the central rib and the rolling elements.



# Yoke type track rollers

**Anti-corrosion protection** Yoke type track rollers PWTR...-2RS-RR are protected against corrosion by the special coating Corrotect®. For a description of the coating, see page 970.

**Sealing** The seals used in yoke type track rollers are shown in the following table Seals.

## Seals

Yoke type track roller	
Series	Seal
STO	Open
NA22...-2RSR	Lip seal
PWTR...-2RS	Protected lip seals on both sides
NATR...-PP NATV...-PP	Three-stage sealing by plastic axial plain washers
NATR NATV	Gap seal
NUTR	Labyrinth seal
NNTR...-2ZL	Sealing shield with lamellar rings

**Three-stage seal** In the three-stage concept, there is a gap seal between the plastic axial plain washer and the outer ring and a labyrinth seal between the formed seal lip and the undercut in the outer ring. The disc spring shape of the axial plain washers gives a preloaded contact seal as the third stage. It also provides axial sliding contact between the outer ring and contact washers, thus reducing wear and grease consumption.

**Lubrication** The bearings are greased using a lithium complex soap grease to GA08 and can be lubricated via the inner ring. Relubrication can be carried out using Arcanol LOAD150.

## Operating temperature

Yoke type track rollers can be used at temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+140\text{ }^{\circ}\text{C}$ . In sealed bearings (suffix 2RS and 2RSR) and bearings with a plastic cage (suffix TV), the temperature range is restricted to between  $-30\text{ }^{\circ}\text{C}$  and  $+120\text{ }^{\circ}\text{C}$ .

Note the information on the operating temperature range in Technical Principles, Lubrication.



Yoke type track rollers NATR..-PP and NATV..-PP are suitable for operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+100\text{ }^{\circ}\text{C}$ , restricted by the grease and the seal material.

## Suffixes

Suffixes for available designs: see table.

## Available designs

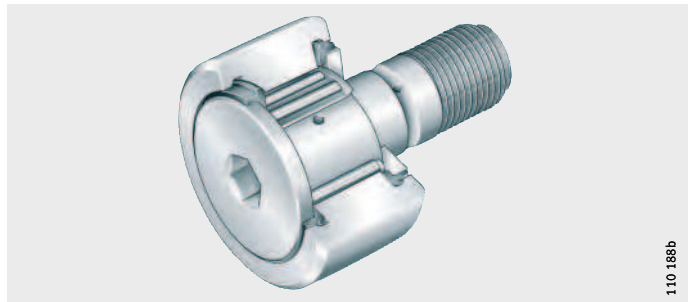
Suffix	Description	Design
PP	Plastic axial plain washer with formed seal lip on both sides of the yoke type track roller, giving a three-stage seal	Standard
RR	Protected against corrosion by Corrotect <sup>®</sup> special coating	
TV	Plastic cage	
2RS	Protected lip seal on both sides of the yoke type track roller	
2RSR	Radial contact lip seal on both sides of the yoke type track roller	
2ZL	Sealing shield with lamellar rings on both sides of the track roller	



# Product overview Stud type track rollers

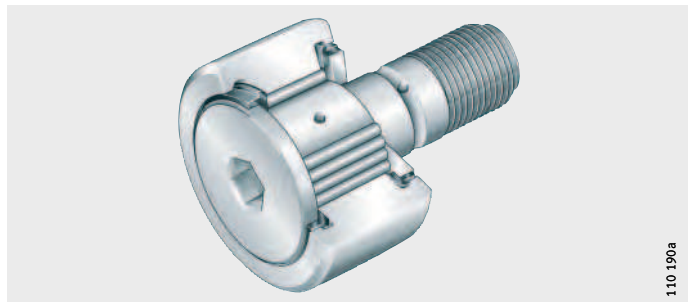
**Without eccentric collar**  
**With cage**  
Plastic axial plain washers  
or gap seals

KR...-PP, KR



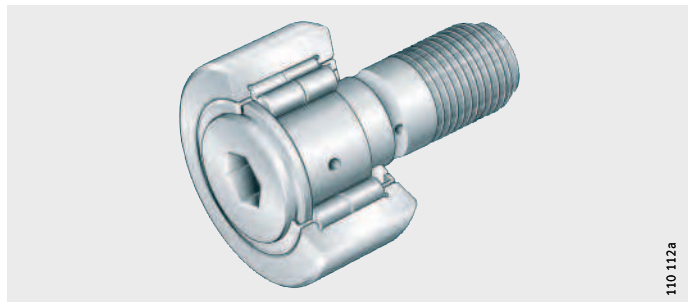
**Full complement**  
**needle roller set**  
Plastic axial plain washers

KRV...-PP



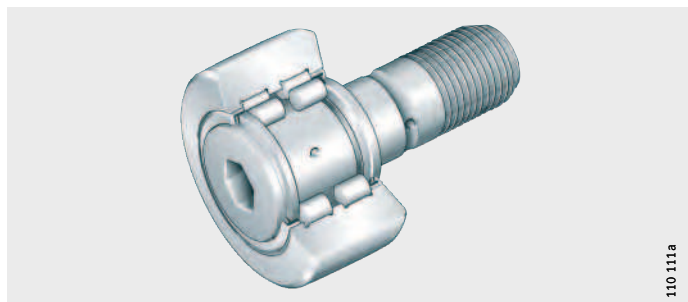
**Full complement**  
**cylindrical roller set**  
Labyrinth seals

NUKR



**Full complement**  
**cylindrical roller set,**  
**with central rib**  
Protected lip seals

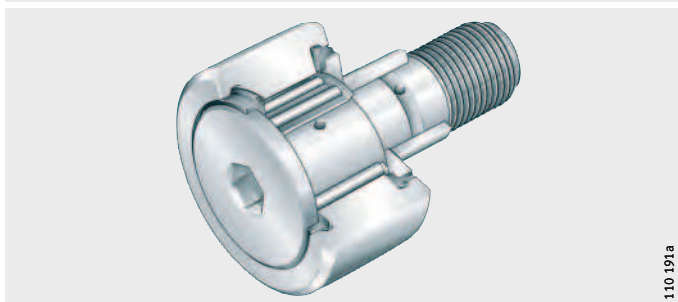
PWKR...-2RS





**With eccentric collar**  
**With cage**  
Plastic axial plain washers

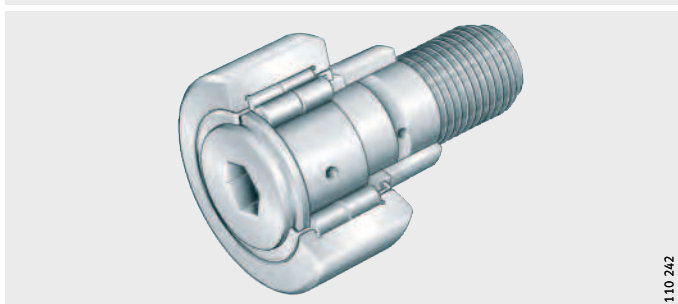
KRE...PP



110 191a

**Full complement cylindrical roller set**  
Labyrinth seals

NUKRE

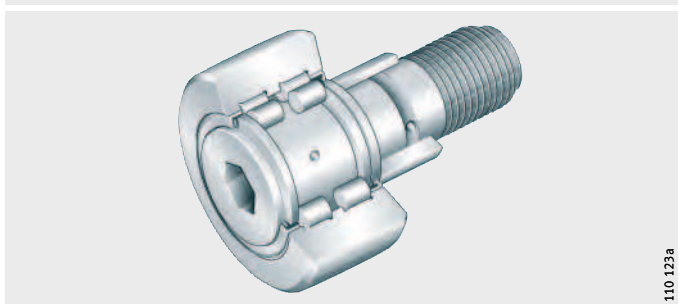


110 242



**Full complement cylindrical roller set, with central rib**  
Protected lip seals

PWKRE...-2RS



110 123a

# Stud type track rollers

## Features

Stud type track rollers are similar in their construction to single and double row yoke type track rollers, except that the raceway is formed by a heavy-section roller stud with a fixing thread and lubrication hole.

Due to the thick-walled outer ring with profiled outside surface and the rolling element set, they can support high radial loads as well as axial loads arising from slight misalignment and skewed running; they are suitable for applications such as cam gears, bed ways and conveying equipment.

## X-life

The series PWKR(E) are supplied in an X-life design.

Due to a modified material and the optimised raceway geometry of the outer rings, the basic rating life has been increased by up to 30%.

The static and dynamic load carrying capacity has also been increased. At the same time, the stress placed on the mating track has been reduced as a result of the optimised lateral surface profile and its improved surface quality.

Due to these measures, highly robust bearing arrangements with an extended operating life can be achieved.

## Outside surface profile of the outer ring

Stud type track rollers with a crowned outside surface are predominantly used since they are often inclined in relation to the mating track and edge stresses must be avoided.

In series KR, the radius of curvature is  $R = 500 \text{ mm}$ .

The series KR..-PP, KRE..-PP, KRV..-PP, NUKR, NUKRE, PWKR..-2RS and PWKRE..-2RS have an outside surface with the optimised INA profile.

In stud type track rollers with this curvature profile (*Figure 1*, page 942 to *Figure 5*, page 943):

- the Hertzian pressure is lower
- edge loading under tilting is lower
- wear of the mating track is reduced
- the operating life of the mating track is extended.

Stud type track rollers are available in several designs as well as with or without an eccentric collar.

**Stud type track rollers without eccentric collar**

Stud type track rollers without an eccentric collar do not have a defined adjustment facility in relation to the mating track on the adjacent construction.

Stud type track rollers with eccentric collar: see page 940.

**With cage, with full complement needle roller or cylindrical roller set**

KR, KR..-PP have a cage, while the design KRV..-PP has a full complement needle roller set.

The series NUKR and PWKR..-2RS have a full complement cylindrical roller set.

Stud type track rollers without a cage have the largest possible number of rolling elements and therefore have particularly high load carrying capacity. Due to the kinematic conditions, however, the speeds achievable with these bearings are somewhat lower than those achievable with the cage-guided stud type track rollers.

**Axial guidance of outer ring**

In KR, KR..-PP and KRV..-PP, axial guidance is provided by the contact flange and contact washers.

The outer rings of series NUKR and PWKR..-2RS are guided by the rolling elements and ribs.

**Anti-corrosion protection**

PWKR..-2RS-RR are protected against corrosion by the special coating Corrotect®. For a description of the coating, see page 970.

**Sealing**

Stud type track rollers are sealed on both sides. Series KR has gap seals, KR..-PP has a three-stage seal comprising plastic axial plain washers with formed seal lips on both sides of the bearing, NUKR has labyrinth seals and PWKR..-2RS has protected lip seals.

The three-stage PP seal is described on page 934.

**Lubrication**

The bearings are greased using a lithium complex soap grease to GA08 and can be lubricated via the roller stud. Relubrication can be carried out using Arcanol LOAD150.



# Stud type track rollers

## Stud type track rollers with eccentric collar

Designs with an eccentric collar can be adjusted by means of a hexagonal socket on the flanged or threaded side of the roller stud. The outer ring outside surface can thus be adjusted against the mating track; as a result, less accurate manufacturing tolerances on the adjacent construction can be tolerated.

Furthermore, this gives improved load distribution when using several stud type track rollers and also allows preloaded linear systems to be easily realised.

The highest point of the eccentric collar is indicated on the roller stud side, the eccentricity  $e$  is stated in the dimension tables.

This is also the location of the radial relubrication holes which should lie in the unloaded zone of the rolling contact.

## With cage or full complement cylindrical roller set

KRE..-PP has a cage, NUKRE and PWKRE..-2RS have a full complement cylindrical roller set.

Bearings without a cage have the largest possible number of rolling elements and therefore have particularly high load carrying capacity. Due to the kinematic conditions, however, the speeds achievable with these bearings are somewhat lower than those achievable with the cage-guided stud type track rollers.

## Axial guidance of outer ring

In the series KRE..-PP, axial guidance is provided by the contact rib and contact washers. The outer rings of series NUKRE and PWKRE..-2RS are axially guided by the rolling elements and ribs.

## Sealing

The stud type track rollers are sealed on both sides. KRE..-PP has a three-stage seal comprising plastic axial plain washers with formed lips on both sides of the bearing, NUKRE has labyrinth seals and PWKRE..-2RS has protected lip seals. For a description of the three-stage PP seal, see page 934.

## Lubrication

The bearings are greased using a lithium complex soap grease to GA08 and can be lubricated via the roller stud. Relubrication can be carried out using Arcanol LOAD150.



The eccentric collar covers the radial lubrication hole in the shank. Relubrication must therefore be carried out via the end faces.

## Operating temperature

Stud type track rollers can be used at temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+140\text{ }^{\circ}\text{C}$ .

In sealed bearings (suffix 2RS), the temperature range is restricted to between  $-30\text{ }^{\circ}\text{C}$  and  $+120\text{ }^{\circ}\text{C}$ .

Note the information on the operating temperature range in Technical Principles, Lubrication.



Stud type track rollers KR..-PP, KRV..-PP and KRE..-PP are suitable for operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+100\text{ }^{\circ}\text{C}$ , restricted by the grease and seal material.

## Suffixes

Suffixes for available designs: see table.

## Available designs

Suffix	Description	Design
PP	Plastic axial plain washer with formed seal lip on both sides of the stud type track roller, giving a three-stage seal	Standard
RR	Protected against corrosion by Corrotect <sup>®</sup> special coating	
SK	Hexagonal socket only on the flange-side end face, no relubrication facility	
2RS	Protected lip seal on both sides of the stud type track roller	



# Yoke type track rollers Stud type track rollers

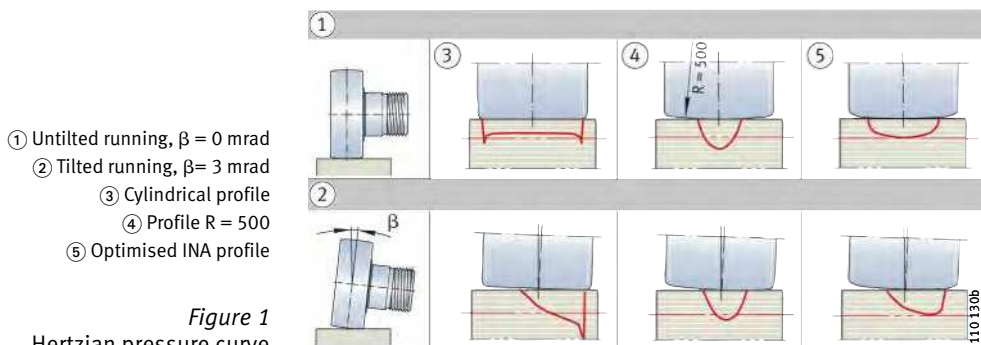
## Design and safety guidelines Optimised INA profile

The advantages of the optimised INA profile are:

- lower Hertzian pressure under tilting, *Figure 1* and *Figure 2*
- higher basic rating life of the outer ring and mating track, *Figure 3*
- reduced wear between the outer ring outside surface and the mating track, *Figure 4* and *Figure 5*, page 943
- increased rigidity at the outer ring contact, *Figure 6*, page 943.

### Hertzian pressure curve

Comparison: Cylindrical profile/profile R = 500 mm with optimised INA profile ( $C_{rw}/P_r = 5$ ), *Figure 1*.

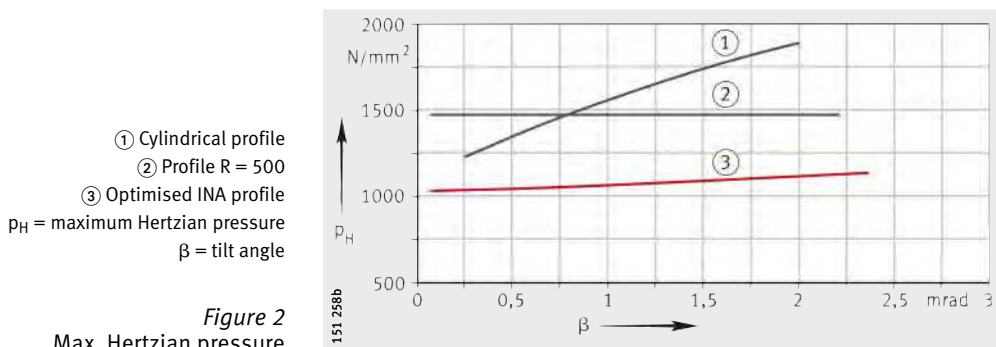


*Figure 1*

Hertzian pressure curve

### Max. Hertzian pressure

Stud type track roller NUKR80,  $F_r = 13\,800\text{ N}$  ( $C_{rw}/P_r = 5$ ), *Figure 2*.

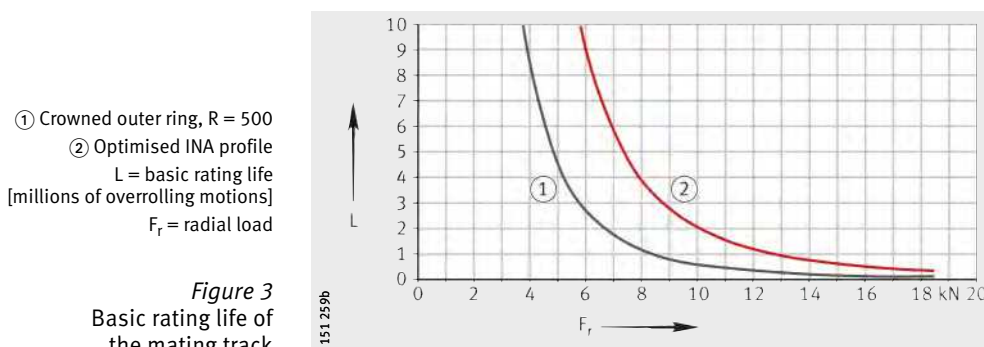


*Figure 2*

Max. Hertzian pressure

### Basic rating life of the mating track

Yoke type track roller NUTR15, mating track made from 42CrMo4V, hardness 350 HV, *Figure 3*.



*Figure 3*

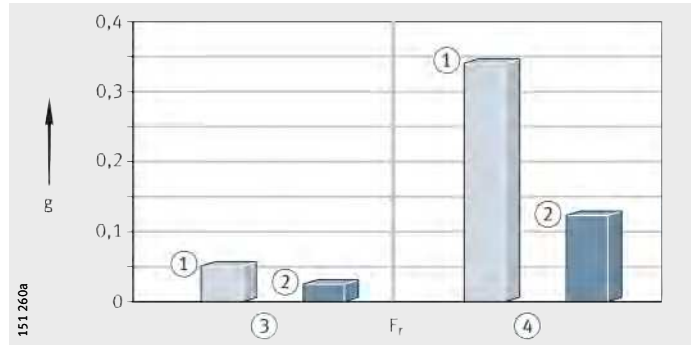
Basic rating life of the mating track

### Wear of mating track

Mating track made from GGG-50.  
Mean value from several test runs after 360 000 overrolling motions, Figure 4.

- ① Outer ring with R = 500
  - ② Optimised INA profile
  - ③ Low load  $F_r$
  - ④ High load  $F_r$
- $g$  = wear  
 $F_r$  = radial load

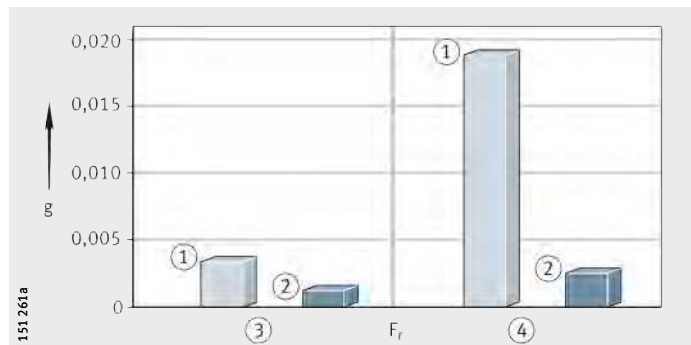
Figure 4  
Wear of mating track



Mating track made from 58CrV4.  
Mean value from several test runs after 8 000 000 overrolling motions, Figure 5.

- ① Outer ring with R = 500
  - ② Optimised INA profile
  - ③ Low load  $F_r$
  - ④ High load  $F_r$
- $g$  = wear  
 $F_r$  = radial load

Figure 5  
Wear of mating track

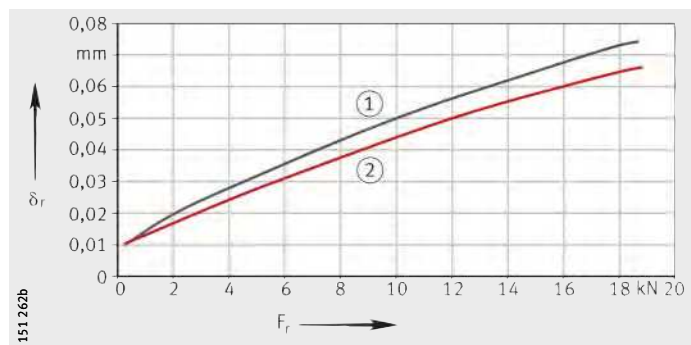


### Rigidity in outer ring contact

Yoke type track roller NUTR15.  
Radial deflection of the outer ring and rolling element set, Figure 6.

- ① Crowned outer ring, R = 500
  - ② Optimised INA profile
- $\delta_r$  = radial deflection  
 $F_r$  = radial load

Figure 6  
Rigidity in outer ring contact



# Yoke type track rollers

## Stud type track rollers

### Installation as yoke or stud type track roller

The thick-walled outer rings can support high radial loads. If these track rollers are used on a flat mating track, the outer rings undergo elastic deformation. Compared to rolling bearings supported in a housing bore, track rollers have the following characteristics:

- modified load distribution in the bearing.  
This is taken into consideration by means of the basic load ratings  $C_{r_w}$  and  $C_{0r_w}$  that are the decisive factors used in life calculation.
- bending stresses in the outer ring.  
These are taken into consideration by the permissible radial loads  $F_{r_{per}}$  and  $F_{0r_{per}}$ . The bending stresses must not exceed the permissible strength values of the material.

### Permissible radial load under dynamic loading



For rotating bearings under dynamic load, the effective dynamic load rating  $C_{r_w}$  is used.  $C_{r_w}$  is used to calculate the basic rating life.

The permissible dynamic radial load  $F_{r_{per}}$  must not be exceeded. If a value for  $F_{r_{per}}$  is not given, the effective dynamic load rating  $C_{r_w}$  is used as a substitute. The radial load acting on the bearing must not exceed this value.

If the basic static load rating  $C_{0r_w}$  is lower than the basic dynamic load rating  $C_{r_w}$ , then  $C_{0r_w}$  applies.

### Permissible radial load under static loading



For bearings under static load, either stationary or with only infrequent rotary motion, the effective static load rating  $C_{0r_w}$  applies.  $C_{0r_w}$  is used to calculate the static load safety factor  $S_0$ .

The permissible static radial load  $F_{0r_{per}}$  must not be exceeded. If a value for  $F_{0r_{per}}$  is not given, the effective static load rating  $C_{0r_w}$  is used as a substitute. The radial load acting on the bearing must not exceed this value.

In addition to the permissible radial load on the bearing, the permissible radial load on the mating track must also be observed, see section Design of mating track, page 958.

### Load carrying capacity and life

The methods for calculating the rating life are:

- the basic rating life to DIN ISO 281
- the adjusted basic rating life to DIN ISO 281
- the expanded calculation of the adjusted reference life to DIN ISO 281-4.

These methods are described in the section Load carrying capacity and life, page 40. For yoke type track rollers, stud type track rollers and ball bearing track rollers, the following values must be substituted:

- $C_r, C_{0r} = C_{r_w}, C_{0r_w}$   
Effective dynamic or static load rating
- $C_{ur} = C_{ur_w}$   
Fatigue limit load as track roller according to the dimension tables.

Other formulae for calculating the rating life, see page 945.



**Other formulae for determining the basic rating life**

$$L_s = 0,0314 \cdot D \cdot \left( \frac{C_{rw}}{P_r} \right)^p$$

or

$$L_h = 26,18 \cdot \frac{D}{H \cdot n_{osc}} \cdot \left( \frac{C_{rw}}{P_r} \right)^p$$

or

$$L_h = 52,36 \cdot \frac{D}{\bar{v}} \cdot \left( \frac{C_{rw}}{P_r} \right)^p$$

$L_s$   $10^5$  m

Basic rating life in  $10^5$  m

$L_h$  h

Basic rating life in operating hours

$C_{rw}$  N

Effective dynamic load rating.

$C_{rw}$  is that load of constant magnitude and direction which a sufficiently large group of apparently identical track rollers can endure for a basic rating life of one million revolutions

$P_r$  N

Equivalent dynamic load (radial load)

$p$  -

Life exponent:

$p = 3$  for yoke and stud type track rollers based on balls

$p = 10/3$  for yoke and stud type track rollers based on needle or cylindrical rollers

$n$   $\text{min}^{-1}$

Operating speed

$D$  mm

Outside diameter of track roller

$H$  m

Single stroke length for reciprocating motion

$n_{osc}$   $\text{min}^{-1}$

Number of return strokes per minute

$\bar{v}$  m/min

Mean travel velocity.



# Yoke type track rollers

## Stud type track rollers

### Operating life

The operating life is the life actually achieved by a rolling bearing. This can deviate significantly from the calculated basic rating life.

This may be due to wear and/or fatigue as a result of:

- deviating operating conditions
- misalignment between the track roller and mating track
- insufficient or excessive operating clearance
- contamination of the track roller
- inadequate lubrication
- excessive operating temperature
- oscillating bearing motion with very small swivel angles, leading to false brinelling
- wear between the outer ring outside surface and the mating track
- high vibration and false brinelling
- very high shock loads, static overloading
- prior damage during installation.

Due to the variety of installation and operating conditions, it is not possible to precisely predetermine the operating life. The most reliable way of arriving at a close estimate is by comparison with similar applications.

### Static load safety factor

The parameter for the static load is the static load safety factor  $S_0$ . It indicates the security against impermissible permanent deformation of the bearing:

$$S_0 = \frac{C_{0r w}}{F_{0r}}$$

$S_0$  –  
Static load safety factor

$C_{0r w}$  N  
Effective radial static load rating, see dimension tables

$F_{0r}$  N  
Maximum static radial load on track roller.

Track rollers are regarded as highly loaded at a static load safety factor  $S_0 < 8$ .



Static load safety factors  $S_0 < 1$  cause plastic deformation of the rolling elements and the raceways, which can impair smooth running. This is only permissible for bearings with small rotary motions or in secondary applications.

For a static load safety factor  $S_0 < 2$ , please contact us.

### Minimum load

In order to ensure that the outer ring is driven and no slippage occurs or the track roller does not lift from the mating track, track rollers must be subjected to a minimum load in dynamic operation. In general, the minimum load is calculated using the ratio  $C_{0r w}/F_r < 60$ .

## Skewed running

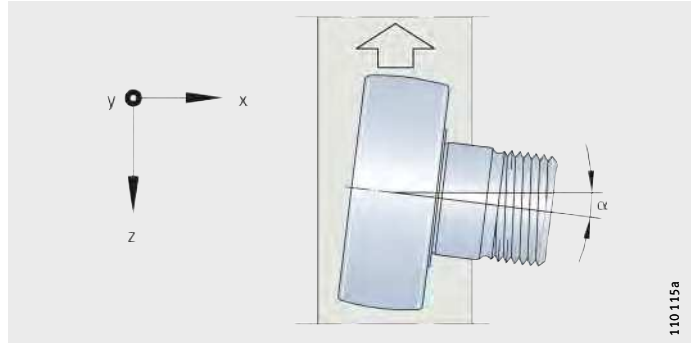
Skewed running leads to additional axial load on the rolling bearing and axial slippage in the rolling contact between the outer ring and mating track, *Figure 7*. Depending on the skewed running angle  $\alpha$  and the lubrication, wear can occur in these cases.



A complete loss of adhesive friction between the outer ring and raceway, with correspondingly severe wear, is to be expected with a skewed running angle  $\alpha \geq 1,4 \cdot 10^{-4} \cdot p_H$  (°) or  $\alpha \geq 2,5 \cdot 10^{-3} \cdot p_H$  (mrad).

$\alpha$  = skewed running angle

*Figure 7*  
Skewed running



## Tilting

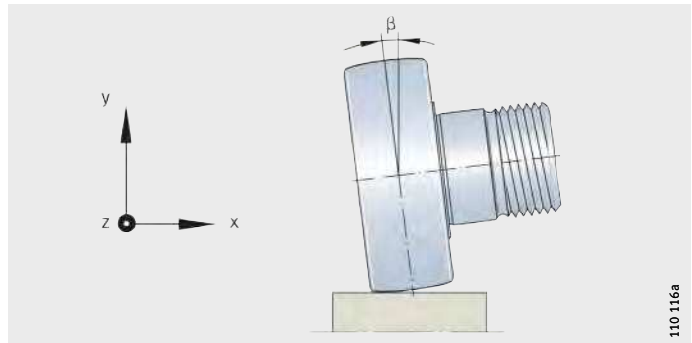
If tilting occurs during running, increased edge stresses occur, especially in track rollers with cylindrical outer rings.

Track rollers with a crowned outer ring are less sensitive to tilting and should therefore be used in preference.

In practice, track rollers with a cylindrical outside surface and a tilting angle of  $\beta > 0,1^\circ$  (1,7 mrad) and track rollers with a crowned outside surface and a tilting angle of  $\beta > 0,25^\circ$  (4,4 mrad) have proved susceptible to damage, *Figure 8*.

$\beta$  = tilting angle

*Figure 8*  
Tilting



# Yoke type track rollers

## Stud type track rollers

**Speeds** The maximum permissible speed for track rollers is essentially determined by the permissible operating temperature of the rolling bearings.

The temperature thus depends on the type of bearing, the load, the lubrication conditions and the cooling conditions.

**Speed during continuous operation** The speeds  $n_{DG}$  in the dimension tables are guide values. They were determined for:

- grease lubrication
- loads during continuous operation of  $< 0,05 \cdot C_{Orw}$
- skewed running angles of  $\alpha < 0,03^\circ$  ( $< 0,5$  mrad)
- an ambient temperature of  $+20$  °C
- outer ring temperatures of  $+70$  °C
- lubricated mating tracks and
- no external axial load.

The speeds must be reduced under the following conditions:

- loads  $> 0,05 \cdot C_{Orw}$
- additional axial forces (skewed running)
- insufficient heat dissipation.

Higher speeds can be achieved with intermittent operation and oil impulse lubrication.

**Speed with lip seals** The speed of track rollers with lip seals is additionally restricted by the permissible sliding speed at the seal lip.

**Frictional torque** The frictional torque  $M_R$  of a track roller is dependent on many influencing factors such as load, speed and track roller type, as well as the lubrication conditions and seal friction. Due to the wide range of these influencing factors, the frictional torque can only be calculated in approximate terms.

For track rollers without contact seals, the frictional torque can be calculated under normal operating conditions and moderate speed range using the following formula:

$$M_R = f \cdot F_r \cdot \frac{d_M}{2}$$

$M_R$	Nmm
Frictional torque of track roller	
$f$	-
Coefficient of friction, see table, page 949	
$F_r$	N
Radial load	
$d_M$	mm
Mean bearing diameter of track roller $(d + D)/2$ .	



The values in the table Coefficient of friction  $f$  are valid for track rollers under radial load and without seals.

If sealed track rollers are used, higher values must be expected.

Additional axial forces, such as those occurring under large skewed running angles, can lead to a substantial increase in the values, especially in the case of track rollers based on needle rollers.

Track rollers based on balls can support axial loads without a significant change in friction.

### Coefficient of friction $f$

Type of track roller	Factor $f$
Ball bearing, single row	0,0015 to 0,002
Ball bearing, double row	0,002 to 0,003
Cylindrical roller bearing, full complement	0,002 to 0,003
Needle roller bearing, with cage	0,003 to 0,004
Needle roller bearing, full complement	0,005 to 0,007

### Displacement resistance

When a track roller rolls on a track, it must overcome not only the friction within the bearing but also the rolling friction between the outer ring and the track.

The displacement resistance  $F_v$  is determined according to the following formula:

$$F_v = \frac{2 \cdot (f_R \cdot F_r + M_R)}{D}$$

$F_v$  Displacement resistance N

$f_R$  Coefficient of rolling friction for tracks made from hardened steel: mm

$f_R = 0,05$  mm

$F_r$  Radial load N

Radial load

$M_R$  Frictional torque of track roller Nmm

$D$  Outside diameter of track roller. mm

Outside diameter of track roller.



# Yoke type track rollers

## Stud type track rollers

### Two contact zones in track rollers

For track rollers, two contact zones must be lubricated and considered separately:

- the rolling elements and the rolling element raceway
- the outside surface of the track roller and the mating track.

The contact zone between the rolling elements and the rolling element raceway is covered in the section Technical Principles, Lubrication.

### Lubrication of the bearing

Yoke and stud type track rollers based on ball bearings are greased using a lithium soap grease with a mineral oil base to GA13.

For yoke and stud type track rollers based on needle and cylindrical rollers, a lithium complex soap grease with a mineral oil base and EP additives to GA08 is used. Greases for initial greasing are listed in the section Lubrication, page 76.

### Arcanol rolling bearing greases for relubrication

Arcanol grease	Designation to DIN 51825	Type of grease	Track roller
LOAD150	KP2N-20	Lithium soap grease with mineral oil base	Yoke and stud type track rollers based on rollers
LOAD220	KP2N-20	Lithium-calcium soap grease with mineral oil base	Yoke and stud type track rollers based on rollers
MULTI3	KP3K-30	Lithium soap grease with mineral oil base	Yoke and stud type track rollers based on balls

### Lubrication of the mating track

For lubrication of the mating track, all lubricants suitable for rolling bearing lubrication may be used.

However, there are applications in which the mating track must not be lubricated.



If the contact point cannot be lubricated, wear must be expected, especially under high loads and at high speeds.

#### Oil lubrication

For oil lubrication, oils of type CLP to DIN 51517 are recommended.

#### Grease lubrication

For grease lubrication, lithium soap greases to DIN 51825 should be used. Relubrication intervals can only be determined under operating conditions.

Relubrication must be carried out at the latest when fretting corrosion first occurs; it can be identified by a reddish discolouration of the mating track or the outer ring.

#### Solid lubricants, anti-friction coatings

These substances are suitable for lubrication. At high traverse or rotational speeds, however, they provide effective lubrication for a significantly shorter period than oil or grease lubrication.

## Central lubrication adapter for stud type track rollers

If a central lubrication system is to be used, a patented central lubrication adapter can be used to connect the standard roller stud of stud type track rollers with hexagonal sockets on both sides, *Figure 9*. This comprises a connection adapter with a hexagonal end and a rapid-fit connection cartridge.

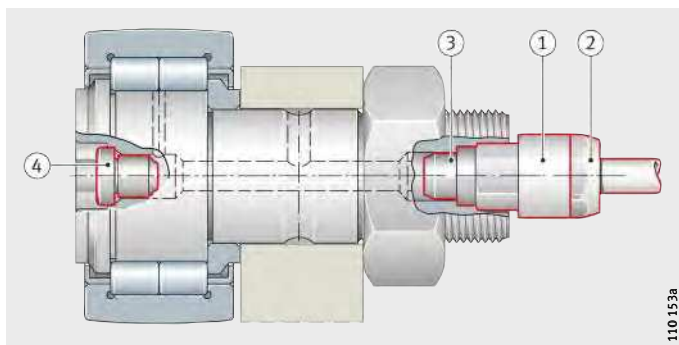
The connection adapter is connected to the roller stud on one end of the stud type track roller by replacing the funnel type lubrication nipple with the fitting cylinder. The hexagonal end prevents rotation of the adapter. The other end of the stud type track roller is closed off by means of the funnel type lubrication nipple, *Figure 9*.

The connection adapter has a M10×1 internal thread. This is used for screw mounting and sealing of the rapid-fit connection cartridge. The cartridge gives firm retention and sealing of the plastic tube. It is therefore no longer necessary to screw the pipe and adapter on to each other.

For dimensions of the adapters, see table and *Figure 10*, page 952.

- ① Connection adapter with M10×1 internal thread
- ② Rapid-fit connection cartridge
- ③ Fitting cylinder
- ④ Funnel type lubrication nipple

*Figure 9*  
Central lubrication adapter and funnel type lubrication nipple



110 153a



# Yoke type track rollers

## Stud type track rollers

### Dimensions of adapter

Central lubrication adapter Designation	W	L	$l_1$ max.	$l_2$	$l_3$ approx.	For polyamide pipe DIN 73 378 $d_1 \times s_{nom}^{1)}$
AP8	8	27	16	22	4	4×0,75
AP10	10	27	15	22	5	4×0,75
AP14	14	25	8	20	6	4×0,75

- 1) Hard PA pipes should preferably be used.  
 Note the operating limits according to DIN 73 378 and manufacturer's guidance.  
 Maximum excess pressure for pipes made from PA 11/12 at +23 °C:  
 31 bar to 62 bar.  
 Maximum excess pressure when using other screw-in connectors: 80 bar.

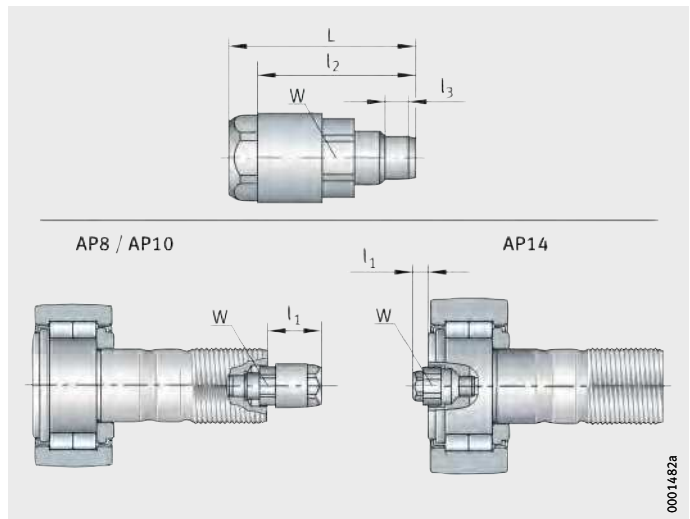


Figure 10  
 Dimensions of  
 central lubrication adapters



### Simplified calculation of relubrication intervals

The table Allocation to stud type track rollers shows the relubrication quantity for central lubrication using flowable grease and its conversion to the number of relubrication impulses for conventional metering nipple sizes.

The data are valid for a lithium soap flowable grease with EP additives and mineral oil base of classes ISO-VG 100 to ISO-VG 220 and NLGI classes 00 or 000.

### Allocation to stud type track rollers

Series <sup>1)</sup>	Outside diameter	Central lubrication adapter	Relubrication quantity g <sup>2)</sup>	Relubrication impulses for metering nipple of size	
	D mm	Designation		30 mm <sup>3</sup>	50 mm <sup>3</sup>
NUKR, NUKRE	35 and 40	AP8	1,1	40	24
	47 and 52	AP10	2,4	89	53
	62 to 90	AP14	7,3	271	163
KR, KRE	35 and 40	AP8	1,2	44	27
	47 and 52	AP10	1,6	60	36
	62 to 90	AP14	6	222	133
KRV, KRVE	35 and 40	AP8	0,7	26	16
	47 and 52	AP10	1	37	22
	62 to 90	AP14	3,2	120	72

<sup>1)</sup> For stud type track rollers with hexagonal socket on both sides.

<sup>2)</sup> Relubrication quantity and relubrication intervals for central lubrication using flowable grease for the majority of applications.  
The quantity required to fill the feed lines must also be taken into consideration.



# Yoke type track rollers

## Stud type track rollers

### Relubrication periods

The approximate relubrication periods for single shift operation and the majority of load cases are shown in the table Relubrication period for calculating the relubrication intervals. The data are valid for single shift operation; the relubrication quantity and relubrication intervals are valid for the majority of applications. They are based on approximate calculation of the relubrication interval  $t_{fR}$ ; relubrication interval: see section Lubrication, page 76. Within these periods, the number of relubrication impulses derived from the table Allocation to stud type track rollers, page 953, should be evenly distributed.

### Relubrication period for calculating the relubrication intervals

Load ratio $C_{0rw}/P_r$	Maximum operating speed $n_{max}$ in % of $n_{DG}$			
	10	25	50	100
$5 > C_{0rw}/P_r \geq 3$	1/2 yearly	–	–	–
$10 > C_{0rw}/P_r \geq 5$	yearly	4 months	monthly	–
$C_{0rw}/P_r \geq 10$	yearly	8 months	2 months	14 days

### Periods in single shift operation

Months	Weeks	Working days	Working hours
1/2	2	10	80
1	4	20	160
2	8	40	320
4	16	80	640
6	24	120	960
8	32	160	1 280
12	48	240	1 920

### Fitting of central lubrication adapter

The stud type track roller must be mounted before fitting the adapter. The unused relubrication hole in the roller stud must be closed off using the funnel type lubrication nipple supplied.



Only the lubrication nipples supplied should be used.

The central lubrication adapter should preferably be pressed in using a manual lever press under low, uniform pressure or carefully driven into the unused hexagonal socket of the roller stud by means of light blows with a plastic hammer; pay attention to the press-in depth  $l_3$  and the position of the hexagon, *Figure 10* and table Dimensions of adapter, page 952.

The plastic pipe must be cut off straight across and inserted into the cartridge until it stops.

Only use polyamide pipe to DIN 73 378. Check the seating of the pipe. Note maximum pressures, maximum temperatures and minimum bending radius. The maximum pipe length up to the distributor is 1 m.

### Adjacent construction for yoke type track rollers

For yoke type track rollers without an inner ring, the rolling element raceway on the shaft or stud must be hardened and ground, see table.

The surface hardness must be 670 HV + 170 HV and the hardening depth CHD or SHD must be sufficiently large.

### Tolerances and surface for the shaft or stud raceway

Diameter tolerance of shafts or studs		Roughness max.	Roundness max.	Parallelism max.
Without inner ring	With inner ring			
k5	g6 (with point load)	R <sub>a</sub> 0,4 (R <sub>z</sub> 2)	25% of diameter tolerance	50% of diameter tolerance

### Location of yoke type track rollers without axial guidance

For yoke type track rollers without axial guidance, the outer ring and needle roller and cage assembly must be laterally guided, *Figure 11*. The axial contact surfaces for the outer rings must be precision machined (R<sub>a</sub>2 recommended), wear-resistant and lubricated.



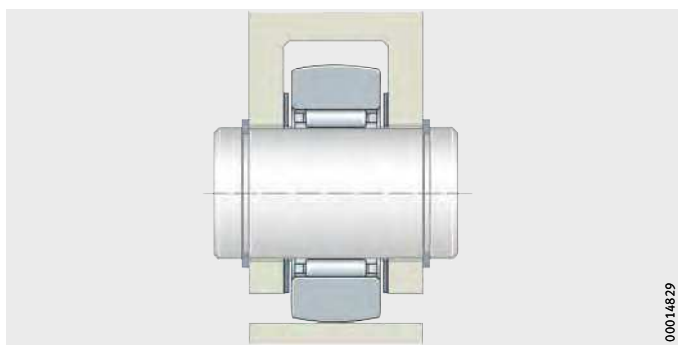
Yoke type track rollers without axial guidance are not self-retaining. The outer ring and the needle roller and cage assembly are matched to each other and must not be interchanged during fitting with components from other bearings of the same size. The inner rings are matched to the enveloping circle tolerance F6 and can be interchanged within their accuracy class (used in different combinations).



RSTO

*Figure 11*

Lateral guidance of outer ring and needle roller and cage assembly



# Yoke type track rollers

## Stud type track rollers

### Location of yoke type track rollers with axial guidance

Yoke type track rollers with axial guidance must be axially clamped in place.

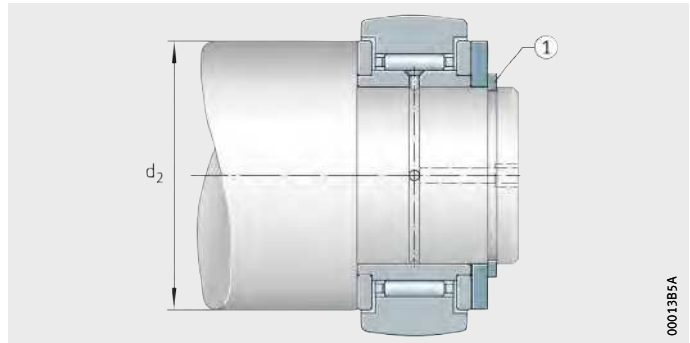
The thrust washers must be axially supported if axial loads occur. The dimension  $d_2$  in the dimension tables must be observed, *Figure 12*.

Yoke type track rollers NATR and NATV can be located using conventional fasteners such as snap rings, *Figure 12*.

**NATR**

① Snap ring  
 $d_2$  = abutment diameter

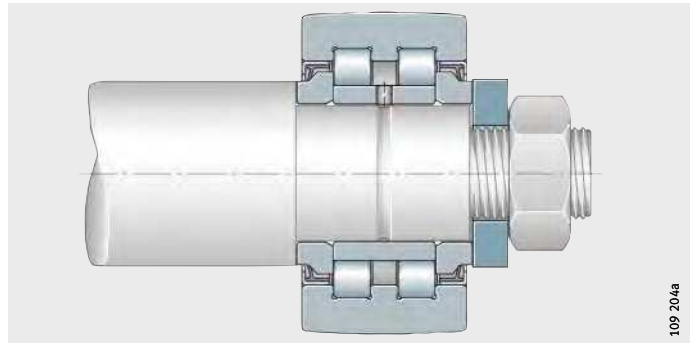
*Figure 12*  
 Location by snap ring



For NNTR..-2ZL, NUTR, PWTR..-2RS, the inner ring and thrust rib must be axially located, *Figure 13*.

**PWTR..-2RS**

*Figure 13*  
 Clamping of inner rings and thrust washers



## Adjacent construction for stud type track rollers

The bore tolerance H7 produces a clearance fit since the stud tolerance is h7 without an eccentric collar and h9 with an eccentric collar.

The locating surfaces for stud type track rollers must be flat, perpendicular and of sufficient height. The strength of the nut locating surface must be sufficiently high. The dimension must not be less than the dimension  $d_2$  in the dimension tables.

The entry chamfer on the locating bore must not be more than  $0,5 \times 45^\circ$ .

### Axial location

Stud type track rollers must be axially secured using a hexagonal nut. The nuts of grade 8 to ISO 4 032 (M6, M8), ISO 8 673, are not included in the delivery and must be ordered separately.

If heavy vibration occurs, the stud type track rollers can be located using self-locking nuts to DIN 985 or special locking washers.



For self-locking nuts, a higher tightening torque must be observed; the advice given by the nut manufacturer must be followed.

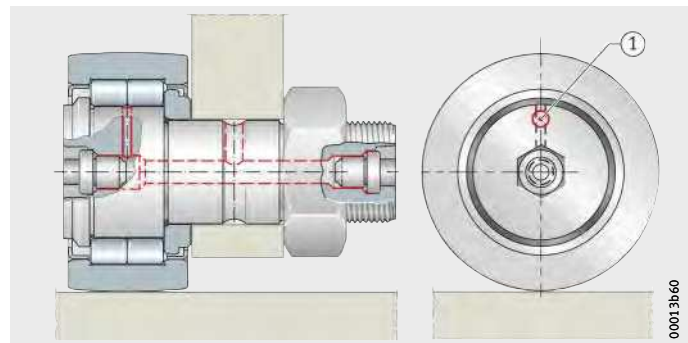
### Position of lubrication hole

The position of the radial lubrication hole is indicated on the flanged side of the roller stud, *Figure 14*. This must not be positioned in the loaded zone.



NUKR

① Marking



*Figure 14*  
Position of lubrication hole

# Yoke type track rollers

## Stud type track rollers

### Design of mating track

In the design of the mating track (material and strength, heat treatment, surface), the Hertzian pressure  $p_H$  must be taken into consideration. This is dependent on the load, the contact geometry (point contact or line contact) and the modulus of elasticity of the materials.

#### Nomogram

The Hertzian pressure can be read from the nomogram, *Figure 16*, page 959, or calculated.

The nomogram is valid for mating tracks made from steel.

For other materials, the correction factor  $k$  must be taken into consideration, see table Correction factor  $k$ , page 960.

Other conditions:

- Point contact
- Radius of curvature  $R = 500$ ; for  $R > 500$ , see page 960
- Mating track flat in the direction of the track roller axis
- Signs according to *Figure 15*.

#### Example

- Stud type track roller NUKR35 with optimised INA profile,  $D = 35$  mm
- Outer ring width  $C = 18$  mm
- Radial load  $F_r = 2\,500$  N
- Cam plate, radius  $r_L = 80$  mm.

#### Curvature sum

$$\frac{1}{r_L} + \frac{2}{D} = \frac{1}{80} + \frac{2}{35} = 0,07 \text{ mm}^{-1}$$

$$p_{H500} = 1\,250 \text{ N/mm}^2$$

$$p_{H \text{ opt. INA profile}} \approx 1\,250 \text{ N/mm}^2 \cdot k_{pH}$$

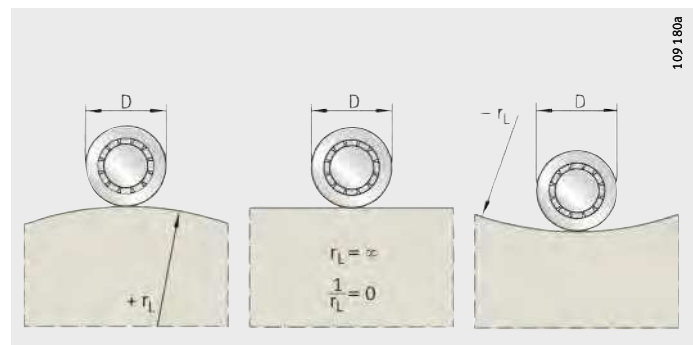
$$= 1\,250 \text{ N/mm}^2 \cdot 0,85$$

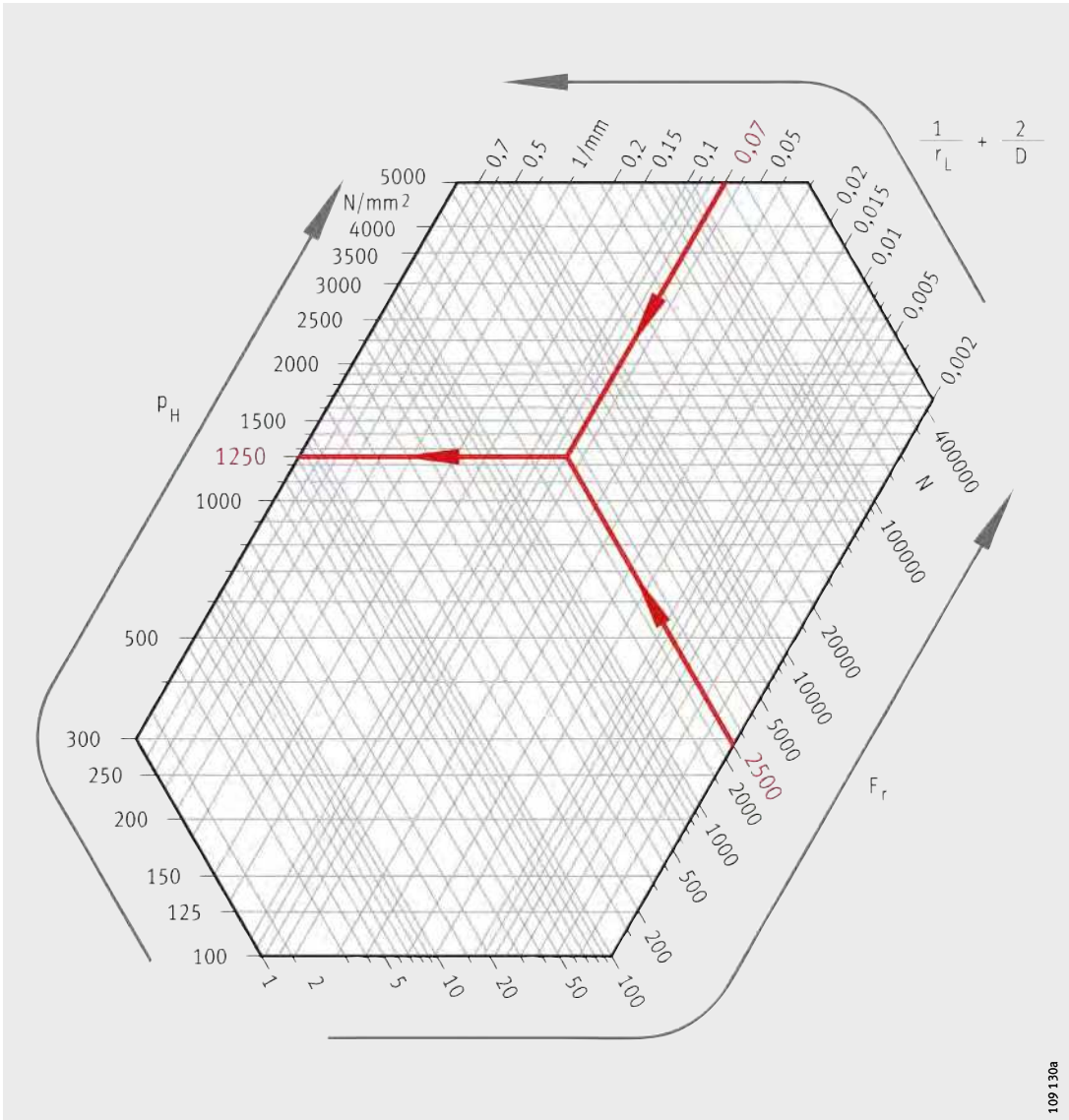
$$= 1\,063 \text{ N/mm}^2$$

( $1\,025 \text{ N/mm}^2$  from calculation program BEARINX<sup>®</sup>),  $k_{pH}$  see page 960.

$D$  = outside diameter of track roller  
 $r_L$  = raceway radius

*Figure 15*  
Raceway radii and signs





109 130a

**Figure 16**  
 Nomogram for  
 determining the Hertzian pressure;  
 calculation example (red)

# Yoke type track rollers

## Stud type track rollers

### Track rollers with optimised INA profile

For the optimised INA profile, the following calculation provides sufficiently precise values,  $k_{pH}$  see table:

$$p_{H \text{ opt. INA profile}} \approx k_{pH} \cdot p_{H500}$$

### Pressure factor $k_{pH}$

Outer ring width C mm	Pressure factor $k_{pH}$
10 incl. 15	1
over 15 incl. 20	0,85
over 20 incl. 30	0,83
over 30 incl. 35	0,8

### Radius of curvature $R > 500$

For  $R > 500$  mm, the following applies:

$$p_{HR} = p_{H500} \cdot \left( \frac{500}{R} \right)^{0,185}$$

### Materials for mating track

The mating track is subjected to high load during overrolling. This produces high Hertzian contact pressures. The strength and surface hardness of the material must be matched to this load. For raceways subjected to high loads, through hardened steels, case hardened steels and steels for flame or induction hardening are recommended. For raceways subjected to low loads, construction steels and cast steel or cast iron materials can be used, see table.

$$p_H = k \cdot p_H (\text{steel/steel})$$

### Correction factor k

Material	Material no.	Correction factor for mating track with	
		Point contact	Line contact
GG-20	0.6020	0,74	0,8
GG-30	0.6030	0,81	0,85
GG-40	–	0,85	0,88
GGG-40	0.7040	0,92	0,94
GGG-60	0.7060	0,94	0,96
GGG-80	0.7080	0,96	0,97



**Guide values for permissible Hertzian pressure**

The table Materials and guide values for permissible Hertzian pressure gives a selection of materials with the associated values. The values were determined on steel test specimens; loadings of  $10^7$  were achieved.

On a similar basis to the calculation of the load carrying capacity of rolling bearings, this gives:

- $p_{H \text{ stat}}$  for predominantly static load
- $p_{H \text{ dyn}}$  for predominantly dynamic load.

**Materials and guide values for permissible Hertzian pressure**

Material		Material no.	Hertzian pressure		Proof stress of material $R_{p0.2}$ N/mm <sup>2</sup>
			$p_{H \text{ stat}}$ N/mm <sup>2</sup>	$p_{H \text{ dyn}}$ N/mm <sup>2</sup>	
Cast iron	GG-15	0.6015	850	340	120
	GG-20	0.6020	1 050	420	150
	GG-25	0.6025	1 200	480	190
	GG-30	0.6030	1 350	540	220
	GG-35	0.6035	1 450	580	250
	GG-40	–	1 500	600	280
Spheroidal graphite cast iron	GGG-40	0.7040	1 000	490	250
	GGG-50	0.7050	1 150	560	320
	GGG-60	0.7060	1 400	680	380
	GGG-70	0.7070	1 550	750	440
	GGG-80	0.7080	1 650	800	500
Cast steel	GS-38	1.0420	780	380	200
	GS-45	1.0446	920	450	230
	GS-52	1.0552	1 050	510	260
	GS-60	1.0558	1 250	600	300
	GS-62	–	1 300	630	350
	GS-70	–	1 450	700	420
Construction steel	St 37-2	1.0037	690	340	235
	St 44-2	1.0044	860	420	275
	St 52-3	1.0570	980	480	355
Quenched and tempered steel	C 45 V	1.0503	1 400	670	500
	Cf 53 V	1.1213	1 450	710	520
	Cf 56 V	–	1 550	760	550
	C 60 V	1.0601	1 600	780	580
	46 Cr 2 V	1.7006	1 750	850	650
	42 CrMo 4 V	1.7225	2 000	980	900
	50 CrV 4 V	1.8159	2 000	980	900
Hardened steel	100 Cr 6 H	1.3505	4 000	1 500	1 900
	16 MnCr 5 E	1.7131	4 000	1 500	770
	Cf 53 Hl	1.1213	4 000	1 500	730
	Cf 56 Hl	–	4 000	1 500	760



# Yoke type track rollers

## Stud type track rollers

### Hardenable materials

The following materials with a purity level corresponding to that of alloyed construction steels may be used:

- through hardening steels to ISO 683-17 such as 100Cr6. In special cases, surface hardening is possible.
- case hardening steels to ISO 683-17 such as 17MnCr5 or EN 10 084 such as 16MnCr5. In addition to the hardenability, the core strength must also be taken into consideration. For case hardening, a fine grained hardening structure and a case hardening depth CHD according to the formula below is necessary.
- steels for flame or induction hardening to ISO 683-17 such as Cf54 or DIN 17 212 such as Cf53. For flame or induction hardening, only the parts of the machine component used as raceways must be hardened. The material should be quenched and tempered before hardening. The surface hardening depth SHD is determined using the formula below.

### Heat treatment of the mating track

The following apply for hardened mating tracks:

- a surface hardness of 670 HV + 170 HV
- CHD, SHD according to the formulae, page 962
  - in accordance with DIN 50 190, the depth of the hardened surface zone at which there is still a hardness of 550 HV
- hardness curves according to *Figure 17* and *Figure 18*, page 963
- a hardening depth of  $\geq 0,3$  mm.

The formulae are based on the hardness curves normally achieved with skilled heat treatment.

Case hardening:

$$CHD \geq 2,73 \cdot 10^{-5} \cdot \frac{p_H}{\left(\frac{1}{r_L} + \frac{2}{D}\right)}$$

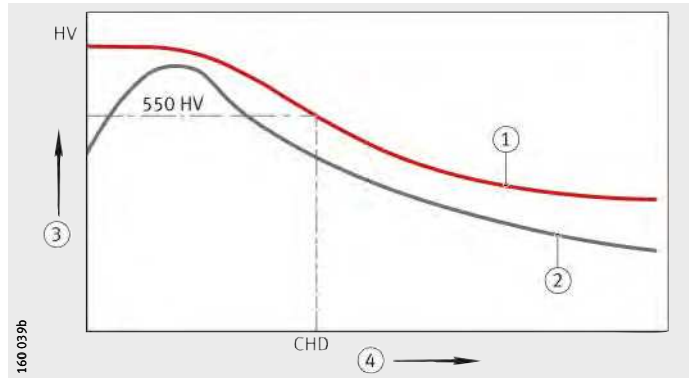
Flame and induction hardening:

$$SHD \geq 10^{-5} \cdot \frac{\left(4,4 \cdot \frac{p_H^2}{R_{p0,2}} - 3,5 \cdot p_H\right)}{\left(\frac{1}{r_L} + \frac{2}{D}\right)}$$

$p_H$	N/mm <sup>2</sup>
Max. Hertzian pressure	
CHD	mm
Case hardening depth	
SHD	mm
Surface hardening depth	
D	mm
Outside diameter of track roller	
$R_{p0,2}$	N/mm <sup>2</sup>
Proof stress of mating track material, see table, page 961	
$r_L$	mm
Radius of mating track –	
the raceway must be flat in the direction of the track roller axis, <i>Figure 15</i> , page 958.	

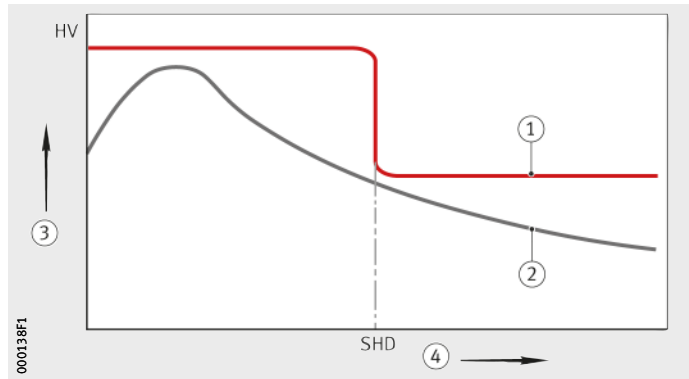
- ① Case hardening
  - ② Required hardness
  - ③ Hardness
  - ④ Distance from surface
- CHD = case hardening depth with hardness 550 HV

*Figure 17*  
Case hardening depth CHD, hardness curve



- ① Flame or induction hardening
  - ② Required hardness
  - ③ Hardness
  - ④ Distance from surface
- SHD = surface hardening depth

*Figure 18*  
Surface hardening depth SHD, hardness curve



**INA guideways as mating tracks**

These guideways are ready-to-fit units from the INA linear range. They are to the appropriate grade Q20 for yoke and stud type track rollers and correspond to the dimensions of standard profiles:

- parallelism 20  $\mu\text{m}/\text{m}$
- surface quality  $R_a 0,8$
- hardness 58 HRC to 62 HRC
- angular misalignment between the raceways max. 1 mrad (1  $\mu\text{m}/\text{mm}$ )
- deviations of the guideway cross-section +0,015/+0,05
- length tolerance of the individual guideway +1 mm/m.

**Enquiries**

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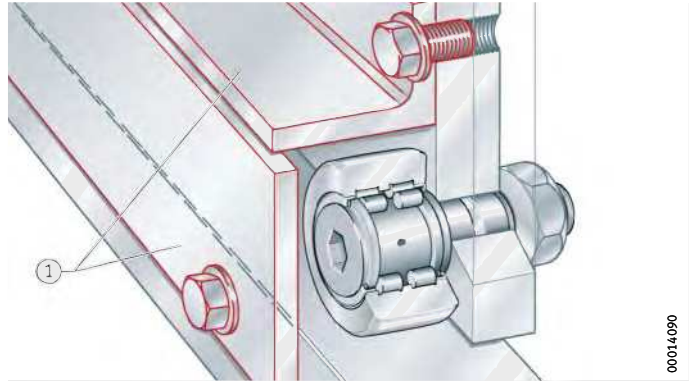
# Yoke type track rollers

## Stud type track rollers

### Protection of mating track



The mating track must be protected against contamination. Where necessary, covers and wipers preferably made from felt should be placed ahead of the track roller, *Figure 19*.



① Covers

*Figure 19*  
Protection of mating track  
against contamination

### Fitting



Track rollers are precision machine elements. These products must be very carefully handled before and during fitting. Their trouble-free operation depends largely on the care taken during fitting.

The products must be protected against dust, contaminants and moisture. Contaminants have a detrimental influence on the running and operating life of rolling bearings.

Do not cool the bearings excessively. Moisture due to condensation can lead to corrosion in the bearings and bearing seats.

Yoke type track rollers RSTO and STO are not self-retaining. The outer ring and the needle roller and cage assembly are matched to each other and must not be interchanged during fitting with components from other bearings of the same size.

The assembly area must be kept clean and free from dust.

Check the seat of the axis for dimensional and geometrical accuracy and cleanliness.

Lightly oil the bearing ring seating surfaces or rub with solid lubricant.

After fitting, the bearings must be supplied with lubricant.

Finally, check the correct functioning of the bearing arrangement.

- Fitting tools** Depending on the application, the following are suitable:
- induction heaters;  
note the manufacturer's guidance on grease and seals
  - heating cupboard; heating up to +80 °C
  - mechanical or hydraulic presses;  
use fitting sleeves that cover the whole circumference of the bearing ring end faces
  - hammer and fitting sleeves;  
blows should only be applied concentrically to the sleeve.



Fitting forces must never be directed through the rolling elements. Direct blows on the bearing rings must be avoided. Ensure that the seals are not damaged during fitting.

**Guidelines for dismantling**

Dismantling should be taken into consideration in the original design of the bearing position.

If the bearing is to be reused:

- do not apply direct blows to the bearing rings
- do not apply dismantling forces through the rolling elements
- carefully clean the bearings after dismantling
- do not use a concentrated or "hard" flame.



# Yoke type track rollers

## Stud type track rollers

### Fitting and dismantling of yoke type track rollers (needle and cylindrical roller types)

If the tolerances are unfavourable, the yoke type track roller should be pressed onto the shaft or stud using a press, *Figure 20*. The inner ring must be fitted such that the pressing-in force is distributed uniformly on the end face of the inner ring.

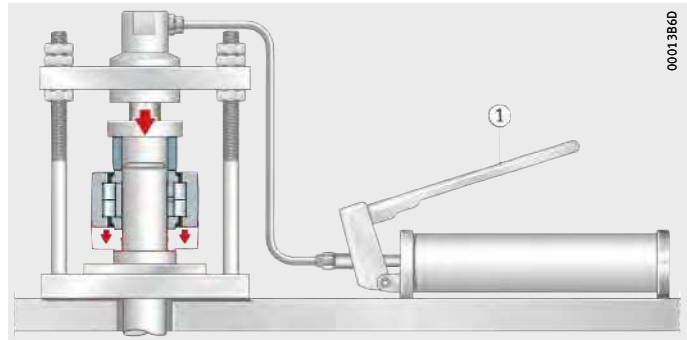
#### Lubrication hole

The bearings should be fitted such that the lubrication holes are positioned in the unloaded zone. For yoke type track rollers PWTR and NNTR, there is no need for defined positioning of the lubrication hole.

#### NUTR

① Fitting press

*Figure 20*  
Fitting of yoke type track roller using a fitting press



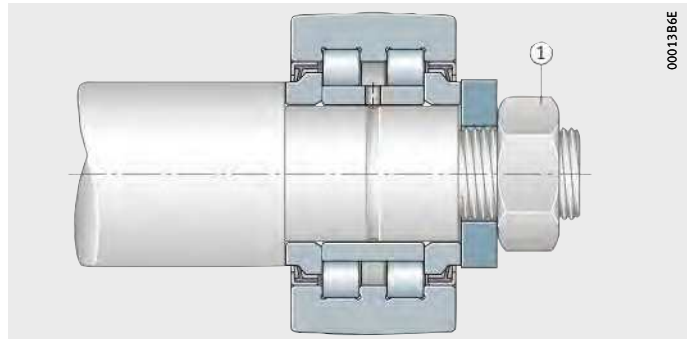
#### Axial location

Yoke type track rollers NUTR, PWTR and NNTR must be axially clamped in place, *Figure 21*.

#### PWTR..-2RS

① Hexagon nut

*Figure 21*  
Axial location



**Fitting and dismantling of stud type track rollers (needle and cylindrical roller types)**



Stud type track rollers should be fitted using a press if possible (similar to *Figure 20*, page 966).

Blows on the flange of the roller stud must be avoided.

The position of the radial lubrication hole is indicated on the flanged side of the roller stud. It must not be positioned in the loaded zone, *Figure 14*, page 957.

**Drive fit lubrication nipples for stud type track rollers**



Stud type track rollers are supplied with loose drive fit lubrication nipples that must be pressed in correctly before fitting the bearings, *Figure 22*.

For lubrication of stud type track rollers using the central lubrication adapter, *Figure 9*, page 951.

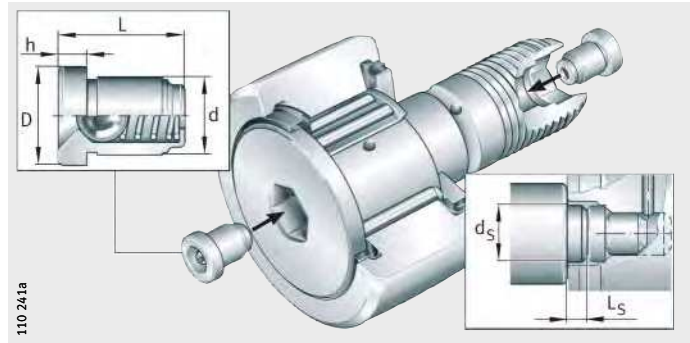
Only the lubrication nipples supplied may be used, see table.

If relubrication is to be carried out via the locating bore, the axial lubrication holes in the stud type track roller must be closed off using the lubrication nipples before fitting, *Figure 22*.

KR..-PP

*Figure 22*

Stud type track roller with drive fit lubrication nipple and dimensions for pressing mandrel



Lubrication nipple	Dimensions in mm						Suitable for outside diameter D
	D	d	L	h	d <sub>s</sub> ±0,1	L <sub>s</sub>	
NIPA1	6	4	6	1,5 <sup>1)</sup>	–	–	16 and 19
NIPA1×4,5	4,7	4	4,5	1	4,5	5	22 to 32
NIPA2×7,5	7,5	6	7,5	2	7,5	6	35 to 52
NIPA3×9,5	10	8	9,5	3	10	9	62 to 90

<sup>1)</sup> Projection of lubrication nipple, see dimension tables.

## Yoke type track rollers

## Stud type track rollers

### Axial location of stud type track rollers

Stud type track rollers must be axially secured using a hexagon nut. The slot or hexagonal socket on the ends of the roller stud can be used to hold the bearing by means of a key while tightening the fixing nut and to adjust the eccentric collar, *Figure 23*.

If heavy vibration occurs, self-locking nuts to DIN 985 or special locking washers can be used.



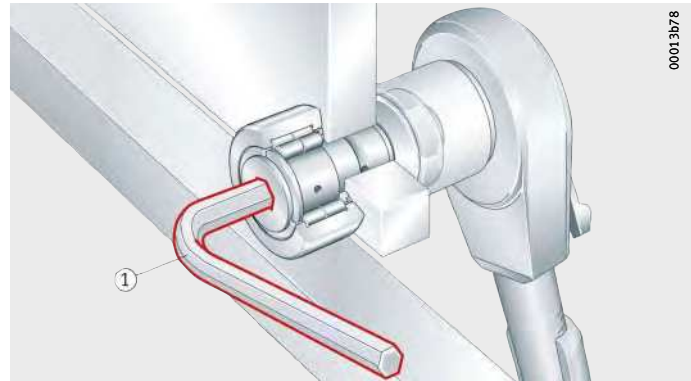
The tightening torque for the fixing nuts stated in the dimension tables must be observed. It is only in this way that the permissible radial load can be ensured.

If this cannot be adhered to, an interference fit is required.

For self-locking nuts, the higher tightening torque must be observed; the advice given by the nut manufacturer must be followed.

① Allen key

*Figure 23*  
Holding the bearing using an Allen key



### Stud type track rollers with eccentric collar

The highest point on the eccentric collar is indicated on the roller stud side, *Figure 14*, page 957.



## Initial operation and relubrication

Stud type track rollers have a lubrication hole for relubrication:

- on the flange side of the roller stud
- on the thread-side end face, from an outside diameter of 22 mm
- on the shank of the roller stud from an outside diameter of 30 mm with an additional lubrication groove.



Stud type track rollers with an eccentric collar cannot be relubricated via the stud. The eccentric collar covers the lubrication hole.

For lubrication, only grease guns with needle point nozzles may be used that have an opening angle  $\leq 60^\circ$ , *Figure 24*.

Before initial operation, the lubrication holes and feed pipes must be filled with grease in order to ensure protection against corrosion; lubrication can be carried out at the same time.

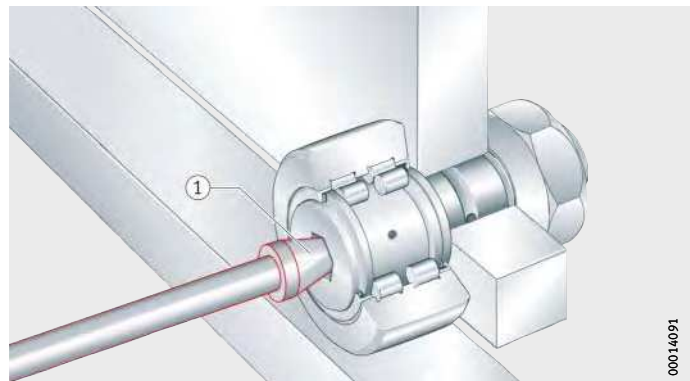
Lubrication will be more difficult if a rolling element is located over the radial lubrication hole. Relubrication should therefore be carried out with the bearing still warm from operation and rotating if safe to do so, before the bearing comes to rest if safe to do so and before extended breaks in operation.

The grease used for relubrication must be the same as that used for initial greasing. If this is not possible, the miscibility and compatibility of the greases should be checked, see page 950.

Relubrication should continue until a fresh collar of grease appears at the seal gaps. The old grease must be able to leave the bearing unhindered.



① Needle point nozzle, opening angle  $\leq 60^\circ$



*Figure 24*  
Relubrication using a grease gun

00014091

## Yoke type track rollers Stud type track rollers

### Anti-corrosion protection by Corrotect® coating

Track rollers are often subjected to aggressive media. In such applications, corrosion protection is therefore a decisive factor in achieving a long operating life of the bearings.

In principle, corrosion-resistant steels may be used for track rollers. In many applications, however, the special coating Corrotect® is more cost-effective. For a comprehensive description of the coating, see section Anti-corrosion protection, page 119.

#### Corrotect®

Corrotect® is an extremely thin, electroplated surface coating with a thickness of 0,5 µm to 3 µm.

The coating is effective against moisture, contaminated water, salt spray and weakly alkaline and weakly acidic cleaning agents.

Yoke type track rollers PWTR and stud type track rollers PWKR with the suffix RR have the CR(VI)-free Corrotect® coating as standard. Other yoke and stud type track rollers with Corrotect® coating are treated as special designs.

Figure 25 shows an uncoated and a coated stud type track roller after the salt spray test.

### Fitting of coated track rollers

In order to reduce the press-in force required, the surface should be lightly greased; the tolerances are increased by the thickness of the coating.



Before track rollers with the Corrotect® coating are fitted, compatibility with the media should always be checked.



Figure 25  
Uncoated and coated  
stud type track roller  
after salt spray test

**Accuracy** The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620, for KR(E) and KRV to ISO 7 063.

The following deviations from DIN 620 apply:

- the diameter tolerance of the profiled outside surface 0/−0,05 mm
- for NNTR, the diameter tolerance to h10
- for NATR, NATV, NUTR, PWTR..-2RS, the tolerance of the width B to h12
- for NATR, NATV, the roundness of the inner ring
- for stud type track rollers, the tolerance of the shank diameter h7 and the eccentric collar diameter h9.

For PWTR..-2RS-RR and PWKR..-2RS-RR, the tolerances are increased by the thickness of the Corrotect® special coating.

**Radial internal clearance** The radial internal bearing clearance corresponds approximately to class C2 and in the case of STO and NA22..-2RSR to class CN in accordance with DIN 620-4.

**Radial internal clearance**

Bore d mm		Radial internal clearance							
		C2 μm		CN μm		C3 μm		C4 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
–	24	0	25	20	45	35	60	50	75
24	30	0	25	20	45	35	60	50	75
30	40	5	30	25	50	45	70	60	85
40	50	5	35	30	60	50	80	70	100
50	65	10	40	40	70	60	90	80	110
65	80	10	45	40	75	65	100	90	125
80	100	15	50	50	85	75	110	105	140
100	120	15	55	50	90	85	125	125	165
120	140	15	60	60	105	100	145	145	190

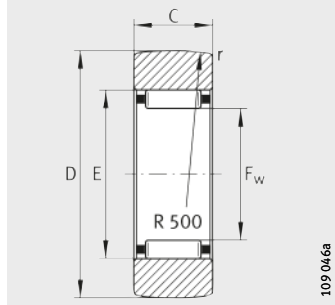


**Enveloping circle** For RSTO and RNA22..-2RSR, the needle roller enveloping circle  $F_w$  is in the tolerance zone F6.

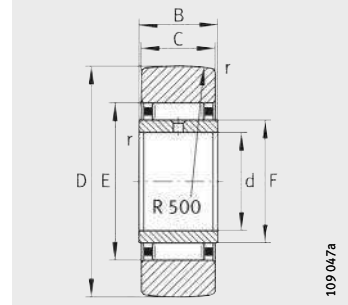
The enveloping circle is the inner inscribed circle of the needle rollers in clearance-free contact with the adjacent construction.

# Yoke type track rollers

Without axial guidance  
Open



RSTO



STO

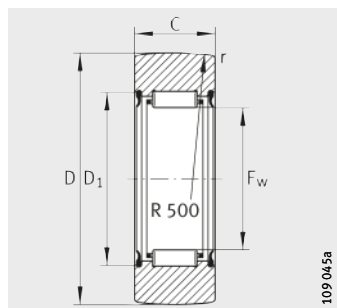
**Dimension table** - Dimensions in mm

Without inner ring Designation	Mass m ≈g	With inner ring Designation	Mass m ≈g	Dimensions							Basic load ratings		Fatigue limit load $C_{urw}$ N	Speed $n_D$ G min <sup>-1</sup>
				D	d	C	B	F <sup>1)</sup> F <sub>w</sub>	E	r min.	dyn. $C_{rw}$ N	stat. $C_{Orw}$ N		
<b>RSTO5-TV</b>	8,5	–	–	<b>16</b>	–	7,8	–	7	10	0,3	2 550	2 600	330	16 000
<b>RSTO6-TV</b>	12,5	<b>STO6-TV</b>	17	<b>19</b>	6	9,8	10	10	13	0,3	3 750	4 550	650	10 000
<b>RSTO8-TV</b>	21	<b>STO8-TV</b>	26	<b>24</b>	8	9,8	10	12	15	0,3	4 200	5 500	780	8 000
<b>RSTO10</b>	42	<b>STO10</b>	49	<b>30</b>	10	11,8	12	14	20	0,3	8 400	9 300	1 370	5 500
<b>RSTO12</b>	49	<b>STO12</b>	57	<b>32</b>	12	11,8	12	16	22	0,3	9 000	10 300	1 530	4 500
<b>RSTO15</b>	50	<b>STO15</b>	63	<b>35</b>	15	11,8	12	20	26	0,3	9 100	10 900	1 640	3 300
<b>RSTO17</b>	88	<b>STO17</b>	107	<b>40</b>	17	15,8	16	22	29	0,3	14 200	17 900	2 550	2 800
<b>RSTO20</b>	130	<b>STO20</b>	152	<b>47</b>	20	15,8	16	25	32	0,3	16 100	21 700	3 050	2 400
<b>RSTO25</b>	150	<b>STO25</b>	177	<b>52</b>	25	15,8	16	30	37	0,3	16 400	23 200	3 300	1 800
<b>RSTO30</b>	255	<b>STO30</b>	308	<b>62</b>	30	19,8	20	38	46	0,6	23 100	35 000	4 700	1 300
<b>RSTO35</b>	375	<b>STO35</b>	441	<b>72</b>	35	19,8	20	42	50	0,6	25 000	40 500	5 400	1 100
<b>RSTO40</b>	420	<b>STO40</b>	530	<b>80</b>	40	19,8	20	50	58	1	23 700	39 500	5 900	850
<b>RSTO45</b>	453	<b>STO45</b>	576	<b>85</b>	45	19,8	20	55	63	1	25 000	43 500	5 900	750
<b>RSTO50</b>	481	<b>STO50</b>	617	<b>90</b>	50	19,8	20	60	68	1	25 500	46 000	6 300	650

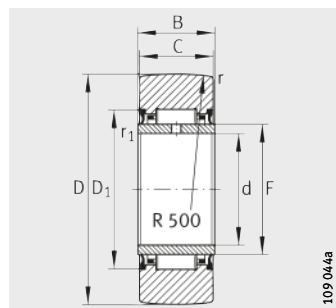
<sup>1)</sup> F = raceway diameter of the inner ring.  
F<sub>w</sub> = needle roller enveloping circle in tolerance zone F6.

# Yoke type track rollers

Without axial guidance



RNA22...-2RSR



NA22...-2RSR

Dimension table · Dimensions in mm

Without inner ring Designation	Mass m ≈g	Dimensions					Basic load ratings		Fatigue limit load C <sub>urw</sub> N	Speed n <sub>DG</sub> min <sup>-1</sup>
		D	C	F <sub>w</sub> <sup>1)</sup>	D <sub>1</sub> min.	r min.	dyn. C <sub>rw</sub> N	stat. C <sub>0rw</sub> N		
RNA22/6-2RSR	18	19	11,8	10	16	0,3	3 900	3 700	485	9 000
RNA22/8-2RSR	29	24	11,8	12	18	0,3	4 800	4 300	630	7 000
RNA2200-2RSR	52	30	13,8	14	20	0,6	7 000	6 900	1 090	5 500
RNA2201-2RSR	57	32	13,8	16	22	0,6	7 500	8 300	1 270	4 700
RNA2202-2RSR	60	35	13,8	20	26	0,6	7 600	9 800	1 370	3 400
RNA2203-2RSR	94	40	15,8	22	28	1	9 900	14 000	1 840	3 000
RNA2204-2RSR	152	47	17,8	25	33	1	14 000	19 100	2 650	2 300
RNA2205-2RSR	179	52	17,8	30	38	1	14 400	20 800	2 900	1 800
RNA2206-2RSR	284	62	19,8	35	43	1	17 100	26 000	3 550	1 400
RNA2207-2RSR	432	72	22,7	42	50	1,1	21 500	36 000	5 200	1 100
RNA2208-2RSR	530	80	22,7	48	57	1,1	26 000	41 000	5 300	850

Dimension table · Dimensions in mm

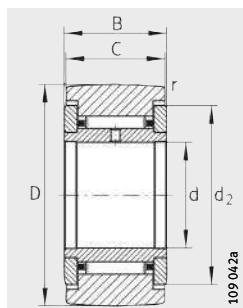
With inner ring Designation	Mass m ≈g	Dimensions							Basic load ratings		Fatigue limit load C <sub>urw</sub> N	Speed n <sub>DG</sub> min <sup>-1</sup>	
		D	d	C	B	F <sup>1)</sup>	D <sub>1</sub> min.	r min.	r <sub>1</sub> min.	dyn. C <sub>rw</sub> N			stat. C <sub>0rw</sub> N
NA22/6-2RSR	22	19	6	11,8	12	10	16	0,3	0,3	3 900	3 700	485	9 000
NA22/8-2RSR	34	24	8	11,8	12	12	18	0,3	0,3	4 800	4 300	630	7 000
NA2200-2RSR	60	30	10	13,8	14	14	20	0,6	0,3	7 000	6 900	1 090	5 500
NA2201-2RSR	67	32	12	13,8	14	16	22	0,6	0,3	7 500	8 300	1 270	4 700
NA2202-2RSR	75	35	15	13,8	14	20	26	0,6	0,3	7 600	9 800	1 370	3 400
NA2203-2RSR	112	40	17	15,8	16	22	28	1	0,3	9 900	14 000	1 840	3 000
NA2204-2RSR	177	47	20	17,8	18	25	33	1	0,3	14 000	19 100	2 650	2 300
NA2205-2RSR	209	52	25	17,8	18	30	38	1	0,3	14 400	20 800	2 900	1 800
NA2206-2RSR	324	62	30	19,8	20	35	43	1	0,3	17 100	26 000	3 550	1 400
NA2207-2RSR	505	72	35	22,7	23	42	50	1,1	0,6	21 500	36 000	5 200	1 100
NA2208-2RSR	628	80	40	22,7	23	48	57	1,1	0,6	26 000	41 000	5 300	850
NA2210-2RSR	690	90	50	22,7	23	58	68	1,1	0,6	26 000	43 000	5 600	650

<sup>1)</sup> F = raceway diameter of the inner ring.  
F<sub>w</sub> = needle roller enveloping circle in tolerance zone F6.

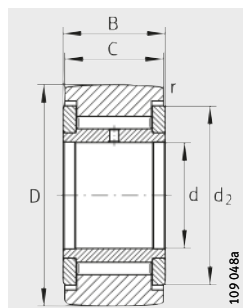


# Yoke type track rollers

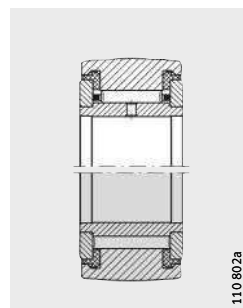
With axial guidance  
Gap seals or axial plain washers



NATR  
(R = 500 mm)



NATV  
(R = 500 mm)



NATR..-PP (optimised)  
NATV..-PP INA profile)

**Dimension table** - Dimensions in mm

Designation <sup>1)</sup>	Mass m ≈g	Designation <sup>2)</sup>	Mass m ≈g	Dimensions						Basic load ratings		Fatigue limit load C <sub>rw</sub> N	Speed n <sub>DG</sub> min <sup>-1</sup>
				D	d	B	C	d <sub>2</sub>	r min.	dyn. C <sub>rw</sub> N	stat. C <sub>0rw</sub> N		
NATR5	14	NATR5-PP	14	16	5	12	11	12,5	0,15	3 150	3 350	450	14 000
NATV5	15	NATV5-PP	15	16	5	12	11	12,5	0,15	4 900	6 600	950	3 800
NATR6	20	NATR6-PP	19	19	6	12	11	15	0,15	3 500	4 000	540	11 000
NATV6	21	NATV6-PP	21	19	6	12	11	15	0,15	5 400	8 000	1 170	3 100
NATR8	41	NATR8-PP	38	24	8	15	14	19	0,3	5 500	6 600	930	7 500
NATV8	42	NATV8-PP	41	24	8	15	14	19	0,3	7 800	11 600	1 590	2 500
NATR10	64	NATR10-PP	61	30	10	15	14	23	0,6	6 800	8 600	1 220	5 500
NATV10	65	NATV10-PP	64	30	10	15	14	23	0,6	9 500	14 900	2 050	2 100
NATR12	71	NATR12-PP	66	32	12	15	14	25	0,6	7 000	9 000	1 290	4 500
NATV12	72	NATV12-PP	69	32	12	15	14	25	0,6	9 700	15 700	2 170	1 800
NATR15	104	NATR15-PP	95	35	15	19	18	27,6	0,6	9 700	14 300	1 830	3 600
NATV15	109	NATV15-PP	101	35	15	19	18	27,6	0,6	12 600	23 100	3 200	1 600
NATR17	144	NATR17-PP	139	40	17	21	20	31,5	1	10 900	15 800	2 090	2 900
NATV17	152	NATV17-PP	147	40	17	21	20	31,5	1	14 700	26 500	3 500	1 400
NATR20	246	NATR20-PP	236	47	20	25	24	36,5	1	15 400	26 000	3 400	2 400
NATV20	254	NATV20-PP	245	47	20	25	24	36,5	1	20 300	42 000	5 900	1 300
NATR25	275	NATR25-PP	271	52	25	25	24	41,5	1	15 300	27 000	3 550	1 800
NATV25	285	NATV25-PP	281	52	25	25	24	41,5	1	20 200	44 000	6 200	1 000
NATR30	470	NATR30-PP	444	62	30	29	28	51	1	23 200	39 000	5 200	1 300
NATV30	481	NATV30-PP	468	62	30	29	28	51	1	30 000	62 000	8 800	850
-	-	NATR35-PP	547	72	35	29	28	58	1,1	24 800	44 500	5 900	1 000
-	-	NATV35-PP	630	72	35	29	28	58	1,1	32 500	71 000	10 100	750
-	-	NATR40-PP	795	80	40	32	30	66	1,1	32 000	58 000	8 300	850
-	-	NATV40-PP	832	80	40	32	30	66	1,1	40 000	88 000	13 000	650
-	-	NATR50-PP	867	90	50	32	30	76	1,1	31 000	59 000	8 400	650
-	-	NATV50-PP	969	90	50	32	30	76	1,1	39 000	92 000	13 600	550

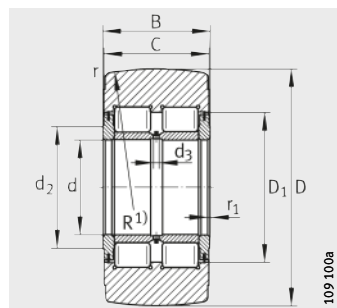
1) Bearings with gap seals and radius of curvature of R = 500 mm.

2) Bearings with plastic axial plain washers and optimised INA profile.  
Permissible operating temperature: -30 °C to +100 °C (continuous operation).

# Yoke type track rollers

With axial guidance

Sealed



NNTR...-2ZL

Dimension table · Dimensions in mm

Designation <sup>1)</sup>	Mass m ≈kg	Dimensions						Mounting dimensions			Number of lubrication holes
		D h10	d	B	C	r min.	r <sub>1</sub> min.	d <sub>2</sub>	D <sub>1</sub>	d <sub>3</sub>	
NNTR50X130X65-2ZL	5,2	<b>130</b>	50	65	63	3	2	63	80	3	3
NNTR55X140X70-2ZL	6,4	<b>140</b>	55	70	68	3	2	73	91	4	3
NNTR60X150X75-2ZL	7,8	<b>150</b>	60	75	73	3	2	78	97	4	3
NNTR65X160X75-2ZL	8,8	<b>160</b>	65	75	73	3	2	82	103	5	3
NNTR70X180X85-2ZL	13	<b>180</b>	70	85	83	3	2	92	115	5	3
NNTR80X200X90-2ZL	16,8	<b>200</b>	80	90	88	4	2	102	127	5	3
NNTR90X220X100-2ZL	22,5	<b>220</b>	90	100	98	4	2,5	119	146	5	3
NNTR100X240X105-2ZL	28	<b>240</b>	100	105	103	4	2,5	132	160	6	6
NNTR110X260X115-2ZL	35,6	<b>260</b>	110	115	113	4	2,5	143	174	6	6
NNTR120X290X135-2ZL	52,8	<b>290</b>	120	135	133	4	3	155	191	8	6
NNTR130X310X146-2ZL	65,2	<b>310</b>	130	146	144	5	3	165	204	8	6

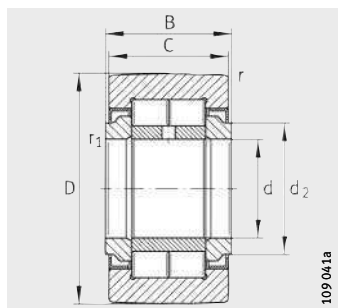
Dimension table (continued)

Designation <sup>1)</sup>	Basic load ratings				Fatigue limit load	Speed
	dyn. C <sub>rw</sub> N	stat. C <sub>orw</sub> N	dyn. F <sub>r per</sub> N	stat. F <sub>or per</sub> N	C <sub>urw</sub> N	n <sub>D G</sub> min <sup>-1</sup>
NNTR50X130X65-2ZL	193 000	265 000	265 000	265 000	37 000	1 100
NNTR55X140X70-2ZL	226 000	315 000	280 000	315 000	44 500	850
NNTR60X150X75-2ZL	255 000	365 000	330 000	365 000	53 000	800
NNTR65X160X75-2ZL	280 000	395 000	350 000	395 000	56 000	700
NNTR70X180X85-2ZL	355 000	510 000	465 000	510 000	75 000	600
NNTR80X200X90-2ZL	415 000	610 000	550 000	610 000	87 000	500
NNTR90X220X100-2ZL	500 000	750 000	600 000	750 000	104 000	400
NNTR100X240X105-2ZL	560 000	870 000	710 000	870 000	118 000	340
NNTR110X260X115-2ZL	670 000	1 050 000	820 000	1 050 000	143 000	300
NNTR120X290X135-2ZL	880 000	1 400 000	1 110 000	1 400 000	187 000	260
NNTR130X310X146-2ZL	1 010 000	1 630 000	1 280 000	1 630 000	216 000	240

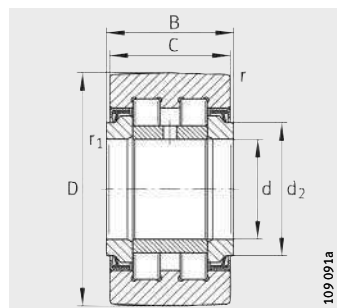
<sup>1)</sup> Radius of curvature R = 10 000 for NNTR50X130X65-2ZL to NNTR110X260X115-2ZL  
R = 15 000 for NNTR120X290X135-2ZL and NNTR130X310X146-2ZL.

# Yoke type track rollers

With axial guidance  
Sealed



NUTR  
(optimised INA profile)



PWTR..-2RS  
(optimised INA profile)

**Dimension table** - Dimensions in mm

Designation	X-life	Mass m ≈ g	Dimensions							Basic load ratings				Fatigue limit load	Speed
			D	d	B	C	d <sub>2</sub>	r min.	r <sub>1</sub> min.	dyn. C <sub>r w</sub> N	stat. C <sub>0 r w</sub> N	dyn. F <sub>r per</sub> N	stat. F <sub>0 r per</sub> N	C <sub>ur w</sub> N	n <sub>D G</sub> min <sup>-1</sup>
NUTR15	–	99	35	15	19	18	20	0,6	0,3	15 300	18 700	8 500	16 800	2 430	6 500
PWTR15-2RS	XL	99	35	15	19	18	20	0,6	0,3	12 600	14 600	10 700	14 600	1 760	6 000
NUTR17	–	147	40	17	21	20	22	1	0,5	18 700	24 900	13 000	24 900	3 150	5 500
PWTR17-2RS	XL	147	40	17	21	20	22	1	0,5	14 300	17 900	16 500	17 900	2 160	5 000
NUTR1542	–	158	42	15	19	18	20	0,6	0,3	18 300	24 300	24 300	24 300	3 100	6 500
PWTR1542-2RS	XL	158	42	15	19	18	20	0,6	0,3	14 700	16 200	16 200	16 200	2 140	6 000
NUTR1747	–	220	47	17	21	20	22	1	0,5	21 600	30 500	30 500	30 500	3 850	5 500
PWTR1747-2RS	XL	220	47	17	21	20	22	1	0,5	15 900	18 400	18 400	18 400	2 440	5 000
NUTR20	–	245	47	20	25	24	27	1	0,5	28 500	37 500	16 200	32 500	4 850	4 200
PWTR20-2RS	XL	245	47	20	25	24	27	1	0,5	24 500	30 500	20 700	30 500	3 750	3 800
NUTR2052	–	321	52	20	25	24	27	1	0,5	32 000	44 000	38 000	44 000	5 700	4 200
PWTR2052-2RS	XL	321	52	20	25	24	27	1	0,5	27 000	35 000	31 000	35 000	4 250	3 800
NUTR25	–	281	52	25	25	24	31	1	0,5	29 000	40 500	17 100	34 000	5 300	4 200
PWTR25-2RS	XL	281	52	25	25	24	31	1	0,5	25 000	33 000	21 800	33 000	4 100	3 800
NUTR2562	–	450	62	25	25	24	31	1	0,5	35 500	54 000	54 000	54 000	6 900	4 200
PWTR2562-2RS	XL	450	62	25	25	24	31	1	0,5	30 000	42 500	42 500	42 500	5 200	3 800
NUTR30	–	465	62	30	29	28	38	1	0,5	40 000	55 000	23 400	46 000	7 300	2 600
PWTR30-2RS	XL	465	62	30	29	28	38	1	0,5	35 000	45 500	29 000	45 500	5 800	2 200



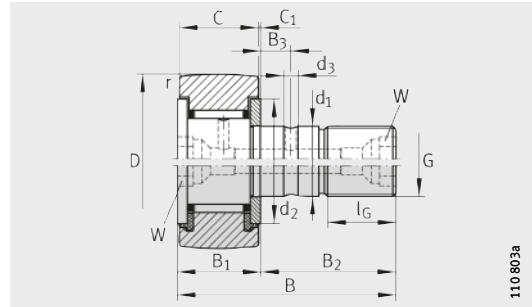
**Dimension table** (continued) - Dimensions in mm

Designation	X-life	Mass m ≈g	Dimensions							Basic load ratings				Fatigue limit load	Speed
			D	d	B	C	d <sub>2</sub>	r min.	r <sub>1</sub> min.	dyn. C <sub>r<sub>w</sub></sub> N	stat. C <sub>0r<sub>w</sub></sub> N	dyn. F <sub>r per</sub> N	stat. F <sub>0r per</sub> N	C <sub>ur<sub>w</sub></sub> N	n <sub>D G</sub> min <sup>-1</sup>
<b>NUTR3072</b>	–	697	<b>72</b>	30	29	28	38	1	0,5	48 000	70 000	68 000	70 000	9 200	2 600
<b>PWTR3072-2RS</b>	<b>XL</b>	697	<b>72</b>	30	29	28	38	1	0,5	41 000	56 000	54 000	56 000	7 200	2 200
<b>NUTR35</b>	–	630	<b>72</b>	35	29	28	44	1,1	0,6	45 000	65 000	31 500	63 000	8 700	2 100
<b>PWTR35-2RS</b>	<b>XL</b>	630	<b>72</b>	35	29	28	44	1,1	0,6	38 500	54 000	39 000	54 000	6 900	1 800
<b>NUTR3580</b>	–	836	<b>80</b>	35	29	28	44	1,1	0,6	51 000	78 000	76 000	78 000	10 300	2 100
<b>PWTR3580-2RS</b>	<b>XL</b>	836	<b>80</b>	35	29	28	44	1,1	0,6	43 500	63 000	59 000	63 000	8 100	1 800
<b>NUTR40</b>	–	816	<b>80</b>	40	32	30	50,5	1,1	0,6	56 000	80 000	31 000	60 000	11 000	1 600
<b>PWTR40-2RS</b>	<b>XL</b>	816	<b>80</b>	40	32	30	50,5	1,1	0,6	45 000	61 000	39 500	61 000	7 900	1 500
<b>NUTR45</b>	–	883	<b>85</b>	45	32	30	55,2	1,1	0,6	56 000	83 000	32 000	62 000	11 500	1 400
<b>PWTR45-2RS</b>	<b>XL</b>	883	<b>85</b>	45	32	30	55,2	1,1	0,6	45 500	63 000	41 000	63 000	8 200	1 300
<b>NUTR4090</b>	–	1 129	<b>90</b>	40	32	30	50,5	1,1	0,6	66 000	101 000	84 000	101 000	13 900	1 600
<b>PWTR4090-2RS</b>	<b>XL</b>	1 129	<b>90</b>	40	32	30	50,5	1,1	0,6	52 000	75 000	67 000	75 000	9 600	1 500
<b>NUTR50</b>	–	950	<b>90</b>	50	32	30	59,8	1,1	0,6	56 000	86 000	32 500	63 000	11 900	1 300
<b>PWTR50-2RS</b>	<b>XL</b>	950	<b>90</b>	50	32	30	59,8	1,1	0,6	46 000	66 000	42 000	66 000	8 500	1 100
<b>NUTR45100</b>	–	1 396	<b>100</b>	45	32	30	55,2	1,1	0,6	72 000	115 000	106 000	115 000	15 800	1 400
<b>PWTR45100-2RS</b>	<b>XL</b>	1 396	<b>100</b>	45	32	30	55,2	1,1	0,6	56 000	85 000	85 000	85 000	10 900	1 300
<b>NUTR50110</b>	–	1 690	<b>110</b>	50	32	30	59,8	1,1	0,6	76 000	128 000	128 000	128 000	17 600	1 300
<b>PWTR50110-2RS</b>	<b>XL</b>	1 690	<b>110</b>	50	32	30	59,8	1,1	0,6	59 000	94 000	94 000	94 000	12 100	1 100



# Needle roller stud type track rollers

With axial guidance  
Open or sealed



from D = 22 mm **KR** (R = 500 mm)  
**KR..-PP** (optimised INA profile)

110 803a

**Dimension table** - Dimensions in mm

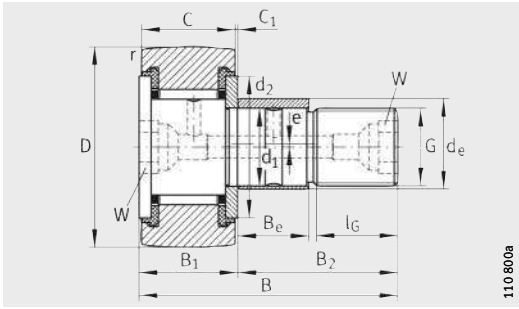
Designation	Mass m ≈g	With eccentric collar Designation	Mass m ≈g	Dimensions										
				D	d <sub>1</sub> h7	B	B <sub>1</sub> max.	B <sub>2</sub>	B <sub>3</sub>	C	C <sub>1</sub>	r min.	d <sub>2</sub>	d <sub>3</sub>
<b>KR16</b> <sup>3)</sup>	19	–	–	<b>16</b>	6	28	12,2	16	–	11	0,6	0,15	12,5	–
<b>KR16-PP</b> <sup>3)</sup>	18	<b>KRE16-PP</b> <sup>3)</sup>	20	<b>16</b>	6	28	12,2	16	–	11	0,6	0,15	12,5	–
<b>KR16-SK-PP</b> <sup>4)</sup>	19	–	–	<b>16</b>	6	28	12,2	16	–	11	0,6	0,15	12,5	–
<b>KRV16-PP</b> <sup>3)</sup>	19	–	–	<b>16</b>	6	28	12,2	16	–	11	0,6	0,15	12,5	–
<b>KR19</b> <sup>3)</sup>	29	–	–	<b>19</b>	8	32	12,2	20	–	11	0,6	0,15	15	–
<b>KR19-PP</b> <sup>3)</sup>	29	<b>KRE19-PP</b> <sup>3)</sup>	32	<b>19</b>	8	32	12,2	20	–	11	0,6	0,15	15	–
<b>KR19-SK-PP</b> <sup>4)</sup>	29	–	–	<b>19</b>	8	32	12,2	20	–	11	0,6	0,15	15	–
<b>KRV19-PP</b> <sup>3)</sup>	31	–	–	<b>19</b>	8	32	12,2	20	–	11	0,6	0,15	15	–
<b>KR22</b>	45	–	–	<b>22</b>	10	36	13,2	23	–	12	0,6	0,3	17,5	–
<b>KR22-PP</b>	43	<b>KRE22-PP</b>	47	<b>22</b>	10	36	13,2	23	–	12	0,6	0,3	17,5	–
<b>KRV22-PP</b>	45	–	–	<b>22</b>	10	36	13,2	23	–	12	0,6	0,3	17,5	–
<b>KR26</b>	59	–	–	<b>26</b>	10	36	13,2	23	–	12	0,6	0,3	17,5	–
<b>KR26-PP</b>	57	<b>KRE26-PP</b>	62	<b>26</b>	10	36	13,2	23	–	12	0,6	0,3	17,5	–
<b>KRV26-PP</b>	59	–	–	<b>26</b>	10	36	13,2	23	–	12	0,6	0,3	17,5	–
<b>KR30</b>	92	–	–	<b>30</b>	12	40	15,2	25	6	14	0,6	0,6	23	3
<b>KR30-PP</b>	88	<b>KRE30-PP</b>	93	<b>30</b>	12	40	15,2	25	6	14	0,6	0,6	23	3
<b>KRV30-PP</b>	91	–	–	<b>30</b>	12	40	15,2	25	6	14	0,6	0,6	23	3
<b>KR32</b>	103	–	–	<b>32</b>	12	40	15,2	25	6	14	0,6	0,6	23	3
<b>KR32-PP</b>	98	<b>KRE32-PP</b>	104	<b>32</b>	12	40	15,2	25	6	14	0,6	0,6	23	3
<b>KRV32-PP</b>	101	–	–	<b>32</b>	12	40	15,2	25	6	14	0,6	0,6	23	3

1) Drive fit lubrication nipples are supplied loose. Only these lubrication nipples should be used.

2) Nominal dimension for hexagonal socket.

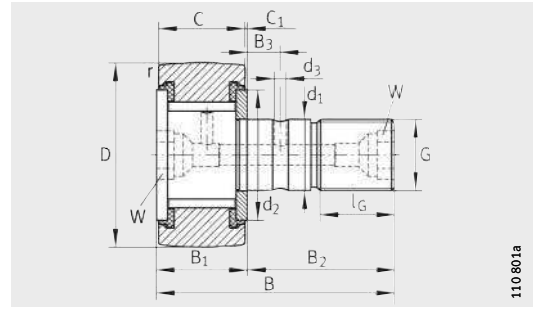
3) Relubrication hole only on the flange-side end face with slot for countertensioning during fitting.

4) Hexagonal socket only on the flange-side end face. No relubrication facility.



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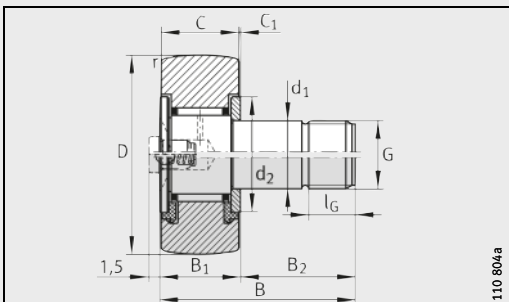
from D = 22 mm KRE..-PP (optimised INA profile)



110 801a

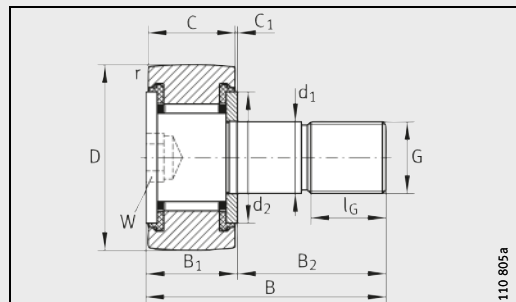
from D = 22 mm KRV..-PP (optimised INA profile)

G	l <sub>G</sub>	W <sup>2)</sup>	Eccentric collar			Drive fit lubrication nipple <sup>1)</sup>	Nut tightening torque M <sub>A</sub> Nm	Basic load ratings		Fatigue limit load C <sub>urw</sub> N	Speed n <sub>DG</sub> min <sup>-1</sup>
			d <sub>e</sub> h9	B <sub>e</sub>	e			dyn. C <sub>r w</sub> N	stat. C <sub>0 r w</sub> N		
M6(X1)	8	-	-	-	-	NIPA1	3	3 150	3 350	450	14 000
M6(X1)	8	-	9	7	0,5	NIPA1	3	3 150	3 350	450	14 000
M6(X1)	8	4	-	-	-	-	3	3 150	3 350	450	14 000
M6(X1)	8	-	-	-	-	NIPA1	3	4 900	6 600	950	3 800
M8(X1,25)	10	-	-	-	-	NIPA1	8	3 500	4 000	540	11 000
M8(X1,25)	10	-	11	9	0,5	NIPA1	8	3 500	4 000	540	11 000
M8(X1,25)	10	4	-	-	-	-	8	3 500	4 000	540	11 000
M8(X1,25)	10	-	-	-	-	NIPA1	8	5 400	8 000	1 170	3 100
M10X1	12	5	-	-	-	NIPA1X4,5	15	4 550	5 300	730	8 000
M10X1	12	5	13	10	0,5	NIPA1X4,5	15	4 550	5 300	730	8 000
M10X1	12	5	-	-	-	NIPA1X4,5	15	6 200	9 200	1 210	2 600
M10X1	12	5	-	-	-	NIPA1X4,5	15	5 100	6 400	840	8 000
M10X1	12	5	13	10	0,5	NIPA1X4,5	15	5 100	6 400	840	8 000
M10X1	12	5	-	-	-	NIPA1X4,5	15	7 300	11 500	1 500	2 600
M12X1,5	13	6	-	-	-	NIPA1X4,5	22	6 800	8 600	1 220	5 500
M12X1,5	13	6	15	11	0,5	NIPA1X4,5	22	6 800	8 600	1 220	5 500
M12X1,5	13	6	-	-	-	NIPA1X4,5	22	9 500	14 900	2 050	2 100
M12X1,5	13	6	-	-	-	NIPA1X4,5	22	7 100	9 200	1 290	5 500
M12X1,5	13	6	15	11	0,5	NIPA1X4,5	22	7 100	9 200	1 290	5 500
M12X1,5	13	6	-	-	-	NIPA1X4,5	22	10 000	16 100	2 200	2 100



110 804a

KR16, KR19  
KR16-PP, KR19-PP (KRV16-PP, KRV19-PP)

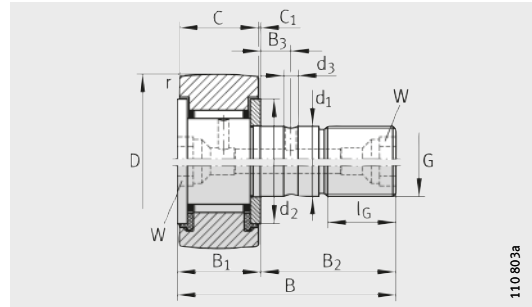


110 805a

KR16-SK-PP, KR19-SK-PP

# Needle roller stud type track rollers

With axial guidance  
Open or sealed



KR \_\_\_\_\_ (R = 500 mm)  
KR...-PP (optimised INA profile)

110 803a

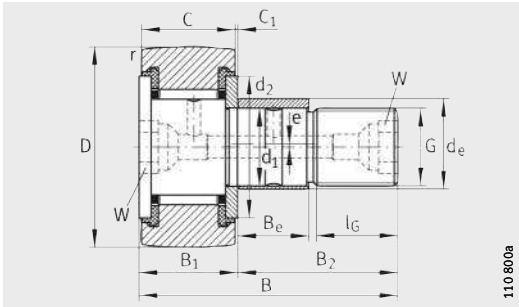
**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈g	With eccentric collar Designation	Mass m ≈g	Dimensions										
				D	d <sub>1</sub> h7	B	B <sub>1</sub> max.	B <sub>2</sub>	B <sub>3</sub>	C	C <sub>1</sub>	r min.	d <sub>2</sub>	d <sub>3</sub>
<b>KR35</b>	173	–	–	<b>35</b>	16	52	19,6	32,5	8	18	0,8	0,6	27,6	3
<b>KR35-PP</b>	164	<b>KRE35-PP</b>	177	<b>35</b>	16	52	19,6	32,5	8	18	0,8	0,6	27,6	3
<b>KRV35-PP</b>	166	–	–	<b>35</b>	16	52	19,6	32,5	8	18	0,8	0,6	27,6	3
<b>KR40</b>	247	–	–	<b>40</b>	18	58	21,6	36,5	8	20	0,8	1	31,5	3
<b>KR40-PP</b>	239	<b>KRE40-PP</b>	255	<b>40</b>	18	58	21,6	36,5	8	20	0,8	1	31,5	3
<b>KRV40-PP</b>	247	–	–	<b>40</b>	18	58	21,6	36,5	8	20	0,8	1	31,5	3
<b>KR47-PP</b>	381	<b>KRE47-PP</b>	400	<b>47</b>	20	66	25,6	40,5	9	24	0,8	1	36,5	4
<b>KRV47-PP</b>	390	–	–	<b>47</b>	20	66	25,6	40,5	9	24	0,8	1	36,5	4
<b>KR52-PP</b>	454	<b>KRE52-PP</b>	473	<b>52</b>	20	66	25,6	40,5	9	24	0,8	1	36,5	4
<b>KRV52-PP</b>	463	–	–	<b>52</b>	20	66	25,6	40,5	9	24	0,8	1	36,5	4
<b>KR62-PP</b>	770	<b>KRE62-PP</b>	798	<b>62</b>	24	80	30,6	49,5	11	29	0,8	1	44	4
<b>KRV62-PP</b>	787	–	–	<b>62</b>	24	80	30,6	49,5	11	29	0,8	1	44	4
<b>KR72-PP</b>	1 010	<b>KRE72-PP</b>	1 038	<b>72</b>	24	80	30,6	49,5	11	29	0,8	1,1	44	4
<b>KRV72-PP</b>	1 027	–	–	<b>72</b>	24	80	30,6	49,5	11	29	0,8	1,1	44	4
<b>KR80-PP</b>	1 608	<b>KRE80-PP</b>	1 665	<b>80</b>	30	100	37	63	15	35	1	1,1	53	4
<b>KRV80-PP</b>	1 636	–	–	<b>80</b>	30	100	37	63	15	35	1	1,1	53	4
<b>KR90-PP</b>	1 975	<b>KRE90-PP</b>	2 032	<b>90</b>	30	100	37	63	15	35	1	1,1	53	4
<b>KRV90-PP</b>	2 003	–	–	<b>90</b>	30	100	37	63	15	35	1	1,1	53	4

1) Drive fit lubrication nipples are supplied loose. Only these lubrication nipples should be used.

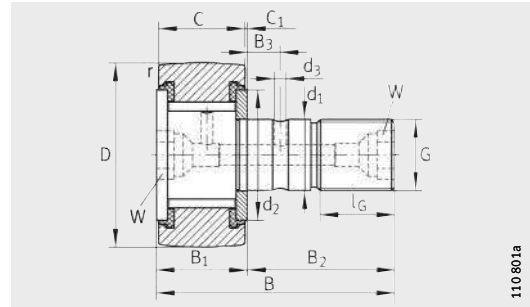
2) Nominal dimension for hexagonal socket.

Suitable central lubrication adapter for connection to a central lubrication system, see page 951.



110 800a

KRE..-PP (optimised INA profile)



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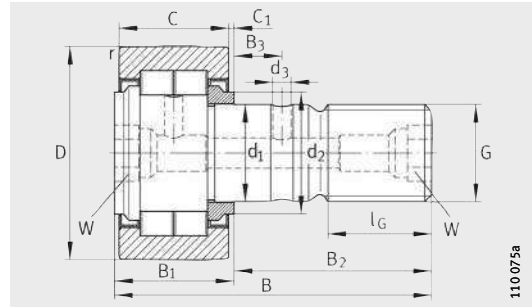
KRv..-PP (optimised INA profile)

				Drive fit lubrication nipple <sup>1)</sup>	Nut tightening torque  $M_A$  Nm	Basic load ratings		Fatigue limit load  $C_{urw}$  N	Speed  $n_D$  $\text{min}^{-1}$		
G	$l_G$	$W^2)$	Eccentric collar			dyn. $C_{rw}$ N	stat. $C_{0rw}$ N				
			$d_e$ h9							$B_e$	e
M16X1,5	17	8	–	–	–	NIPA2X7,5	58	9 700	14 300	1 830	3 600
M16X1,5	17	8	20	14	1	NIPA2X7,5	58	9 700	14 300	1 830	3 600
M16X1,5	17	8	–	–	–	NIPA2X7,5	58	12 600	23 100	3 200	1 600
M18X1,5	19	8	–	–	–	NIPA2X7,5	87	10 900	15 800	2 090	2 900
M18X1,5	19	8	22	16	1	NIPA2X7,5	87	10 900	15 800	2 090	2 900
M18X1,5	19	8	–	–	–	NIPA2X7,5	87	14 700	26 500	3 500	1 400
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	15 400	26 000	3 400	2 400
M20X1,5	21	10	–	–	–	NIPA2X7,5	120	20 300	42 000	5 900	1 300
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	16 600	29 000	3 800	2 400
M20X1,5	21	10	–	–	–	NIPA2X7,5	120	22 300	48 000	6 700	1 300
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	26 000	48 000	6 800	1 900
M24X1,5	25	14	–	–	–	NIPA3X9,5	220	33 500	75 000	11 200	1 100
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	28 000	53 000	7 200	1 900
M24X1,5	25	14	–	–	–	NIPA3X9,5	220	36 500	85 000	12 600	1 100
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	38 500	77 000	11 000	1 300
M30X1,5	32	14	–	–	–	NIPA3X9,5	450	48 500	117 000	17 400	850
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	40 500	83 000	11 700	1 300
M30X1,5	32	14	–	–	–	NIPA3X9,5	450	52 000	129 000	19 000	850



# Cylindrical roller stud type track rollers

With axial guidance



NUKR (optimised INA profile)

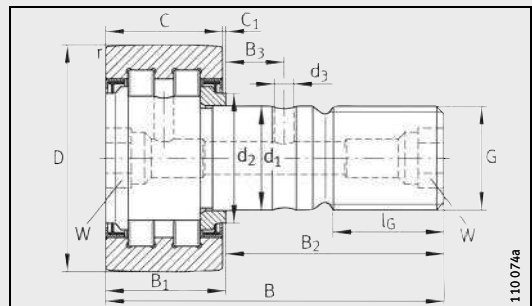
Dimension table - Dimensions in mm

Without eccentric collar Designation	Mass m ≈g	With eccentric collar Designation	Mass m ≈g	X-life	Dimensions										
					D	d <sub>1</sub> h7	B	B <sub>1</sub> max.	B <sub>2</sub>	B <sub>3</sub>	C	C <sub>1</sub>	r min.	d <sub>2</sub>	d <sub>3</sub>
NUKR35	164	–	–	–	35	16	52	19,6	32,5	7,8	18	0,8	0,6	20	3
–	–	NUKRE35	177	–	35	16	52	22,6	29,5	–	18	3,8	0,6	27,6	–
PWKR35-2RS	164	–	–	XL	35	16	52	19,6	32,5	7,8	18	0,8	0,6	20	3
–	–	PWKRE35-2RS	177	XL	35	16	52	22,6	29,5	–	18	3,8	0,6	27,6	–
NUKR40	242	–	–	–	40	18	58	21,6	36,5	8	20	0,8	1	22	3
–	–	NUKRE40	258	–	40	18	58	24,6	33,5	–	20	3,8	1	30	–
PWKR40-2RS	242	–	–	XL	40	18	58	21,6	36,5	8	20	0,8	1	22	3
–	–	PWKRE40-2RS	258	XL	40	18	58	24,6	33,5	–	20	3,8	1	30	–
NUKR47	380	NUKRE47	400	–	47	20	66	25,6	40,5	9	24	0,8	1	27	4
PWKR47-2RS	380	PWKRE47-2RS	400	XL	47	20	66	25,6	40,5	9	24	0,8	1	27	4
NUKR52	450	NUKRE52	470	–	52	20	66	25,6	40,5	9	24	0,8	1	31	4
PWKR52-2RS	450	PWKRE52-2RS	470	XL	52	20	66	25,6	40,5	9	24	0,8	1	31	4
NUKR62	795	NUKRE62	824	–	62	24	80	30,6	49,5	11	28	1,3	1	38	4
PWKR62-2RS	795	PWKRE62-2RS	824	XL	62	24	80	30,6	49,5	11	28	1,3	1	38	4
NUKR72	1020	NUKRE72	1050	–	72	24	80	30,6	49,5	11	28	1,3	1,1	44	4
PWKR72-2RS	1020	PWKRE72-2RS	1050	XL	72	24	80	30,6	49,5	11	28	1,3	1,1	44	4
NUKR80	1600	NUKRE80	1670	–	80	30	100	37	63	15	35	1	1,1	47	4
PWKR80-2RS	1600	PWKRE80-2RS	1670	XL	80	30	100	37	63	15	35	1	1,1	47	4
NUKR90	1960	NUKRE90	2020	–	90	30	100	37	63	15	35	1	1,1	47	4
PWKR90-2RS	1960	PWKRE90-2RS	2020	XL	90	30	100	37	63	15	35	1	1,1	47	4

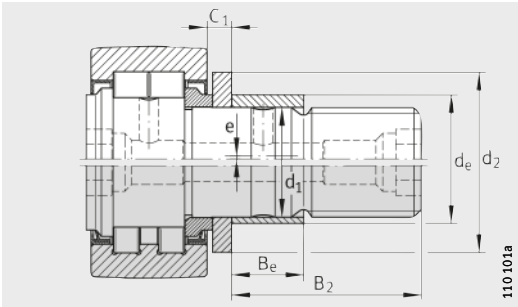
1) Drive fit lubrication nipples are supplied loose. Only these lubrication nipples should be used.

2) Nominal dimension for hexagonal socket.

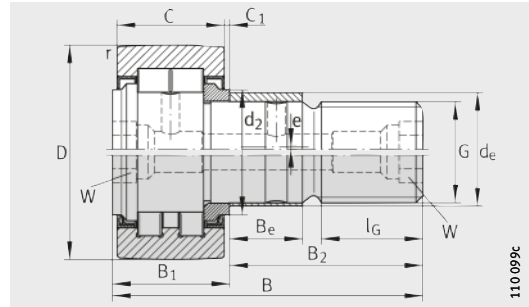
Suitable central lubrication adapter for connection to a central lubrication system, see page 951.



PWKR..-2RS (optimised INA profile)



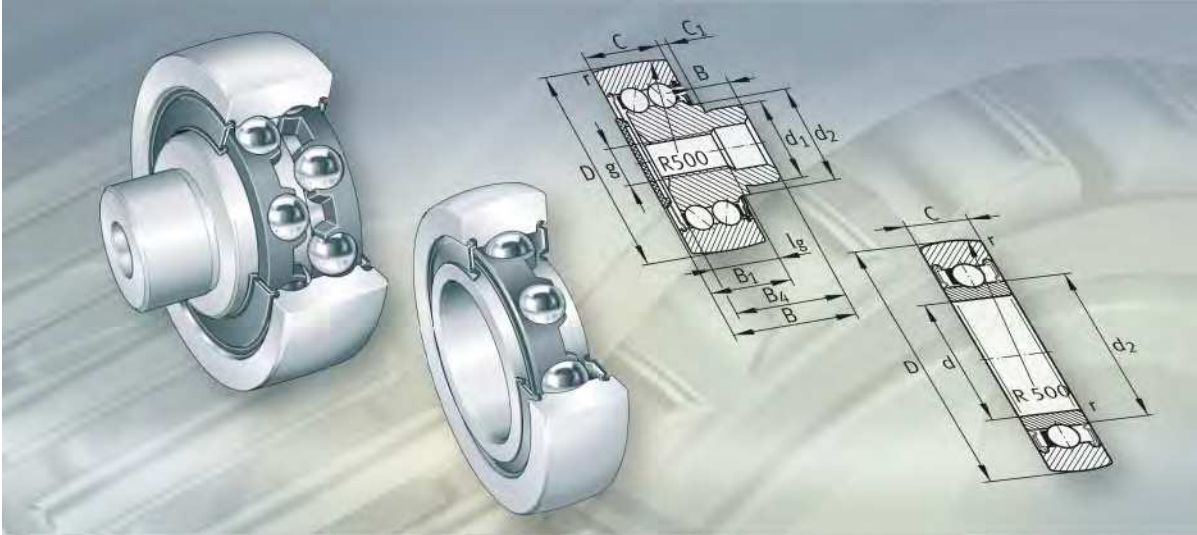
NUKRE35/NUKRE40  
PWKRE35-2RS/PWKRE40-2RS  
(optimised INA profile)



NUKRE  
PWKRE...-2RS  
(optimised INA profile)

G	l <sub>G</sub>	W <sup>2)</sup>	Eccentric collar			Drive fit lubrication nipple <sup>1)</sup>	Nut tightening torque M <sub>A</sub> Nm	Basic load ratings				Fatigue limit load C <sub>urw</sub> N	Speed n <sub>DG</sub> min <sup>-1</sup>
			d <sub>e</sub> h9	B <sub>e</sub>	e			dyn. C <sub>r</sub> <sub>rw</sub> N	stat. C <sub>0r</sub> <sub>w</sub> N	dyn. F <sub>r</sub> <sub>per</sub> N	stat. F <sub>0r</sub> <sub>per</sub> N		
M16X1,5	17	8	—	—	—	NIPA2X7,5	58	15 300	18 700	8 500	16 800	2 430	6 500
M16X1,5	17	8	20	12	1	NIPA2X7,5	58	15 300	18 700	8 500	16 800	2 430	6 500
M16X1,5	17	8	—	—	—	NIPA2X7,5	58	12 600	14 600	10 700	14 600	1 760	6 000
M16X1,5	17	8	20	12	1	NIPA2X7,5	58	12 600	14 600	10 700	14 600	1 760	6 000
M18X1,5	19	8	—	—	—	NIPA2X7,5	87	18 700	24 900	13 000	24 900	3 150	5 500
M18X1,5	19	8	22	14	1	NIPA2X7,5	87	18 700	24 900	13 000	24 900	3 150	5 500
M18X1,5	19	8	—	—	—	NIPA2X7,5	87	14 300	17 900	16 500	17 900	2 160	5 000
M18X1,5	19	8	22	14	1	NIPA2X7,5	87	14 300	17 900	16 500	17 900	2 160	5 000
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	28 500	37 500	16 200	32 500	4 850	4 200
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	24 500	30 500	20 700	30 500	3 750	3 800
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	29 000	40 500	17 100	34 000	5 300	4 200
M20X1,5	21	10	24	18	1	NIPA2X7,5	120	25 000	33 000	21 800	33 000	4 100	3 800
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	40 000	55 000	23 400	46 000	7 300	2 600
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	35 000	45 500	29 000	45 500	5 800	2 200
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	45 000	65 000	31 500	63 000	8 700	2 600
M24X1,5	25	14	28	22	1	NIPA3X9,5	220	38 500	54 000	39 000	54 000	6 900	2 200
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	69 000	104 000	47 500	95 000	14 100	1 800
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	56 000	79 000	60 000	79 000	10 600	1 800
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	78 000	123 000	76 000	123 000	16 700	1 800
M30X1,5	32	14	35	29	1,5	NIPA3X9,5	450	62 000	92 000	92 000	92 000	12 200	1 800





## Ball bearing track rollers



# Ball bearing track rollers

		Page
<b>Product overview</b>	Ball bearing track rollers.....	986
<b>Features</b>	Outside surface profile of the outer ring .....	988
	Yoke type track rollers .....	988
	Stud type track rollers.....	988
	Track rollers with plastic outer tyre.....	989
	Operating temperature .....	990
	Suffixes.....	990
	Other products .....	990
<b>Design and safety guidelines</b>	Adjacent construction for yoke type track rollers .....	991
	Adjacent construction for stud type track rollers.....	991
	Fitting.....	992
<b>Accuracy</b>	Radial internal clearance .....	993
<b>Dimension tables</b>	Yoke type track rollers, single row, sealed .....	994
	Yoke type track rollers, double row, sealed .....	995
	Stud type track rollers, sealed.....	998
	Stud type track rollers, with eccentric collar, sealed .....	1000
	Track rollers with plastic outer tyre, sealed.....	1002

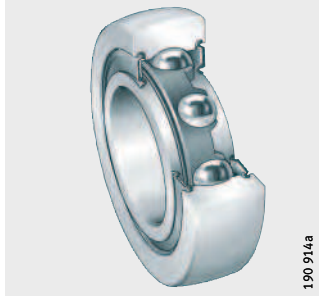


# Product overview **Ball bearing track rollers**

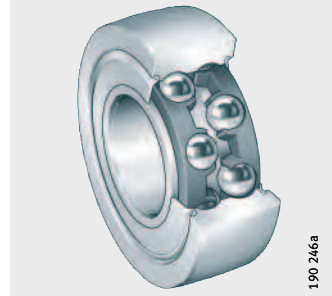
## **Yoke type track rollers**

Single row and double row  
Lip seals or  
sealing shields

LR6, LR60, LR2



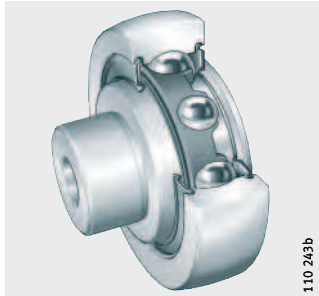
LR50, LR52, LR53



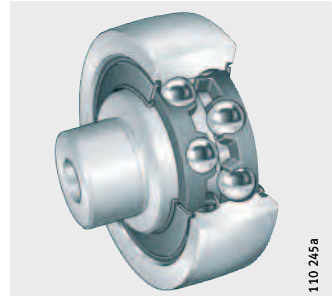
## **Stud type track rollers**

Single row and double row  
Lip seals or  
sealing shield and cover

ZL2..-DRS

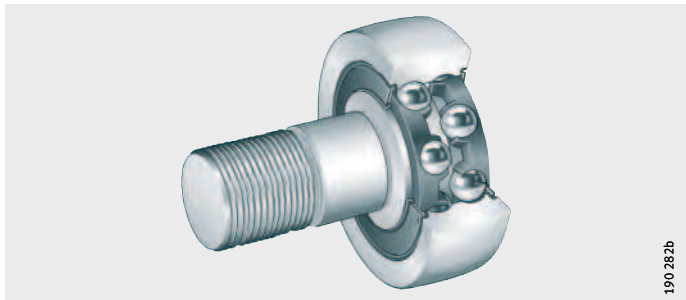


ZL52..-DRS



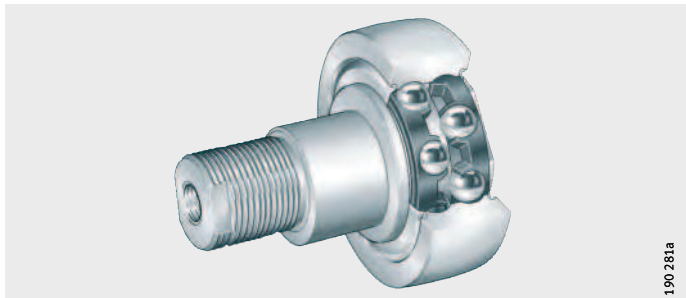
Lip seals

KR52..-2RS



With eccentric collar  
Sealing shields

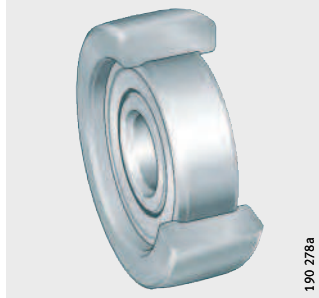
ZLE52..-2Z



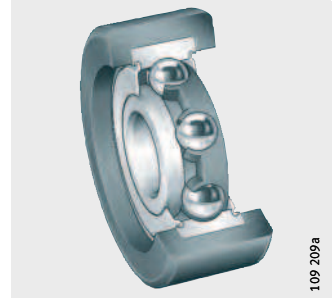
**Track rollers with plastic outer tyre**

Cylindrical or crowned outside surface  
Lip seals or sealing shields

KLRU



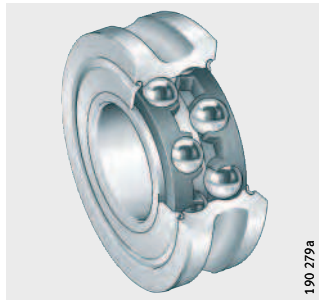
KLRZ



**Other products**


Track rollers with profiled outer ring

LFR5



# Ball bearing track rollers

<b>Features</b>	<p>Ball bearing track rollers are self-retaining, single or double row ball bearings with particularly thick-walled outer rings. In addition to high radial forces, these bearings can also support axial forces in both directions.</p> <p>The outer rings have a crowned or cylindrical outside surface. Designs with a crowned outside surface are used where they are inclined in relation to the mating track and edge stresses must be avoided.</p> <p>Ball bearing track rollers are available with an inner ring, with a stud and with a plastic tyre on the outer ring.</p>
<b>Outside surface profile of the outer ring</b>	<p>Yoke type track rollers with a crowned outside surface and stud type track rollers have a radius of curvature of <math>R = 500</math> mm.</p> <p>Yoke type track rollers with a cylindrical outside surface have the suffix X.</p>
<b>Yoke type track rollers</b>	<p>Yoke type track rollers have outer rings with a crowned or cylindrical outside surface, inner rings and ball and cage assemblies with plastic cages. They are similar in construction to deep groove or angular contact ball bearings and are mounted on shafts or studs.</p> <p>Yoke type track rollers LR6, LR60 and LR2 are single row units, LR50, LR52 and LR53 are double row units.</p>
<b>Anti-corrosion protection</b>	<p>Where an increased level of anti-corrosion protection is required, ball bearing track rollers are available by agreement and as a special design with the special coating Corrotect<sup>®</sup>, see Anti-corrosion protection by Corrotect<sup>®</sup> coating, page 970.</p>
<b>Sealing</b>	<p>Yoke type track rollers with the suffix 2RSR have lip seals on both sides. In some sizes, RS seals are fitted for reasons of space.</p> <p>Double row yoke type track rollers with the suffix 2Z have sealing shields on both sides, bearings with the suffix 2RS have lip seals on both sides.</p>
<b>Lubrication</b>	<p>The yoke type track rollers are greased using a lithium soap grease to GA13. Double row yoke type track rollers can in some cases be relubricated via the inner ring.</p>
<b>Stud type track rollers</b>	<p>Stud type track rollers have outer rings with a crowned outside surface, heavy-section roller studs and ball and cage assemblies with plastic cages. The stud type track rollers are available with and without an eccentric collar.</p> <p>For ease of fitting, the roller stud has a thread or a threaded bore. For countertensioning during fitting, there is a slot, hexagonal socket or a flat area on the external thread.</p> <p>Track rollers ZL2 are single row units, ZL52, ZLE52 and KR52 are double row units.</p>

<b>Without eccentric collar</b>	Stud type track rollers without an eccentric collar are suitable for applications where a defined requirement for adjustment in relation to the mating track on the adjacent construction is not required.
<b>With eccentric collar</b>	Stud type track rollers ZLE52 have an eccentric collar. The eccentric collar can be used to set the outside surface of the outer ring clearance-free against the mating track. This gives optimum geometrical locking between the track roller and mating track. Furthermore, larger manufacturing tolerances can be tolerated in the adjacent construction. In addition, more uniform load distribution is achieved when using more than one stud type track roller.  For countertensioning during fitting, this series has flat areas on both sides of the roller stud.
<b>Sealing</b>	Stud type track rollers ZL2 and ZL52 have lip seals on the stud side and the suffix DRS. The opposite side can be sealed using the plastic cover supplied. Series KR52 is sealed on both sides by lip seals and has the suffix 2RS.  Stud type track rollers ZLE52 have sealing shields on both sides and the suffix 2Z.
<b>Lubrication</b>	The stud type track rollers are greased using a lithium soap grease to GA13; ZLE52 can be lubricated via the roller stud.
<b>Track rollers with plastic outer tyre</b>	Track rollers KLRU and KLRZ comprise single row deep groove ball bearings with a shrink-fitted polyamide outer ring (PA). Polyamide can tolerate higher specific contact pressures than elastomer and is relatively resistant to abrasion.  These track rollers are mounted on shafts or studs and are used where low loads are present and the bearings are required to run particularly quietly.
<b>Outside surface profile of the outer ring</b>	Track rollers KLRU have an outer ring with a crowned outside surface. The radius of curvature is indicated in the dimension table. Series KLRZ has a cylindrical outside surface.
<b>Maximum radial load</b>	 <p>The maximum radial load is determined by the permissible contact pressure; <math>F_{r\ per}</math> must not be exceeded.</p>
<b>Sealing</b>	
<b>Lubrication</b>	They are greased using a lithium soap grease to GA13 and cannot be relubricated.



# Ball bearing track rollers

## Operating temperature

Track rollers are suitable for temperatures from  $-20\text{ }^{\circ}\text{C}$  to  $+120\text{ }^{\circ}\text{C}$ , restricted by the grease, cage material and sealing ring material. The information on the operating temperature range in the section Lubrication, page 76, must be observed.



Track rollers with plastic tyre KLRU and KLRZ are suitable for operating temperatures from  $-20\text{ }^{\circ}\text{C}$  to  $+80\text{ }^{\circ}\text{C}$ , restricted by the grease, cage material, sealing ring material and the plastic tyre.

## Suffixes

Suffixes for available designs: see table.

## Available designs

Suffix	Description	Design
DRS	Lip seal on the stud side	Standard
RR	Protected against corrosion by Corrotect <sup>®</sup> special coating	Special design, available by agreement
X	Cylindrical outside surface	Standard
2RS	Lip seals on both sides, giving axial sealing action	Standard
2RSR	Lip seals on both sides, giving radial sealing action	
2Z	Sealing shields on both sides	

## Other products

Schaeffler also supplies profiled track rollers LFR5 in which the outer ring has a gothic arch profile.

These profiled track rollers are preferably used with a shaft or circular section mating track.

## Enquiries

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## Design and safety guidelines



For reliable and problem-free operation of track rollers, it is essential that attention is paid to the following items:

- Installation as yoke or stud type track roller, see page 944
- Permissible radial load under dynamic or static loading, see page 944
- Load carrying capacity and life, see page 944
- Operating life, see page 946
- Minimum load, see page 946
- Skewed running and tilting, see page 947
- Speeds, see page 948
- Lubrication, see page 950.

### Adjacent construction for yoke type track rollers

The abutment surfaces for the bearings must be flat and perpendicular. Due to the contact pressure occurring, they must not be less than the dimension  $d_2$ , see dimension table.

Yoke type track rollers LR can be axially clamped or located by means of conventional fasteners such as snap rings.



### Shaft tolerances

In general, yoke type track rollers have point load on the inner ring. In order to ensure adequate support and to avoid fretting corrosion as far as possible, the shaft should be in the tolerance zone h6.

### Adjacent construction for stud type track rollers

The abutment surfaces for the track rollers must be flat and perpendicular. Due to the contact pressure occurring, they must not be less than the dimension  $d_2$ , see dimension table.

The lead chamfer on the locating bore must not be more than  $0,5 \times 45^\circ$ .



Stud type track rollers ZL and KR must be axially clamped.

The nut contact surface must have sufficiently high strength and the tightening torque  $M_A$  for the fixing nut must be observed, see dimension table. The roller stud can only transmit the permissible radial load if the correct tightening torque is applied.

If the tightening torque cannot be adhered to, an interference fit is required.

### Bore tolerance

Suitable stud and bore tolerances, see table.

### Stud and bore tolerances

Track roller Series	Tolerance	
	Stud	Bore (recommended)
ZL2	r6	H7
ZL52	r6	
KR52	h7	
ZLE52	h9	

# Ball bearing track rollers

## Fitting

### Yoke type track rollers

If the tolerances are unfavourable, the yoke type track roller should be pressed onto the shaft or stud using a press, *Figure 1*.

The inner ring must be fitted such that the pressing-in force is distributed uniformly on the end face of the inner ring.

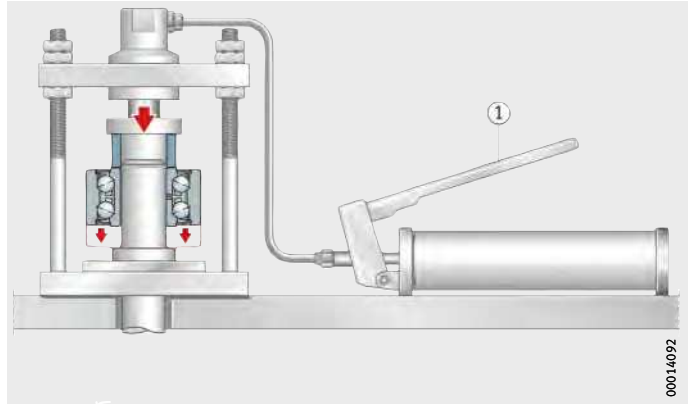


Fitting forces must never be directed through the rolling elements. Ensure that the seals are not damaged.

The yoke type track rollers must be secured axially.

LR50, LR52, LR53

① Fitting press



*Figure 1*  
Fitting of the yoke type track roller using a fitting press

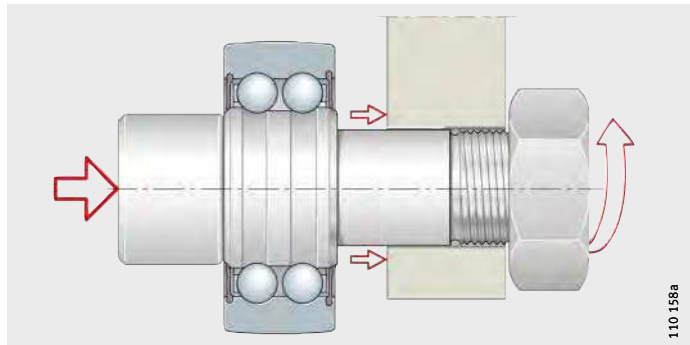
### Stud type track rollers

Stud type track rollers are fitted and dismantled by methods to those used for yoke type track rollers, *Figure 2*.



The tightening torques given in the dimension tables must be observed. It is only in this way that the permissible radial load can be ensured.

Screws and nuts of grade 8.8 or better must be used.



*Figure 2*  
Fitting of stud type track roller



**Accuracy** The dimensional and geometrical tolerances correspond to tolerance class PN to DIN 620.

In a deviation from DIN 620, the diameter tolerance of the profiled outside surface is 0/-0,05 mm.

Stud tolerance for stud type track rollers and bore tolerances, see tables, page 991.

**Radial internal clearance** The radial internal clearance corresponds to class CN in accordance with DIN 620-4.

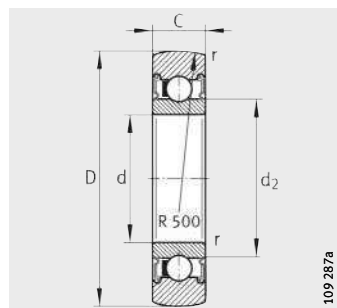
**Radial internal clearance**

Bore		Radial internal clearance									
d mm		C2 μm		CN μm		C3 μm		C4 μm		C5 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2,5	10	0	7	2	13	8	23	14	29	20	37
10	18	0	9	3	18	11	25	18	33	25	45
18	24	0	10	5	20	13	28	20	36	28	48
24	30	1	11	5	20	13	28	23	41	30	53
30	40	1	11	6	20	15	33	28	46	40	64
40	50	1	11	6	23	18	36	30	51	45	73
50	65	1	15	8	28	23	43	38	61	55	90



# Yoke type track rollers

Single row  
Sealed



LR6...-2RSR, LR2...-2RSR,  
LR2...-X-2RSR<sup>1)</sup>

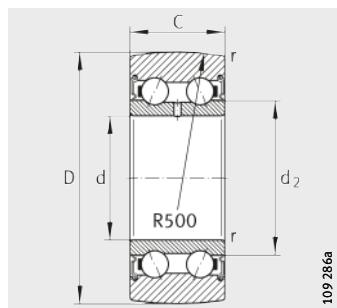
**Dimension table** - Dimensions in mm

Designation	Mass m ≈g	Dimensions					Basic load ratings		Fatigue limit load C <sub>urw</sub> N	Speed n <sub>D</sub> G min <sup>-1</sup>
		D	d	C	d <sub>2</sub>	r min.	dyn. C <sub>r w</sub> N	stat. C <sub>0 r w</sub> N		
LR604-2RSR	10	13	4	4	6,1	0,2	870	350	18,1	24 000
LR605-2RSR	10	16	5	5	7,5	0,2	1 220	510	25,5	23 000
LR606-2RSR	10	19	6	6	8,7	0,3	1 840	790	39,5	22 000
LR607-2RSR	10	22	7	6	9	0,3	2 120	880	42,5	20 000
LR608-2RSR	20	24	8	7	10	0,3	2 750	1 240	63	19 000
LR6000-2RSR	20	28	10	8	14,6	0,3	4 550	2 500	128	16 000
LR6001-2RSR	30	30	12	8	16,6	0,3	4 750	2 800	144	15 000
LR200-2RS	50	32	10	9	16,6	0,6	4 850	2 310	117	13 000
LR200-X-2RS <sup>1)</sup>	50	32	10	9	16,6	0,6	4 850	2 310	117	13 000
LR201-2RSR	50	35	12	10	18,3	0,6	5 600	2 750	137	12 000
LR201-X-2RSR <sup>1)</sup>	50	35	12	10	18,3	0,6	5 600	2 750	137	12 000
LR202-2RSR	70	40	15	11	21	0,6	6 600	3 350	170	11 000
LR202-X-2RSR <sup>1)</sup>	70	40	15	11	21	0,6	6 600	3 350	170	11 000
LR203-2RSR	110	47	17	12	24	0,6	8 500	4 450	223	9 000
LR203-X-2RSR <sup>1)</sup>	110	47	17	12	24	0,6	8 500	4 450	223	9 000
LR204-2RSR	150	52	20	14	29	1	10 600	5 700	295	8 000
LR204-X-2RSR <sup>1)</sup>	150	52	20	14	29	1	10 600	5 700	295	8 000
LR205-2RSR	230	62	25	15	33,5	1	12 500	7 100	360	7 000
LR205-X-2RSR <sup>1)</sup>	230	62	25	15	33,5	1	12 500	7 100	360	7 000
LR206-2RS	330	72	30	16	37,4	1	16 600	9 700	500	5 500
LR206-X-2RS <sup>1)</sup>	330	72	30	16	37,4	1	16 600	9 700	500	5 500
LR207-2RS	400	80	35	17	42,4	1,1	20 400	12 100	640	4 500
LR207-X-2RS <sup>1)</sup>	400	80	35	17	42,4	1,1	20 400	12 100	640	4 500
LR209-2RS	500	90	45	19	53,2	1,1	22 400	13 700	730	3 600
LR209-X-2RS <sup>1)</sup>	500	90	45	19	53,2	1,1	22 400	13 700	730	3 600

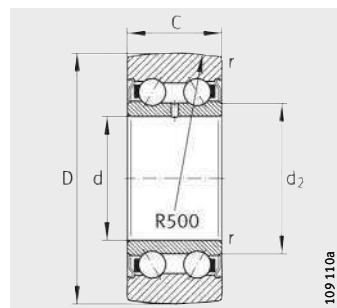
<sup>1)</sup> Track roller with cylindrical outside surface.

# Yoke type track rollers

Double row  
Sealed



LR50..-2RSR



LR52..-2Z,  
LR52..-X-2Z<sup>1)</sup>

**Dimension table** · Dimensions in mm

Designation	Mass m ≈g	Dimensions					Basic load ratings		Fatigue limit load C <sub>urw</sub> N	Speed n <sub>DG</sub> min <sup>-1</sup>
		D	d	C	d <sub>2</sub>	r min.	dyn. C <sub>rw</sub> N	stat. C <sub>0rw</sub> N		
LR50/5-2RSR	10	17	5	7	8,2	0,2	1 690	940	48,5	12 000
LR50/6-2RSR	20	19	6	9	9,3	0,3	2 700	1 370	66	11 000
LR50/7-2RSR	20	22	7	10	10,5	0,3	3 300	1 700	81	10 000
LR50/8-2RSR <sup>2)</sup>	30	24	8	11	10,5	0,3	4 300	2 390	119	10 000
LR5000-2RS	30	28	10	12	13,5	0,3	4 750	2 850	145	9 000
LR5001-2RS	30	30	12	12	15,5	0,3	5 100	3 100	161	8 500
LR5200-2Z	70	32	10	14	15,4	0,6	6 800	4 100	208	11 000
LR5200-X-2Z <sup>1)</sup>	70	32	10	14	15,4	0,6	6 800	4 100	208	11 000
LR5200-2RS	70	32	10	14	15,4	0,6	6 800	4 100	208	8 000
LR5002-2RS	50	35	15	13	20,4	0,3	6 500	4 150	217	7 000
LR5201-2Z	80	35	12	15,9	17,1	0,6	8 700	5 200	260	10 000
LR5201-X-2Z <sup>1)</sup>	80	35	12	15,9	17,1	0,6	8 700	5 200	260	10 000
LR5201-2RS	80	35	12	15,9	17,1	0,6	8 700	5 200	260	7 500
LR5003-2RS	70	40	17	14	21,6	0,3	7 800	5 300	270	6 000
LR5202-2Z	110	40	15	15,9	20	0,6	10 000	6 300	320	10 000
LR5202-X-2Z <sup>1)</sup>	110	40	15	15,9	20	0,6	10 000	6 300	320	10 000
LR5202-2RS	110	40	15	15,9	20	0,6	10 000	6 300	320	7 000

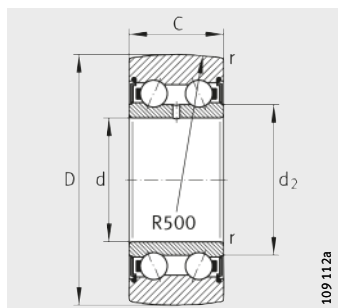
<sup>1)</sup> Track roller with cylindrical outside surface.

<sup>2)</sup> Without lubrication hole.

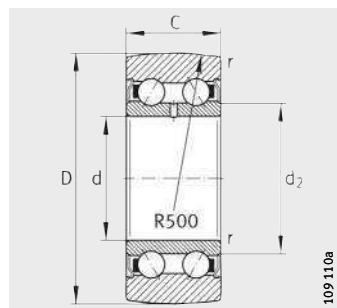


# Yoke type track rollers

Double row  
Sealed



LR50...-2RS, LR52...-2RS,  
LR53...-2RS



LR52...-2Z, LR53...-2Z,  
LR52...-X-2Z<sup>1)</sup>

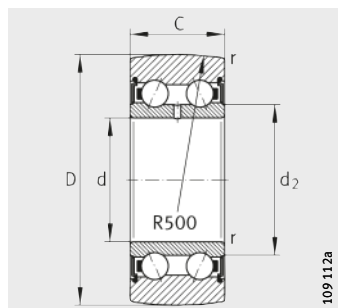
**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈ g	Dimensions					Basic load ratings		Fatigue limit load C <sub>urw</sub> N	Speed n <sub>D G</sub> min <sup>-1</sup>
		D	d	C	d <sub>2</sub>	r min.	dyn. C <sub>rw</sub> N	stat. C <sub>0rw</sub> N		
LR5004-2RS	120	<b>47</b>	20	16	25,2	0,6	11 700	7 700	400	5 500
LR5203-2Z	170	<b>47</b>	17	17,5	22,5	0,6	12 800	8 400	420	7 500
LR5203-X-2Z <sup>1)</sup>	170	<b>47</b>	17	17,5	22,5	0,6	12 800	8 400	420	7 500
LR5203-2RS	170	<b>47</b>	17	17,5	22,5	0,6	12 800	8 400	420	5 500
LR5005-2RS	150	<b>52</b>	25	16	29,8	0,6	11 800	8 200	440	4 700
LR5204-2Z	230	<b>52</b>	20	20,6	26,5	1	16 100	10 700	550	7 000
LR5204-X-2Z <sup>1)</sup>	230	<b>52</b>	20	20,6	26,5	1	16 100	10 700	550	7 000
LR5204-2RS	230	<b>52</b>	20	20,6	26,5	1	16 100	10 700	550	5 000
LR5303-2RS	210	<b>52</b>	17	22,2	23,5	1	17 500	11 300	560	4 700
LR5006-2RS	250	<b>62</b>	30	19	35,5	1	16 100	11 900	630	4 000
LR5205-2Z	340	<b>62</b>	25	20,6	30,3	1	18 800	13 200	670	6 500
LR5205-X-2Z <sup>1)</sup>	340	<b>62</b>	25	20,6	30,3	1	18 800	13 200	670	6 500
LR5205-2RS	340	<b>62</b>	25	20,6	30,3	1	18 800	13 200	670	4 500
LR5304-2Z	340	<b>62</b>	20	22,2	29	1,1	21 500	14 800	740	6 500
LR5304-2RS	340	<b>62</b>	20	22,2	29	1,1	21 500	14 800	740	4 500
LR5007-2RS	300	<b>68</b>	35	20	41,7	1	17 800	13 300	720	4 300

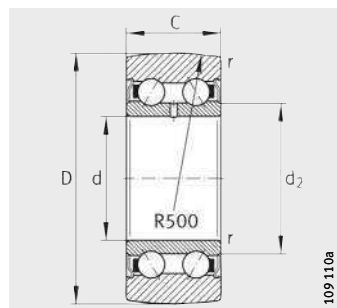
<sup>1)</sup> Track roller with cylindrical outside surface.

# Yoke type track rollers

Double row  
Sealed



LR52..-2RS, LR53..-2RS



LR52..-2Z, LR53..-2Z,  
LR52..-X-2Z<sup>1)</sup>

**Dimension table** (continued) - Dimensions in mm

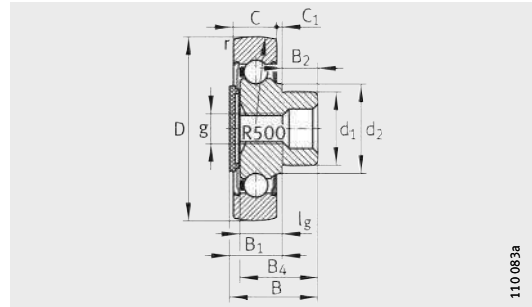
Designation	Mass m ≈g	Dimensions					Basic load ratings			Fatigue limit load C <sub>urw</sub> N	Speed n <sub>D G</sub> min <sup>-1</sup>
		D	d	C	d <sub>2</sub>	r min.	dyn. C <sub>rw</sub> N	stat. C <sub>0rw</sub> N	F <sub>r per</sub> N		
LR5206-2Z	510	<b>72</b>	30	23,8	37,4	1	25 000	18 000	–	930	5 000
LR5206-X-2Z <sup>1)</sup>	510	<b>72</b>	30	23,8	37,4	1	25 000	18 000	–	930	5 000
LR5206-2RS	510	<b>72</b>	30	23,8	37,4	1	25 000	18 000	–	930	3 500
LR5305-2Z	500	<b>72</b>	25	25,4	34,4	1,1	28 000	19 900	–	1 000	5 500
LR5305-2RS	500	<b>72</b>	25	25,4	34,4	1,1	28 000	19 900	–	1 000	3 900
LR5207-2Z	660	<b>80</b>	35	27	42,4	1,1	31 000	22 800	–	1 200	3 900
LR5207-X-2Z <sup>1)</sup>	660	<b>80</b>	35	27	42,4	1,1	31 000	22 800	–	1 200	3 900
LR5207-2RS	660	<b>80</b>	35	27	42,4	1,1	31 000	22 800	–	1 200	2 800
LR5306-2Z	670	<b>80</b>	30	30,2	41,4	1,1	35 500	25 500	–	1 330	4 300
LR5306-2RS	670	<b>80</b>	30	30,2	41,4	1,1	35 500	25 500	–	1 330	3 100
LR5208-2Z	750	<b>85</b>	40	30,2	48,4	1,1	35 000	26 000	21 100	1 360	3 500
LR5208-X-2Z <sup>1)</sup>	750	<b>85</b>	40	30,2	48,4	1,1	35 000	26 000	21 100	1 360	3 500
LR5208-2RS	750	<b>85</b>	40	30,2	48,4	1,1	35 000	26 000	21 100	1 360	2 500
LR5307-2Z	970	<b>90</b>	35	34,9	47,7	1,5	44 000	32 500	–	1 670	3 600
LR5307-2RS	970	<b>90</b>	35	34,9	47,7	1,5	44 000	32 500	–	1 670	2 500
LR5308-2Z	1 200	<b>100</b>	40	36,5	52,4	1,5	54 000	40 500	–	2 100	3 300
LR5308-2RS	1 200	<b>100</b>	40	36,5	52,4	1,5	54 000	40 500	–	2 100	2 300

<sup>1)</sup> Track roller with cylindrical outside surface.



# Stud type track rollers

Sealed

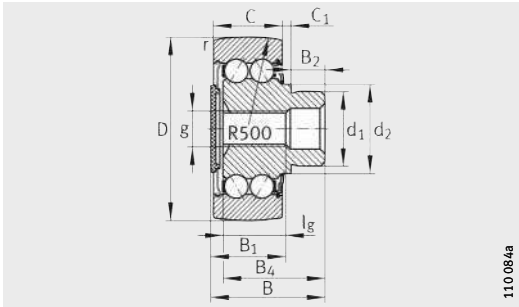


ZL2..-DRS

110.083a

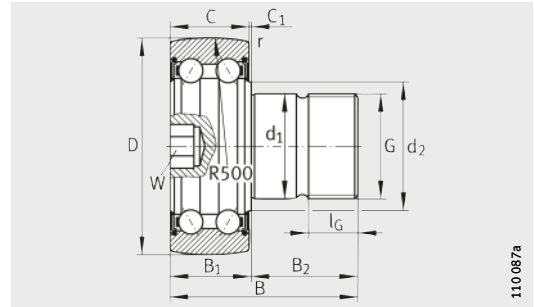
**Dimension table** - Dimensions in mm

Designation	Mass m ≈g	Dimensions										
		D	d <sub>1</sub>	B	B <sub>1</sub> max.	B <sub>2</sub>	B <sub>4</sub>	C	C <sub>1</sub>	d <sub>2</sub>	r	G
ZL5201-DRS	90	35	14	33,2	19,5	14	31	15,9	2,6	17,1	0,6	-
KR5201-2RS	120	35	12	49,2	17	32,5	-	15,9	0,8	17,1	0,6	M12X1,5
ZL202-DRS	80	40	16	23,8	14	10	21,5	11	2	20	0,6	-
ZL5202-DRS	120	40	16	36,2	20,5	16	34	15,9	3,5	20	0,6	-
KR5202-2RS	190	40	16	53,2	17	36,5	-	15,9	0,8	20	0,6	M16X1,5
ZL203-DRS	120	47	18	26,5	14,5	12	24,5	12	2	22,9	0,6	-
ZL5203-DRS	190	47	18	39,5	21,5	18	37,5	17,5	3,5	22,9	0,6	-
KR5203-2RS	290	47	18	58,8	18,5	40,5	-	17,5	0,8	22,9	0,6	M18X1,5
ZL204-DRS	170	52	20	30,7	17	14	28,5	14	2	26,8	1	-
ZL5204-DRS	250	52	20	45,3	25,5	20	43	20,6	4	26,8	1	-
KR5204-2RS	380	52	20	63,6	22,5	41,5	-	20,6	1,5	26,8	1	M20X1,5
ZL205-DRS	250	62	25	33,8	18	16	31	15	2	30,3	1	-
ZL5205-DRS	380	62	25	50,4	25,5	25	47,5	20,6	4	30,3	1	-
KR5205-2RS	580	62	24	70,9	21,5	49,5	-	20,6	0,8	30,3	1	M24X1,5
ZL206-DRS	550	72	30	59	29	30	56,5	23,8	4,5	37,3	1	-
KR5206-2RS	800	72	24	74,1	25	49,5	-	23,8	0,8	37,3	1	M24X1,5
ZL5207-DRS	710	80	35	69,2	33,5	36	66,5	27	5,5	42,4	1,1	-
KR5207-2RS	1 200	80	30	91	28	63	-	27	1	42,4	1,1	M30X1,5



110084a

ZL52...-DRS



110087a

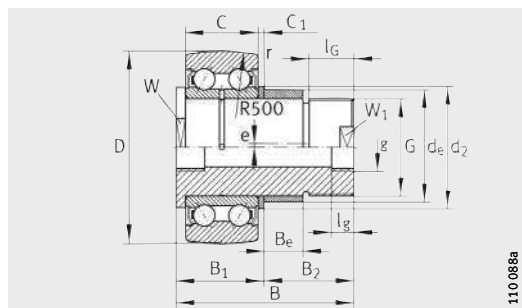
KR52...-2RS

				Tightening torque $M_A$ Nm	Basic load ratings		Fatigue limit load $C_{urw}$ N	Speed $n_{DG}$ min <sup>-1</sup>
$l_G$	g	$l_g$	W		dyn. $C_{rw}$ N	stat. $C_{Orw}$ N		
-	M8	14	-	-	8 700	5 200	260	7 500
17	-	-	6	45	8 700	5 200	260	7 500
-	M8	15	-	-	6 600	3 350	170	8 500
-	M8	15	-	-	10 000	6 300	320	7 000
19	-	-	8	70	10 000	6 300	320	7 000
-	M8	16	-	-	8 500	4 450	223	6 500
-	M8	15	-	-	12 800	8 400	420	5 500
21	-	-	8	115	12 800	8 400	420	5 500
-	M10	18	-	-	10 600	5 700	295	6 000
-	M10	18	-	-	16 100	10 700	550	5 000
21	-	-	10	160	16 100	10 700	550	5 000
-	M10	19	-	-	12 500	7 100	360	5 500
-	M10	18	-	-	18 800	13 200	670	4 500
25	-	-	10	290	18 800	13 200	670	4 500
-	M16	20	-	-	25 000	18 000	930	3 500
25	-	-	10	290	25 000	18 000	930	3 500
-	M16	20	-	-	31 000	22 800	1 200	2 800
32	-	-	12	600	31 000	22 800	1 200	2 800



# Stud type track rollers

With eccentric collar  
Sealed



ZLE52...-2Z

**Dimension table** - Dimensions in mm

Designation	Mass m ≈g	Dimensions										
		D	d <sub>e</sub>	B	B <sub>1</sub> max.	B <sub>2</sub>	C	C <sub>1</sub>	d <sub>2</sub>	r min.	W	W <sub>1</sub>
ZLE5201-2Z	250	<b>35</b>	18	65,5	20,5	45	15,9	2	25	0,6	15	9
ZLE5202-2Z	350	<b>40</b>	22	66,5	21,5	45	15,9	2,5	27	0,6	17	10
ZLE5204-2Z	460	<b>52</b>	24	76	26	50	20,6	2,5	30	1	22	17
ZLE5205-2Z	640	<b>62</b>	24	88	32	56	20,6	8	30	1	22	17
ZLE5207-2Z	1300	<b>80</b>	35	99	35	64	27	3	45	1,1	40	27

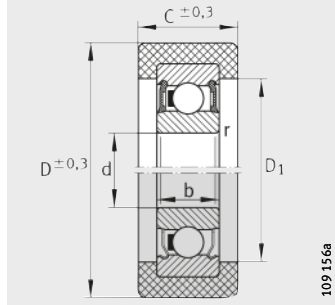


						Tightening torque $M_A$ Nm	Basic load ratings		Fatigue limit load $C_{urw}$ N	Speed $n_{DG}$ $\text{min}^{-1}$
e	$B_e$	g	$l_g$	G	$l_G$ min.		dyn. $C_{rw}$ N	stat. $C_{0rw}$ N		
1	18	M6	6	M12X1,5	24	30	8 700	5 200	260	10 000
1	16	M8X1	8	M14	25	40	10 000	6 300	320	10 000
1	18	M8X1	8	M20X1,5	29	150	16 100	10 700	550	7 000
1	25	M8X1	8	M20X1,5	28	150	18 800	13 200	670	6 500
1,5	29	M8X1	8	M30X1,5	32	540	31 000	22 800	1 200	3 900

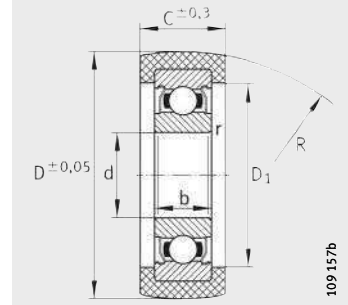


# Track rollers

With plastic outer tyre  
Sealed



**KLRZ..-2RSR**  
**KLRZ..-2Z**



**KLRU..-2Z**

**Dimension table** - Dimensions in mm

Designation	Mass m ≈g	Dimensions							Basic load ratings of track roller <sup>1)</sup> F <sub>r per</sub> N	Deep groove ball bearing fitted	Basic load ratings of deep groove ball bearing	
		D	d	C	b	D <sub>1</sub>	R	r			dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
<b>KLRU08X28X11-2Z</b>	16	<b>27,5</b>	8	11	7	20	500	0,3	250	608-2Z	3 200	1 250
<b>KLRZ10X30X10-2Z</b>	50	<b>30</b>	10	10	8	24	–	0,3	250	6000-2Z	4 600	1 970
<b>KLRU12X35X12-2Z</b>	30	<b>34,8</b>	12	12	8	26	300	0,3	340	6001-2Z	5 100	2 370
<b>KLRZ12X41X16-2RSR</b>	50	<b>41</b>	12	16	10	29,5	–	0,6	500	6201-2RSR	7 100	3 100
<b>KLRU12X47X20-2Z</b>	45	<b>46,8</b>	12	20	10	28,5	300	0,6	500	6201-2Z	7 100	3 100
<b>KLRU15X47X20-2Z</b>	50	<b>46,8</b>	15	20	11	31,5	300	0,6	500	6202-2Z	7 700	3 500

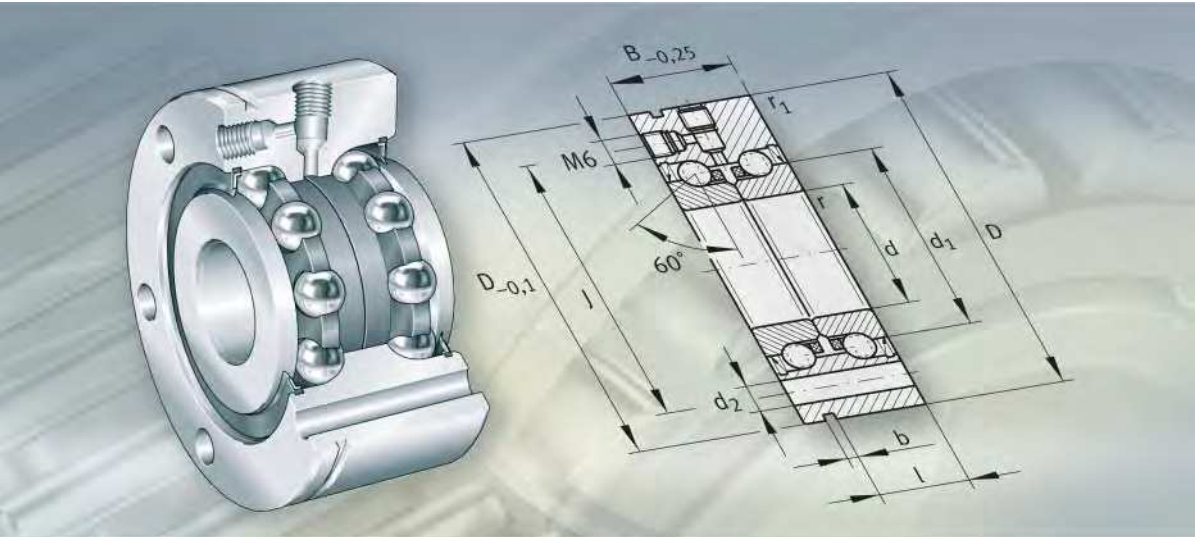
<sup>1)</sup> Valid for installation as track roller.  
The values apply for operating temperatures up to max. +40 °C.







**FAG**



## Bearings for screw drives

- Axial angular contact ball bearings
- Needle roller/axial cylindrical roller bearings
- Seal carrier assemblies
- Precision locknuts

# Bearings for screw drives

## **Matrix for preselection of bearings** ..... **1008**

The application-oriented matrix allows rapid preselection of the suitable bearing.

---

## **Axial angular contact ball bearings** ..... **1010**

Axial angular contact ball bearings are precision bearings for screw drives. Depending on the series, they can support radial forces as well as axial forces from one or both sides. The inner ring is matched to the ball and cage assemblies and the outer ring. As a result, the bearings can be set to a defined axial preload. Contact seals protect the rolling element system against contamination and moisture. For higher speeds, gap seals can be used.

The bearings are available with and without fixing holes in the outer ring. Bearings with holes are screw mounted directly on the adjacent construction. This solution is particularly economical since there is no need for the locating bore otherwise required or for the bearing cover with the associated matching work.

For many applications, a bearing arrangement of lower precision is often sufficient. For this purpose, bearings with less stringent tolerances are available.

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## **Needle roller/axial cylindrical roller bearings** ..... **1064**

These bearings are double direction precision axial cylindrical roller bearings with a radial bearing component. The inner ring, outer ring and cylindrical roller and cage assemblies are matched to each other such that they can be set to a defined axial preload using a precision locknut.

The bearings are available with and without fixing holes in the outer ring. Bearings with holes are screw mounted directly on the adjacent construction. The large contact surface and the small pitch of the holes allows a connection to the adjacent construction that is extremely rigid and with low tendency to settling. The bearing cover that would otherwise be required to hold the bearing, and the matching work required, can therefore be dispensed with.

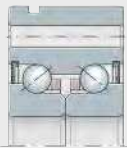
If the axial abutment of the shaft locating washer is not sufficient or a seal raceway is required, bearings with a stepped, extended shaft locating washer on one side are suitable.

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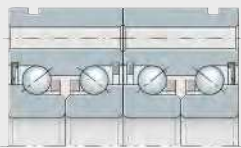
## **Seal carrier assemblies Precision locknuts** ..... **1092**

Seal carrier assemblies DRS are complete sealing sets that are screw mounted on the outer ring of needle roller/axial cylindrical roller bearings ZARF(L). They are precisely centred in this position and seal the bearings against external influences.

The precision locknuts AM, ZM, ZMA for axial or radial locking are used to set bearings for screw drives to a defined axial preload. They are also used where high axial forces must be supported and high runout accuracy and rigidity are required.



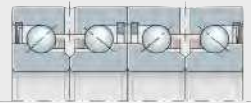
ZKLF



ZKLF..-2RS-2AP



ZKLN



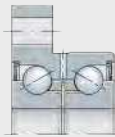
ZKLN..-2RS-2AP



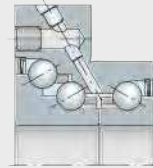
7602, 7603,  
BSB



ZKLR

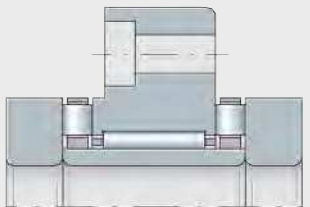


ZKLFA

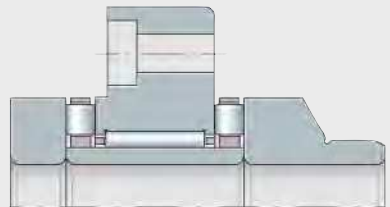


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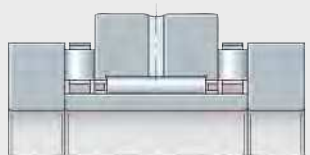
107 558a



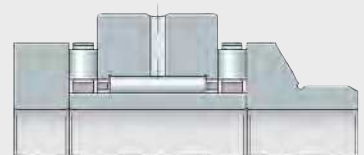
ZARF



ZARF..-L

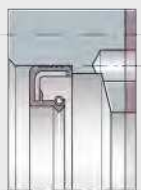


ZARN



ZARN..-L

107 559



DRS



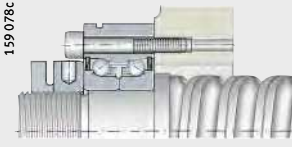
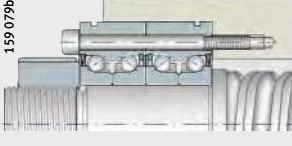
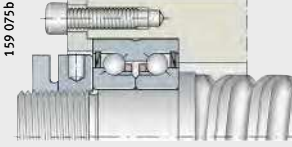
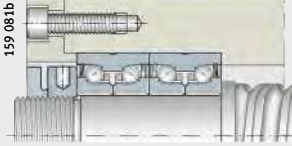
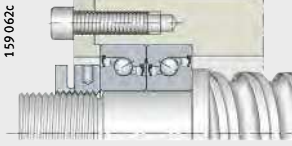
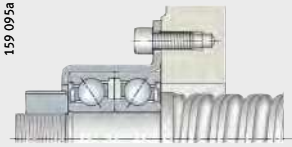
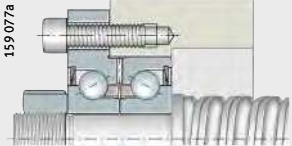
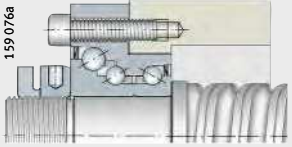
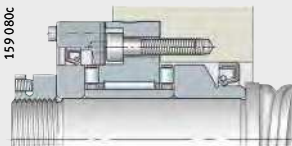

AM



ZM, ZMA

107 560

# Matrix for preselection of bearings

Application	Series	
<b>For standard applications</b>		<b>ZKLF...-2Z</b> <b>ZKLF...-2RS</b> <b>ZKLF...-2RS-PE</b>
		<b>ZKLF...-2RS-2AP</b>
		<b>ZKLN...-2Z</b> <b>ZKLN...-2RS</b> <b>ZKLN...-2RS-PE</b>
		<b>ZKLN...-2RS-2AP</b>
		<b>7602</b> <b>7602-2RS</b> <b>7603</b> <b>7603-2RS</b> <b>BSB</b> <b>BSB-2RS</b>
<b>For special applications</b>		<b>ZKLR...-2Z</b> <b>ZKLR...-2RS</b>
		<b>ZKLFA...-2Z</b> <b>ZKLFA...-2RS</b>
		<b>DKLFA...-2RS</b>
<b>For applications requiring very high accuracy and rigidity</b>		<b>ZARF (L)</b>
		<b>ZARN (L)</b>

**Definition of symbols**

- +++ very good
- ++ good
- + satisfactory
- sufficient

**Attention!**

This selection matrix is a general overview for preliminary assessment of whether bearings can be considered for the required purpose. For the specific application, the data in the product sections and the technical principles must always be taken into consideration.

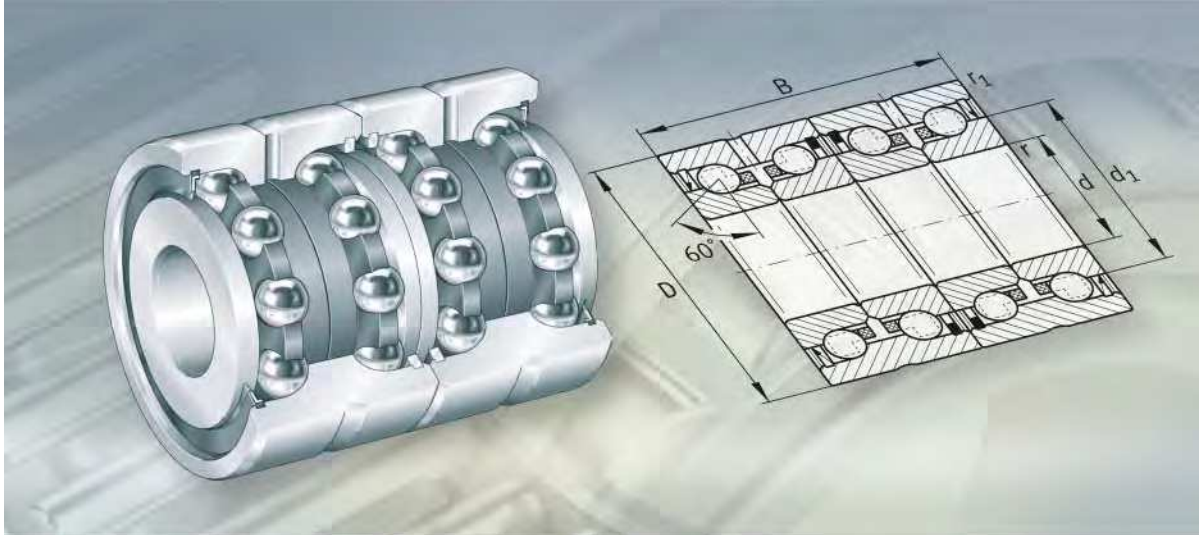


Features	Characteristics					
	High runout accuracy	High speeds and low friction	High rigidity and load carrying capacity	Work on adjacent construction and mounting	Low lubricant consumption	For description see page
<ul style="list-style-type: none"> <li>■ Outer ring for flange mounting</li> <li>■ Gap seals or contact seals on both sides</li> <li>■ Greased, with relubrication facility</li> <li>■ Most economical type of screw drive bearing arrangement</li> </ul>	++	+++	+	+++	++	1014
<ul style="list-style-type: none"> <li>■ As ZKLF, but in matched pair</li> <li>■ Significantly higher load carrying capacity and rigidity than ZKLF</li> </ul>	++	++	++	++	++	1015
<ul style="list-style-type: none"> <li>■ Gap seals or contact seals on both sides</li> <li>■ Greased, with relubrication facility</li> <li>■ Easier to fit than single row bearings, e.g. for plummer block housings</li> </ul>	++	+++	+	+	++	1016
<ul style="list-style-type: none"> <li>■ As ZKLN, but in matched pair</li> <li>■ Significantly higher load carrying capacity and rigidity than ZKLN</li> </ul>	++	++	++	+	++	1017
<ul style="list-style-type: none"> <li>■ Open or sealed on both sides</li> <li>■ Highly suitable for mounting in pairs to form wide range of contact angle combinations</li> </ul>	++	+++	+	-	++	1018
<ul style="list-style-type: none"> <li>■ Particularly economical alternative to solutions with individual ball bearings</li> <li>■ Gap seals or contact seals on both sides</li> <li>■ Simple to fit</li> <li>■ For applications with comparatively low loads, but high positional accuracy</li> </ul>	+	+++	-	+++	++	1019
<ul style="list-style-type: none"> <li>■ Outer ring for flange mounting</li> <li>■ Stepped outer ring with flattened areas on both sides</li> <li>■ Gap seals or contact seals on both sides</li> </ul>	++	+++	+	+++	++	1020
<ul style="list-style-type: none"> <li>■ Higher load capacity on one side</li> <li>■ Outer ring for flange mounting</li> <li>■ Sealed on both sides</li> <li>■ For vertical axes</li> <li>■ For locating/locating bearing arrangements</li> </ul>	+	++	++	+++	++	1021
<ul style="list-style-type: none"> <li>■ Outer ring for flange mounting</li> <li>■ Very high accuracy, rigidity and load carrying capacity</li> <li>■ Bearing prepared for sealing</li> </ul>	+++	+	+++	+	-	1067
<ul style="list-style-type: none"> <li>■ Very high accuracy, rigidity and load carrying capacity</li> <li>■ Bearing prepared for sealing</li> </ul>	+++	+	+++	-	-	1068





**FAG**



**Axial angular contact ball bearings**

# Axial angular contact ball bearings

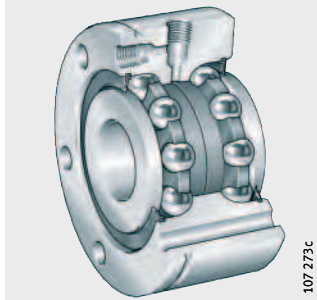
	Page
<b>Product overview</b>	Axial angular contact ball bearings ..... 1012
<b>Features</b>	Double row, for screw mounting ..... 1014
	Double row, not for screw mounting ..... 1016
	Single row, for matching in pairs ..... 1018
	Angular contact ball bearing unit, for screw mounting ..... 1019
	Double row, with flange, for screw mounting ..... 1020
	Triple row, with flange, for screw mounting ..... 1021
	Operating temperature ..... 1022
	Cages ..... 1022
	Suffixes ..... 1022
<b>Design and safety guidelines</b>	Basic rating life ..... 1023
	Static load safety factor ..... 1024
	Maximum radial load on screw connections for ZKLF ..... 1030
	Permissible static axial load for ZKLF ..... 1031
	Design of adjacent construction ..... 1031
	Speeds ..... 1031
	Friction ..... 1032
	Lubrication ..... 1033
	Mounting guidelines ..... 1034
<b>Dimension tables</b>	Axial angular contact ball bearings
	for screw mounting ..... 1038
	for screw mounting, less stringent tolerances ..... 1040
	for screw mounting, matched pair ..... 1042
	not for screw mounting ..... 1044
	not for screw mounting, less stringent tolerances ..... 1048
	not for screw mounting, matched pair ..... 1050
	single direction ..... 1052
	single direction, sealed ..... 1056
	Angular contact ball bearing units,
	for screw mounting ..... 1058
	Double row axial angular contact ball bearings with flange,
	for screw mounting ..... 1060
	Triple row axial angular contact ball bearings with flange,
	for screw mounting ..... 1062



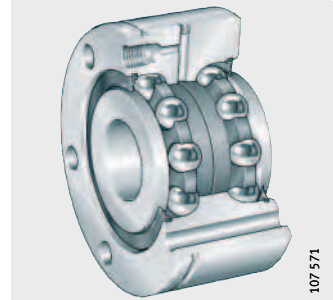
# Product overview Axial angular contact ball bearings

**Double row,  
for screw mounting**  
Lip seals or gap seals

ZKLF..-2RS, ZKLF..-2Z

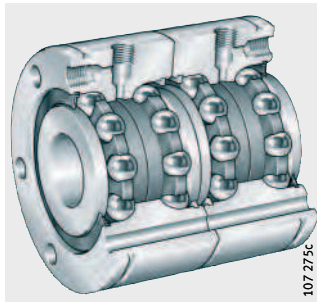


ZKLF..-2RS-PE



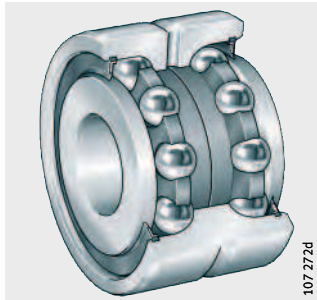
Matched pair

ZKLF..-2RS-2AP



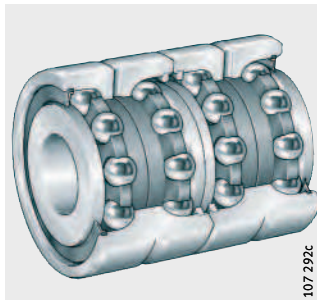
**Double row,  
not for screw mounting**  
Lip seals or gap seals

ZKLN..-2RS, ZKLN..-2Z,  
ZKLN..-2RS-PE



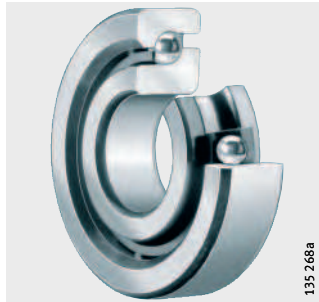
Matched pair

ZKLN..-2RS-2AP

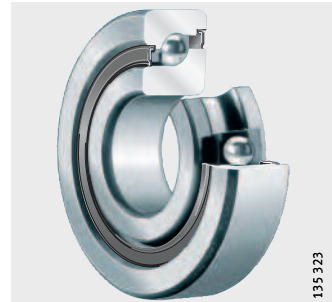


**Single row,  
for matching in pairs**  
With or without lip seals

7602, 7603, BSB

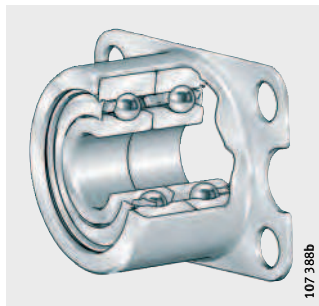


7602..-2RS, 7603..-2RS,  
BSB..-2RS



**Angular contact  
ball bearing unit,  
for screw mounting**  
Lip seals or gap seals

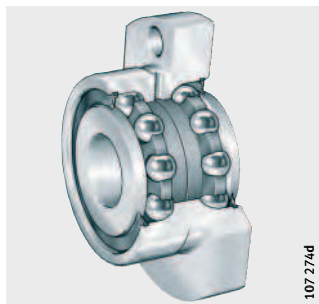
ZKLR..-2RS, ZKLR..-2Z



**Double or triple row,  
flange with flattened areas,  
for screw mounting**

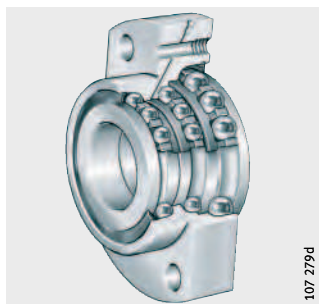
Double row  
Lip seals or gap seals

ZKLFA..-2RS, ZKLFA..-2Z



Triple row  
Lip seals

DKLFA..-2RS



# Axial angular contact ball bearings

## Features

Screw drive bearing arrangements are subjected to requirements that often cannot be optimally fulfilled by the design construction of conventional bearings.

For the design of bearing arrangements for the highly dynamic operating conditions in screw drives that have high accuracy, high load carrying capacity, high rigidity, low friction, are easy to fit and maintenance-free or low-maintenance, there is a wide range of INA and FAG axial angular contact ball bearings. With this product range, solutions can be found to all the technical and economic demands placed on the bearing arrangements of screw drives.

## Single row and multi-row designs

Axial angular contact ball bearings are available as single, double or triple row ready-to-fit units. They are self-retaining and comprise thick-walled, geometrically stable outer rings, ball and cage assemblies and one-piece or two-piece inner rings. In several series, the outer ring has through holes for simple flange mounting to the adjacent construction.

The bearing rings are matched to each other such that a defined preload is achieved when the rings are clamped in place using a precision locknut.

## Radial and axial load carrying capacity

Due to the contact angle of  $60^\circ$ , the bearings can support not only radial forces but high axial forces as well.

## Double row, for screw mounting

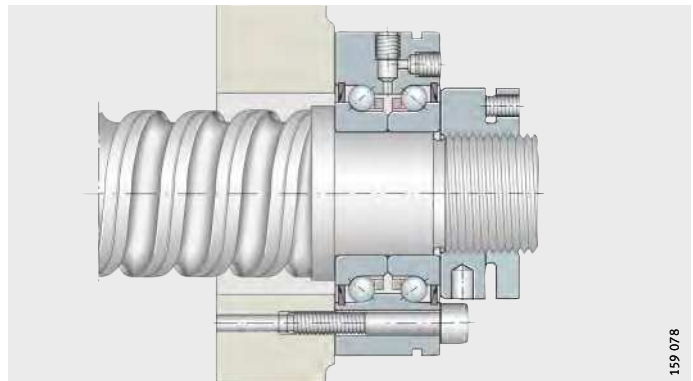
Axial angular contact ball bearings ZKLF are screw mounted directly on the adjacent construction or in a radial locating bore, *Figure 1* and *Figure 2*, page 1015. The cover that would otherwise be required and the associated matching work can therefore be dispensed with.

In order to aid removal of the bearings from a locating bore, the outer ring has a circumferential extraction slot.

Relubrication is facilitated by radial and axial threaded connectors with detachable grub screws.

ZKLF..-2RS  
ZKLF..-2Z

*Figure 1*  
Outer ring screw mounted on flat adjacent construction, preloaded using locknut

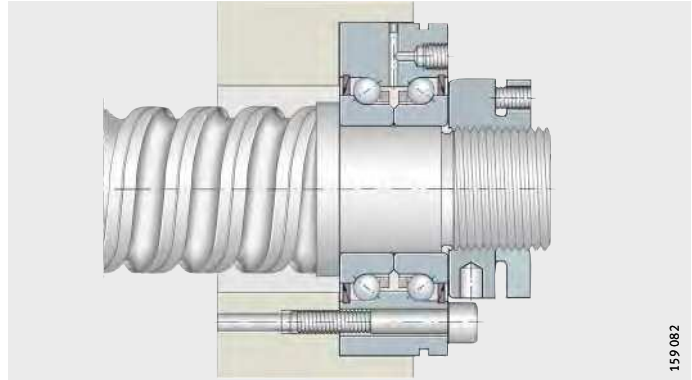


**With less stringent tolerances**

Axial angular contact ball bearings ZKLF..-2RS-PE correspond to series ZKLF but have a runout tolerance within P5 to DIN 620, less stringent diameter tolerances and the suffix PE. They are used where a lower positional accuracy is acceptable. As a result, the adjacent construction does not need to be as accurate with these bearings.

Relubrication is facilitated by an axial threaded connector. The radial lubrication duct is firmly closed off.

**ZKLF..-2RS-PE**



*Figure 2*  
Outer ring screw mounted in bore,  
preloaded using locknut

**Heavy series**

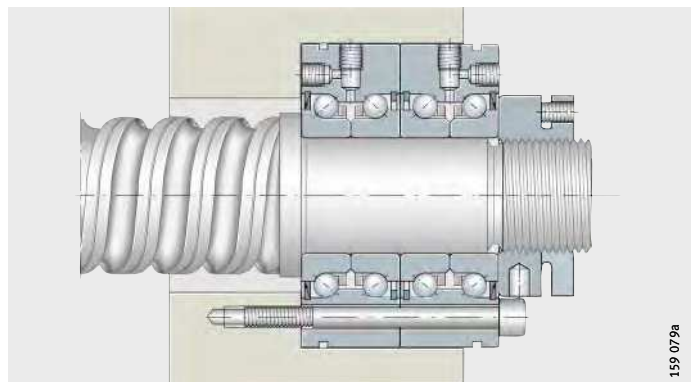
Axial angular contact ball bearings ZKLF..-2RS and ZKLF..-2Z are also available in a heavy series. For the same shaft diameter, they have a larger cross-section and thus higher basic load ratings.

**Matched pairs**

Bearings of series ZKLF..-2RS-2AP comprise a matched pair of bearings ZKLF..-2RS, *Figure 3*. The individual bearings are matched to each other.

Matched bearings have an arrow marking on the outside surface of the outer rings. When the bearings are arranged correctly, the lip seals face outwards. During fitting, the hole pattern of the two bearings must match, not the marking.

**ZKLF..-2RS-2AP**



*Figure 3*  
Matched pair,  
outer ring screw mounted in bore,  
preloaded using locknut

# Axial angular contact ball bearings

**Seals** Bearings with the suffix 2RS have lip seals and highly effective sealing.

Bearings with the suffix 2Z are sealed using gap seals and are suitable for higher speeds.

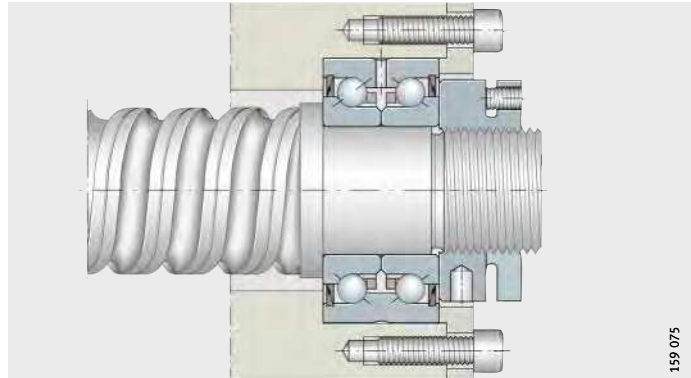
**Lubrication** The bearings are greased using a lithium soap grease to GA28 and can be lubricated via the lubrication connectors in the outer ring. For the majority of applications, the initial greasing is sufficient for the whole bearing operating life.

## Double row, not for screw mounting

Axial angular contact ball bearings ZKLN are mounted in a housing bore, *Figure 4*. The bearing outer ring is axially located by a cover.

ZKLN..-2RS  
ZKLN..-2Z

*Figure 4*  
Outer ring located using cover,  
preloaded using locknut



## With less stringent tolerances

Axial angular contact ball bearings ZKLN..-2RS-PE correspond to series ZKLN but have a runout tolerance within P5 to DIN 620, less stringent diameter tolerances and the suffix PE. They are used where a lower positional accuracy is acceptable. As a result, the adjacent construction does not need to be as accurate with these bearings.

## Heavy series

Axial angular contact ball bearings ZKLN..-2RS and ZKLN..-2Z are also available in a heavy series. For the same shaft diameter, they have a larger cross-section and thus higher basic load ratings.



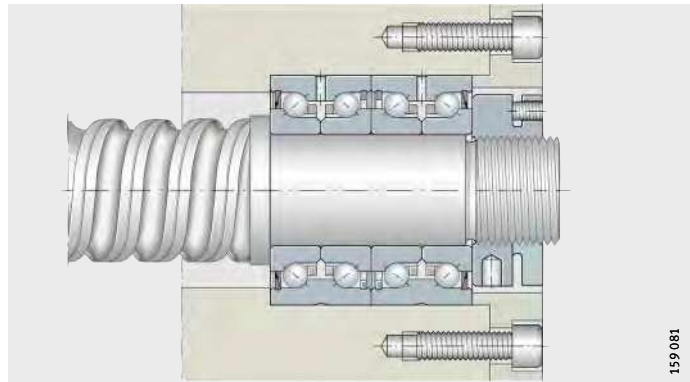
**Matched pairs** Bearings of series ZKLN..-2RS-2AP comprise a matched pair of bearings ZKLN..-2RS, *Figure 5*. The individual bearings are matched to each other.

Matched bearings have an arrow marking on the outside surface of the outer rings. When the bearings are arranged correctly, the lip seals face outwards.

The bearing outer rings are axially clamped by a cover, *Figure 5*.

**ZKLN..-2RS-2AP**

*Figure 5*  
Matched pair,  
outer rings located using cover,  
preloaded using locknut



**Seals** Bearings with the suffix 2RS have lip seals and highly effective sealing.

Bearings with the suffix 2Z are sealed using gap seals and are suitable for higher speeds.

**Lubrication** The bearings are greased using a lithium soap grease to GA28 and can be lubricated via a lubrication slot and lubrication holes in the outer ring. For the majority of applications, the initial greasing is sufficient for the whole bearing operating life.

# Axial angular contact ball bearings

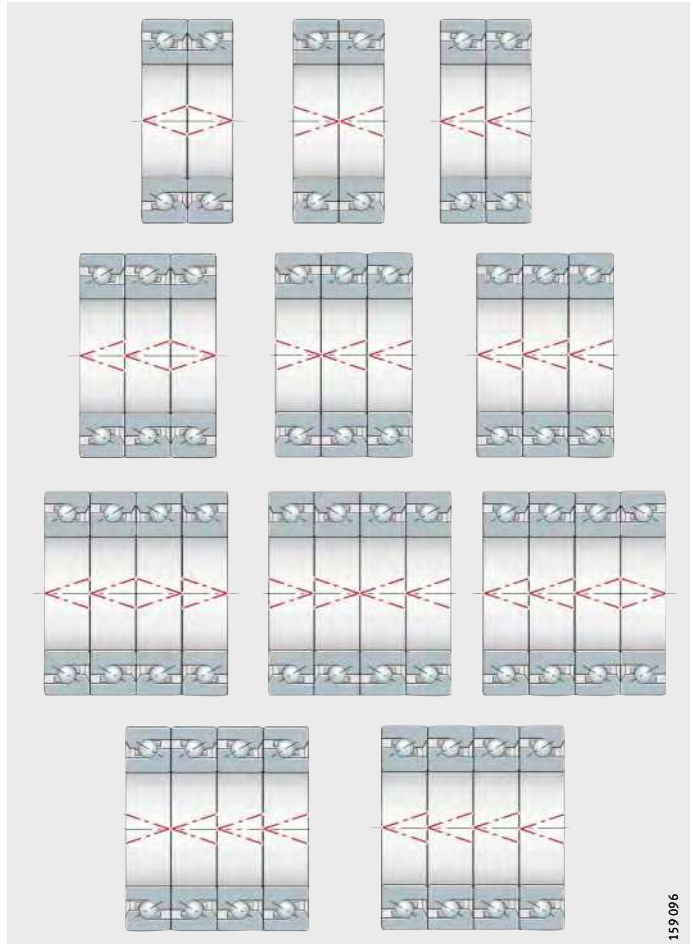
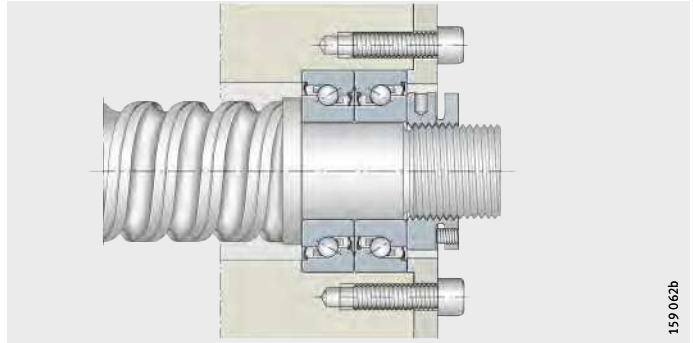
**Single row,  
for matching in pairs**

Bearings 7602, 7603 and BSB are designed as universal bearings, *Figure 6* and *Figure 7*.

They can be combined in a wide range of sets for different requirements, *Figure 7*.

**7602..-2RS, 7603..-2RS, BSB..-2RS**

*Figure 6*  
Single row axial angular  
contact ball bearings,  
two-bearing set in O arrangement



**7602, 7603, BSB**

*Figure 7*  
Set combinations

**Seals** Single row axial angular contact ball bearings for matching are bearings of the open basic design. However, some sizes are fitted with seals.

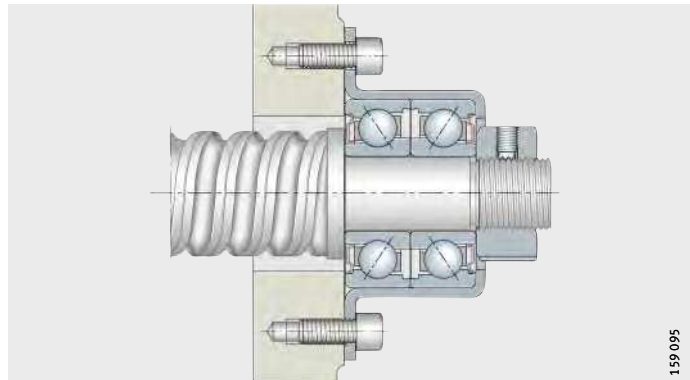
**Lubrication** Single row axial angular contact ball bearings of the open basic design are not supplied greased. The designs fitted with seals are greased for life with Arcanol L55.

**Angular contact ball bearing unit, for screw mounting**

Angular contact ball bearing units ZKLR are low-cost bearings and therefore particularly economical. They comprise a deep drawn sheet steel housing with an integral matched pair of angular contact ball bearings in an X arrangement, *Figure 8*. The housing has a Corrotect® coating and is thus protected against rust. The ball bearings are sealed on both sides by lip seals or gap seals. The bearing assembly is preloaded clearance-free.

ZKLR...-2RS  
ZKLR...-2Z

*Figure 8*  
Angular contact ball bearing unit



**Particularly easy to fit**

The units are particularly easy to fit. They:

- are directly flange mounted, for example on the milled face of the adjacent construction. This eliminates the need for precise, costly fits and additional flange covers for seating and axial location of the bearings
- require no additional parts for location of the bearings in the housing
- reduce errors in fitting due to the smaller number of components compared to conventional solutions
- are self-aligning by means of the screw drive nut during fitting. This effectively eliminates any warping due to misalignment of the bearing seats
- have a defined preload. It is not necessary to preload the bearing during fitting as is usually the case with screw drive bearing arrangements
- require only clearance-free axial location on the threaded spindle.

# Axial angular contact ball bearings

**Seals** Bearings with the suffix 2RS have lip seals and highly effective sealing. Bearings with the suffix 2Z are sealed using gap seals and are suitable for higher speeds.

**Lubrication** The bearings are greased using a lithium soap grease to DIN 51 825–K2N–40.

**Operating limits** The units are highly suitable, due to their dimensions and design, for space-saving and simple bearing arrangements in highly dynamic screw drives, for example:

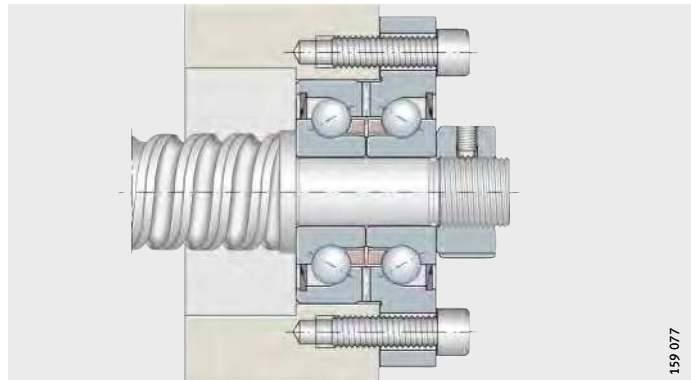
- in inspection and measuring equipment
- in small machine tools
- in medical and laboratory equipment
- in precision engineering and electronic components manufacture
- where complete units will give a simpler bearing arrangement.

## Double row, with flange, for screw mounting

Series ZKLFA has a stepped outer ring. It can therefore be screw mounted easily on the adjacent construction, *Figure 9*. The flange has flattened areas on both sides, so the radial design envelope in the adjacent construction can be kept very small.

ZKLFA..-2RS  
ZKLFA..-2Z

*Figure 9*  
Outer ring screw mounted on adjacent construction, preloaded using locknut



**Seals** Bearings with the suffix 2RS have lip seals and highly effective sealing. Bearings with the suffix 2Z are sealed using gap seals and are suitable for higher speeds.

**Lubrication** The bearings are greased using a lithium soap grease to GA28 and can be lubricated via a lubrication groove and lubrication holes in the outer ring. For the majority of applications, the initial greasing is sufficient for the whole bearing operating life.

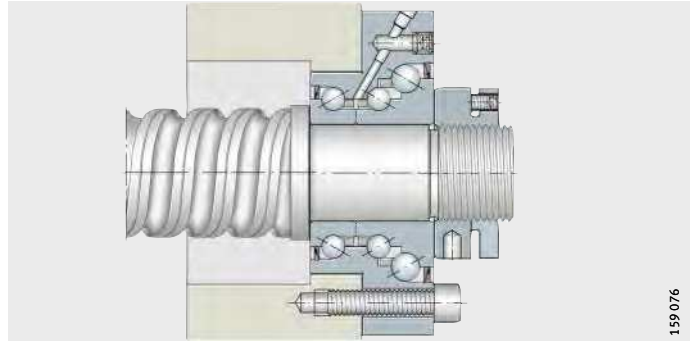
**Triple row,  
with flange,  
for screw mounting**

Axial angular contact ball bearings DKLFA..-2RS have, in addition to two rows of balls with a contact angle of 60° in an O arrangement, an extra row of balls, *Figure 10*. Due to this additional row, the bearings can support higher axial loads in one direction.

Due to the stepped outer ring, the bearings can be easily flange mounted on the adjacent construction. The flange has flattened areas on both sides. As a result, it requires only a small design envelope in the adjacent construction.

**DKLFA..-2RS**

*Figure 10*  
Outer ring screw mounted  
on adjacent construction,  
preloaded using locknut



In order to make full use of the load carrying capacity of bearings DKLFA..-2RS, their design requires that they are subjected to continuous load in the main load direction. They are therefore used mainly in screw drives with a locating/locating bearing arrangement and tensioned spindles or in vertically arranged screw drive bearing arrangements.

For design of the bearing arrangement, please contact us.

**Seals**

Triple row axial angular contact ball bearings have lip seals on both sides.

**Lubrication**

The bearings are greased using a lithium soap grease to GA28. If necessary, lubrication can be carried out via a threaded connector for central lubrication systems on the flange side.



For calculation of relubrication intervals based on a stated load spectrum (speed, load, operating duration, environmental conditions), please contact us.



# Axial angular contact ball bearings

## Operating temperature

Sealed axial angular contact ball bearings are suitable for operating temperatures from  $-30\text{ °C}$  to  $+120\text{ °C}$ , restricted by the grease, the seal material and the plastic cages in the ball and cage assemblies.



The operating temperature influences the dynamic bearing characteristics. The values given in the dimension table are based on a room temperature of  $+20\text{ °C}$ .

## Cages

The axial angular contact ball bearings have plastic cages. The cage design is not indicated in the suffix.

In series 7602, 7603 and BSB, the polyamide cages are indicated by the suffix TVP or T.

## Suffixes

Suffixes for the available designs: see table.

## Available designs

Suffix	Description	Design
PE	Less stringent bearing design	Standard
T, TVP	Polyamide cage, guided by balls	
2AP	Axial angular contact ball bearings, matched pair (ZKLN, ZKLF)	
2RS	Contact seals on both sides	
2Z	Gap seals on both sides	

## Design and safety guidelines

### Basic rating life

The decisive factors in determining the bearing size are the basic rating life, the static load safety factor and the axial limiting load. The basic rating life  $L$  and  $L_h$  are calculated as follows:

$$L_{10} = \left(\frac{C}{P}\right)^p$$

$$L_{10h} = \frac{16\,666}{n} \cdot \left(\frac{C}{P}\right)^p$$

$L_{10}$  10<sup>6</sup> revolutions  
 Basic rating life in millions of revolutions  
 $L_{10h}$  h  
 Basic rating life in operating hours  
 $C_r, C_a$  N  
 Basic dynamic radial or axial load rating according to dimension table  
 $C_r$  is valid for a contact angle  $\alpha \leq 45^\circ$ ,  
 $C_a$  is valid for a contact angle  $\alpha > 45^\circ$   
 $P$  N  
 Equivalent dynamic bearing load  
 $p$  –  
 Life exponent  $p = 3$   
 $n$  min<sup>-1</sup>  
 Operating speed.



### Resultant and equivalent bearing load P for ZKLR

Bearing unit Designation	Factor P
ZKLR0624-2Z	$P = 140 + 0,13 F_a^{1,4} + 0,003 \cdot F_r^{1,9}$
ZKLR0828-2Z	$P = 210 + 0,28 F_a^{1,27} + 0,002 \cdot F_r^{1,9}$
ZKLR1035-2Z	$P = 240 + 0,47 F_a^{1,17} + 0,0015 \cdot F_r^{1,9}$
ZKLR1244-2RS	$P = 580 + 0,046 F_a^{1,3} + 0,076 \cdot F_r^{1,28}$
ZKLR1547-2RS	$P = 540 + 0,011 F_a^{1,5} + 0,022 \cdot F_r^{1,45}$
ZKLR2060-2RS	$P = 960 + 0,0082 F_a^{1,5} + 0,017 \cdot F_r^{1,45}$

### Static limiting load diagrams for ZKLR

The easy-to-use static limiting load diagrams allow quick verification of the bearing size of series ZKLR, as a function of the axial and radial operating load, *Figure 21 to Figure 23*, page 1029.

The decisive requirement is that the intersection between the axial and radial load must be below the limit line.

Example: If the operating loads  $F_a$  and  $F_r$  are below the limit line, the bearing size is suitable for the application, see example *Figure 23*, page 1029.

# Axial angular contact ball bearings

## Resultant and equivalent bearing load P for ZKLN, ZKLF, ZKLFA, DKLFA, BSB, 7602, 7603

The bearings are axially preloaded to a defined value if the recommended precision locknuts are used and the correct nut tightening torque is applied. The resultant axial bearing load  $F_{a\text{res}}$  is determined from the axial operating load  $F_{aB}$  and taking account of the axial preload according to *Figure 11*, page 1025, to *Figure 15*, page 1026. For 7602, 7603 and BSB, the  $F_{a\text{res}}$  diagrams are based on two-bearing sets in an O or X arrangement, see page 1018. For calculation of other set combinations, please contact us.



A load in excess of the limit value will lead to the rolling element row without load lifting off the raceway. As a result, higher wear will occur under rapid acceleration. For extreme moment loads and statically overdefined systems (locating/locating bearing arrangements), please contact us. The calculation program BEARINX® can give a precise design in this case.

## Axial and radial operating loads

Under purely axial load,  $P = F_{a\text{res}}$ . If additional radial operating loads are present, P must be calculated as follows:

$$P = X \cdot F_r + Y \cdot F_{a\text{res}}$$

The values X and Y are given in the following table.

### Factors X and Y

Load ratio	Factor	
	X	Y
$\frac{F_{a\text{res}}}{F_r} \leq 2,17$	1,9	0,55
$\frac{F_{a\text{res}}}{F_r} > 2,17$	0,92	1

## Load varying in steps

In this case, P and n are calculated as follows ( $q$  = time portion %):

$$P = p \sqrt{\frac{q_1 \cdot n_1 \cdot P_1^p + \dots + q_z \cdot n_z \cdot P_z^p}{q_1 \cdot n_1 + \dots + q_z \cdot n_z}}$$

$$n = \frac{q_1 \cdot n_1 + \dots + q_z \cdot n_z}{100}$$

## Static load safety factor

The static load safety factor  $S_0$  indicates the security against impermissible permanent deformations in the bearing:

$$S_0 = \frac{C_0}{P_0}$$

$S_0$  Static load safety factor  
 $C_{0r}, C_{0a}$  N Basic static radial or axial load rating according to dimension table  
 $C_{0r}$  is valid for a contact angle  $\alpha \leq 45^\circ$ ,  
 $C_{0a}$  is valid for a contact angle  $\alpha > 45^\circ$   
 $P_0$  N Maximum static load of bearing.



In machine tools,  $S_0$  should be  $\geq 4$ .



### Resultant bearing load $F_{a\ res}$

**Example (red lines)**

Bearing ZKLN1545

Axial operating load  $F_{aB} = 1500\ N$

$F_{a\ res} \approx 1750\ N$

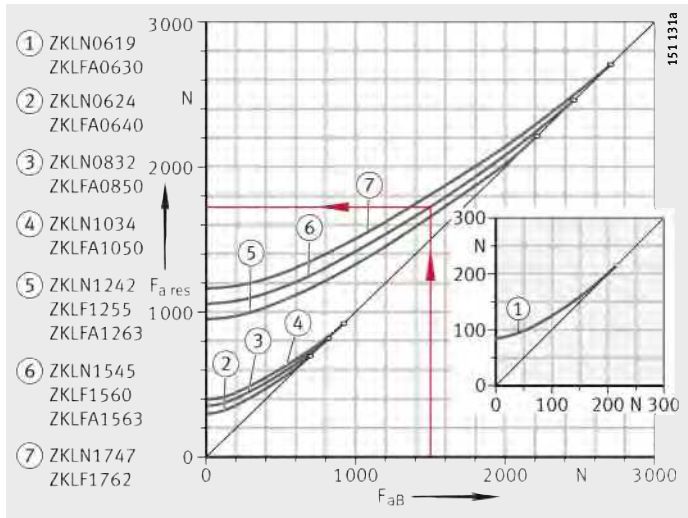
Loading by operating load and preload

$F_{aB}$  = operating load

$F_{a\ res}$  = resultant bearing load

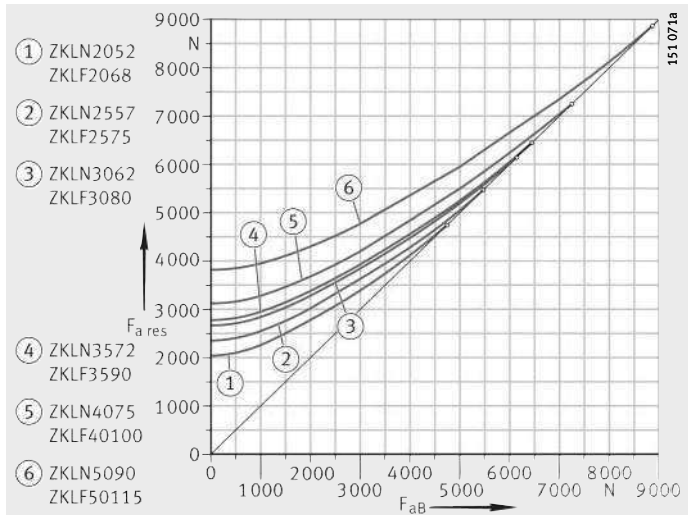
° = limit value

**Figure 11**  
Resultant bearing load  
ZKLN, ZKLF and ZKLFA,  
up to  $d = 17\ mm$



$F_{aB}$  = operating load  
 $F_{a\ res}$  = resultant bearing load  
° = limit value

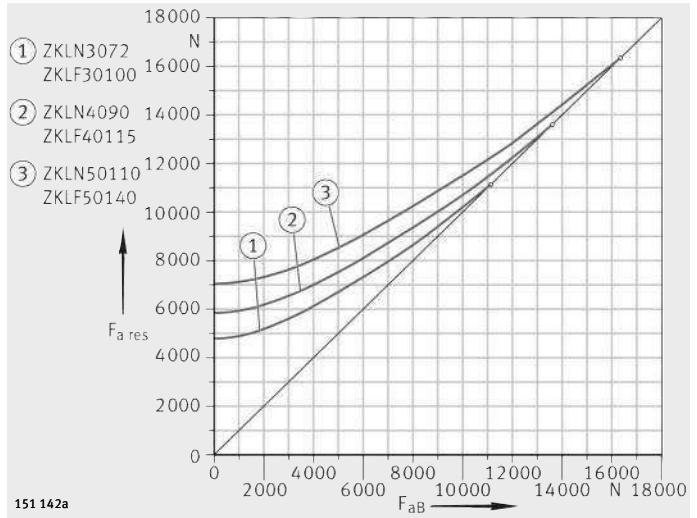
**Figure 12**  
Resultant bearing load  
ZKLN, ZKLF,  
from  $d = 20\ mm$  to  $50\ mm$



# Axial angular contact ball bearings

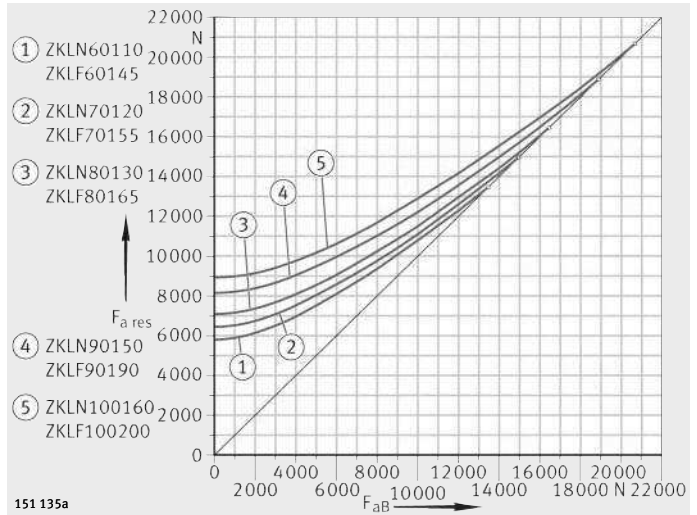
$F_{aB}$  = operating load  
 $F_{a\ res}$  = resultant bearing load  
 $^{\circ}$  = limit value

**Figure 13**  
 Resultant bearing load  
 ZKLN, ZKLF, heavy series



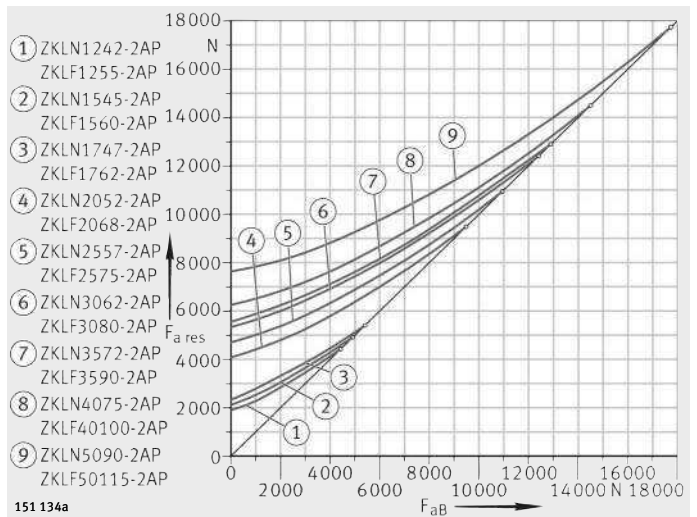
$F_{aB}$  = operating load  
 $F_{a\ res}$  = resultant bearing load  
 $^{\circ}$  = limit value

**Figure 14**  
 Resultant bearing load  
 ZKLN, ZKLF, from d = 60 mm



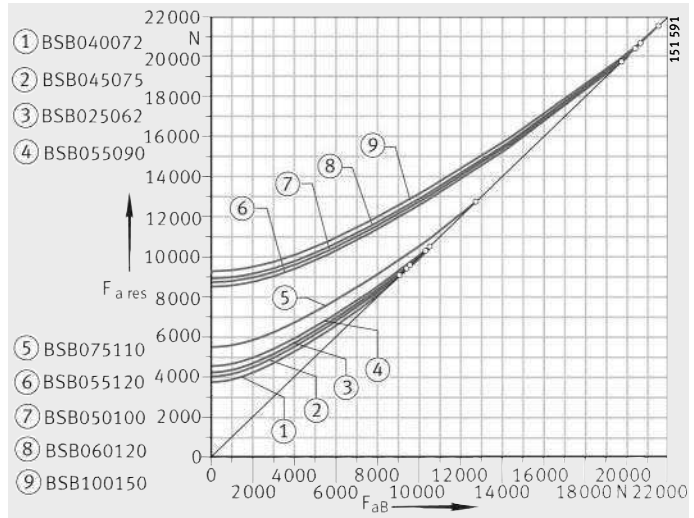
$F_{aB}$  = operating load  
 $F_{a\ res}$  = resultant bearing load  
 $^{\circ}$  = limit value

**Figure 15**  
 Resultant bearing load  
 ZKLN...-2AP and ZKLF...-2AP



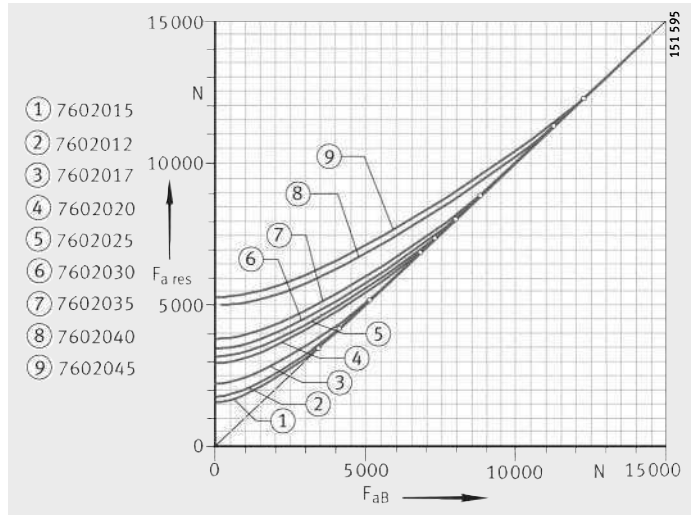
$F_{aB}$  = operating load  
 $F_{a\ res}$  = resultant bearing load  
 ° = limit value

**Figure 16**  
 Resultant bearing load  
 BSB



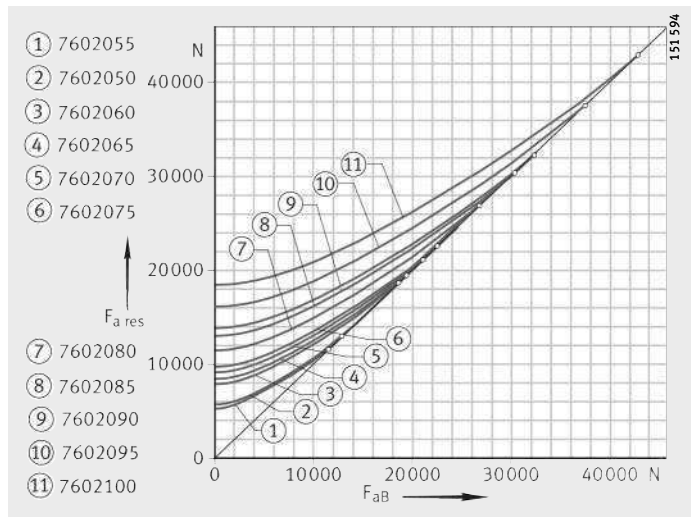
$F_{aB}$  = operating load  
 $F_{a\ res}$  = resultant bearing load  
 ° = limit value

**Figure 17**  
 Resultant bearing load  
 7602012 to 7602045



$F_{aB}$  = operating load  
 $F_{a\ res}$  = resultant bearing load  
 ° = limit value

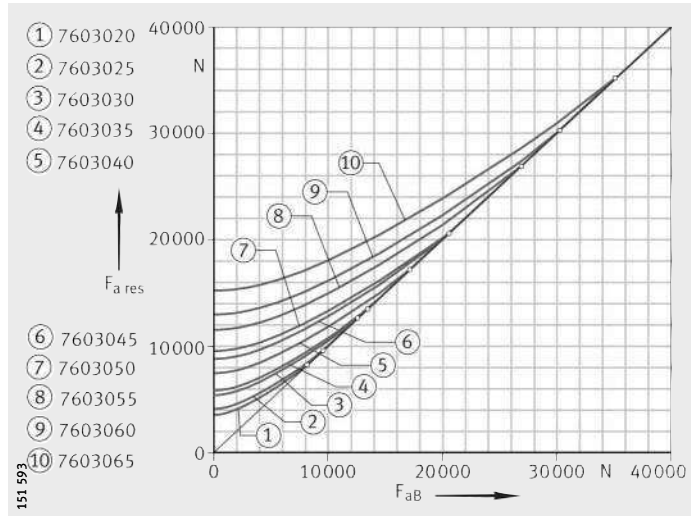
**Figure 18**  
 Resultant bearing load  
 7602050 to 7602100



# Axial angular contact ball bearings

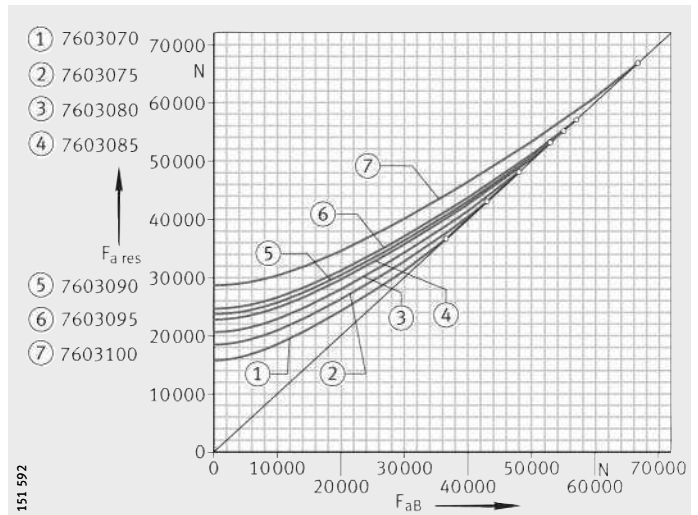
$F_{aB}$  = operating load  
 $F_{a\text{ res}}$  = resultant bearing load  
 $^{\circ}$  = limit value

**Figure 19**  
 Resultant bearing load  
 7603020 to 7603065



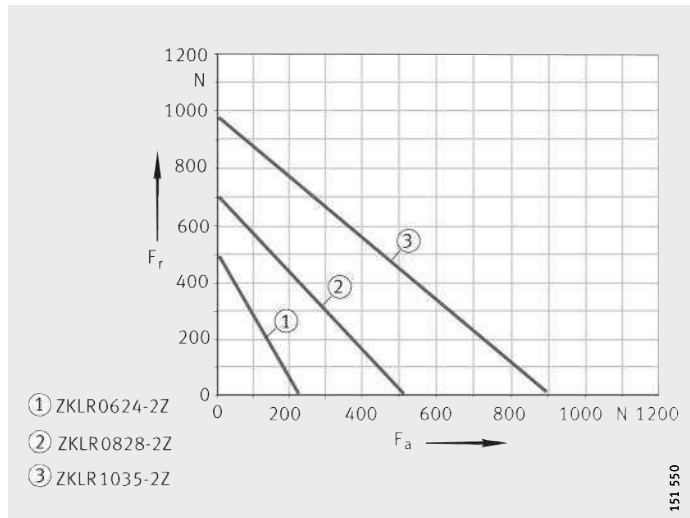
$F_{aB}$  = operating load  
 $F_{a\text{ res}}$  = resultant bearing load  
 $^{\circ}$  = limit value

**Figure 20**  
 Resultant bearing load  
 7603070 to 7603100



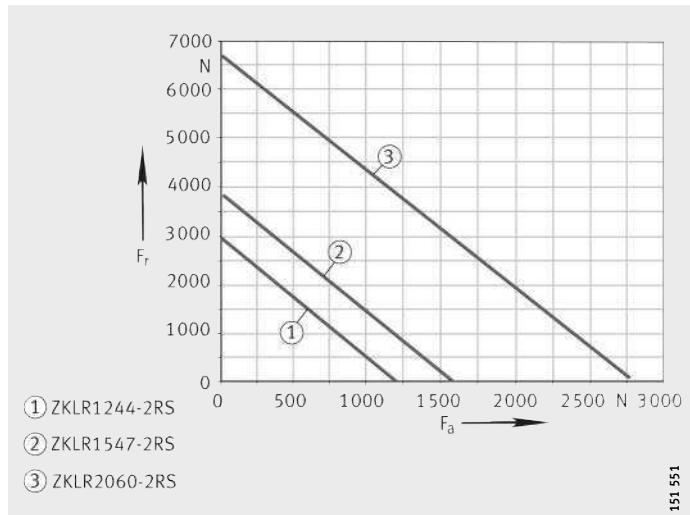
$F_a$  = axial load  
 $F_r$  = radial load

**Figure 21**  
 Static limiting load diagrams  
 ZKLR



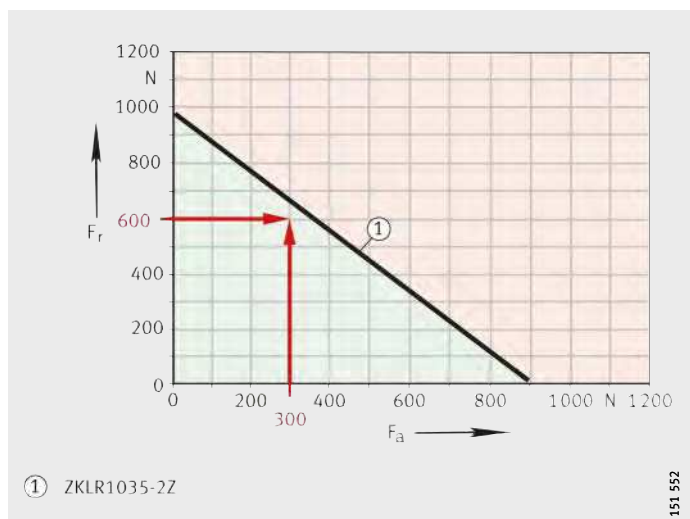
$F_a$  = axial load  
 $F_r$  = radial load

**Figure 22**  
 Static limiting load diagrams  
 ZKLR



$F_a$  = 300 N  
 $F_r$  = 600 N  
 Bearing is suitable in static terms since  
 the intersection  $F_a/F_r$  is below the limit line

**Figure 23**  
 Static limiting load diagram –  
 example ZKLR1035-2Z



# Axial angular contact ball bearings

## Maximum radial load on screw connections for ZKLF

If bearings of series ZKLF are screw mounted on a flat adjacent construction, the maximum radial load that can be supported by the screw connections must be taken into consideration.

If the screws used are as stated in the dimension tables to DIN EN ISO 4 762, the maximum radial load that can be supported before the outer ring moves, in the case of dry components, is restricted to  $\approx 0,1 \times C_{0a}$ . If the outer ring is additionally bonded in place using, for example, Loctite 638, the maximum radial load that can be supported increases to approx.  $\approx 0,5 \times C_{0a}$ .

If the maximum radial loads that can be supported (without any axial load content) are considered in relation to the rolling element set, it can be seen that:

- With a static load safety factor of  $S_0 \geq 4$  as required for machine tools, the load that can be supported by the screw connections of the outer ring is in any case greater than the radial load as restricted by the rolling element set.

This means that (at least in theory) radial loads can be supported that, in relation to the rolling element set, will lead to a static load safety factor of  $S_0 \leq 1$  (incipient plastic deformation of rolling elements), if the outer ring is additionally bonded in place.

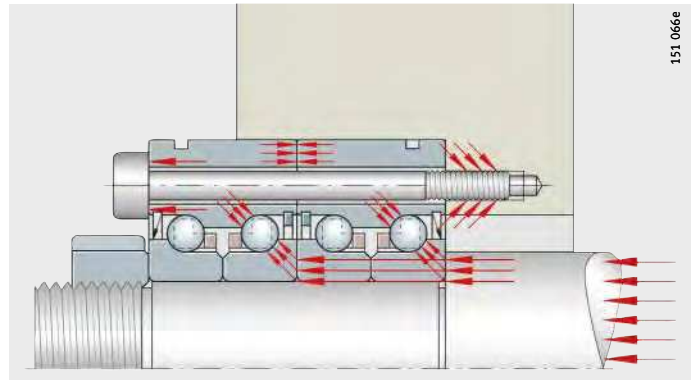
This means that, under normal design criteria and with the decisive static load safety factor for the corresponding areas of application (e.g.  $S_0 = 4$  for machine tools), the rolling element set is always the decisive criterion.

## Permissible static axial load for ZKLF

For bearings of series ZKLF, the permissible static axial load in the direction of the screw connections, *Figure 24*, is:

$$P_{0\text{per}} \leq \frac{C_{0a}}{2}$$

The basic static axial load rating  $C_{0a}$  is stated in the dimension tables.



*Figure 24*  
Static axial load in the direction of the screw connections

## Design of adjacent construction

The adjacent construction (the shaft and housing) must be designed in accordance with the data in the dimension tables.

The abutment diameters for the shaft and housing shoulders  $d_a$  and  $D_a$  must be in accordance with the dimension tables.

$d_a$  and  $D_a$  are recommended minimum abutment diameters. If these values are not used, the rib diameter  $d_1$  according to the dimension table must be observed.



## Matched bearings

In matched bearing pairs of series ZKLN and ZKLF, the depth of the housing bore must be defined such that the outer ring of the outermost bearing is radially supported to at least  $1/4$  of its width.

## Speeds

The limiting speeds  $n_G$  given in the dimension tables are based on the following conditions:

- bearing preloaded, no external operating load
- operating duration 25%
- max. equilibrium temperature +50 °C.

Under favourable environmental influences, a bearing with gap seals (suffix 2Z) can be used instead of contact seals. The limiting speed of these bearings is approximately twice that of axial angular contact ball bearings with contact seals.

# Axial angular contact ball bearings

**Friction** In most applications, preloading of bearings by means of the locknut tightening torque gives sufficiently accurate setting values. The reference here is the tightening torque  $M_A$  according to the dimension table in conjunction with an INA precision locknut.

The frictional torque  $M_{RL}$  given in the dimension tables is a guide value. The frictional torques are based, for bearings of series ZKLN, ZKLF, ZKLFA, DKLFA, 7602..-2RS, 7603..-2RS, BSB..-2RS and ZKLR on grease lubrication, measured at a speed of  $n = 5 \text{ min}^{-1}$ .

For unsealed bearings of series 7602, 7603 and BSB, the frictional torque  $M_{RL}$  is based on lightly oiled raceways.

For dimensioning of the drive, the starting frictional torque and the frictional torque at high speeds of  $2$  to  $3 \times M_{RL}$  must be taken into consideration.

**Seal friction** In axial angular contact ball bearings with contact seals (suffix 2RS), the extent of seal friction must not be neglected. Sealing influences the limiting speeds.

**Frictional energy** The frictional energy  $N_R$  of the bearings can be calculated as follows:

$$N_R = \frac{M_{RL} \cdot n}{9,55}$$

$N_R$  Frictional energy W  
 $M_{RL}$  Bearing frictional torque Nm  
 $n$  Operating speed.  $\text{min}^{-1}$

In any analysis of the thermal balance, the various operating speeds  $n_i$  and their corresponding time portions  $q_i$  must be taken into consideration.



**Lubrication** Bearings for screw drives can be lubricated with grease or oil. In machine tools, however, the mean bearing temperature should not exceed +50 °C. If this is the case, a lubrication method without heat dissipation such as grease lubrication or oil impulse lubrication can be selected.



For higher bearing temperatures and open bearings, recirculating oil lubrication should be used.

**Grease lubrication** Bearings with a relubrication facility of series ZKLN, ZKLF, ZKLFA and DKLFA are greased with a lithium soap grease to GA28 and are preferably run with grease lubrication. In most cases, the initial greasing is sufficient for the whole operating life of the bearing.

Under certain application conditions, relubrication may be necessary. In this case, Arcanol MULTITOP is suitable. The initial greasing is compatible with greases with a mineral oil base.

For checking by calculation of the grease operating life or relubrication interval, please contact us.

**Relubrication interval** The relubrication intervals cannot be determined precisely in advance. They are essentially dependent on the operating conditions and the environmental influences such as temperature, contamination, dust, water, etc.



Bearings must always be relubricated:

- before and after long stoppage periods
- in conditions of high humidity
- within the defined lubrication intervals as stated in the technical proposal letter.

For the following conditions, please contact us:

- if the bearings are stationary
- if vibration is present
- if very small oscillating movements occur.

**Relubrication quantity** If bearings of series ZKLN, ZKLF, ZKLFA and DKLFA must be relubricated due to the application conditions, please contact us regarding the relubrication quantities.

**Oil lubrication** Other lubrication methods such as oil impulse lubrication or recirculating oil lubrication are also possible. For oil lubrication, good results have been obtained with oils CLP to DIN 51 517 and HLP to DIN 51 524 of ISO-VG 32 to ISO-VG 100.

If oil impulse lubrication is intended for series ZKLN and ZKLF, gap seals are advantageous. They prevent contamination entering the bearing and allow oil to leave the bearing. This prevents overlubrication.



# Axial angular contact ball bearings

## Mounting guidelines



Bearings should only be fitted and dismantled in accordance with the Fitting and Maintenance Manual TPI 100. This TPI is available upon request.

During fitting of bearings, mounting forces should be applied only to the bearing ring to be fitted. Mounting forces must never be directed through the rolling elements or sealing rings.

The characteristics of the bearings are only valid when used in combination with INA precision locknuts and the associated tightening torques given in the dimension tables.

Axial angular contact ball bearings are self-retaining and the individual bearing components are matched to each other. The inner rings must not be removed from the bearing during fitting and dismantling. If individual bearing components are removed from the bearing, please contact us before carrying out any reassembly.

### Location of outer ring using ring nut for ZKLN, 7602, 7603, BSB

Axial angular contact ball bearings ZKLN, 7602, 7603 and BSB must be located clearance-free in the housing and on the shaft and must be axially preloaded during fitting. The axial preload force must be distributed evenly over the circumference in order to avoid deformation of the raceways.

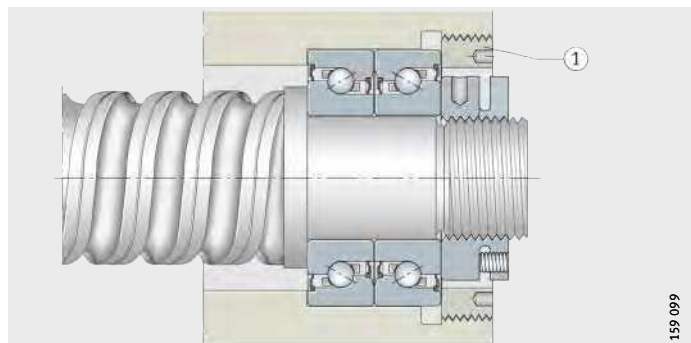
Outer rings are axially tensioned to the preload force given in the dimension table by means of a ring nut (not supplied), *Figure 25*. Secure the ring nut against loosening (using, for example, Loctite 638).

Ring nuts with a runout of max. 5 µm apply the preload force evenly over the bearing rings and should therefore be used in preference to location by means of a cover.

ZKLN, 7602, 7603, BSB

① Ring nut

*Figure 25*  
Two-bearing set in O arrangement, locknut, ring nut



### Location of outer ring using a cover

Clamping of the outer rings using a cover and cap screws leads to deformation of the raceways, *Figure 26*. In order to minimise the deformation and achieve the calculated life:

- the cover should be designed with adequate rigidity
- the number of fixing screws should be selected in accordance with the load but at least four should be used
- the screws should be tightened in a cross-wise sequence in four stages (finger tight, 40%, 70%, 100% of  $M_A$ ).



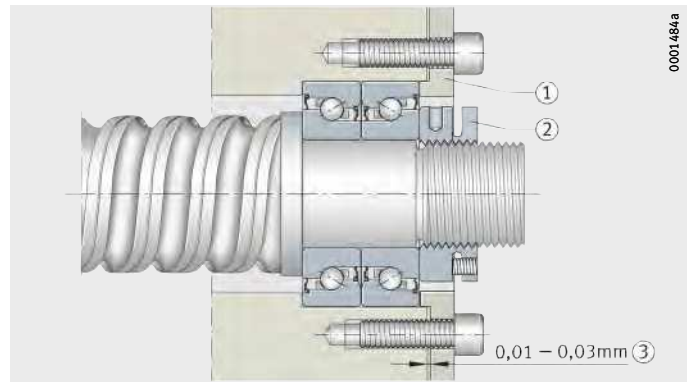
Observe the axial preload force in the dimension table. If other values are used, this will influence the bearing preload, bearing friction and heat generation in the bearing position.

ZKLN, 7602, 7603, BSB

- ① Cover
- ② Locknut
- ③ Gap before tightening of the cover fixing screws

*Figure 26*

Two-bearing set in O arrangement, locknut, cover



# Axial angular contact ball bearings

## Location of inner ring using locknut

Axial angular contact ball bearings must be axially preloaded during fitting by means of a precision locknut.

When preloading the bearings by means of the bearing inner rings using the recommended precision locknut, the tightening torques given in the dimension tables must be observed.

The tightening torques for the individual bearing sizes are only valid for the INA precision locknuts listed.

The preload force for series DKLFA is determined specifically on the basis of the operating conditions (load spectrum). Please contact us.

In order to counteract settling, it is recommended that the locknut should initially be tightened to twice the tightening torque  $M_A$  and then relieved of load again. It should only then be tightened again to the stated tightening torque  $M_A$ . Finally, the precision locknut should be secured against rotation by the torque-controlled tightening of the grub screws.

The characteristics of the bearings are only valid if the preload forces specified in the dimension tables are observed.

The tightening torques for INA precision locknuts required for this purpose are also given in the dimension tables.



If other suitable locknuts are used, the manufacturer's guidance on calculation of the necessary tightening torque should be observed.

Only locknuts with a minimum runout accuracy of the end face to the thread of 5  $\mu\text{m}$  should be used.

## Fixing screws

The fixing screws for the outer ring must be tightened in a crosswise sequence. They may be loaded up to 70% of their proof stress.

If the bearing outer ring is supported by an additional housing cover, it must be ensured that the fixing screws are sufficiently well dimensioned.

## Fitting of angular contact ball bearing units



Angular contact ball bearing units ZKLR require no additional preload after fitting. They can often therefore be located on the spindle simply by means of clearance-free clamping.

The type of axial location depends on the load to be supported. The adjacent construction can be a milled flat face or, if necessary, even an unmachined screw mounting surface without radial centring.

### Fitting

Locate the bearing unit using a locknut ① or clearance-free clamping on the threaded spindle ②, *Figure 27*.

Screw mount the bearing unit on the adjacent construction; tighten the screws only finger tight ③.

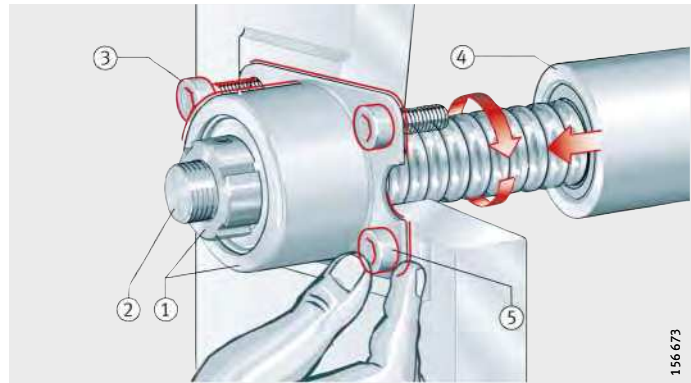
Move the screw drive nut ④ towards the bearing unit (the position of the screw drive is the datum for the linear guidance system, the nut serves as a functional element for alignment). The bearing will align itself to the optimum radial position (due to the constraining forces exerted by the datum).

Screw the bearing unit to the adjacent construction using the tightening torque specified in the assembly drawing ⑤.

### ZKLR

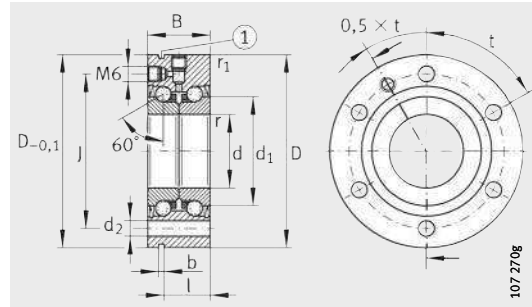
- ① Locknut
- ② Threaded spindle
- ③ Tightening of fixing screws finger tight
- ④ Screw drive nut
- ⑤ Tightening of fixing screws

*Figure 27*  
Fitting of bearing unit



# Axial angular contact ball bearings

For screw mounting



ZKLF..-2RS, ZKLF..-2Z (d ≤ 50 mm)  
① Extraction slot

**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions										Mounting dimensions		Fixing screws <sup>1)</sup> DIN 912-10.9	
		d	D	B	d <sub>1</sub>	r	r <sub>1</sub>	J	d <sub>2</sub>	b	l	D <sub>a</sub>	d <sub>a</sub>		
				-0,25		min.	min.					max.	min.	Size	Quantity
ZKLF1255-2RS	0,37	12 <sub>-0,005</sub>	55 <sub>-0,01</sub>	25	25	0,3	0,6	42	6,8	3	17	33	16	M6	3
ZKLF1255-2Z	0,37	12 <sub>-0,005</sub>	55 <sub>-0,01</sub>	25	25	0,3	0,6	42	6,8	3	17	33	16	M6	3
ZKLF1560-2RS	0,43	15 <sub>-0,005</sub>	60 <sub>-0,01</sub>	25	28	0,3	0,6	46	6,8	3	17	35	20	M6	3
ZKLF1560-2Z	0,43	15 <sub>-0,005</sub>	60 <sub>-0,01</sub>	25	28	0,3	0,6	46	6,8	3	17	35	20	M6	3
ZKLF1762-2RS	0,45	17 <sub>-0,005</sub>	62 <sub>-0,01</sub>	25	30	0,3	0,6	48	6,8	3	17	37	23	M6	3
ZKLF1762-2Z	0,45	17 <sub>-0,005</sub>	62 <sub>-0,01</sub>	25	30	0,3	0,6	48	6,8	3	17	37	23	M6	3
ZKLF2068-2RS	0,61	20 <sub>-0,005</sub>	68 <sub>-0,01</sub>	28	34,5	0,3	0,6	53	6,8	3	19	43	25	M6	4
ZKLF2068-2Z	0,61	20 <sub>-0,005</sub>	68 <sub>-0,01</sub>	28	34,5	0,3	0,6	53	6,8	3	19	43	25	M6	4
ZKLF2575-2RS	0,72	25 <sub>-0,005</sub>	75 <sub>-0,01</sub>	28	40,5	0,3	0,6	58	6,8	3	19	48	32	M6	4
ZKLF2575-2Z	0,72	25 <sub>-0,005</sub>	75 <sub>-0,01</sub>	28	40,5	0,3	0,6	58	6,8	3	19	48	32	M6	4
ZKLF3080-2RS	0,78	30 <sub>-0,005</sub>	80 <sub>-0,01</sub>	28	45,5	0,3	0,6	63	6,8	3	19	53	40	M6	6
ZKLF3080-2Z	0,78	30 <sub>-0,005</sub>	80 <sub>-0,01</sub>	28	45,5	0,3	0,6	63	6,8	3	19	53	40	M6	6
ZKLF30100-2RS <sup>3)</sup>	1,63	30 <sub>-0,005</sub>	100 <sub>-0,01</sub>	38	51	0,3	0,6	80	8,8	3	30	64	47	M8	8
ZKLF30100-2Z	1,63	30 <sub>-0,005</sub>	100 <sub>-0,01</sub>	38	51	0,3	0,6	80	8,8	3	30	64	47	M8	8
ZKLF3590-2RS	1,13	35 <sub>-0,005</sub>	90 <sub>-0,01</sub>	34	52	0,3	0,6	75	8,8	3	25	62	45	M8	4
ZKLF3590-2Z	1,13	35 <sub>-0,005</sub>	90 <sub>-0,01</sub>	34	52	0,3	0,6	75	8,8	3	25	62	45	M8	4
ZKLF40100-2RS	1,46	40 <sub>-0,005</sub>	100 <sub>-0,01</sub>	34	58	0,3	0,6	80	8,8	3	25	67	50	M8	4
ZKLF40100-2Z	1,46	40 <sub>-0,005</sub>	100 <sub>-0,01</sub>	34	58	0,3	0,6	80	8,8	3	25	67	50	M8	4
ZKLF40115-2RS <sup>3)</sup>	2,2	40 <sub>-0,005</sub>	115 <sub>-0,01</sub>	46	65	0,6	0,6	94	8,8	3	36	80	56	M8	12
ZKLF40115-2Z <sup>3)</sup>	2,2	40 <sub>-0,005</sub>	115 <sub>-0,01</sub>	46	65	0,6	0,6	94	8,8	3	36	80	56	M8	12
ZKLF50115-2RS	1,86	50 <sub>-0,005</sub>	115 <sub>-0,01</sub>	34	72	0,3	0,6	94	8,8	3	25	82	63	M8	6
ZKLF50115-2Z	1,86	50 <sub>-0,005</sub>	115 <sub>-0,01</sub>	34	72	0,3	0,6	94	8,8	3	25	82	63	M8	6
ZKLF50140-2RS <sup>3)</sup>	4,7	50 <sub>-0,005</sub>	140 <sub>-0,01</sub>	54	80	0,6	0,6	113	11	3	45	98	63	M10	12
ZKLF50140-2Z <sup>3)</sup>	4,7	50 <sub>-0,005</sub>	140 <sub>-0,01</sub>	54	80	0,6	0,6	113	11	3	45	98	63	M10	12
ZKLF60145-2Z	4,3	60 <sub>-0,008</sub>	145 <sub>-0,015</sub>	45	85	0,6	0,6	120	8,8	3	35	100	82	M8	8
ZKLF70155-2Z	4,9	70 <sub>-0,008</sub>	155 <sub>-0,015</sub>	45	85	0,6	0,6	130	8,8	3	35	110	92	M8	8
ZKLF80165-2Z	5,3	80 <sub>-0,008</sub>	165 <sub>-0,015</sub>	45	105	0,6	0,6	140	8,8	3	35	120	102	M8	8
ZKLF90190-2Z	8,7	90 <sub>-0,008</sub>	190 <sub>-0,015</sub>	55	120	0,6	0,6	165	11	3	45	138	116	M10	8
ZKLF100200-2Z	9,3	100 <sub>-0,008</sub>	200 <sub>-0,015</sub>	55	132	0,6	0,6	175	11	3	45	150	128	M10	8

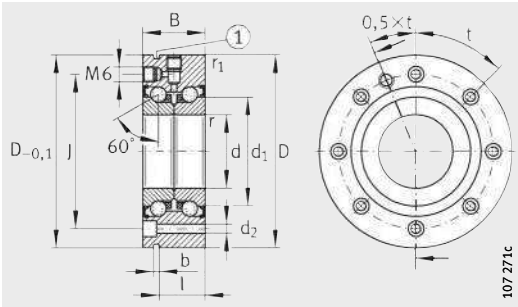
1) Tightening torque of fixing screws according to manufacturer's data. Screws are not included in the delivery.

2) Mass moment of inertia for rotating inner ring.

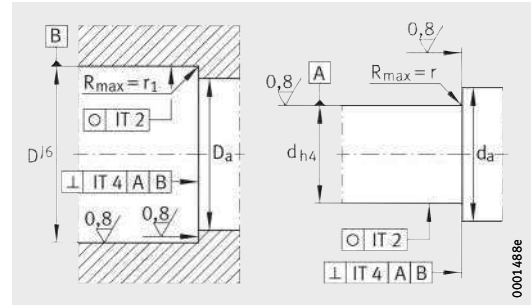
3) Heavy series.

4) Only valid in conjunction with INA precision locknuts.

5) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



ZKL.-2Z, (60 mm ≤ d ≤ 100 mm)  
 ① Extraction slot



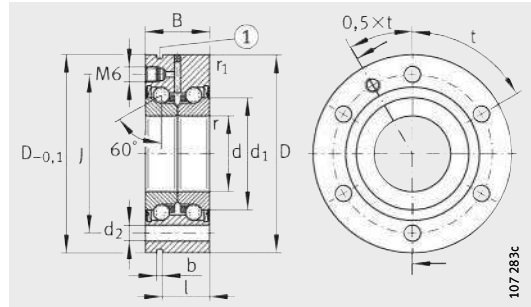
Design of adjacent construction

Pitch t	Basic load ratings axial		Limiting speed n <sub>G</sub> grease	Bearing frictional torque M <sub>RL</sub>	Rigid- ity axial c <sub>aL</sub>	Tilting rigid- ity c <sub>kL</sub>	Mass moment of inertia <sup>2)</sup> M <sub>m</sub>	Axial run-out <sup>5)</sup>	Recommended INA locknut; to be ordered separately			
	dyn. C <sub>a</sub>	stat. C <sub>0a</sub>							Designation	Tightening torque <sup>4)</sup> M <sub>A</sub> Nm	Axial pre-load force N	
Quantity Xt	N	N	min <sup>-1</sup>	Nm	N/μm	Nm/m rad	kg · cm <sup>2</sup>	μm				
3X120°	16900	24700	3800	0,16	375	50	0,068	2	<b>ZM12</b>	–	8	5038
3X120°	16900	24700	7600	0,08	375	50	0,068	2	<b>ZM12</b>	–	8	5038
3X120°	17900	28000	3500	0,2	400	65	0,102	2	<b>ZM15</b>	<b>AM15</b>	10	5484
3X120°	17900	28000	7000	0,1	400	65	0,102	2	<b>ZM15</b>	<b>AM15</b>	10	5484
3X120°	18800	31000	3300	0,24	450	80	0,132	2	<b>ZM17</b>	<b>AM17</b>	15	7157
3X120°	18800	31000	6600	0,12	450	80	0,132	2	<b>ZM17</b>	<b>AM17</b>	15	7157
4X 90°	26000	47000	3000	0,3	650	140	0,273	2	<b>ZM20</b>	<b>AM20</b>	18	9079
4X 90°	26000	47000	5400	0,15	650	140	0,273	2	<b>ZM20</b>	<b>AM20</b>	18	9079
4X 90°	27500	55000	2600	0,4	750	200	0,486	2	<b>ZM25</b>	<b>AM25</b>	25	9410
4X 90°	27500	55000	4700	0,2	750	200	0,486	2	<b>ZM25</b>	<b>AM25</b>	25	9410
6X 60°	29000	64000	2200	0,5	850	300	0,73	2,5	<b>ZM30</b>	<b>AM30</b>	32	10451
6X 60°	29000	64000	4300	0,25	850	300	0,73	2,5	<b>ZM30</b>	<b>AM30</b>	32	10451
8X 45°	59000	108000	2100	0,8	950	400	1,91	2,5	<b>ZMA30/52</b>	<b>AM30</b>	65	19509
8X 45°	59000	108000	4000	0,4	950	400	1,91	2,5	<b>ZMA30/52</b>	<b>AM30</b>	65	19509
4X 90°	41000	89000	2000	0,6	900	400	1,51	2,5	<b>ZM35</b>	<b>AM35/58</b>	40	10770
4X 90°	41000	89000	3800	0,3	900	400	1,51	2,5	<b>ZM35</b>	<b>AM35/58</b>	40	10770
4X 90°	43000	101000	1800	0,7	1000	550	2,26	2,5	<b>ZM40</b>	<b>AM40</b>	55	13412
4X 90°	43000	101000	3300	0,35	1000	550	2,26	2,5	<b>ZM40</b>	<b>AM40</b>	55	13412
12X 30°	72000	149000	1600	1,3	1200	750	5,5	2,5	<b>ZMA40/62</b>	<b>AM40</b>	110	25185
12X 30°	72000	149000	3100	0,65	1200	750	5,5	2,5	<b>ZMA40/62</b>	<b>AM40</b>	110	25185
6X 60°	46500	126000	1500	0,9	1250	1000	5,24	2,5	<b>ZM50</b>	<b>AM50</b>	85	17009
6X 60°	46500	126000	3000	0,45	1250	1000	5,24	2,5	<b>ZM50</b>	<b>AM50</b>	85	17009
12X 30°	113000	250000	1200	2,6	1400	1500	15,2	2,5	<b>ZMA50/75</b>	<b>AM50</b>	150	29436
12X 30°	113000	250000	2500	1,3	1400	1500	15,2	2,5	<b>ZMA50/75</b>	<b>AM50</b>	150	29436
8X 45°	84000	214000	3000	1	1300	1650	13,7	3	<b>ZMA60/98</b>	<b>AM60</b>	100	17893
8X 45°	88000	241000	2800	1,2	1450	2250	19,8	3	<b>ZMA70/110</b>	<b>AM70</b>	130	19717
8X 45°	91000	265000	2700	1,4	1600	3000	27,6	3	<b>ZMA80/120</b>	<b>AM80</b>	160	20604
8X 45°	135000	395000	2300	2,3	1700	4400	59,9	3	<b>ZMA90/130</b>	<b>AM90</b>	200	25198
8X 45°	140000	435000	2150	2,6	1900	5800	85,3	3	<b>ZMA100/140</b>	<b>AM100</b>	250	28760



# Axial angular contact ball bearings

For screw mounting  
Less stringent tolerances



ZKLF..-2RS-PE  
① Extraction slot

**Dimension table** - Dimensions in mm

Designation	Mass m	Dimensions										Mounting dimensions		Fixing screws <sup>1)</sup> DIN 912-10.9	
		d	D	B	d <sub>1</sub>	r	r <sub>1</sub>	J	d <sub>2</sub>	b	l	D <sub>a</sub>	d <sub>a</sub>	Size	Quantity
		≈kg	-0,01		-0,25		min.	min.					max.		
<b>ZKLF1255-2RS-PE</b>	0,37	<b>12</b>	55 <sub>-0,013</sub>	25	25	0,3	0,6	42	6,8	3	17	33	16	M6	3
<b>ZKLF1560-2RS-PE</b>	0,43	<b>15</b>	60 <sub>-0,013</sub>	25	28	0,3	0,6	46	6,8	3	17	35	20	M6	3
<b>ZKLF1762-2RS-PE</b>	0,45	<b>17</b>	62 <sub>-0,013</sub>	25	30	0,3	0,6	48	6,8	3	17	37	23	M6	3
<b>ZKLF2068-2RS-PE</b>	0,61	<b>20</b>	68 <sub>-0,013</sub>	28	34,5	0,3	0,6	53	6,8	3	19	43	25	M6	4
<b>ZKLF2575-2RS-PE</b>	0,72	<b>25</b>	75 <sub>-0,013</sub>	28	40,5	0,3	0,6	58	6,8	3	19	48	32	M6	4
<b>ZKLF3080-2RS-PE</b>	0,78	<b>30</b>	80 <sub>-0,013</sub>	28	45,5	0,3	0,6	63	6,8	3	19	53	40	M6	6
<b>ZKLF3590-2RS-PE</b>	1,13	<b>35</b>	90 <sub>-0,015</sub>	34	52	0,3	0,6	75	8,8	3	25	62	45	M8	4
<b>ZKLF40100-2RS-PE</b>	1,46	<b>40</b>	100 <sub>-0,015</sub>	34	58	0,3	0,6	80	8,8	3	25	67	50	M8	4
<b>ZKLF50115-2RS-PE</b>	1,86	<b>50</b>	115 <sub>-0,015</sub>	34	72	0,3	0,6	94	8,8	3	25	82	63	M8	6

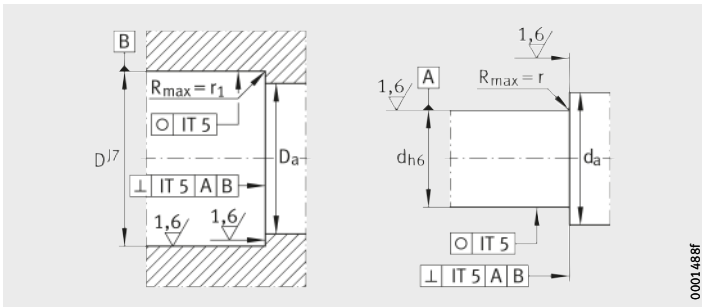
1) Tightening torque of fixing screws according to manufacturer's data.  
Screws are not included in the delivery.

2) Mass moment of inertia for rotating inner ring.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.





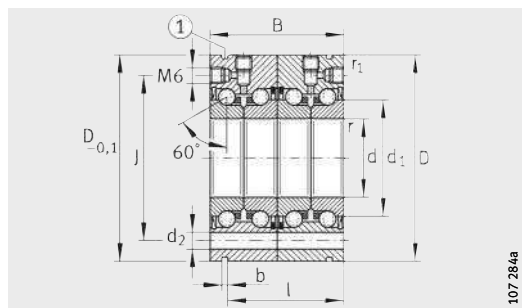
Design of adjacent construction

Pitch	Basic load ratings axial		Limiting speed $n_G$ grease	Bearing frictional torque $M_{RL}$	Rigidity axial $c_{aL}$	Tilting rigidity $c_{kL}$	Mass moment of inertia <sup>2)</sup> $M_m$	Axial run-out <sup>4)</sup> $\mu m$	Recommended INA locknut; to be ordered separately			
	dyn. $C_a$	stat. $C_{0a}$							Designation	Tightening torque <sup>3)</sup> $M_A$ Nm	Axial preload force N	
t	N	N	$min^{-1}$	Nm	N/ $\mu m$	Nm/m rad	$kg \cdot cm^2$	$\mu m$				
3X120°	16 900	24 700	3 800	0,16	375	50	0,068	5	<b>ZM12</b>	–	8	5 038
3X120°	17 900	28 000	3 500	0,2	400	65	0,102	5	<b>ZM15</b>	<b>AM15</b>	10	5 484
3X120°	18 800	31 000	3 300	0,24	450	80	0,132	5	<b>ZM17</b>	<b>AM17</b>	15	7 157
4X 90°	26 000	47 000	3 000	0,3	650	140	0,273	5	<b>ZM20</b>	<b>AM20</b>	18	9 079
4X 90°	27 500	55 000	2 600	0,4	750	200	0,486	5	<b>ZM25</b>	<b>AM25</b>	25	9 410
6X 60°	29 000	64 000	2 200	0,5	850	300	0,73	5	<b>ZM30</b>	<b>AM30</b>	32	10 451
4X 90°	41 000	89 000	2 000	0,6	900	400	1,51	5	<b>ZM35</b>	<b>AM35/58</b>	40	10 770
4X 90°	43 000	101 000	1 800	0,7	1 000	550	2,26	5	<b>ZM40</b>	<b>AM40</b>	55	13 412
6X 60°	46 500	126 000	1 500	0,9	1 250	1 000	5,24	5	<b>ZM50</b>	<b>AM50</b>	85	17 009



# Axial angular contact ball bearings

For screw mounting  
Matched pair



ZKL...-2RS-2AP  
① Extraction slot

**Dimension table** - Dimensions in mm

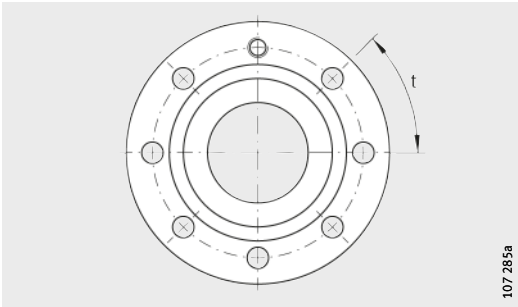
Designation	Mass m ≈kg	Dimensions											Mounting dimensions		Fixing screws <sup>1)</sup> DIN 912-10.9	
		d	D	B	d <sub>1</sub>	r	r <sub>1</sub>	J	d <sub>2</sub>	l	b	D <sub>a</sub>	d <sub>a</sub>	Size	Quantity	
		-0,005	-0,010	-0,50	min.	min.						max.	min.			
<b>ZKL1762-2RS-2AP</b>	0,9	<b>17</b>	62	50	30	0,3	0,6	48	6,8	42	3	37	23	M6X60	5	
<b>ZKL2068-2RS-2AP</b>	1,22	<b>20</b>	68	56	34,5	0,3	0,6	53	6,8	47	3	43	25	M6X70	7	
<b>ZKL2575-2RS-2AP</b>	1,44	<b>25</b>	75	56	40,5	0,3	0,6	58	6,8	47	3	48	32	M6X70	7	
<b>ZKL3080-2RS-2AP</b>	1,56	<b>30</b>	80	56	45,5	0,3	0,6	63	6,8	47	3	53	40	M6X70	11	
<b>ZKL3590-2RS-2AP</b>	2,26	<b>35</b>	90	68	52	0,3	0,6	75	8,8	59	3	62	45	M8X80	7	
<b>ZKL40100-2RS-2AP</b>	2,92	<b>40</b>	100	68	58	0,3	0,6	80	8,8	59	3	67	50	M8X80	7	
<b>ZKL50115-2RS-2AP</b>	3,72	<b>50</b>	115	68	72	0,3	0,6	94	8,8	59	3	82	63	M8X80	11	

<sup>1)</sup> Tightening torque of fixing screws according to manufacturer's data.  
Screws are not included in the delivery.

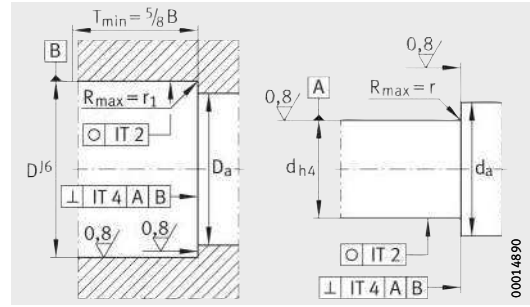
<sup>2)</sup> Mass moment of inertia for rotating inner ring.

<sup>3)</sup> Only valid in conjunction with INA precision locknuts.

<sup>4)</sup> The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



Hole pattern



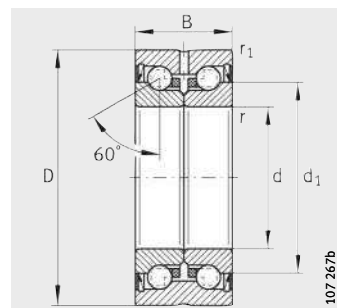
Design of adjacent construction

Pitch  t	Basic load ratings axial		Limiting speed $n_G$ grease	Bearing frictional torque $M_{RL}$	Rigidity axial $c_{aL}$	Tilting rigidity $c_{kL}$	Mass moment of inertia <sup>2)</sup> $M_m$	Axial run-out <sup>4)</sup>	Recommended INA locknut; to be ordered separately			
	dyn. $C_a$	stat. $C_{0a}$							Designation	Tightening torque <sup>3)</sup> $M_A$ Nm	Axial preload force N	
Quantity $X_t$	N	N	$\text{min}^{-1}$	Nm	N/ $\mu\text{m}$	Nm/mrad	$\text{kg} \cdot \text{cm}^2$	$\mu\text{m}$				
6X60°	30 500	62 000	3 300	0,36	800	200	0,264	2	<b>ZM17</b>	<b>AM17</b>	15	7 157
8X45°	42 000	94 000	3 000	0,45	1 150	320	0,564	2	<b>ZMA20/38</b>	<b>AM20</b>	18	9 079
8X45°	44 500	111 000	2 600	0,6	1 300	450	0,972	2	<b>ZMA25/45</b>	<b>AM25</b>	25	9 410
12X30°	47 500	127 000	2 200	0,75	1 500	620	1,46	2,5	<b>ZMA30/52</b>	<b>AM30</b>	32	10 451
8X45°	66 000	177 000	2 000	0,9	1 600	900	3,02	2,5	<b>ZMA35/58</b>	<b>AM35/58</b>	40	10 770
8X45°	70 000	202 000	1 800	1,05	1 750	1 200	4,52	2,5	<b>ZMA40/62</b>	<b>AM40</b>	55	13 412
12X30°	76 000	250 000	1 500	1,35	2 200	2 250	10,48	2,5	<b>ZMA50/75</b>	<b>AM50</b>	85	17 009



# Axial angular contact ball bearings

Not for screw mounting



ZKLN...-2RS

ZKLN...-2Z

**Dimension table** - Dimensions in mm

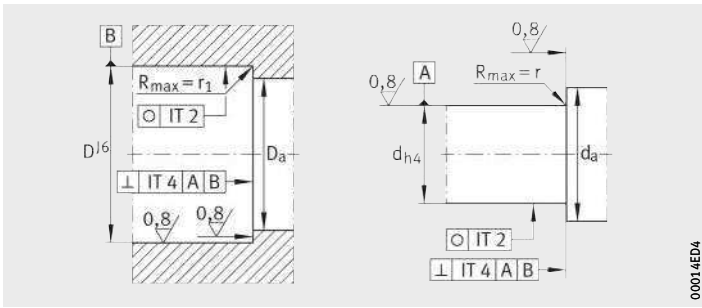
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		Basic load ratings axial	
		d	D	B	d <sub>1</sub>	r	r <sub>1</sub>	D <sub>a</sub>	d <sub>a</sub>	dyn. C <sub>a</sub>	stat. C <sub>0a</sub>
		-0,005	-0,010	-0,25		min.	min.	max.	min.	N	N
ZKLN0619-2Z	0,02	6 <sup>+0,002</sup> <sub>-0,003</sub>	19	12	12	0,3	0,3	16	9	4 900	6 100
ZKLN0624-2RS	0,03	6 <sup>+0,002</sup> <sub>-0,003</sub>	24	15	14	0,3	0,6	19	9	6 900	8 500
ZKLN0624-2Z	0,03	6 <sup>+0,002</sup> <sub>-0,003</sub>	24	15	14	0,3	0,6	19	9	6 900	8 500
ZKLN0832-2RS	0,09	<b>8</b>	32	20	19	0,3	0,6	26	11	12 500	16 300
ZKLN0832-2Z	0,09	<b>8</b>	32	20	19	0,3	0,6	26	11	12 500	16 300
ZKLN1034-2RS	0,1	<b>10</b>	34	20	21	0,3	0,6	28	14	13 400	18 800
ZKLN1034-2Z	0,1	<b>10</b>	34	20	21	0,3	0,6	28	14	13 400	18 800
ZKLN1242-2RS	0,2	<b>12</b>	42	25	25	0,3	0,6	33	16	16 900	24 700
ZKLN1242-2Z	0,2	<b>12</b>	42	25	25	0,3	0,6	33	16	16 900	24 700
ZKLN1545-2RS	0,21	<b>15</b>	45	25	28	0,3	0,6	35	20	17 900	28 000
ZKLN1545-2Z	0,21	<b>15</b>	45	25	28	0,3	0,6	35	20	17 900	28 000
ZKLN1747-2RS	0,22	<b>17</b>	47	25	30	0,3	0,6	37	23	18 800	31 000
ZKLN1747-2Z	0,22	<b>17</b>	47	25	30	0,3	0,6	37	23	18 800	31 000
ZKLN2052-2RS	0,31	<b>20</b>	52	28	34,5	0,3	0,6	43	25	26 000	47 000
ZKLN2052-2Z	0,31	<b>20</b>	52	28	34,5	0,3	0,6	43	26	26 000	47 000
ZKLN2557-2RS	0,34	<b>25</b>	57	28	40,5	0,3	0,6	48	32	27 500	55 000
ZKLN2557-2Z	0,34	<b>25</b>	57	28	40,5	0,3	0,6	48	32	27 500	55 000
ZKLN3062-2RS	0,39	<b>30</b>	62	28	45,5	0,3	0,6	53	40	29 000	64 000
ZKLN3062-2Z	0,39	<b>30</b>	62	28	45,5	0,3	0,6	53	40	29 000	64 000
ZKLN3072-2RS <sup>2)</sup>	0,72	<b>30</b>	72	38	51	0,3	0,6	64	47	59 000	108 000
ZKLN3072-2Z <sup>2)</sup>	0,72	<b>30</b>	72	38	51	0,3	0,6	64	47	59 000	108 000
ZKLN3572-2RS	0,51	<b>35</b>	72	34	52	0,3	0,6	62	45	41 000	89 000
ZKLN3572-2Z	0,51	<b>35</b>	72	34	52	0,3	0,6	62	45	41 000	89 000

1) Mass moment of inertia for rotating inner ring.

2) Heavy series.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



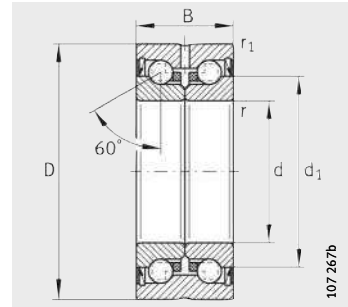
Design of adjacent construction

Limiting speed $n_G$ grease $\text{min}^{-1}$	Bearing frictional torque $M_{RL}$ Nm	Rigidity axial $c_{aL}$ $\text{N}/\mu\text{m}$	Tilting rigidity $c_{kL}$ $\text{Nm}/\text{mrad}$	Mass moment of inertia <sup>1)</sup> $M_m$ $\text{kg} \cdot \text{cm}^2$	Axial runout <sup>4)</sup> $\mu\text{m}$	Recommended INA locknut; to be ordered separately		
						Designation	Tightening torque <sup>3)</sup> $M_A$ Nm	Axial preload force N
14 000	0,01	150	4	0,0019	2	<b>ZM06</b> –	1	916
6 800	0,04	200	8	0,0044	2	<b>ZM06</b> –	2	2 404
12 000	0,02	200	8	0,0044	2	<b>ZM06</b> –	2	2 404
5 100	0,08	250	20	0,02	2	<b>ZM08</b> –	4	2 216
9 500	0,04	250	20	0,02	2	<b>ZM08</b> –	4	2 216
4 600	0,12	325	25	0,029	2	<b>ZM10</b> –	6	4 891
8 600	0,06	325	25	0,029	2	<b>ZM10</b> –	6	4 891
3 800	0,16	375	50	0,068	2	<b>ZM12</b> –	8	5 038
7 600	0,08	375	50	0,068	2	<b>ZM12</b> –	8	5 038
3 500	0,2	400	65	0,102	2	<b>ZM15</b> <b>AM15</b>	10	5 484
7 000	0,1	400	65	0,102	2	<b>ZM15</b> <b>AM15</b>	10	5 484
3 300	0,24	450	80	0,132	2	<b>ZM17</b> <b>AM17</b>	15	7 157
6 600	0,12	450	80	0,132	2	<b>ZM17</b> <b>AM17</b>	15	7 157
3 000	0,3	650	140	0,273	2	<b>ZM20</b> <b>AM20</b>	18	9 079
5 400	0,15	650	140	0,273	2	<b>ZM20</b> <b>AM20</b>	18	9 079
2 600	0,4	750	200	0,486	2	<b>ZM25</b> <b>AM25</b>	25	9 410
4 700	0,2	750	200	0,486	2	<b>ZM25</b> <b>AM25</b>	25	9 410
2 200	0,5	850	300	0,73	2,5	<b>ZM30</b> <b>AM30</b>	32	10 451
4 300	0,25	850	300	0,73	2,5	<b>ZM30</b> <b>AM30</b>	32	10 451
2 100	0,8	950	400	1,91	2,5	<b>ZMA30/52</b> <b>AM30</b>	65	19 509
4 000	0,4	950	400	1,91	2,5	<b>ZMA30/52</b> <b>AM30</b>	65	19 509
2 000	0,6	900	400	1,51	2,5	<b>ZM35</b> <b>AM35/58</b>	40	10 770
3 800	0,3	900	400	1,51	2,5	<b>ZM35</b> <b>AM35/58</b>	40	10 770



# Axial angular contact ball bearings

Not for screw mounting



ZKLN...-2RS  
ZKLN...-2Z

**Dimension table** (continued) · Dimensions in mm

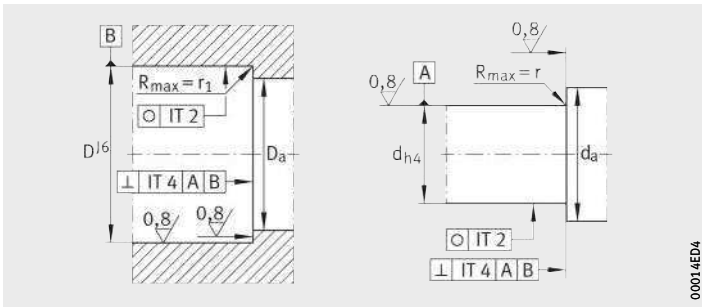
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		Basic load ratings axial	
		d	D	B	d <sub>1</sub>	r	r <sub>1</sub>	D <sub>a</sub>	d <sub>a</sub>	dyn. C <sub>a</sub>	stat. C <sub>0a</sub>
				-0,25	min.	min.	max.	min.	N	N	
ZKLN4075-2RS	0,61	40 <sub>-0,005</sub>	75 <sub>-0,01</sub>	34	58	0,3	0,6	67	50	43 000	101 000
ZKLN4075-2Z	0,61	40 <sub>-0,005</sub>	75 <sub>-0,01</sub>	34	58	0,3	0,6	67	50	43 000	101 000
ZKLN4090-2RS <sup>2)</sup>	0,95	40 <sub>-0,005</sub>	90 <sub>-0,01</sub>	46	65	0,6	0,6	80	56	72 000	149 000
ZKLN4090-2Z <sup>2)</sup>	0,95	40 <sub>-0,005</sub>	90 <sub>-0,01</sub>	46	65	0,6	0,6	80	56	72 000	149 000
ZKLN5090-2RS	0,88	50 <sub>-0,005</sub>	90 <sub>-0,01</sub>	34	72	0,3	0,6	82	63	46 500	126 000
ZKLN5090-2Z	0,88	50 <sub>-0,005</sub>	90 <sub>-0,01</sub>	34	72	0,3	0,6	82	63	46 500	126 000
ZKLN50110-2RS <sup>2)</sup>	2,5	50 <sub>-0,005</sub>	110 <sub>-0,01</sub>	54	80	0,6	0,6	98	63	113 000	250 000
ZKLN50110-2Z <sup>2)</sup>	2,5	50 <sub>-0,005</sub>	110 <sub>-0,01</sub>	54	80	0,6	0,6	98	63	113 000	250 000
ZKLN60110-2Z	2,2	60 <sub>-0,008</sub>	110 <sub>-0,015</sub>	45	85	0,6	0,6	100	82	84 000	214 000
ZKLN70120-2Z	2,4	70 <sub>-0,008</sub>	120 <sub>-0,015</sub>	45	95	0,6	0,6	110	92	88 000	241 000
ZKLN80130-2Z	2,7	80 <sub>-0,008</sub>	130 <sub>-0,015</sub>	45	105	0,6	0,6	120	102	91 000	265 000
ZKLN90150-2Z	4,5	90 <sub>-0,008</sub>	150 <sub>-0,015</sub>	55	120	0,6	0,6	138	116	135 000	395 000
ZKLN100160-2Z	4,9	100 <sub>-0,008</sub>	160 <sub>-0,015</sub>	55	132	0,6	0,6	150	128	140 000	435 000

1) Mass moment of inertia for rotating inner ring.

2) Heavy series.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



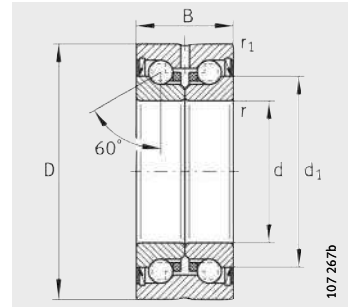
Design of adjacent construction

Limiting speed $n_G$ grease  min <sup>-1</sup>	Bearing frictional torque $M_{RL}$  Nm	Rigidity axial $c_{aL}$  N/ $\mu$ m	Tilting rigidity $c_{kL}$  Nm/mrad	Mass moment of inertia <sup>1)</sup> $M_m$  kg · cm <sup>2</sup>	Axial runout <sup>4)</sup>  $\mu$ m	Recommended INA locknut; to be ordered separately			
						Designation	Tightening torque <sup>3)</sup> $M_A$ Nm	Axial preload force N	
1 800	0,7	1 000	550	2,26	2,5	<b>ZM40</b>	<b>AM40</b>	55	13 412
3 300	0,35	1 000	550	2,26	2,5	<b>ZM40</b>	<b>AM40</b>	55	13 412
1 600	1,3	1 200	750	5,5	2,5	<b>ZMA40/62</b>	<b>AM40</b>	110	25 185
3 100	0,65	1 200	750	5,5	2,5	<b>ZMA40/62</b>	<b>AM40</b>	110	25 185
1 500	0,9	1 250	1 000	5,24	2,5	<b>ZM50</b>	<b>AM50</b>	85	17 009
3 000	0,45	1 250	1 000	5,24	2,5	<b>ZM50</b>	<b>AM50</b>	85	17 009
1 200	2,6	1 400	1 500	15,2	2,5	<b>ZMA50/75</b>	<b>AM50</b>	150	29 436
2 500	1,3	1 400	1 500	15,2	2,5	<b>ZMA50/75</b>	<b>AM50</b>	150	29 436
3 000	1	1 300	1 650	13,7	3	<b>ZMA60/98</b>	<b>AM60</b>	100	17 893
2 800	1,2	1 450	2 250	19,8	3	<b>ZMA70/110</b>	<b>AM70</b>	130	19 171
2 700	1,4	1 600	3 000	27,6	3	<b>ZMA80/120</b>	<b>AM80</b>	160	20 604
2 300	2,3	1 700	4 400	59,9	3	<b>ZMA90/130</b>	<b>AM90</b>	200	25 198
2 150	2,6	1 900	5 800	85,3	3	<b>ZMA100/140</b>	<b>AM100</b>	250	28 760



# Axial angular contact ball bearings

Not for screw mounting  
Less stringent tolerances



ZKLN...-2RS-PE

**Dimension table** - Dimensions in mm

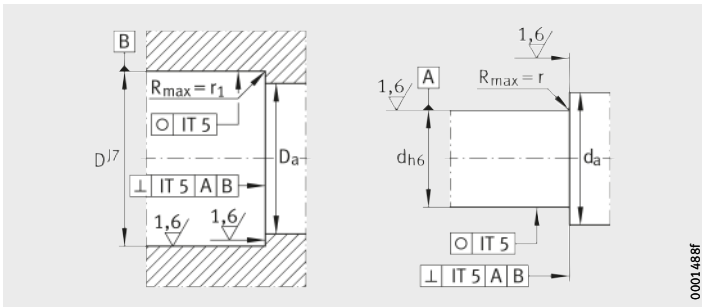
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		Basic load ratings axial	
		d	D	B	d <sub>1</sub>	r	r <sub>1</sub>	D <sub>a</sub>	d <sub>a</sub>	dyn. C <sub>a</sub>	stat. C <sub>0a</sub>
				-0,25		min.	min.	max.	min.	N	N
ZKLN0624-2RS-PE	0,03	6 <sup>+0,003</sup> <sub>-0,005</sub>	24 <sub>-0,01</sub>	15	14	0,3	0,6	19	9	6 900	8 500
ZKLN1034-2RS-PE	0,1	10 <sup>-0,008</sup>	34 <sub>-0,011</sub>	20	21	0,3	0,6	28	14	13 400	18 800
ZKLN1242-2RS-PE	0,2	12 <sub>-0,01</sub>	42 <sub>-0,011</sub>	25	25	0,3	0,6	33	16	16 900	24 700
ZKLN1545-2RS-PE	0,21	15 <sub>-0,01</sub>	45 <sub>-0,011</sub>	25	28	0,3	0,6	35	20	17 900	28 000
ZKLN1747-2RS-PE	0,22	17 <sub>-0,01</sub>	47 <sub>-0,011</sub>	25	30	0,3	0,6	37	23	18 800	31 000
ZKLN2052-2RS-PE	0,31	20 <sub>-0,01</sub>	52 <sub>-0,013</sub>	28	34,5	0,3	0,6	43	25	26 000	47 000
ZKLN2557-2RS-PE	0,34	25 <sub>-0,01</sub>	57 <sub>-0,013</sub>	28	40,5	0,3	0,6	48	32	27 500	55 000
ZKLN3062-2RS-PE	0,39	30 <sub>-0,01</sub>	62 <sub>-0,013</sub>	28	45,5	0,3	0,6	53	40	29 000	64 000
ZKLN3572-2RS-PE	0,51	35 <sub>-0,01</sub>	72 <sub>-0,013</sub>	34	52	0,3	0,6	62	45	41 000	89 000
ZKLN5090-2RS-PE	0,88	50 <sub>-0,01</sub>	90 <sub>-0,015</sub>	34	72	0,3	0,6	82	63	46 500	126 000

1) Mass moment of inertia for rotating inner ring.

2) Only valid in conjunction with INA precision locknuts.

3) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.





Design of adjacent construction

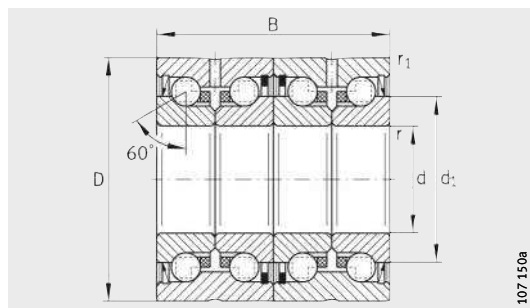
Limiting speed $n_G$ grease $\text{min}^{-1}$	Bearing frictional torque $M_{RL}$ Nm	Rigidity axial $c_{aL}$ $\text{N}/\mu\text{m}$	Tilting rigidity $c_{kL}$ $\text{Nm}/\text{mrad}$	Mass moment of inertia <sup>1)</sup> $M_m$ $\text{kg} \cdot \text{cm}^2$	Axial runout <sup>3)</sup> $\mu\text{m}$	Recommended INA locknut; to be ordered separately		
						Designation	Tightening torque <sup>2)</sup> $M_A$ Nm	Axial preload force N
6 800	0,04	200	8	0,0044	5	<b>ZM06</b> –	2	2 404
4 600	0,12	325	25	0,029	5	<b>ZM10</b> –	6	4 891
3 800	0,16	375	50	0,068	5	<b>ZM12</b> –	8	5 038
3 500	0,2	400	65	0,102	5	<b>ZM15</b> <b>AM15</b>	10	5 484
3 300	0,24	450	80	0,132	5	<b>ZM17</b> <b>AM17</b>	15	7 157
3 000	0,3	650	140	0,273	5	<b>ZM20</b> <b>AM20</b>	18	9 079
2 600	0,4	750	200	0,486	5	<b>ZM25</b> <b>AM25</b>	25	9 410
2 200	0,5	850	300	0,73	5	<b>ZM30</b> <b>AM30</b>	32	10 451
2 000	0,6	900	400	1,51	5	<b>ZM35</b> <b>AM35/38</b>	40	10 770
1 500	0,9	1 250	1 000	5,24	5	<b>ZM50</b> <b>AM50</b>	85	17 009



# Axial angular contact ball bearings

Not for screw mounting

Matched pair



ZKLN...-2RS-2AP

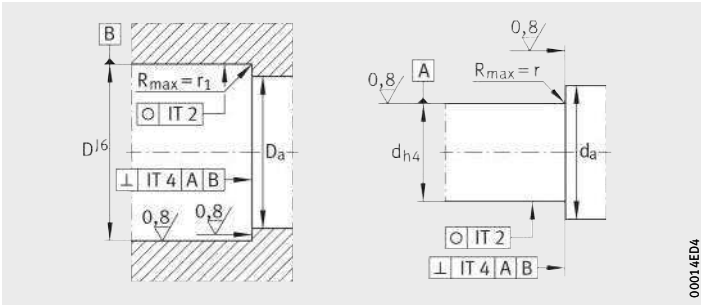
**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		Basic load ratings axial	
		d	D	B	d <sub>1</sub>	r	r <sub>1</sub>	D <sub>a</sub>	d <sub>a</sub>	dyn. C <sub>a</sub>	stat. C <sub>0a</sub>
		-0,005	-0,01	-0,5		min.	min.	max.	min.	N	N
<b>ZKLN1747-2RS-2AP</b>	0,44	<b>17</b>	47	50	30	0,3	0,6	37	23	30 500	62 000
<b>ZKLN2052-2RS-2AP</b>	0,62	<b>20</b>	52	56	34,5	0,3	0,6	43	25	42 000	94 000
<b>ZKLN2557-2RS-2AP</b>	0,68	<b>25</b>	57	56	40,5	0,3	0,6	48	32	44 500	111 000
<b>ZKLN3062-2RS-2AP</b>	0,78	<b>30</b>	62	56	45,5	0,3	0,6	53	40	47 500	127 000
<b>ZKLN3572-2RS-2AP</b>	1,02	<b>35</b>	72	68	52	0,3	0,6	62	45	66 000	177 000
<b>ZKLN4075-2RS-2AP</b>	1,22	<b>40</b>	75	68	58	0,3	0,6	67	50	70 000	202 000
<b>ZKLN5090-2RS-2AP</b>	1,76	<b>50</b>	90	68	72	0,3	0,6	82	63	76 000	250 000

1) Mass moment of inertia for rotating inner ring.

2) Only valid in conjunction with INA precision locknuts.

3) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



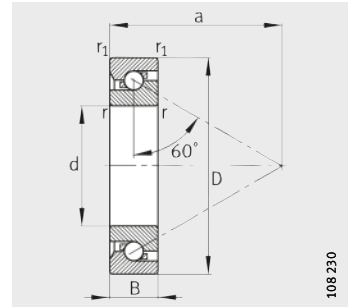
Design of adjacent construction

Limiting speed $n_G$ grease $\text{min}^{-1}$	Bearing frictional torque $M_{RL}$ Nm	Rigidity axial $c_{aL}$ $\text{N}/\mu\text{m}$	Tilting rigidity $c_{kL}$ $\text{Nm}/\text{mrad}$	Mass moment of inertia <sup>1)</sup> $M_m$ $\text{kg} \cdot \text{cm}^2$	Axial runout <sup>3)</sup> $\mu\text{m}$	Recommended INA locknut; to be ordered separately		
						Designation	Tightening torque <sup>2)</sup> $M_A$ Nm	Axial preload force N
3 300	0,36	800	200	0,264	2	<b>ZM17</b> <b>AM17</b>	15	7 157
3 000	0,45	1 150	320	0,546	2	<b>ZMA20/38</b> <b>AM20</b>	18	9 079
2 600	0,6	1 300	450	0,972	2	<b>ZMA25/45</b> <b>AM25</b>	25	9 410
2 200	0,75	1 500	620	1,46	2,5	<b>ZMA30/52</b> <b>AM30</b>	32	10 451
2 000	0,9	1 600	900	3,02	2,5	<b>ZMA35/58</b> <b>AM35/58</b>	40	10 770
1 800	1,05	1 750	1 200	4,52	2,5	<b>ZMA40/62</b> <b>AM40</b>	55	13 412
1 500	1,35	2 200	2 250	10,48	2,5	<b>ZMA50/75</b> <b>AM50</b>	85	17 009



# Axial angular contact ball bearings

Single direction

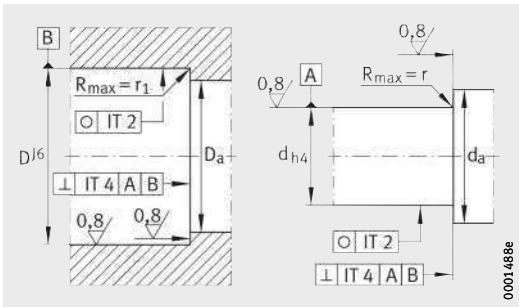


7602, 7603, BSB

Dimension table - Dimensions in mm

Designation	Mass m ≈kg	Dimensions					Mounting dimensions		Basic load ratings axial	
		d	D	B	r, r <sub>1</sub> min.	a ≈	D <sub>a</sub> H12	d <sub>a</sub> h12	dyn. C <sub>a</sub> N	stat. C <sub>0a</sub> N
7602012-TVP	0,042	12 <sub>-0,004</sub>	32 <sub>-0,006</sub>	10 <sub>-0,08</sub>	0,6	24	27	17	12 200	20 700
7602015-TVP	0,052	15 <sub>-0,004</sub>	35 <sub>-0,006</sub>	11 <sub>-0,08</sub>	0,6	27,5	30	20,5	13 100	24 700
7602017-TVP	0,074	17 <sub>-0,004</sub>	40 <sub>-0,006</sub>	12 <sub>-0,08</sub>	0,6	31	34,5	23	17 200	32 500
7602020-TVP	0,139	20 <sub>-0,005</sub>	47 <sub>-0,006</sub>	14 <sub>-0,12</sub>	1	36	39,5	27,5	19 100	38 000
BSB020047-T	0,13	20 <sub>-0,005</sub>	47 <sub>-0,006</sub>	15 <sub>-0,12</sub>	1	36,5	39,5	27,5	20 800	43 000
7603020-TVP	0,17	20 <sub>-0,005</sub>	52 <sub>-0,007</sub>	15 <sub>-0,12</sub>	1,1	39,5	43,5	30,5	25 500	53 000
7602025-TVP	0,147	25 <sub>-0,005</sub>	52 <sub>-0,007</sub>	15 <sub>-0,12</sub>	1	41	45	32	23 200	50 000
BSB025062-T	0,24	25 <sub>-0,005</sub>	62 <sub>-0,007</sub>	15 <sub>-0,12</sub>	1	46,5	52	38	29 500	68 000
7603025-TVP	0,275	25 <sub>-0,005</sub>	62 <sub>-0,007</sub>	17 <sub>-0,12</sub>	1,1	47,5	52	38	29 500	68 000
BSB030062-T	0,22	30 <sub>-0,005</sub>	62 <sub>-0,007</sub>	15 <sub>-0,12</sub>	1	47,5	52,5	39,5	27 500	66 000
7602030-TVP	0,232	30 <sub>-0,005</sub>	62 <sub>-0,007</sub>	16 <sub>-0,12</sub>	1	48	52,5	39,5	27 500	66 000
7603030-TVP	0,409	30 <sub>-0,005</sub>	72 <sub>-0,007</sub>	19 <sub>-0,12</sub>	1,1	55,5	61	45	36 500	89 000
BSB035072-T	0,3	35 <sub>-0,006</sub>	72 <sub>-0,007</sub>	15 <sub>-0,12</sub>	1	54	60,5	46,5	31 500	81 000
7602035-TVP	0,339	35 <sub>-0,006</sub>	72 <sub>-0,007</sub>	17 <sub>-0,12</sub>	1,1	55	60,5	46,5	31 500	81 000
7603035-TVP	0,546	35 <sub>-0,006</sub>	80 <sub>-0,007</sub>	21 <sub>-0,12</sub>	1,5	61,5	67	51	38 000	100 000
BSB040072-T	0,26	40 <sub>-0,006</sub>	72 <sub>-0,007</sub>	15 <sub>-0,12</sub>	1	56	62,5	49	29 500	82 000
7602040-TVP	0,418	40 <sub>-0,006</sub>	80 <sub>-0,007</sub>	18 <sub>-0,12</sub>	1,1	62,5	69,5	53,5	39 000	106 000
BSB040090-T	0,65	40 <sub>-0,006</sub>	90 <sub>-0,008</sub>	20 <sub>-0,12</sub>	1,5	67	75,5	56,5	52 000	138 000
7603040-TVP	0,751	40 <sub>-0,006</sub>	90 <sub>-0,008</sub>	23 <sub>-0,12</sub>	1,5	68,5	75,5	56,5	52 000	138 000
BSB045075-T	0,26	45 <sub>-0,006</sub>	75 <sub>-0,007</sub>	15 <sub>-0,12</sub>	1	59,5	68	52	30 000	85 000
7602045-TVP	0,488	45 <sub>-0,006</sub>	85 <sub>-0,008</sub>	19 <sub>-0,12</sub>	1,1	66	73	57	39 500	111 000
BSB045100-T	0,81	45 <sub>-0,006</sub>	100 <sub>-0,008</sub>	20 <sub>-0,12</sub>	1,5	75	85,5	64,5	62 000	172 000
7603045-TVP	0,992	45 <sub>-0,006</sub>	100 <sub>-0,008</sub>	25 <sub>-0,12</sub>	1,5	77,5	85,5	64,5	62 000	172 000
7602050-TVP	0,557	50 <sub>-0,006</sub>	90 <sub>-0,008</sub>	20 <sub>-0,12</sub>	1,1	71,5	79	63	41 000	122 000
BSB050100-T	0,75	50 <sub>-0,006</sub>	100 <sub>-0,008</sub>	20 <sub>-0,12</sub>	1,5	75	85,5	64,5	62 000	172 000
7603050-TVP	1,29	50 <sub>-0,006</sub>	110 <sub>-0,008</sub>	27 <sub>-0,12</sub>	2	85,5	94	72	72 000	203 000
BSB055090-T	0,38	55 <sub>-0,007</sub>	90 <sub>-0,008</sub>	15 <sub>-0,15</sub>	1,0	70,5	80	65	33 500	98 000
7602055-TVP	0,74	55 <sub>-0,007</sub>	100 <sub>-0,008</sub>	21 <sub>-0,15</sub>	1,5	77,5	85,5	69,5	42 000	132 000
BSB055120-T	1,2	55 <sub>-0,007</sub>	120 <sub>-0,008</sub>	20 <sub>-0,15</sub>	2,0	86	97,5	77	63 000	188 000
7603055-TVP	1,67	55 <sub>-0,007</sub>	120 <sub>-0,008</sub>	29 <sub>-0,15</sub>	2	91,5	101	77	85 000	255 000

- 1) Valid for matched pair of bearings in O or X arrangement.
- 2) Valid for individual bearing with stated preload force, bearing lightly oiled.
- 3) Only valid in conjunction with INA precision locknuts.
- 4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



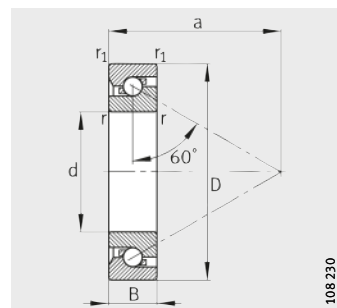
Design of adjacent construction

Limiting speed $n_G$ grease	Bearing frictional torque <sup>2)</sup> $M_{RL}$	Rigidity <sup>1)</sup> axial $c_{aL}$	Axial runout <sup>4)</sup>	Recommended INA locknut; to be ordered separately			
				Designation	Tightening torque <sup>3)</sup> $M_A$ Nm	Axial preload force N	
$\text{min}^{-1}$	Nm	$\text{N}/\mu\text{m}$	$\mu\text{m}$				
8 000	0,015	476	2	<b>ZM12</b>	<b>AM12</b>	8	6 110
6 700	0,02	516	2	<b>ZM15</b>	<b>AM15</b>	10	5 740
6 000	0,03	596	2	<b>ZM17</b>	<b>AM17</b>	15	8 060
5 000	0,05	703	2	<b>ZM20</b>	<b>AM20</b>	18	8 490
5 600	0,05	703	2	<b>ZM20</b>	<b>AM20</b>	18	8 490
4 500	0,06	787	2	<b>ZM20</b>	<b>AM20</b>	25	11 600
4 500	0,065	772	2	<b>ZM25</b>	<b>AM25</b>	25	9 430
4 300	0,085	917	2	<b>ZM25</b>	<b>AM25</b>	40	14 480
3 800	0,085	917	2	<b>ZM25</b>	<b>AM25</b>	40	14 480
4 200	0,085	893	2	<b>ZM30</b>	<b>AM30</b>	32	10 240
3 800	0,085	893	2	<b>ZM30</b>	<b>AM30</b>	32	10 240
3 200	0,13	1 073	2	<b>ZM30</b>	<b>AM30</b>	55	16 180
3 700	0,115	1 020	2	<b>ZM35</b>	<b>AM35</b>	40	11 310
3 200	0,115	1 020	2	<b>ZM35</b>	<b>AM35</b>	40	11 310
3 000	0,17	1 192	2	<b>ZM35</b>	<b>AM35</b>	65	17 380
3 500	0,115	1 016	2	<b>ZM40</b>	<b>AM40</b>	40	10 190
2 800	0,17	1 190	2	<b>ZM40</b>	<b>AM40</b>	55	13 330
3 100	0,225	1 292	2	<b>ZM40</b>	<b>AM40</b>	110	25 120
2 600	0,225	1 292	2	<b>ZM40</b>	<b>AM40</b>	110	25 120
3 300	0,13	1 072	2	<b>ZM45</b>	<b>AM45</b>	50	11 140
2 600	0,19	1 247	2	<b>ZM45</b>	<b>AM45</b>	65	14 410
2 700	0,3	1 473	2	<b>ZM45</b>	<b>AM45</b>	120	25 160
2 200	0,3	1 473	2	<b>ZM45</b>	<b>AM45</b>	120	25 160
2 400	0,23	1 360	2	<b>ZM50</b>	<b>AM50</b>	85	16 810
2 700	0,33	1 473	2	<b>ZM50</b>	<b>AM50</b>	120	23 770
2 000	0,36	1 601	2	<b>ZM50</b>	<b>AM50</b>	150	28 930
2 800	0,19	1 246	3	<b>ZM55</b>	<b>AM55</b>	60	12 040
2 200	0,25	1 394	3	<b>ZM55</b>	<b>AM55</b>	85	15 060
2 400	0,36	1 553	3	<b>ZM55</b>	<b>AM55</b>	110	20 070
1 900	0,46	1 723	3	<b>ZM55</b>	<b>AM55</b>	130	24 120



# Axial angular contact ball bearings

Single direction



7602, 7603, BSB

Dimension table (continued) · Dimensions in mm

Designation <sup>4)</sup>	Mass m ≈kg	Dimensions					Mounting dimensions	
		d	D	B	r, r <sub>1</sub>	a	D <sub>a</sub> H12	d <sub>a</sub> h12
					min.	≈		
7602060-TVP	0,94	<b>60</b> <sub>-0,007</sub>	110 <sub>-0,008</sub>	22 <sub>-0,15</sub>	1,5	86	96	77
BSB060120-T	1,1	<b>60</b> <sub>-0,007</sub>	120 <sub>-0,009</sub>	20 <sub>-0,15</sub>	1,5	88	100,5	79,5
7603060-TVP	2,08	<b>60</b> <sub>-0,007</sub>	130 <sub>-0,009</sub>	31 <sub>-0,15</sub>	2,1	98	107,5	82,5
7602065-TVP	1,19	<b>65</b> <sub>-0,007</sub>	120 <sub>-0,009</sub>	23 <sub>-0,15</sub>	1,5	92,5	103	84
7603065-TVP	2,58	<b>65</b> <sub>-0,007</sub>	140 <sub>-0,009</sub>	33 <sub>-0,15</sub>	2,1	107,5	118,5	91,5
7602070-TVP	1,3	<b>70</b> <sub>-0,007</sub>	125 <sub>-0,009</sub>	24 <sub>-0,15</sub>	1,5	96,5	108	87
7603070-TVP	3,16	<b>70</b> <sub>-0,007</sub>	150 <sub>-0,009</sub>	35 <sub>-0,15</sub>	2,1	113	124,5	95,5
BSB075110-T	0,47	<b>75</b> <sub>-0,007</sub>	110 <sub>-0,008</sub>	15 <sub>-0,15</sub>	1,5	87,5	99,5	85
7602075-TVP	1,42	<b>75</b> <sub>-0,007</sub>	130 <sub>-0,009</sub>	25 <sub>-0,15</sub>	1,5	102,5	114,5	93,5
7603075-TVP	3,74	<b>75</b> <sub>-0,007</sub>	160 <sub>-0,01</sub>	37 <sub>-0,15</sub>	2,1	123	135,5	105,5
7602080-TVP	1,72	<b>80</b> <sub>-0,007</sub>	140 <sub>-0,009</sub>	26 <sub>-0,15</sub>	2	109	122	100
7603080-TVP	4,5	<b>80</b> <sub>-0,007</sub>	170 <sub>-0,01</sub>	39 <sub>-0,15</sub>	2,1	129,5	143	111
7602085-TVP	2,17	<b>85</b> <sub>-0,008</sub>	150 <sub>-0,009</sub>	28 <sub>-0,2</sub>	2	117	131	107
7603085-TVP	5,24	<b>85</b> <sub>-0,008</sub>	180 <sub>-0,01</sub>	41 <sub>-0,2</sub>	3	136	151	116
7602090-TVP	2,67	<b>90</b> <sub>-0,008</sub>	160 <sub>-0,01</sub>	30 <sub>-0,2</sub>	2	124	138,5	113,5
7603090-TVP	6,18	<b>90</b> <sub>-0,008</sub>	190 <sub>-0,011</sub>	43 <sub>-0,2</sub>	3	142,5	157,5	122,5
7602095-TVP	3,25	<b>95</b> <sub>-0,008</sub>	170 <sub>-0,01</sub>	32 <sub>-0,2</sub>	2,1	131	146,5	119,5
7603095-TVP	7,22	<b>95</b> <sub>-0,008</sub>	200 <sub>-0,011</sub>	45 <sub>-0,2</sub>	3	150	165	130
BSB100150-T	1,4	<b>100</b> <sub>-0,008</sub>	150 <sub>-0,009</sub>	22,5 <sub>-0,2</sub>	2	119,5	135	114,5
7602100-TVP	3,9	<b>100</b> <sub>-0,008</sub>	180 <sub>-0,01</sub>	34 <sub>-0,2</sub>	2,1	138	154,5	125,5
7603100-TVP	8,78	<b>100</b> <sub>-0,008</sub>	215 <sub>-0,011</sub>	47 <sub>-0,2</sub>	3	161	178	140

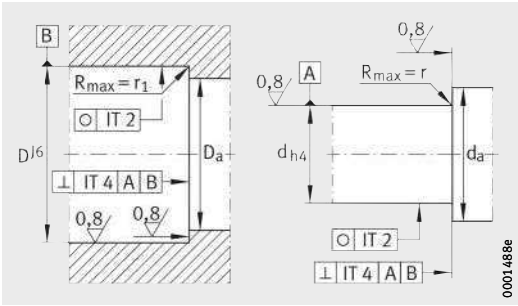
1) Valid for matched pair of bearings in O or X arrangement.

2) Valid for individual bearing with stated preload force, bearing lightly oiled.

3) Only valid in conjunction with INA precision locknuts.

4) Available by agreement.

5) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



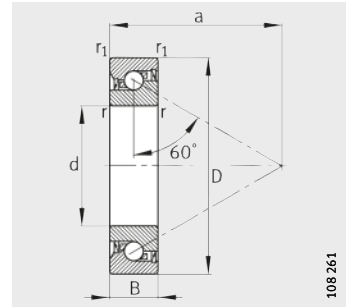
Design of adjacent construction

Basic load ratings axial		Limiting speed $n_G$ grease	Bearing frictional torque <sup>2)</sup> $M_{RL}$	Rigidity <sup>1)</sup> axial $c_{aL}$	Axial runout <sup>5)</sup> $\mu\text{m}$	Recommended INA locknut; to be ordered separately		
dyn. $C_a$	stat. $C_{0a}$					Designation	Tightening torque <sup>3)</sup> $M_A$ Nm	Axial preload force N
N	N	$\text{min}^{-1}$	Nm	N/ $\mu\text{m}$	$\mu\text{m}$			
58 000	183 000	2 000	0,35	1 623	3	<b>ZM60</b> <b>AM60</b>	100	17 410
64 000	196 000	2 300	0,38	1 623	3	<b>ZM60</b> <b>AM60</b>	120	20 020
92 000	270 000	1 800	0,54	1 840	3	<b>ZM60</b> <b>AM60</b>	150	25 840
60 000	197 000	1 800	0,41	1 753	3	<b>ZM65</b> <b>AM65</b>	110	17 680
106 000	330 000	1 600	0,7	2 052	3	<b>ZM65</b> <b>AM65</b>	150	25 290
68 000	220 000	1 800	0,44	1 753	3	<b>ZM70</b> <b>AM70</b>	115	17 300
117 000	360 000	1 600	0,76	2 108	3	<b>ZM70</b> <b>AM70</b>	180	27 640
37 000	133 000	2 300	0,29	1 534	3	<b>ZM75</b> <b>AM75</b>	140	18 560
70 000	236 000	1 600	0,48	1 888	3	<b>ZM75</b> <b>AM75</b>	160	22 820
132 000	425 000	1 400	0,92	2 335	3	<b>ZM75</b> <b>AM75</b>	200	29 360
81 000	275 000	1 500	0,6	2 047	3	<b>ZM80</b> <b>AM80</b>	160	21 620
144 000	465 000	1 400	1,1	2 466	3	<b>ZM80</b> <b>AM80</b>	220	31 020
95 000	340 000	1 400	0,76	2 209	3	<b>ZM85</b> <b>AM85</b>	250	30 460
169 000	550 000	1 300	1,25	2 539	3	<b>ZM85</b> <b>AM85</b>	280	36 310
102 000	365 000	1 400	0,79	2 275	3	<b>ZM90</b> <b>AM90</b>	250	29 160
172 000	580 000	1 200	1,3	2 654	3	<b>ZM90</b> <b>AM90</b>	300	37 360
116 000	410 000	1 300	0,95	2 435	3	–	–	31 700
175 000	600 000	1 200	1,45	2 770	3	–	–	38 280
73 000	265 000	1 800	0,6	2 052	3	<b>ZM100</b> <b>AM100</b>	200	21 190
128 000	465 000	1 200	1,1	2 594	3	<b>ZM100</b> <b>AM100</b>	255	29 150
201 000	700 000	1 100	1,7	2 965	3	<b>ZM100</b> <b>AM100</b>	305	36 330



# Axial angular contact ball bearings

Single direction  
Sealed



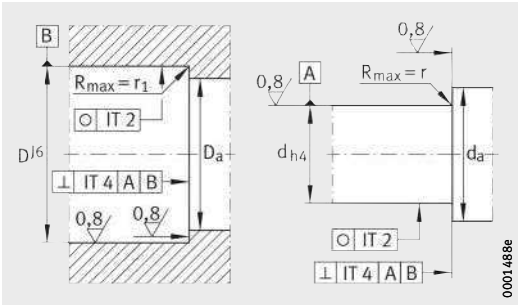
7602...-2RS, 7603...-2RS,  
BSB...-2RS

**Dimension table** - Dimensions in mm

Designation	Mass m  ≈kg	Dimensions					Mounting dimensions	
		d	D	B	r, r <sub>1</sub>  min.	a  ≈	D <sub>a</sub> H12	d <sub>a</sub> h12
<b>7602012-2RS-TVP</b>	0,042	<b>12<sub>-0,004</sub></b>	32 <sub>-0,006</sub>	10 <sub>-0,08</sub>	0,6	24	27	17
<b>7602015-2RS-TVP</b>	0,052	<b>15<sub>-0,004</sub></b>	35 <sub>-0,006</sub>	11 <sub>-0,08</sub>	0,6	27,5	30	20,5
<b>7602020-2RS-TVP</b>	0,12	<b>20<sub>-0,005</sub></b>	47 <sub>-0,006</sub>	14 <sub>-0,12</sub>	1	36	39,5	27,5
<b>7603020-2RS-TVP</b>	0,17	<b>20<sub>-0,005</sub></b>	52 <sub>-0,007</sub>	15 <sub>-0,12</sub>	1,1	36,5	43,5	30,5
<b>7602025-2RS-TVP</b>	0,15	<b>25<sub>-0,005</sub></b>	52 <sub>-0,007</sub>	15 <sub>-0,12</sub>	1	41	45	32
<b>BSB025062-2RS-T</b>	0,24	<b>25<sub>-0,005</sub></b>	62 <sub>-0,007</sub>	15 <sub>-0,12</sub>	1	46,5	52	38
<b>7603025-2RS-TVP</b>	0,27	<b>25<sub>-0,005</sub></b>	62 <sub>-0,007</sub>	17 <sub>-0,12</sub>	1,1	47,5	52	38
<b>BSB030062-2RS-T</b>	0,22	<b>30<sub>-0,005</sub></b>	62 <sub>-0,007</sub>	15 <sub>-0,12</sub>	1	47,5	52,5	39,5
<b>7602030-2RS-TVP</b>	0,23	<b>30<sub>-0,005</sub></b>	62 <sub>-0,007</sub>	16 <sub>-0,12</sub>	1	48	52,5	39,5
<b>BSB035072-2RS-T</b>	0,3	<b>35<sub>-0,006</sub></b>	72 <sub>-0,007</sub>	15 <sub>-0,12</sub>	1	54	60,5	46,5
<b>BSB040072-2RS-T</b>	0,26	<b>40<sub>-0,006</sub></b>	72 <sub>-0,007</sub>	15 <sub>-0,12</sub>	1	56	62,5	49

- 1) Valid for matched pair of bearings in O or X arrangement.
- 2) Valid for individual bearing with stated preload force, bearing lightly oiled.
- 3) Only valid in conjunction with INA precision locknuts.
- 4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.





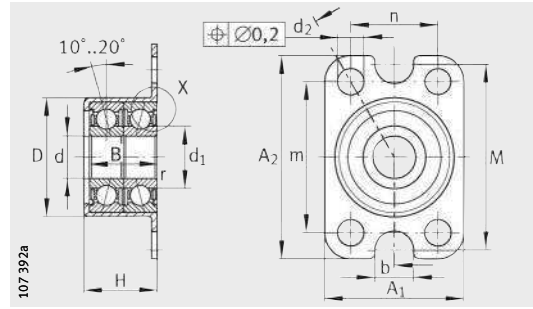
Design of adjacent construction

Basic load ratings axial		Limiting speed $n_G$ grease	Bearing frictional torque <sup>2)</sup> $M_{RL}$	Rigidity <sup>1)</sup> axial $c_{aL}$	Axial runout <sup>4)</sup> $\mu\text{m}$	Recommended INA locknut; to be ordered separately		
dyn. $C_a$	stat. $C_{0a}$					Designation	Tightening torque <sup>3)</sup> $M_A$ Nm	Axial preload force N
N	N	$\text{min}^{-1}$	Nm	$\text{N}/\mu\text{m}$	$\mu\text{m}$			
12 200	20 700	8 000	0,018	476	2	<b>ZM12</b> <b>AM12</b>	8	6 110
13 100	24 700	6 700	0,024	516	2	<b>ZM15</b> <b>AM15</b>	10	5 740
19 100	38 000	5 000	0,06	703	2	<b>ZM20</b> <b>AM20</b>	18	8 490
25 500	53 000	4 500	0,07	787	2	<b>ZM20</b> <b>AM20</b>	18	11 600
23 200	50 000	3 800	0,08	772	2	<b>ZM25</b> <b>AM25</b>	25	9 430
29 500	68 000	4 300	0,1	917	2	<b>ZM25</b> <b>AM25</b>	40	14 480
29 500	68 000	3 800	0,1	917	2	<b>ZM25</b> <b>AM25</b>	40	14 480
27 500	66 000	4 200	0,1	893	2	<b>ZM30</b> <b>AM30</b>	32	10 240
27 500	66 000	3 800	0,1	893	2	<b>ZM30</b> <b>AM30</b>	32	10 240
31 500	81 000	3 700	0,14	1 020	2	<b>ZM35</b> <b>AM35</b>	40	11 310
29 500	82 000	3 500	0,14	1 016	2	<b>ZM40</b> <b>AM40</b>	40	10 190



# Angular contact ball bearing units

For screw mounting

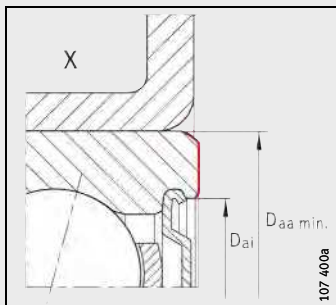


ZKLR0624-2Z, ZKLR0828-2Z

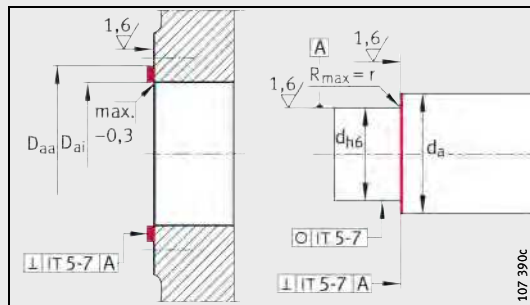
**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions													
		d	A <sub>1</sub>	A <sub>2</sub>	D	B	d <sub>1</sub>	r	d <sub>2</sub>	b	m	n	M	H	d <sub>a</sub>
ZKLR0624-2Z	0,023	6 <sub>-0,008</sub>	24	35	20,5	12	10,4	0,3	4,5	6,6	26	15	32	13	8
ZKLR0828-2Z	0,03	8 <sub>-0,008</sub>	28	35	23,9	14	11,8	0,3	4,5	6,6	26	20	35	15,5	10,4
ZKLR1035-2Z	0,05	10 <sub>-0,008</sub>	35	35	28,14	16	14,7	0,3	4,5	-	26	26	-	17,5	12,4
ZKLR1244-2RS	0,12	12 <sub>-0,007</sub>	44	50	35,45	20	16,6	0,3	6,6	-	38	32	-	22	14
ZKLR1547-2RS	0,14	15 <sub>-0,007</sub>	47	51	38,45	22	18	0,3	6,6	-	39	35	-	24	17,5
ZKLR2060-2RS	0,3	20 <sub>-0,008</sub>	60	60	50,45	28	24,4	0,3	6,6	-	47	47	-	30	24

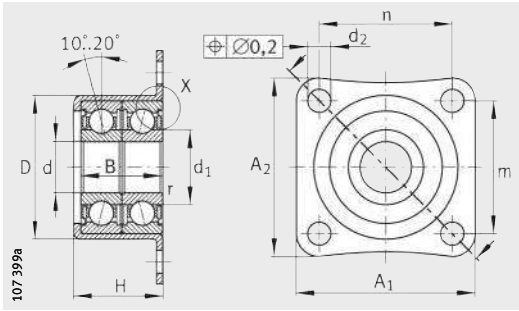
- 1) Tightening torque for the fixing screws as recommended by the manufacturer. Screws must be ordered separately.
- 2) Mass moment of inertia for rotating inner ring.
- 3) The locknut is only used to axially locate the bearing unit. It has no influence on the bearing preload.
- 4) Stated geometrical tolerances only required in diameter area between D<sub>ai</sub> and D<sub>aa</sub>.
- 5) Only valid in conjunction with INA precision locknuts.
- 6) Statistically determined mean values from measurements on the complete bearing.
- 7) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



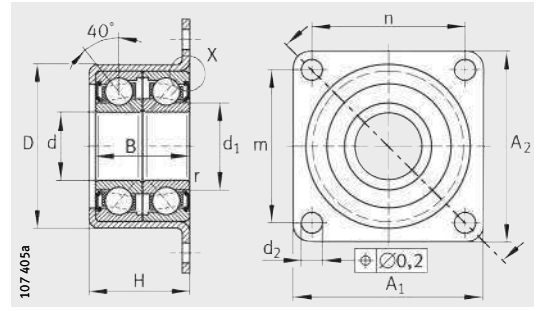
Axial abutment area of outer ring



Design of adjacent construction<sup>4)</sup>



ZKL1035-2Z



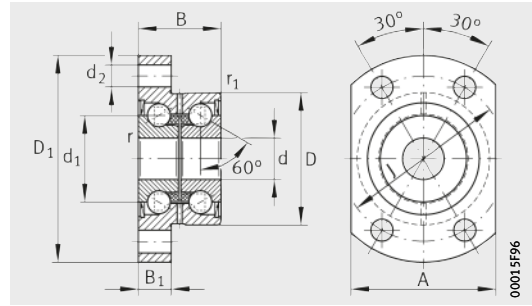
ZKL1244-2RS, ZKL1547-2RS, ZKL2060-2RS

D <sub>ai</sub>	D <sub>aa</sub> min.	Fixing screws DIN 912 <sup>1)</sup>		Basic load ratings				Limiting speed n <sub>G grease</sub> min <sup>-1</sup>	Bearing frictional torque M <sub>RL</sub> Nm	Rigid-ity axial <sup>6)</sup> c <sub>aL</sub> N/μm	Mass moment of inertia <sup>2)</sup> M <sub>m</sub> kg · cm <sup>2</sup>	Axial runout <sup>7)</sup> μm	Recommended INA locknut; to be ordered separately <sup>3)</sup>	
				radial		axial							Designation	Tightening torque <sup>5)</sup> M <sub>A</sub> Nm
				dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	dyn. C <sub>a</sub> N	stat. C <sub>0a</sub> N							
16	19	M4 M6	4 2	3 850	1 870	1 340	1 250	7 300	0,04	17	0,0014	7	<b>ZM06</b>	2
18	22	M4 M6	4 2	4 900	2 280	1 810	1 520	6 200	0,08	20	0,0028	7	<b>ZM08</b>	4
22	26	M4	4	7 400	3 600	2 550	2 420	5 100	0,12	26	0,0075	7	<b>ZM10</b>	6
27	32	M6	4	13 600	8 500	13 200	17 900	3 700	0,16	170	0,0102	7	<b>ZM12</b>	8
29	35	M6	4	16 700	10 700	16 400	22 400	3 400	0,2	200	0,0178	7	<b>ZM15</b>	10
39	47	M6	4	28 000	19 100	27 500	40 000	2 800	0,3	250	0,263	8	<b>ZM20</b>	18



# Double row axial angular contact ball bearings with flange

For screw mounting



ZKLFA...-2RS, ZKLFA...-2Z

**Dimension table** - Dimensions in mm

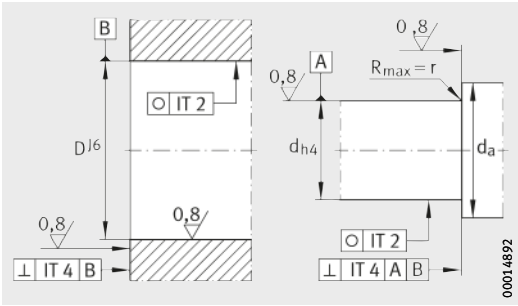
Designation	Mass m	Dimensions											Mounting dimensions	
		d	D	B	d <sub>1</sub>	D <sub>1</sub>	r	r <sub>1</sub>	B <sub>1</sub>	d <sub>2</sub>	J	A	d <sub>a</sub>	
		≈kg	-0,005	-0,01	-0,25			min.	min.					min.
<b>ZKLFA0630-2Z</b>	0,05	<b>6</b>	19	12	12	30	0,3	0,3	5	3,5	24	22	9	15
<b>ZKLFA0640-2RS</b>	0,08	<b>6</b>	24	15	14	40	0,3	0,6	6	4,5	32	27	9	18
<b>ZKLFA0640-2Z</b>	0,08	<b>6</b>	24	15	14	40	0,3	0,6	6	4,5	32	27	9	18
<b>ZKLFA0850-2RS</b>	0,17	<b>8</b>	32	20	19	50	0,3	0,6	8	5,5	40	35	11	25
<b>ZKLFA0850-2Z</b>	0,17	<b>8</b>	32	20	19	50	0,3	0,6	8	5,5	40	35	11	25
<b>ZKLFA1050-2RS</b>	0,18	<b>10</b>	32	20	21	50	0,3	0,6	8	5,5	40	35	14	27
<b>ZKLFA1050-2Z</b>	0,18	<b>10</b>	32	20	21	50	0,3	0,6	8	5,5	40	35	14	27
<b>ZKLFA1263-2RS</b>	0,3	<b>12</b>	42	25	25	63	0,3	0,6	10	6,8	53	45	16	31
<b>ZKLFA1263-2Z</b>	0,3	<b>12</b>	42	25	25	63	0,3	0,6	10	6,8	53	45	16	31
<b>ZKLFA1563-2RS</b>	0,31	<b>15</b>	42	25	28	63	0,3	0,6	10	6,8	53	45	20	34
<b>ZKLFA1563-2Z</b>	0,31	<b>15</b>	42	25	28	63	0,3	0,6	10	6,8	53	45	20	34

1) Tightening torque for the fixing screws as recommended by the manufacturer. Screws are not included in the delivery.

2) Mass moment of inertia for rotating inner ring.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



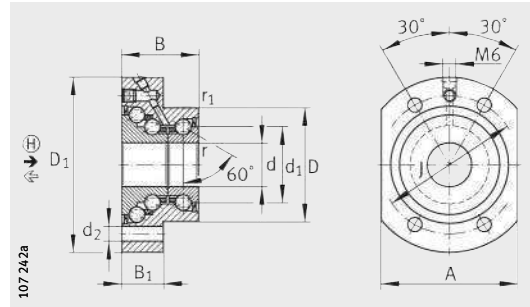
Design of adjacent construction

Fixing screws <sup>1)</sup> DIN 912-10.9		Basic load ratings axial		Limiting speed $n_G$ grease min <sup>-1</sup>	Bearing frictional torque $M_{RL}$ Nm	Rigid-ity axial $c_{aL}$ N/ $\mu$ m	Tilting rigidity $c_{kL}$ Nm/mrad	Mass moment of inertia <sup>2)</sup> $M_m$ kg · cm <sup>2</sup>	Axial runout <sup>4)</sup> $\mu$ m	Recommended INA locknut; to be ordered separately		
		dyn. $C_a$ N	stat. $C_{0a}$ N							Designation	Tight-ening torque <sup>3)</sup> $M_A$ Nm	Axial pre-load force N
M3	4	4 900	6 100	14 000	0,01	150	4	0,0019	2	<b>ZM06</b> –	2	916
M4	4	6 900	8 500	6 800	0,04	200	8	0,0044	2	<b>ZM06</b> –	2	2 404
M4	4	6 900	8 500	12 000	0,02	200	8	0,0044	2	<b>ZM06</b> –	2	2 404
M5	4	12 500	16 300	5 100	0,08	250	20	0,02	2	<b>ZM08</b> –	4	2 216
M5	4	12 500	16 300	9 500	0,04	250	20	0,02	2	<b>ZM08</b> –	4	2 216
M5	4	13 400	18 800	4 600	0,12	325	25	0,029	2	<b>ZM10</b> –	6	4 891
M5	4	13 400	18 800	8 600	0,06	325	25	0,029	2	<b>ZM10</b> –	6	4 891
M6	4	16 900	24 700	3 800	0,16	375	50	0,068	2	<b>ZM12</b> –	8	5 038
M6	4	16 900	24 700	7 600	0,08	375	50	0,068	2	<b>ZM12</b> –	8	5 038
M6	4	17 900	28 000	3 500	0,2	400	65	0,102	2	<b>ZM15 AM15</b>	10	5 484
M6	4	17 900	28 000	7 000	0,1	400	65	0,102	2	<b>ZM15 AM15</b>	10	5 484



# Triple row axial angular contact ball bearings with flange

For screw mounting



DKLFA...-2RS ( $d \leq 20 \text{ mm}$ )

## Attention!

The bearings require continuous load in the main load direction  $\oplus$ .

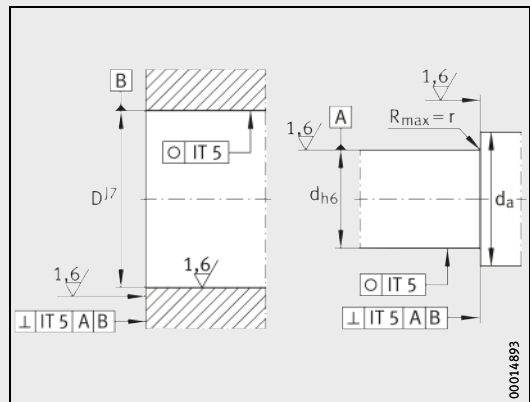
Dimension table - Dimensions in mm

Designation	Mass m ≈kg	Dimensions											Mounting dimensions	
		d	D	B	d <sub>1</sub>	D <sub>1</sub>	r	r <sub>1</sub>	B <sub>1</sub>	d <sub>2</sub>	J	A	d <sub>a</sub>	
		-0,010	-0,013	-0,25			min.	min.					min.	max.
DKLFA1575-2RS	0,53	15	45	32	28	75	0,3	0,6	18	6,8	58	55	20	35
DKLFA2080-2RS	0,7	20	52	35	34,5	80	0,3	0,6	19	6,8	63	62	25	43
DKLFA2590-2RS	0,9	25	57	38	40,5	90	0,3	0,6	22	8,8	75	70	32	48
DKLFA30100-2RS	1	30	62	38	45,5	100	0,3	0,6	22	8,8	80	72	40	53
DKLFA30110-2RS <sup>3)</sup>	2,5	30	75	56	51	110	0,3	0,6	35	8,8	95	85	47	64
DKLFA40115-2RS	1,5	40	72	42	58	115	0,3	0,6	23	8,8	94	90	50	67
DKLFA40140-2RS <sup>3)</sup>	4,2	40	90	60	65	140	0,3	0,6	35	11	118	110	56	80

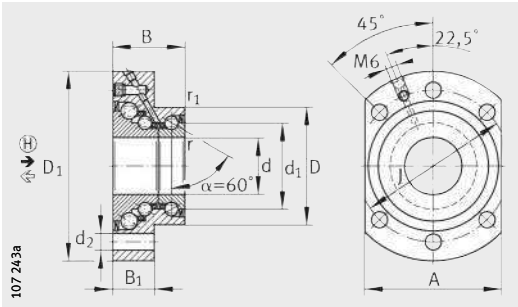
- 1) Tightening torque for the fixing screws as recommended by the manufacturer. Screws are not included in the delivery.
- 2) Mass moment of inertia for rotating inner ring.
- 3) Heavy series.
- 4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.

## INA locknuts (accessories)

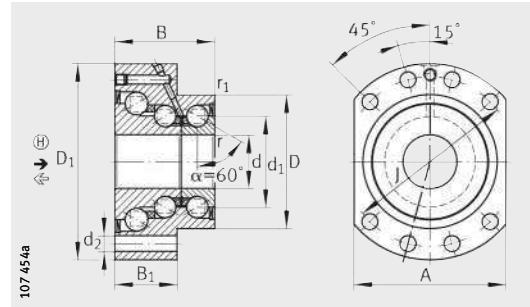
Triple row angular contact ball bearing Designation	Recommended INA locknut; to be ordered separately Designation		
	①	②	
DKLFA1575-2RS	AM15	ZMA15/33	ZM17
DKLFA2080-2RS	AM20	ZMA20/38	ZM25
DKLFA2590-2RS	AM25	ZMA25/45	AM30
DKLFA30100-2RS	AM30	ZMA30/52	ZM35
DKLFA30110-2RS	AM30/65	-	ZM35
DKLFA40115-2RS	AM40	ZMA40/62	ZM45
DKLFA40140-2RS	AM40/85	-	ZM45



Design of adjacent construction

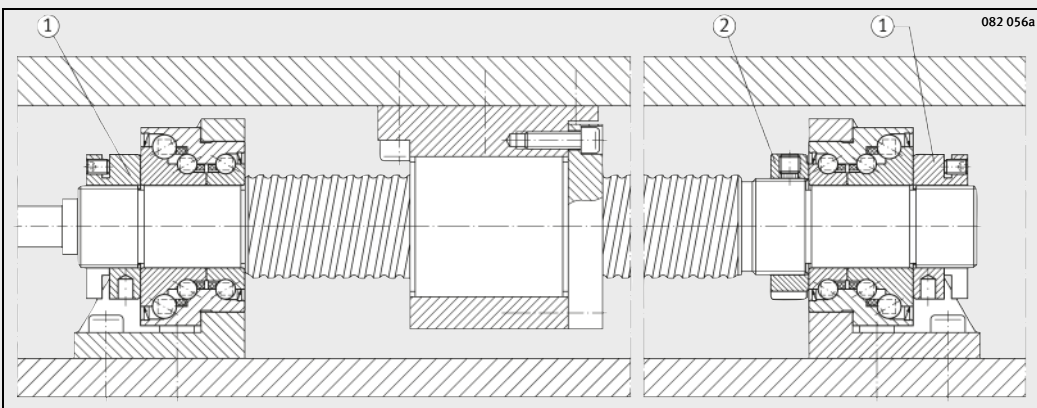


DKLFA..-2RS ( $d \geq 25 \text{ mm}$ )



DKLFA..-2RS  
Heavy series

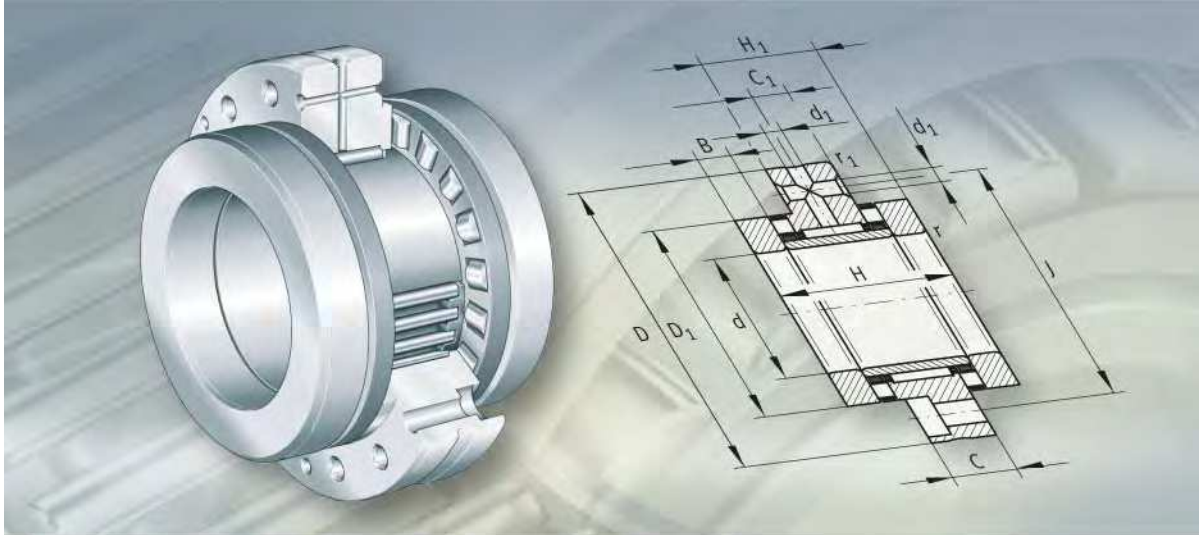
Fixing screws <sup>1)</sup> DIN 912-10.9	Basic load ratings					Limiting speed $n_G$ grease $\text{min}^{-1}$	Bearing frictional torque $M_{RL}$ Nm	Rigidity axial $\leftarrow$ $c_{aL}$ N/ $\mu\text{m}$	Rigidity axial $\rightarrow$ $c_{aL}$ N/ $\mu\text{m}$	Tilting rigidity $c_{kL}$ Nm/mrad	Mass moment of inertia <sup>2)</sup> $M_m$ kg · cm <sup>2</sup>	Axial run-out <sup>4)</sup> $\mu\text{m}$
	axial $\leftarrow$		axial $\rightarrow$									
	dyn. $C_a$	stat. $C_{0a}$	dyn. $C_a$	stat. $C_{0a}$								
Size	Quantity	N	N	N	N							
M6	4	17 900	28 000	37 000	83 000	2 600	0,35	500	950	140	0,278	5
M6	4	26 000	47 000	44 500	110 000	2 200	0,45	750	1 100	260	0,553	5
M8	6	27 500	55 000	52 000	144 000	2 000	0,6	850	1 200	370	1,12	5
M8	6	29 000	64 000	55 000	165 000	1 800	0,75	900	1 400	500	1,7	5
M8	8	59 000	108 000	106 000	257 000	1 600	1,5	1 300	1 600	650	3,23	5
M8	6	43 000	101 000	73 000	227 000	1 500	1	1 100	1 700	1 000	4,23	5
M10	8	72 000	149 000	126 000	363 000	1 200	2,5	1 800	2 000	1 370	9,32	5



Ball screw drive spindle with locating bearing arrangement on both sides  
Numbers in circles: see table INA locknuts (accessories), page 1062



**FAG**



**Needle roller/  
axial cylindrical roller bearings**



# Needle roller/axial cylindrical roller bearings

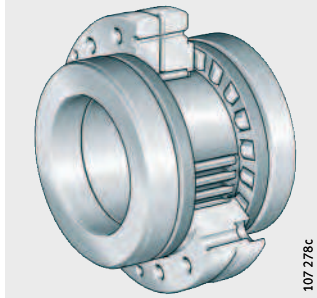
	Page
<b>Product overview</b>	Needle roller/axial cylindrical roller bearings ..... 1066
<b>Features</b>	Bearings for screw mounting..... 1067
	Bearings not for screw mounting..... 1068
	Operating temperature ..... 1068
	Suffixes..... 1068
<b>Design and safety guidelines</b>	Basic rating life ..... 1069
	Resultant and equivalent bearing load ..... 1069
	Static load safety factor ..... 1069
	Design of adjacent construction..... 1071
	Speeds..... 1071
	Friction..... 1072
	Lubrication ..... 1072
	Mounting guidelines..... 1074
<b>Accuracy</b>	..... 1075
<b>Dimension tables</b>	Needle roller/axial cylindrical roller bearings, light series, for screw mounting..... 1076
	Needle roller/axial cylindrical roller bearings, heavy series, for screw mounting..... 1080
	Needle roller/axial cylindrical roller bearings, light series, not for screw mounting ..... 1084
	Needle roller/axial cylindrical roller bearings, heavy series, not for screw mounting ..... 1088



# Product overview Needle roller/axial cylindrical roller bearings

**For screw mounting**

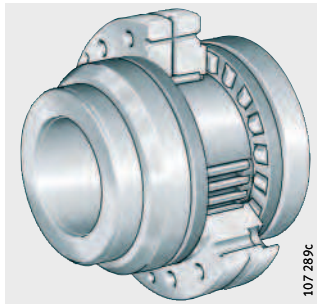
ZARF



107 278c

**With extended shaft locating washer**

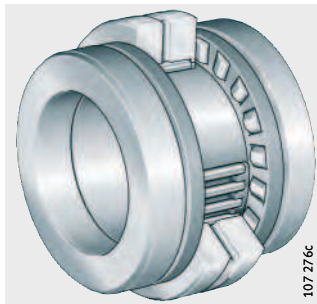
ZARF..-L



107 289c

**Not for screw mounting**

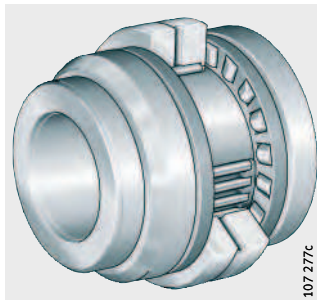
ZARN



107 276c

**With extended shaft locating washer**

ZARN..-L



107 277c

# Needle roller/axial cylindrical roller bearings

**Features** Needle roller/axial cylindrical roller bearings comprise an outer ring with radial and axial raceways, shaft locating washers, an inner ring, a radial needle roller and cage assembly and axial cylindrical roller and cage assemblies. The bearings are available in versions for screw mounting and not for screw mounting.

**Radial and axial load carrying capacity** In addition to radial forces, the bearings can also support axial forces from both directions and tilting moments.

**Preload and internal clearance** The outer ring, inner ring and axial cages are matched to each other such that the bearing is axially clearance-free after preloading by means of an INA precision locknut. The radial internal clearance is C2 according to DIN 620.

**Bearings for screw mounting** Needle roller/axial cylindrical roller bearings ZARF(L) have holes in the outer ring. These are used for screw mounting directly on the adjacent construction or in a radial locating bore, *Figure 1*. Due to screw mounting of the outer ring, the cover that would otherwise be required and the matching work can therefore be dispensed with. The bearings are preloaded against the shaft shoulder by means of a precision locknut AM or ZM(A).

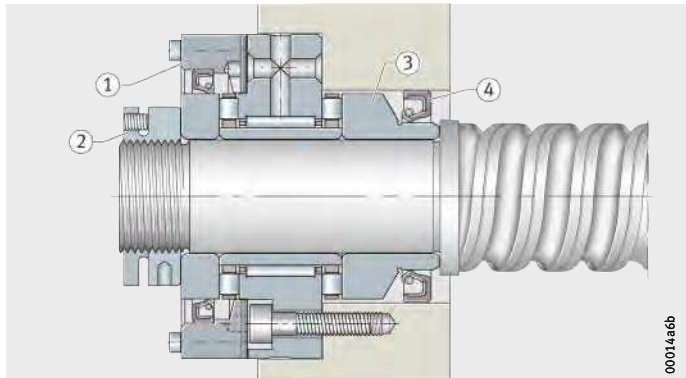
**With seal carrier assembly** In the interests of a simpler design, a seal carrier assembly DRS, *Figure 1*, ①, is recommended. The seal carrier assembly is centred on the outer ring and seals the bearing against outside influences.



**ZARF.-L**

- ① Seal carrier assembly DRS
- ② Locknut
- ③ Stepped shaft locating washer
- ④ Sealing ring

*Figure 1*  
Stepped shaft locating washer with sealing ring



**With extended shaft locating washer** ZARF.-L has an extended and stepped shaft locating washer, *Figure 1*. These series are used in preference where the shaft locating washers are not adequately supported axially by the shaft shoulder or the bearing unit cannot be sealed on the outside surface of the normal shaft locating washer due to space conditions in the adjacent construction.

**Heavy series** ZARF(L) is also available in a heavy series. This series has a larger cross-section for the same shaft diameter and therefore higher basic load ratings.

# Needle roller/axial cylindrical roller bearings

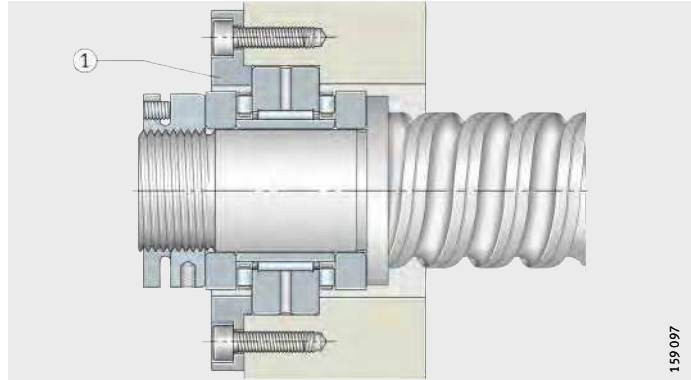
## Bearings not for screw mounting

Bearings ZARN(L) are mounted in a housing bore and the outer ring is located using a cover, *Figure 2*. They are preloaded against the shaft shoulder by means of a precision locknut AM or ZM(A).

### ZARN

① Cover

*Figure 2*  
Bearing outer ring located using cover



## With extended shaft locating washer

ZARN..-L has an extended and stepped shaft locating washer, *Figure 3*.

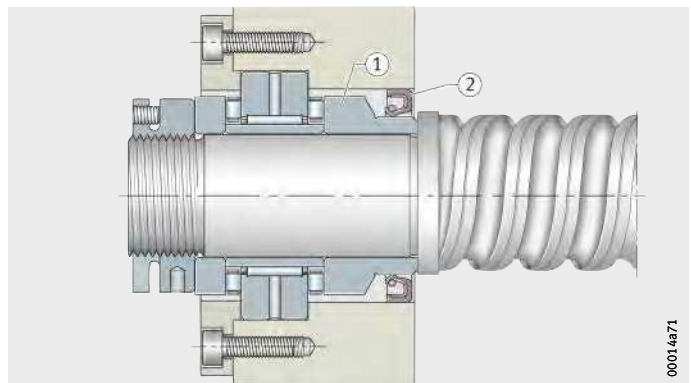
This series is used in preference where the shaft locating washer is not adequately supported axially by the shaft shoulder or the bearing unit cannot be sealed on the outside surface of the normal shaft locating washer due to space conditions in the adjacent construction.

### ZARN..-L

① Stepped shaft locating washer

② Sealing ring

*Figure 3*  
Stepped shaft locating washer with sealing ring



## Heavy series

ZARN(L) is also available in a heavy series. This series has a larger cross-section for the same shaft diameter and therefore higher basic load ratings.

## Operating temperature

The bearings are suitable for temperatures from  $-30\text{ °C}$  to  $+120\text{ °C}$ .

## Suffixes

Suffixes for the available designs: see table.

## Available designs

Suffix	Description	Design
L	Extended, stepped shaft locating washer	Standard
TV	Cages made from glass fibre reinforced polyamide 66	

## Design and safety guidelines

### Basic rating life

The decisive factors in determining the bearing size are the basic rating life, the static load safety factor and the axial limiting load. The basic rating life  $L$  and  $L_h$  are calculated as follows:

$$L_{10} = \left(\frac{C}{P}\right)^p$$

$$L_{10h} = \frac{16\,666}{n} \cdot \left(\frac{C}{P}\right)^p$$

$C_r, C_a$  N  
Basic dynamic radial or axial load rating according to dimension table  
 $p$   
Life exponent  $p = 10/3$ .

### Resultant and equivalent bearing load

The resultant axial bearing load  $F_{a\text{res}}$  is determined from the axial operating load  $F_{aB}$  and taking account of the axial preload, *Figure 4*, page 1070, to *Figure 6*, page 1070.

Under purely axial load,  $P = F_{a\text{res}}$ . If additional radial operating loads are present, these must be calculated separately using the radial basic load ratings. The limit values up to which the axial load can be supported without clearance are shown, *Figure 4*, page 1070, to *Figure 6*, page 1070.



A load in excess of the limit value will lead to the rolling element row without load lifting off the raceway. As a result, higher wear will occur under rapid acceleration. For extreme moment loads and statically overdefined systems (locating/locating bearing arrangements), please contact us. The calculation program BEARINX® can give a precise design in this case.

### Load varying in steps

In this case,  $P$  and  $n$  are calculated as follows ( $q$  = time portion %):

$$P = \sqrt[p]{\frac{q_1 \cdot n_1 \cdot P_1^p + \dots + q_z \cdot n_z \cdot P_z^p}{q_1 \cdot n_1 + \dots + q_z \cdot n_z}}$$

$$n = \frac{q_1 \cdot n_1 + \dots + q_z \cdot n_z}{100}$$

### Static load safety factor

The static load safety factor  $S_0$  is calculated according to (see also page 1024):

$$S_0 = \frac{C_0}{P_0}$$



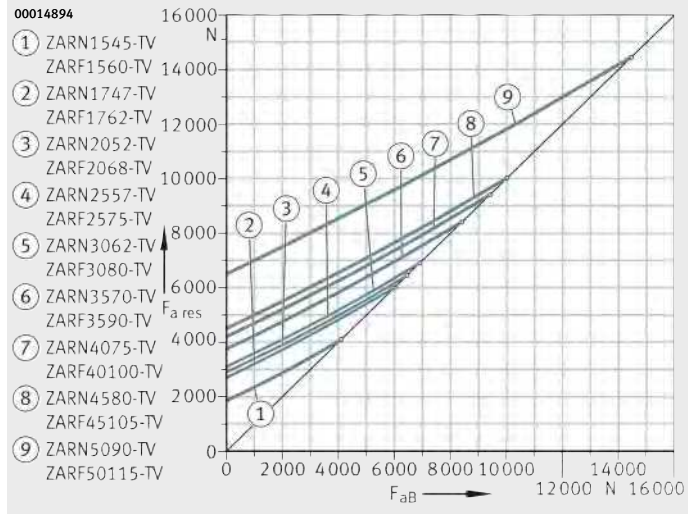
In machine tools,  $S_0$  should be  $\geq 4$ .

# Needle roller/axial cylindrical roller bearings

Resultant bearing load  $F_{a\ res}$

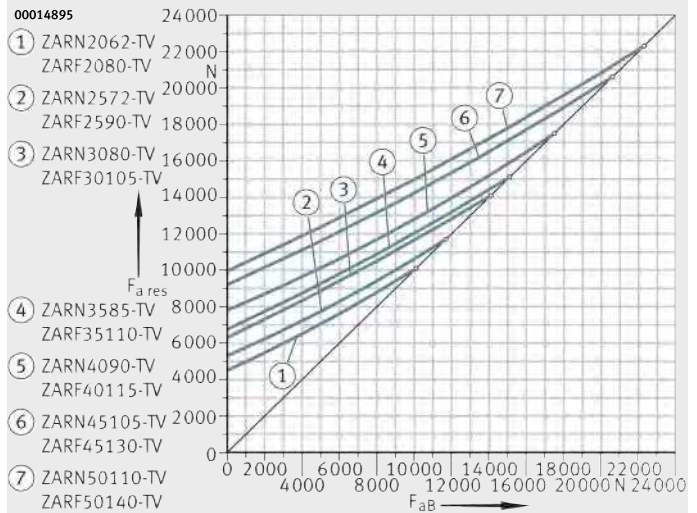
$F_{aB}$  = operating load  
 $F_{a\ res}$  = resultant bearing load  
 $^{\circ}$  = limit value

**Figure 4**  
 Resultant bearing load  
 ZARN, ZARF, light series



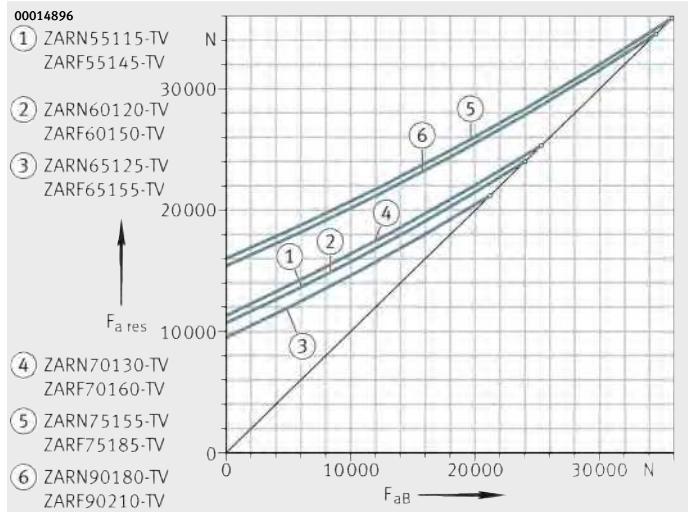
$F_{aB}$  = operating load  
 $F_{a\ res}$  = resultant bearing load  
 $^{\circ}$  = limit value

**Figure 5**  
 Resultant bearing load  
 ZARN, ZARF,  
 heavy series up to  $d = 50$  mm



$F_{aB}$  = operating load  
 $F_{a\ res}$  = resultant bearing load  
 $^{\circ}$  = limit value

**Figure 6**  
 Resultant bearing load  
 ZARN, ZARF,  
 heavy series from  $d = 55$  mm



## Design of adjacent construction

The adjacent construction (the shaft and housing) must be designed in accordance with the data in the dimension tables.

The abutment diameters for the shaft and housing shoulders  $d_a$  and  $D_a$  must be in accordance with the dimension tables.



The permissible contact pressure for the adjacent construction must be observed.

Examples of possible lubricant feeds: see *Figure 7* and *Figure 8*, page 1073.

## Sealing of the bearing position

The bearings are sealed, *Figure 1*, page 1067:

- in the direction of the spindle by a rotary shaft seal on the outside surface machined free from spiral marks of the extended shaft locating washer (ZARN...L, ZARF...L)
- in the direction of the drive by the seal carrier assembly DRS.

## Speeds

The limiting speeds  $n_G$  given in the dimension tables are based on the following conditions:

- bearing preloaded, no external operating load
- operating duration 25%
- max. equilibrium temperature +50 °C.



The limiting speeds  $n_G$  are valid for oil lubrication with adequate cooling.



# Needle roller/axial cylindrical roller bearings

**Friction** In most applications, preloading of bearings by means of the locknut tightening torque gives sufficiently accurate setting values. The reference here is the tightening torque  $M_A$  according to the dimension tables in conjunction with an INA precision locknut. The frictional torque  $M_{RL}$  given in the dimension tables is a guide value. It is based on lightly oiled bearings, measured at a speed of  $n = 5 \text{ min}^{-1}$ . For dimensioning of the drive, the starting frictional torque and the frictional torque at high speeds of  $2$  to  $3 \times M_{RL}$  must be taken into consideration.

**Frictional torque and bearing preload** For applications in which the frictional torque is decisive (for example temperature development, frictional torque compensation between different bearing positions, etc.), it is recommended that the bearing preload should be set in accordance with the bearing frictional torque  $M_{RL}$ .

**Frictional energy** The frictional energy  $N_R$  of the bearings can be calculated as follows:

$$N_R = \frac{M_{RL} \cdot n}{9,55}$$

$N_R$	W
Frictional energy	
$M_{RL}$	Nm
Bearing frictional torque	
$n$	$\text{min}^{-1}$
Operating speed.	

In any analysis of the thermal balance, the various operating speeds  $n_i$  and their corresponding time portions  $q_i$  must be taken into consideration.

**Lubrication** Needle roller/axial cylindrical roller bearings can be relubricated via the outer ring. They are supplied with oil-based or dry preservative and should preferably be lubricated with oil.

Good results have been obtained with oils CLP to DIN 51 517 and HLP to DIN 51 524 of ISO-VG 32 to ISO-VG 100.

**Relubrication for grease lubrication** Relubrication should be carried out with the bearing rotating and still warm from operation in order to achieve good replacement and distribution of grease.

The relubrication interval and quantity can only be determined under operating conditions since it is not possible to calculate all the influences in advance.

Relubrication: see INA Fitting and Maintenance Manual TPI 100.



Where a vertical axis of rotation is used in conjunction with automatic lubrication systems, the lubrication impulse should be selected such that the supply to the upper axial bearing is sufficient.



**Lubricant feed**

Examples of lubricant feeds for ZARF(L) are shown in *Figure 7*, *Figure 8*.

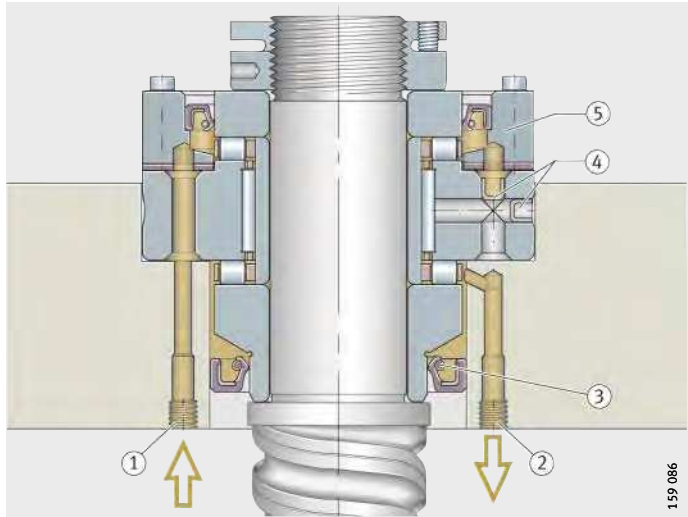


Before initial operation, it must be ensured that all raceways are adequately supplied with lubricant.

**ZARF.-L**

- ① Oil inlet
- ② Oil outlet
- ③ Rotary shaft seal
- ④ Cover
- ⑤ Seal carrier assembly

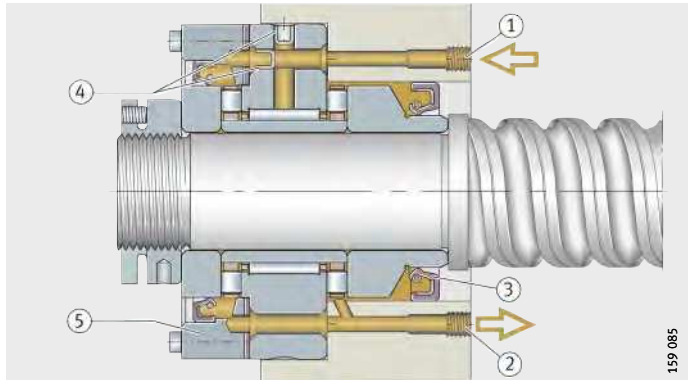
*Figure 7*  
Lubricant feed for vertical mounting position



**ZARF.-L**

- ① Oil inlet
- ② Oil outlet
- ③ Rotary shaft seal
- ④ Cover
- ⑤ Seal carrier assembly

*Figure 8*  
Lubricant feed for horizontal mounting position



# Needle roller/axial cylindrical roller bearings

## Mounting guidelines



Bearings should only be fitted and dismantled in accordance with INA Fitting and Maintenance Manual TPI 100. This TPI is available upon request.

During fitting of bearings, mounting forces should be applied only to the bearing ring to be fitted. Mounting forces must never be directed through the rolling elements.

The characteristics of the bearings are only valid when used in combination with INA precision locknuts and the associated tightening torques given in the dimension tables.

ZARN and ZARF are not self-retaining. The individual bearing components are matched to each other. The individual parts of different bearings must not be interchanged during fitting.

## Setting the axial preload



The preload in the axial component of ZARF(L) bearings is decisive for the function. It must therefore be set with sufficient accuracy.

Since direct force measurement of these values in fitting is not cost-effective, the axial preload is set indirectly using the following methods:

- either by means of the tightening torque  $M_A$  of the precision locknut. The frictional torque may deviate from the value given in the dimension table
- or by means of the bearing frictional torque  $M_{RL}$ .

## Preloading by locknut

Needle roller/axial cylindrical roller bearings must be axially preloaded during fitting by means of a precision locknut.

When preloading the bearing unit by means of the bearing inner rings using the recommended precision locknut, the tightening torques given in the dimension tables must be observed or the preload must be set using the bearing frictional torque given in the dimension tables. The tightening torques given for the individual bearing sizes are only valid for the INA precision locknuts listed.

In order to counteract settling, it is recommended that the locknut should initially be tightened to twice the tightening torque  $M_A$  and then relieved of load again. It should only then be tightened again to the stated tightening torque  $M_A$ . Finally, the precision locknut should be secured against rotation by the torque-controlled tightening of the set screws.

**Fixing screws** The fixing screws for the outer ring must be tightened in a crosswise sequence. They may be loaded up to 70% of their proof stress. If the bearing outer ring is supported by an additional housing cover, it must be ensured that the fixing screws are sufficiently well dimensioned.

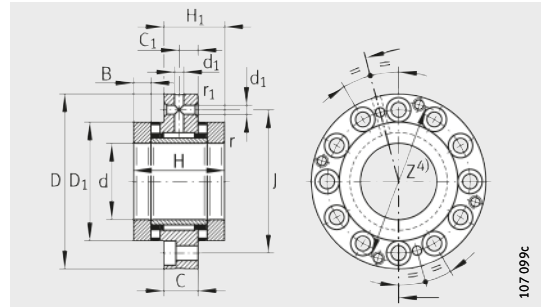
**Accuracy** Dimensional and geometrical accuracy (DIN 620):

- axial P4
- radial P6.



# Needle roller/ axial cylindrical roller bearings

Light series  
For screw mounting

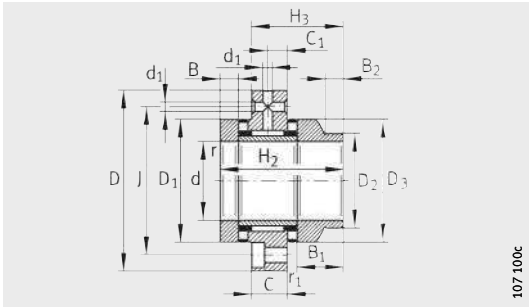


ZARF

**Dimension table** - Dimensions in mm

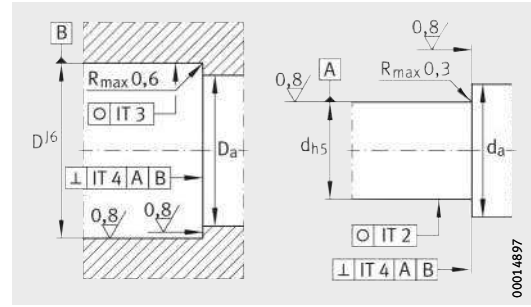
Designation	Mass m ≈kg	Dimensions																	
		d	D	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	C	C <sub>1</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	B	B <sub>1</sub>	B <sub>2</sub>	r	r <sub>1</sub>	d <sub>1</sub>	J
																	min.	min.	
ZARF1560-TV	0,42	15	60	40	26	-	-	14	8	35	-	-	7,5	-	-	0,3	0,6	3,2	46
ZARF1560-L-TV	0,45	15	60	-	-	53	39	14	8	35	24	34	7,5	20,5	11	0,3	0,6	3,2	46
ZARF1762-TV	0,49	17	62	43	27,5	-	-	14	8	38	-	-	9	-	-	0,3	0,6	3,2	48
ZARF1762-L-TV	0,52	17	62	-	-	57	41,5	14	8	38	28	38	9	23	11	0,3	0,6	3,2	48
ZARF2068-TV	0,56	20	68	46	29	-	-	14	8	42	-	-	10	-	-	0,3	0,6	3,2	53
ZARF2068-L-TV	0,61	20	68	-	-	60	43	14	8	42	30	40	10	24	11	0,3	0,6	3,2	53
ZARF2575-TV	0,78	25	75	50	33	-	-	18	10	47	-	-	10	-	-	0,3	0,6	3,2	58
ZARF2575-L-TV	0,84	25	75	-	-	65	48	18	10	47	36	45	10	25	11	0,3	0,6	3,2	58
ZARF3080-TV	0,85	30	80	50	33	-	-	18	10	52	-	-	10	-	-	0,3	0,6	3,2	63
ZARF3080-L-TV	0,9	30	80	-	-	65	48	18	10	52	40	50	10	25	11	0,3	0,6	3,2	63

- 1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.
- 2) Tightening torque of fixing screws according to manufacturer's data.  
Screws are not included in the delivery.
- 3) Mass moment of inertia for rotating inner ring.
- 4) Mounting dimension for seal carrier assembly DRS.  
Seal carrier assemblies: see page 1095 and page 1101.
- 5) Only valid in conjunction with INA precision locknuts.
- 6) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



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Design of adjacent construction

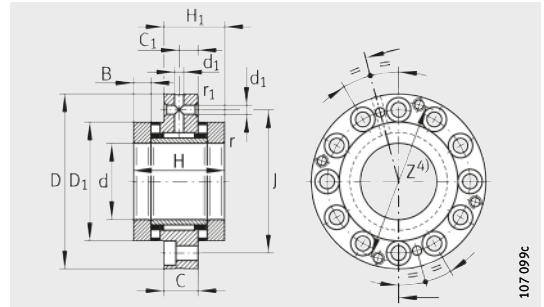
Mounting dimensions <sup>1)</sup>		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia <sup>3)</sup>	Axial runout <sup>6)</sup>
		axial		radial								
D <sub>a</sub>	d <sub>a</sub>	dyn. C <sub>a</sub>	stat. C <sub>0a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	n <sub>G</sub> oil	n <sub>G</sub> grease	M <sub>RL</sub>	c <sub>aL</sub>	c <sub>kL</sub>	M <sub>m</sub>	
max.	min.	N	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>	Nm	N/μm	Nm/mrad	kg · cm <sup>2</sup>	μm
36	28	24 900	53 000	13 000	17 500	8 500	2 200	0,35	1 400	110	0,24	1
36	22	24 900	53 000	13 000	17 500	8 500	2 200	0,35	1 400	110	0,274	1
39	28	26 000	57 000	14 000	19 900	7 800	2 100	0,4	1 600	160	0,373	1
39	26	26 000	57 000	14 000	19 900	7 800	2 100	0,4	1 600	160	0,464	1
43	33	33 500	76 000	14 900	22 400	7 000	2 000	0,5	1 800	230	0,615	1
43	28	33 500	76 000	14 900	22 400	7 000	2 000	0,5	1 800	230	0,683	1
48	39	35 500	86 000	22 600	36 000	6 000	1 900	0,55	1 900	350	0,989	1
48	34	35 500	86 000	22 600	36 000	6 000	1 900	0,55	1 900	350	1,15	1
53	44	39 000	101 000	24 300	41 500	5 500	1 800	0,65	2 200	520	1,46	1
53	38	39 000	101 000	24 300	41 500	5 500	1 800	0,65	2 200	520	1,7	1



Designation	Recommended INA locknut; to be ordered separately				Rotary shaft seal to DIN 3 760; to be ordered separately	Fixing screws <sup>2)</sup> DIN 912-10.9	
	Designation	Tightening torque <sup>5)</sup>	Axial preload force			Size	Quantity
			M <sub>A</sub> Nm	N			
ZARF1560-TV	ZMA15/33	AM15	10	6 506		M6	6
ZARF1560-L-TV	ZMA15/33	AM15	10	6 506		M6	6
ZARF1762-TV	ZM17	AM17	12	7 078		M6	6
ZARF1762-L-TV	ZM17	AM17	12	7 078		M6	6
ZARF2068-TV	ZMA20/38	AM20	18	9 376		M6	8
ZARF2068-L-TV	ZMA20/38	AM20	18	9 376		M6	8
ZARF2575-TV	ZMA25/45	AM25	25	10 470		M6	8
ZARF2575-L-TV	ZMA25/45	AM25	25	10 470		M6	8
ZARF3080-TV	ZMA30/52	AM30	32	11 091		M6	12
ZARF3080-L-TV	ZMA30/52	AM30	32	11 091		M6	12

# Needle roller/ axial cylindrical roller bearings

Light series  
For screw mounting

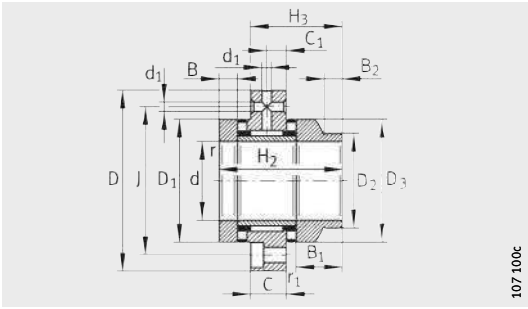


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**Dimension table** (continued) · Dimensions in mm

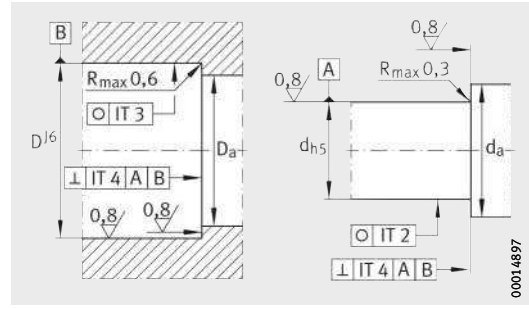
Designation	Mass m ≈kg	Dimensions																	
		d	D	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	C	C <sub>1</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	B	B <sub>1</sub>	B <sub>2</sub>	r	r <sub>1</sub>	d <sub>1</sub>	J
																	min.	min.	
<b>ZARF3590-TV</b>	1,12	<b>35</b>	90	54	35	–	–	18	10	60	–	–	11	–	–	0,3	0,6	3,2	73
<b>ZARF3590-L-TV</b>	1,25	<b>35</b>	90	–	–	70	51	18	10	60	45	58	11	27	12	0,3	0,6	3,2	73
<b>ZARF40100-TV</b>	1,35	<b>40</b>	100	54	35	–	–	18	10	65	–	–	11	–	–	0,3	0,6	3,2	80
<b>ZARF40100-L-TV</b>	1,45	<b>40</b>	100	–	–	70	51	18	10	65	50	63	11	27	12	0,3	0,6	3,2	80
<b>ZARF45105-TV</b>	1,7	<b>45</b>	105	60	40	–	–	22,5	12,5	70	–	–	11,5	–	–	0,3	0,6	6	85
<b>ZARF45105-L-TV</b>	1,85	<b>45</b>	105	–	–	75	55	22,5	12,5	70	56	68	11,5	26,5	12	0,3	0,6	6	85
<b>ZARF50115-TV</b>	2,1	<b>50</b>	115	60	40	–	–	22,5	12,5	78	–	–	11,5	–	–	0,3	0,6	6	94
<b>ZARF50115-L-TV</b>	2,45	<b>50</b>	115	–	–	78	58	22,5	12,5	78	60	78	11,5	29,5	12	0,3	0,6	6	94

- 1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.
- 2) Tightening torque of fixing screws according to manufacturer's data.  
Screws are not included in the delivery.
- 3) Mass moment of inertia for rotating inner ring.
- 4) Mounting dimension for seal carrier assembly DRS.  
Seal carrier assemblies: see page 1095 and page 1101.
- 5) Only valid in conjunction with INA precision locknuts.
- 6) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



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Design of adjacent construction

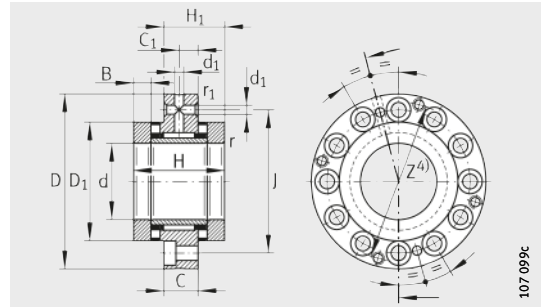
Mounting dimensions <sup>1)</sup>		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia <sup>3)</sup>	Axial runout <sup>6)</sup>
		axial		radial								
Da	da	dyn. Ca	stat. C0a	dyn. Cr	stat. C0r	nG oil	nG grease	MRL	caL	ckL	Mm	
max.	min.	N	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>	Nm	N/μm	Nm/mrad	kg·cm <sup>2</sup>	μm
61	50	56 000	148 000	26 000	47 000	4 800	1 700	0,9	2 600	740	2,8	1
61	43	56 000	148 000	26 000	47 000	4 800	1 700	0,9	2 600	740	3,21	1
66	55	59 000	163 000	27 500	53 000	4 400	1 600	1	2 800	1 030	3,78	1
66	48	59 000	163 000	27 500	53 000	4 400	1 600	1	2 800	1 030	4,35	1
71	60	61 000	177 000	38 000	74 000	4 000	1 500	1,2	3 000	1 340	5,33	1
71	54	61 000	177 000	38 000	74 000	4 000	1 500	1,2	3 000	1 340	6,03	1
79	67	90 000	300 000	40 000	82 000	3 600	1 200	2,2	4 800	2 470	8,42	1
79	58	90 000	300 000	40 000	82 000	3 600	1 200	2,2	4 800	2 470	10,46	1



Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3 760; to be ordered separately	Fixing screws <sup>2)</sup> DIN 912-10.9		
	Designation	Tightening torque <sup>5)</sup> MA Nm	Axial preload force N		Size	Quantity	
ZARF3590-TV	ZMA35/58	AM35/58	42	12 486	—	M6	12
ZARF3590-L-TV	ZMA35/58	AM35/58	42	12 486	45X60X8	M6	12
ZARF40100-TV	ZMA40/62	AM40	55	14 240	—	M8	8
ZARF40100-L-TV	ZMA40/62	AM40	55	14 240	50X65X8	M8	8
ZARF45105-TV	ZMA45/68	AM45	65	15 765	—	M8	8
ZARF45105-L-TV	ZMA45/68	AM45	65	15 765	56X70X8	M8	8
ZARF50115-TV	ZMA50/75	AM50	85	18 410	—	M8	12
ZARF50115-L-TV	ZMA50/75	AM50	85	18 410	60X80X8	M8	12

# Needle roller/ axial cylindrical roller bearings

Heavy series  
For screw mounting



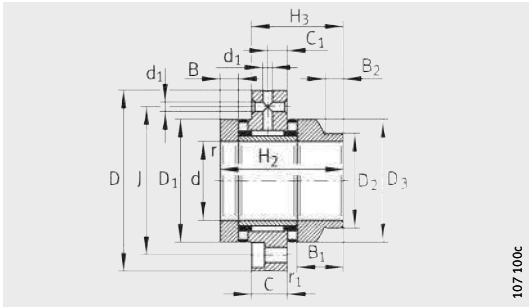
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**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions																
		d	D	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	C	C <sub>1</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	B	B <sub>1</sub>	B <sub>2</sub>	r	r <sub>1</sub>	
																min.	min.	
ZARF2080-TV	1,1	20	80	60	38	-	-	18	10	52	-	-	12,5	-	-	0,3	0,6	
ZARF2080-L-TV	1,22	20	80	-	-	75	53	18	10	52	40	50	12,5	27,5	11	0,3	0,6	
ZARF2590-TV	1,6	25	90	60	38	-	-	18	10	62	-	-	12,5	-	-	0,3	0,6	
ZARF2590-L-TV	1,75	25	90	-	-	75	53	18	10	62	48	60	12,5	27,5	11	0,3	0,6	
ZARF30105-TV	1,95	30	105	66	41	-	-	18	10	68	-	-	14	-	-	0,3	0,6	
ZARF30105-L-TV	2,15	30	105	-	-	82	57	18	10	68	52	66	14	30	12	0,3	0,6	
ZARF35110-TV	1,6	35	110	66	41	-	-	18	10	73	-	-	14	-	-	0,3	0,6	
ZARF35110-L-TV	1,85	35	110	-	-	82	57	18	10	73	60	73	14	30	12	0,3	0,6	
ZARF40115-TV	2,7	40	115	75	47,5	-	-	22,5	12,5	78	-	-	16	-	-	0,3	0,6	
ZARF40115-L-TV	3	40	115	-	-	93	65,5	22,5	12,5	78	60	78	16	34	12	0,3	0,6	
ZARF45130-TV	3,9	45	130	82	51	-	-	22,5	12,5	90	-	-	17,5	-	-	0,3	0,6	
ZARF45130-L-TV	4,3	45	130	-	-	103	72	22,5	12,5	90	70	88	17,5	38,5	14	0,3	0,6	

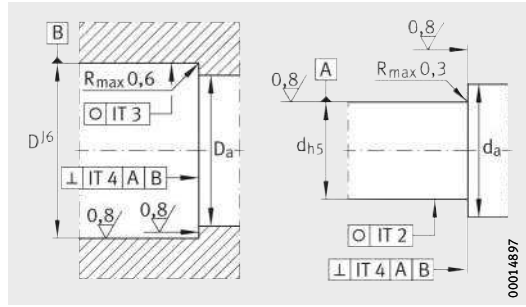
- 1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.
- 2) Tightening torque of fixing screws according to manufacturer's data.  
Screws are not included in the delivery.
- 3) Mass moment of inertia for rotating inner ring.
- 4) Mounting dimension for seal carrier assembly DRS.  
Seal carrier assemblies: see page 1095 and page 1101.
- 5) Only valid in conjunction with INA precision locknuts.
- 6) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.





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Design of adjacent construction

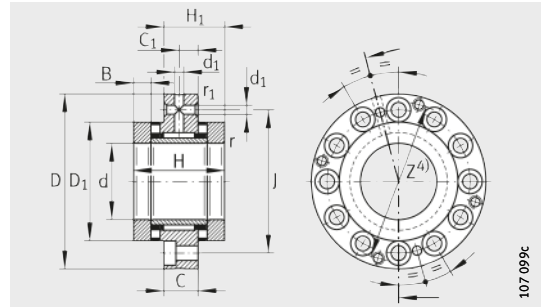
		Mounting dimensions <sup>1)</sup>		Basic load ratings				Limiting speeds		Bearing frictional torque $M_{RL}$ Nm	Rigidity axial $c_{aL}$ N/ $\mu$ m	Tilting rigidity $c_{kL}$ Nm/mrad	Mass moment of inertia <sup>3)</sup> $M_m$ kg · cm <sup>2</sup>	Axial run-out <sup>6)</sup> $\mu$ m
$d_1$	J	$D_a$ max.	$d_a$ min.	dyn. $C_a$ N	stat. $C_{0a}$ N	dyn. $C_r$ N	stat. $C_{0r}$ N	$n_G$ oil min <sup>-1</sup>	$n_G$ grease min <sup>-1</sup>					
3,2	63	53	38	64 000	141 000	22 600	36 000	6 000	1 500	1,3	2 300	400	1,98	1
3,2	63	53	38	64 000	141 000	22 600	36 000	6 000	1 500	1,3	2 300	400	2,27	1
3,2	73	63	45	80 000	199 000	24 300	41 500	4 900	1 400	1,6	3 000	800	3,88	1
3,2	73	63	45	80 000	199 000	24 300	41 500	4 900	1 400	1,6	3 000	800	4,51	1
3,2	85	69	52	107 000	265 000	26 000	47 000	4 400	1 300	2,1	3 300	1 100	6,53	1
3,2	85	69	50	107 000	265 000	26 000	47 000	4 400	1 300	2,1	3 300	1 100	7,43	1
3,2	88	74	60	105 000	265 000	27 500	53 000	4 000	1 250	2,3	2 500	1 300	8,47	1
3,2	88	74	58	105 000	265 000	27 500	53 000	4 000	1 250	2,3	3 500	1 300	10,4	1
6	94	79	65	117 000	315 000	38 000	74 000	3 700	1 200	2,5	3 800	1 800	13,3	1
6	94	79	58	117 000	315 000	38 000	74 000	3 700	1 200	2,5	3 800	1 800	15,5	1
6	105	91	70	154 000	405 000	40 000	82 000	3 300	1 150	3,5	4 000	2 100	23,7	1
6	105	91	68	154 000	405 000	40 000	82 000	3 300	1 150	3,5	4 000	2 100	28,1	1



Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3 760; to be ordered separately	Fixing screws <sup>2)</sup> DIN 912-10.9	
	Designation	Tightening torque <sup>5)</sup> $M_A$ Nm	Axial preload force N		Size	Quantity
ZARF2080-TV	ZMA20/52 AM20	38	18 448	–	M6	12
ZARF2080-L-TV	ZMA20/52 AM20	38	18 448	40X52X7	M6	12
ZARF2590-TV	ZMA25/58 AM25	55	20 790	–	M6	12
ZARF2590-L-TV	ZMA25/58 AM25	55	20 790	48X62X8	M6	12
ZARF30105-TV	ZMA30/65 AM30	75	24 287	–	M8	12
ZARF30105-L-TV	ZMA30/65 AM30	75	24 287	52X68X8	M8	12
ZARF35110-TV	ZMA35/70 AM35	100	27 480	–	M8	12
ZARF35110-L-TV	ZMA35/70 AM35	100	27 480	60X75X8	M8	12
ZARF40115-TV	ZMA40/75 AM40	120	29 834	–	M8	12
ZARF40115-L-TV	ZMA40/75 AM40	120	29 834	60X80X8	M8	12
ZARF45130-TV	ZMA45/85 AM45	150	33 549	–	M8	12
ZARF45130-L-TV	ZMA45/85 AM45	150	33 549	70X90X10	M8	12

# Needle roller/ axial cylindrical roller bearings

Heavy series  
For screw mounting



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**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions																		
		d	D	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	C	C <sub>1</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	B	B <sub>1</sub>	B <sub>2</sub>	r	r <sub>1</sub>	d <sub>1</sub>	J	
ZARF50140-TV	4,2	50	140	82	51	–	–	22,5	12,5	95	–	–	17,5	–	–	0,3	0,6	6	113	
ZARF50140-L-TV	4,65	50	140	–	–	103	72	22,5	12,5	95	75	93	17,5	38,5	14	0,3	0,6	6	113	
ZARF55145-TV	4,5	55	145	82	51	–	–	22,5	12,5	100	–	–	17,5	–	–	0,3	0,6	6	118	
ZARF55145-L-TV	5	55	145	–	–	103	72	22,5	12,5	100	80	98	17,5	38,5	14	0,3	0,6	6	118	
ZARF60150-TV	4,7	60	150	82	51	–	–	22,5	12,5	105	–	–	17,5	–	–	0,3	0,6	6	123	
ZARF60150-L-TV	5,35	60	150	–	–	103	72	22,5	12,5	105	90	105	17,5	38,5	16	0,3	0,6	6	123	
ZARF65155-TV	5,1	65	155	82	51	–	–	22,5	12,5	110	–	–	17,5	–	–	0,3	0,6	6	128	
ZARF65155-L-TV	5,7	65	155	–	–	103	72	22,5	12,5	110	90	108	17,5	38,5	16	0,3	0,6	6	128	
ZARF70160-TV	5,2	70	160	82	51	–	–	22,5	12,5	115	–	–	17,5	–	–	0,3	0,6	6	133	
ZARF70160-L-TV	5,95	70	160	–	–	103	72	22,5	12,5	115	100	115	17,5	38,5	16	0,3	0,6	6	133	
ZARF75185-TV	9,4	75	185	100	62	–	–	27	15	135	–	–	21	–	–	0,3	1	6	155	
ZARF75185-L-TV	10,6	75	185	–	–	125	87	27	15	135	115	135	21	46	16	0,3	1	6	155	
ZARF90210-TV	13,7	90	210	110	69,5	–	–	32	17,5	160	–	–	22,5	–	–	0,3	1	8	180	
ZARF90210-L-TV	15,1	90	210	–	–	135	94,5	32	17,5	160	130	158	22,5	47,5	16	0,3	1	8	180	

<sup>1)</sup> If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.

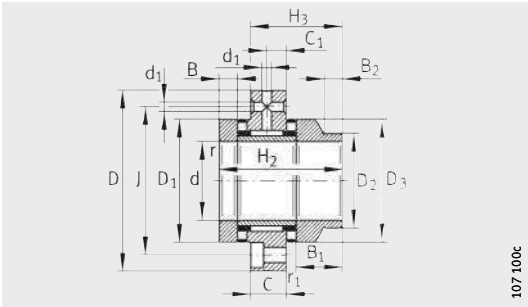
<sup>2)</sup> Tightening torque of fixing screws according to manufacturer's data.  
Screws are not included in the delivery.

<sup>3)</sup> Mass moment of inertia for rotating inner ring.

<sup>4)</sup> Mounting dimension for seal carrier assembly DRS.  
Seal carrier assemblies: see page 1095 and page 1101.

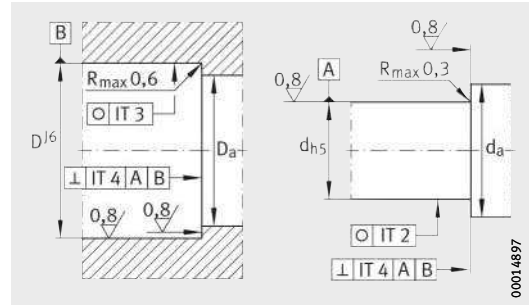
<sup>5)</sup> Only valid in conjunction with INA precision locknuts.

<sup>6)</sup> The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



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Design of adjacent construction

Mounting dimensions <sup>1)</sup>		Basic load ratings				Limiting speeds		Bearing frictional torque M <sub>RL</sub>	Rigidity axial c <sub>aL</sub>	Tilting rigidity c <sub>kL</sub>	Mass moment of inertia <sup>3)</sup> M <sub>m</sub>	Axial run-out <sup>6)</sup>
D <sub>a</sub>	d <sub>a</sub>	axial		radial		n <sub>G</sub> oil	n <sub>G</sub> grease					
max.	min.	dyn. C <sub>a</sub>	stat. C <sub>0a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	min <sup>-1</sup>	min <sup>-1</sup>	Nm	N/μm	Nm/mrad	kg·cm <sup>2</sup>	μm
96	75	172 000	480 000	42 000	90 000	3 100	1 100	3,8	4 600	2 900	29,8	1
96	73	172 000	480 000	42 000	90 000	3 100	1 100	3,8	4 600	2 900	35,3	1
101	85	177 000	500 000	44 000	98 000	2 900	1 000	4	4 900	3 600	36,1	1
101	78	177 000	500 000	44 000	98 000	2 900	1 000	4	4 900	3 600	43	1
106	90	187 000	550 000	44 500	92 000	2 700	950	4,2	5 300	4 300	43,8	1
106	88	187 000	550 000	44 500	92 000	2 700	950	4,2	5 300	4 300	54,5	1
111	97	172 000	500 000	54 000	104 000	2 600	900	4	4 800	4 000	51	1
111	88	172 000	500 000	54 000	104 000	2 600	900	4	4 800	4 000	60,1	1
116	100	201 000	630 000	56 000	119 000	2 400	800	4,8	5 800	6 000	62,2	1
116	98	201 000	630 000	56 000	119 000	2 400	800	4,8	5 800	6 000	77,3	1
136	113	290 000	890 000	72 000	132 000	2 100	700	8	6 600	8 500	149	2
136	110	290 000	890 000	72 000	132 000	2 100	700	8	6 600	8 500	188	2
161	130	325 000	1 030 000	98 000	210 000	1 800	700	10,5	7 700	14 500	312	2
161	125	325 000	1 030 000	98 000	210 000	1 800	700	10,5	7 700	14 500	372	2

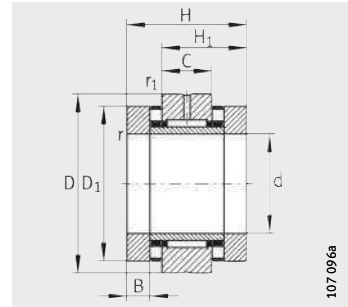


Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3 760; to be ordered separately	Fixing screws <sup>2)</sup> DIN 912-10.9	
	Designation	Tightening torque <sup>5)</sup> M <sub>A</sub> Nm	Axial preload force N		Size	Quantity
ZARF50140-TV	ZMA50/92 AM50	180	37 109	-	M10	12
ZARF50140-L-TV	ZMA50/92 AM50	180	37 109	75X95X10	M10	12
ZARF55145-TV	ZMA55/98 AM55	220	40 772	-	M10	12
ZARF55145-L-TV	ZMA55/98 AM55	220	40 772	80X100X10	M10	12
ZARF60150-TV	ZMA60/98 AM60	250	42 190	-	M10	12
ZARF60150-L-TV	ZMA60/98 AM60	250	42 190	90X110X12	M10	12
ZARF65155-TV	ZMA65/105 AM65	270	41 778	-	M10	12
ZARF65155-L-TV	ZMA65/105 AM65	270	41 778	90X110X12	M10	12
ZARF70160-TV	ZMA70/110 AM70	330	47 692	-	M10	12
ZARF70160-L-TV	ZMA70/110 AM70	330	47 692	100X120X12	M10	12
ZARF75185-TV	ZMA75/125 AM75	580	76 339	-	M12	12
ZARF75185-L-TV	ZMA75/125 AM75	580	76 339	115X140X12	M12	12
ZARF90210-TV	ZMA90/155 AM90	960	102 468	-	M12	16
ZARF90210-L-TV	ZMA90/155 AM90	960	102 468	130X160X12	M12	16

# Needle roller/ axial cylindrical roller bearings

Light series

Not for screw mounting



ZARN

**Dimension table** - Dimensions in mm

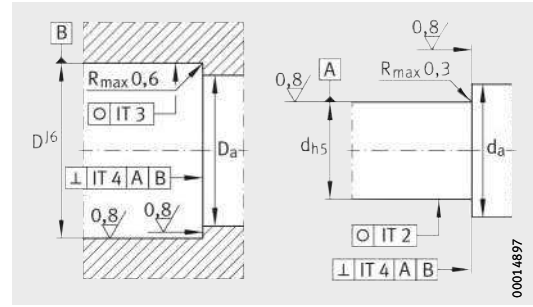
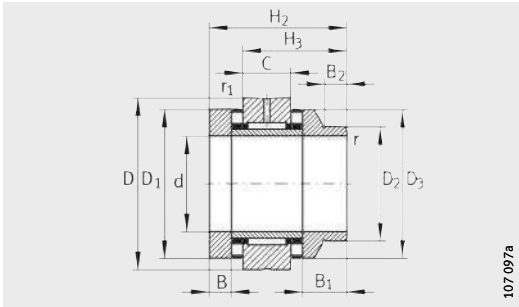
Designation	Mass m ≈kg	Dimensions														
		d	D	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	C	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	B	B <sub>1</sub>	B <sub>2</sub>	r	r <sub>1</sub>
															min.	min.
<b>ZARN1545-TV</b>	0,34	<b>15</b>	45	40	28	–	–	16	35	–	–	7,5	–	–	0,3	0,6
<b>ZARN1545-L-TV</b>	0,37	<b>15</b>	45	–	–	53	41	16	35	24	34	7,5	20,5	11	0,3	0,6
<b>ZARN1747-TV</b>	0,37	<b>17</b>	47	43	29,5	–	–	16	38	–	–	9	–	–	0,3	0,6
<b>ZARN1747-L-TV</b>	0,41	<b>17</b>	47	–	–	57	43,5	16	38	28	38	9	23	11	0,3	0,6
<b>ZARN2052-TV</b>	0,41	<b>20</b>	52	46	31	–	–	16	42	–	–	10	–	–	0,3	0,6
<b>ZARN2052-L-TV</b>	0,46	<b>20</b>	52	–	–	60	45	16	42	30	40	10	24	11	0,3	0,6
<b>ZARN2557-TV</b>	0,53	<b>25</b>	57	50	35	–	–	20	47	–	–	10	–	–	0,3	0,6
<b>ZARN2557-L-TV</b>	0,59	<b>25</b>	57	–	–	65	50	20	47	36	45	10	25	11	0,3	0,6
<b>ZARN3062-TV</b>	0,6	<b>30</b>	62	50	35	–	–	20	52	–	–	10	–	–	0,3	0,6
<b>ZARN3062-L-TV</b>	0,75	<b>30</b>	62	–	–	65	50	20	52	40	50	10	25	11	0,3	0,6

1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.

2) Mass moment of inertia for rotating inner ring.

3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



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Design of adjacent construction

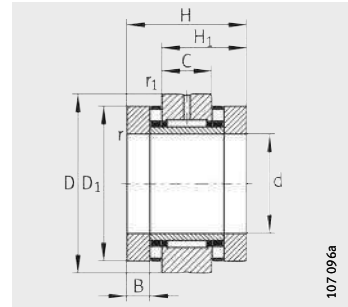
Mounting dimensions <sup>1)</sup>		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia <sup>2)</sup>	Axial runout <sup>4)</sup>
		axial		radial								
Da	da	dyn. Ca	stat. C0a	dyn. Cr	stat. C0r	nG oil	nG grease	MRL	caL	ckL	Mm	
max.	min.	N	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>	Nm	N/μm	Nm/mrad	kg · cm <sup>2</sup>	μm
36	28	24 900	53 000	13 000	17 500	8 500	2 200	0,35	1 400	110	0,24	1
36	22	24 900	53 000	13 000	17 500	8 500	2 200	0,35	1 400	110	0,274	1
39	28	26 000	57 000	14 000	19 900	7 800	2 100	0,4	1 600	160	0,373	1
39	26	26 000	57 000	14 000	19 900	7 800	2 100	0,4	1 600	160	0,464	1
43	33	33 500	76 000	14 900	22 400	7 000	2 000	0,5	1 800	230	0,615	1
43	28	33 500	76 000	14 900	22 400	7 000	2 000	0,5	1 800	230	0,683	1
48	39	35 500	86 000	22 600	36 000	6 000	1 900	0,55	1 900	350	0,989	1
48	34	35 500	86 000	22 600	36 000	6 000	1 900	0,55	1 900	350	1,15	1
53	44	39 000	101 000	24 300	41 500	5 500	1 800	0,65	2 200	520	1,46	1
53	38	39 000	101 000	24 300	41 500	5 500	1 800	0,65	2 200	520	1,7	1



Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3760; to be ordered separately
	Designation	Tightening torque <sup>3)</sup>	Axial preload force	
		MA Nm	N	
ZARN1545-TV	ZMA15/33 AM15	10	6 506	–
ZARN1545-L-TV	ZMA15/33 AM15	10	6 506	24X35X7
ZARN1747-TV	ZM17 AM17	12	7 078	–
ZARN1747-L-TV	ZM17 AM17	12	7 078	28X40X7
ZARN2052-TV	ZMA20/38 AM20	18	9 376	–
ZARN2052-L-TV	ZMA20/38 AM20	18	9 376	30X42X7
ZARN2557-TV	ZMA25/45 AM25	25	10 470	–
ZARN2557-L-TV	ZMA25/45 AM25	25	10 470	36X47X7
ZARN3062-TV	ZMA30/52 AM30	32	11 091	–
ZARN3062-L-TV	ZMA30/52 AM30	32	11 091	40X52X7

# Needle roller/ axial cylindrical roller bearings

Light series  
Not for screw mounting



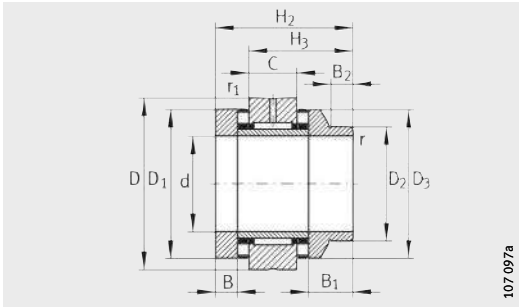
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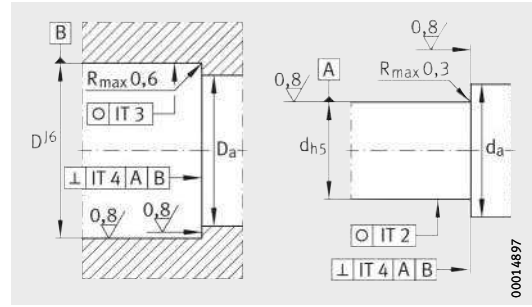
**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions														
		d	D	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	C	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	B	B <sub>1</sub>	B <sub>2</sub>	r	r <sub>1</sub>
															min.	min.
<b>ZARN3570-TV</b>	0,8	<b>35</b>	70	54	37	–	–	20	60	–	–	11	–	–	0,3	0,6
<b>ZARN3570-L-TV</b>	0,93	<b>35</b>	70	–	–	70	53	20	60	45	58	11	27	12	0,3	0,6
<b>ZARN4075-TV</b>	0,9	<b>40</b>	75	54	37	–	–	20	65	–	–	11	–	–	0,3	0,6
<b>ZARN4075-L-TV</b>	1	<b>40</b>	75	–	–	70	53	20	65	50	63	11	27	12	0,3	0,6
<b>ZARN4580-TV</b>	1,12	<b>45</b>	80	60	42,5	–	–	25	70	–	–	11,5	–	–	0,3	0,6
<b>ZARN4580-L-TV</b>	1,27	<b>45</b>	80	–	–	75	57,5	25	70	56	68	11,5	26,5	12	0,3	0,6
<b>ZARN5090-TV</b>	1,43	<b>50</b>	90	60	42,5	–	–	25	78	–	–	11,5	–	–	0,3	0,6
<b>ZARN5090-L-TV</b>	1,78	<b>50</b>	90	–	–	78	60,5	25	78	60	78	11,5	29,5	12	0,3	0,6

- 1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.
- 2) Mass moment of inertia for rotating inner ring.
- 3) Only valid in conjunction with INA precision locknuts.
- 4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



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Design of adjacent construction

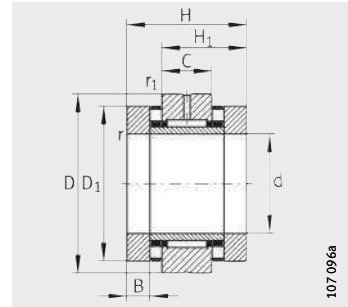
Mounting dimensions <sup>1)</sup>		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia <sup>2)</sup>	Axial runout <sup>4)</sup>
		axial		radial								
D <sub>a</sub>	d <sub>a</sub>	dyn. C <sub>a</sub>	stat. C <sub>0a</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>	n <sub>G</sub> oil	n <sub>G</sub> grease	M <sub>RL</sub>	c <sub>aL</sub>	c <sub>kL</sub>	M <sub>m</sub>	
max.	min.	N	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>	Nm	N/μm	Nm/mrad	kg·cm <sup>2</sup>	μm
61	50	56 000	148 000	26 000	47 000	4 800	1 700	0,9	2 600	740	2,8	1
61	43	56 000	148 000	26 000	47 000	4 800	1 700	0,9	2 600	740	3,21	1
66	55	59 000	163 000	27 500	53 000	4 400	1 600	1	2 800	1 030	3,78	1
66	48	59 000	163 000	27 500	53 000	4 400	1 600	1	2 800	1 030	4,35	1
71	60	61 000	177 000	38 000	74 000	4 000	1 500	1,2	3 000	1 340	5,33	1
71	54	61 000	177 000	38 000	74 000	4 000	1 500	1,2	3 000	1 340	6,03	1
79	67	90 000	300 000	40 000	82 000	3 600	1 200	2,2	4 800	2 470	8,42	1
79	58	90 000	300 000	40 000	82 000	3 600	1 200	2,2	4 800	2 470	10,46	1



Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3 760; to be ordered separately
	Designation		Tightening torque <sup>3)</sup> M <sub>A</sub> Nm	
ZARN3570-TV	ZMA35/58	AM35/58	42	12 486
ZARN3570-L-TV	ZMA35/58	AM35/58	42	12 486
ZARN4075-TV	ZMA40/62	AM40	55	14 240
ZARN4075-L-TV	ZMA40/62	AM40	55	14 240
ZARN4580-TV	ZMA45/68	AM45	65	15 765
ZARN4580-L-TV	ZMA45/68	AM45	65	15 765
ZARN5090-TV	ZMA50/75	AM50	85	18 410
ZARN5090-L-TV	ZMA50/75	AM50	85	18 410

# Needle roller/ axial cylindrical roller bearings

Heavy series  
Not for screw mounting



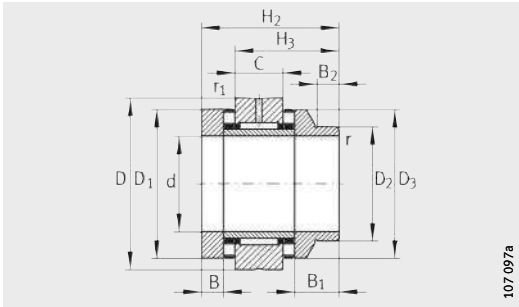
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**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions														
		d	D	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	C	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	B	B <sub>1</sub>	B <sub>2</sub>	r	r <sub>1</sub>
ZARN2062-TV	0,87	<b>20</b>	62	60	40	–	–	20	52	–	–	12,5	–	–	0,3	0,6
ZARN2062-L-TV	0,99	<b>20</b>	62	–	–	75	55	20	52	40	50	12,5	27,5	11	0,3	0,6
ZARN2572-TV	1,17	<b>25</b>	72	60	40	–	–	20	62	–	–	12,5	–	–	0,3	0,6
ZARN2572-L-TV	1,32	<b>25</b>	72	–	–	75	55	20	62	48	60	12,5	27,5	11	0,3	0,6
ZARN3080-TV	1,5	<b>30</b>	80	66	43	–	–	20	68	–	–	14	–	–	0,3	0,6
ZARN3080-L-TV	1,7	<b>30</b>	80	–	–	82	59	20	68	52	66	14	30	12	0,3	0,6
ZARN3585-TV	1,65	<b>35</b>	85	66	43	–	–	20	73	–	–	14	–	–	0,3	0,6
ZARN3585-L-TV	1,8	<b>35</b>	85	–	–	82	59	20	73	60	73	14	30	12	0,3	0,6
ZARN4090-TV	2,09	<b>40</b>	90	75	50	–	–	25	78	–	–	16	–	–	0,3	0,6
ZARN4090-L-TV	2,39	<b>40</b>	90	–	–	93	68	25	78	60	78	16	34	12	0,3	0,6
ZARN45105-TV	3,02	<b>45</b>	105	82	53,5	–	–	25	90	–	–	17,5	–	–	0,3	0,6
ZARN45105-L-TV	3,42	<b>45</b>	105	–	–	103	74,5	25	90	70	88	17,5	38,5	14	0,3	0,6
ZARN50110-TV	3,3	<b>50</b>	110	82	53,5	–	–	25	95	–	–	17,5	–	–	0,3	0,6
ZARN50110-L-TV	3,75	<b>50</b>	110	–	–	103	74,5	25	95	75	93	17,5	38,5	14	0,3	0,6

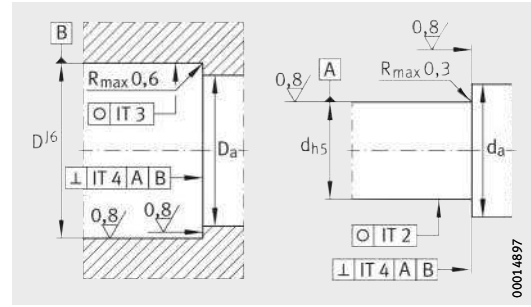
- 1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.
- 2) Mass moment of inertia for rotating inner ring.
- 3) Only valid in conjunction with INA precision locknuts.
- 4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.





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Design of adjacent construction

Mounting dimensions <sup>1)</sup>		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia <sup>2)</sup>	Axial runout <sup>4)</sup>
		axial		radial								
Da	da	dyn. Ca	stat. C0a	dyn. Cr	stat. C0r	nG oil	nG grease	MRL	CaL	CkL	Mm	
max.	min.	N	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>	Nm	N/μm	Nm/mrad	kg · cm <sup>2</sup>	μm
53	38	64 000	141 000	22 600	36 000	6 000	1 500	1,3	2 300	400	1,98	1
53	38	64 000	141 000	22 600	36 000	6 000	1 500	1,3	2 300	400	2,27	1
63	45	80 000	199 000	24 300	41 500	4 900	1 400	1,6	3 000	800	3,88	1
63	45	80 000	199 000	24 300	41 500	4 900	1 400	1,6	3 000	800	4,51	1
69	52	107 000	265 000	26 000	47 000	4 400	1 300	2,1	3 300	1 100	6,53	1
69	50	107 000	265 000	26 000	47 000	4 400	1 300	2,1	3 300	1 100	7,43	1
74	60	105 000	265 000	27 500	53 000	4 000	1 250	2,3	3 500	1 300	8,47	1
74	58	105 000	265 000	27 500	53 000	4 000	1 250	2,3	3 500	1 300	10,4	1
79	65	117 000	315 000	38 000	74 000	3 700	1 200	2,5	3 800	1 800	13,3	1
79	58	117 000	315 000	38 000	74 000	3 700	1 200	2,5	3 800	1 800	15,5	1
91	70	154 000	405 000	40 000	82 000	3 300	1 150	3,5	4 000	2 100	23,7	1
91	68	154 000	405 000	40 000	82 000	3 300	1 150	3,5	4 000	2 100	28,1	1
96	75	172 000	480 000	42 000	90 000	3 100	1 100	3,8	4 600	2 900	29,8	1
96	73	172 000	480 000	42 000	90 000	3 100	1 100	3,8	4 600	2 900	35,3	1

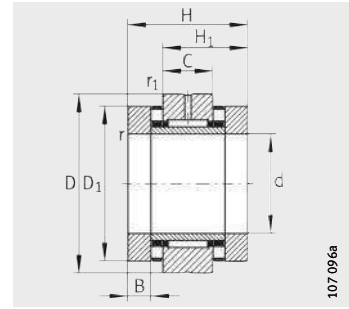


Designation	Recommended INA locknut; to be ordered separately			Tightening torque <sup>3)</sup> MA Nm	Axial preload force N	Rotary shaft seal to DIN 3 760; to be ordered separately
	Designation					
ZARN2062-TV	ZMA20/52	AM20		38	18 448	–
ZARN2062-L-TV	ZMA20/52	AM20		38	18 448	40X52X7
ZARN2572-TV	ZMA25/58	AM25		55	20 790	–
ZARN2572-L-TV	ZMA25/58	AM25		55	20 790	48X62X8
ZARN3080-TV	ZMA30/65	AM30		75	24 287	–
ZARN3080-L-TV	ZMA30/65	AM30		75	24 287	52X68X8
ZARN3585-TV	ZMA35/70	AM35		100	27 480	–
ZARN3585-L-TV	ZMA35/70	AM35		100	27 480	60X75X8
ZARN4090-TV	ZMA40/75	AM40		120	29 834	–
ZARN4090-L-TV	ZMA40/75	AM40		120	29 834	60X80X8
ZARN45105-TV	ZMA45/85	AM45		150	33 549	–
ZARN45105-L-TV	ZMA45/85	AM45		150	33 549	70X90X10
ZARN50110-TV	ZMA50/92	AM50		180	37 109	–
ZARN50110-L-TV	ZMA50/92	AM50		180	37 109	75X95X10

# Needle roller/ axial cylindrical roller bearings

Heavy series

Not for screw mounting



ZARN

Dimension table (continued) · Dimensions in mm

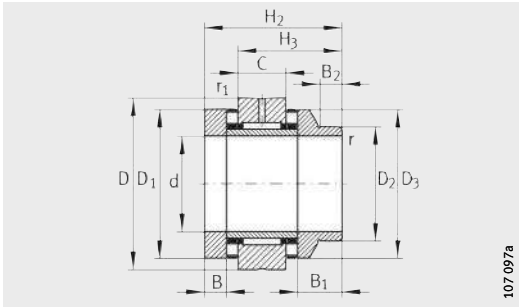
Designation	Mass m ≈kg	Dimensions														
		d	D	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	C	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	B	B <sub>1</sub>	B <sub>2</sub>	r	r <sub>1</sub>
																min.
ZARN55115-TV	3,5	55	115	82	53,5	–	–	25	100	–	–	17,5	–	–	0,3	0,6
ZARN55115-L-TV	4	55	115	–	–	103	74,5	25	100	80	98	17,5	38,5	14	0,3	0,6
ZARN60120-TV	3,7	60	120	82	53,5	–	–	25	105	–	–	17,5	–	–	0,3	0,6
ZARN60120-L-TV	4,85	60	120	–	–	103	74,5	25	105	90	105	17,5	38,5	16	0,3	0,6
ZARN65125-TV	4	65	125	82	53,5	–	–	25	110	–	–	17,5	–	–	0,3	0,6
ZARN65125-L-TV	4,6	65	125	–	–	103	74,5	25	110	90	108	17,5	38,5	16	0,3	0,6
ZARN70130-TV	4,1	70	130	82	53,5	–	–	25	115	–	–	17,5	–	–	0,3	0,6
ZARN70130-L-TV	4,85	70	130	–	–	103	74,5	25	115	100	115	17,5	38,5	16	0,3	0,6
ZARN75155-TV	7,9	75	155	100	65	–	–	30	135	–	–	21	–	–	0,3	1
ZARN75155-L-TV	9,1	75	155	–	–	125	90	30	135	115	135	21	46	16	0,3	1
ZARN90180-TV	11,8	90	180	110	72,5	–	–	35	160	–	–	22,5	–	–	0,3	1
ZARN90180-L-TV	13,2	90	180	–	–	135	97,5	35	160	130	158	22,5	47,5	16	0,3	1

1) If rotary shaft seals are used, the outside diameter of the sealing ring must be taken into consideration.

2) Mass moment of inertia for rotating inner ring.

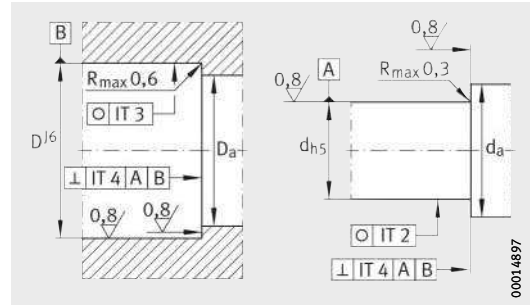
3) Only valid in conjunction with INA precision locknuts.

4) The axial runout data for screw drive bearing arrangements are based on the rotating inner ring.



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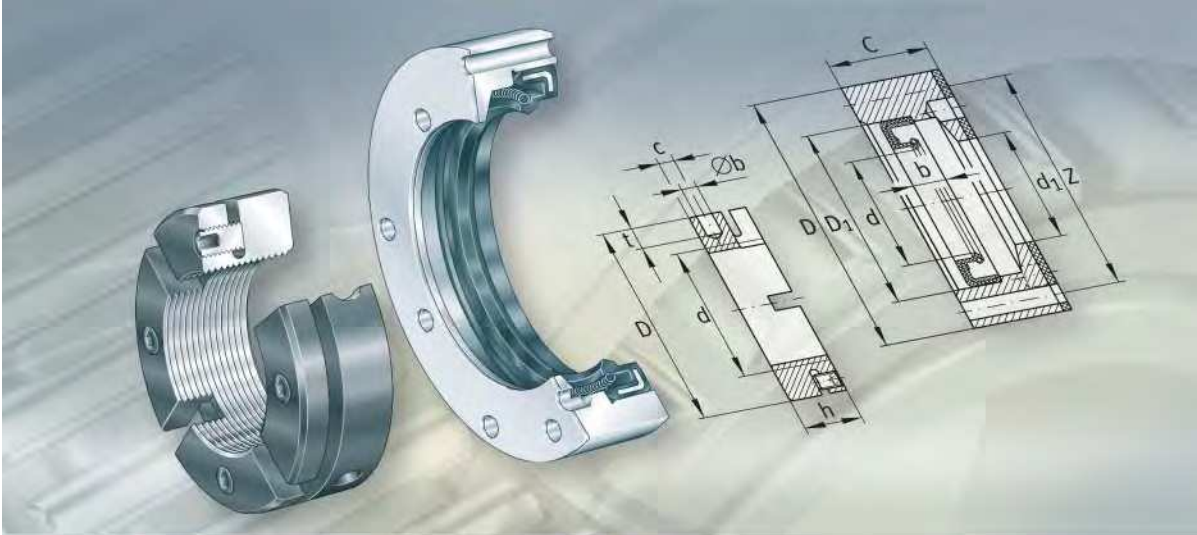
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Design of adjacent construction

Mounting dimensions <sup>1)</sup>		Basic load ratings				Limiting speeds		Bearing frictional torque	Rigidity axial	Tilting rigidity	Mass moment of inertia <sup>2)</sup>	Axial runout <sup>4)</sup>
		axial		radial								
Da	da	dyn. Ca	stat. C0a	dyn. Cr	stat. C0r	nG oil	nG grease	MRL	caL	ckL	Mm	
max.	min.	N	N	N	N	min <sup>-1</sup>	min <sup>-1</sup>	Nm	N/μm	Nm/mrad	kg·cm <sup>2</sup>	μm
101	85	177 000	500 000	44 000	98 000	2 900	1 000	4	4 900	3 600	36,1	1
101	78	177 000	500 000	44 000	98 000	2 900	1 000	4	4 900	3 600	43	1
106	90	187 000	550 000	44 500	92 000	2 700	950	4,2	5 300	4 300	43,8	1
106	88	187 000	550 000	44 500	92 000	2 700	950	4,2	5 300	4 300	54,5	1
111	97	172 000	500 000	54 000	104 000	2 600	900	4	4 800	4 000	51	1
111	88	172 000	500 000	54 000	104 000	2 600	900	4	4 800	4 000	60,1	1
116	100	201 000	630 000	56 000	119 000	2 400	800	4,8	5 800	6 000	62,2	1
116	98	201 000	630 000	56 000	119 000	2 400	800	4,8	5 800	6 000	77,3	1
136	113	290 000	890 000	72 000	132 000	2 100	700	8	6 600	8 500	149	2
136	110	290 000	890 000	72 000	132 000	2 100	700	8	6 600	8 500	188	2
161	130	325 000	1 030 000	98 000	210 000	1 800	700	10,5	7 700	14 500	312	2
161	125	325 000	1 030 000	98 000	210 000	1 800	700	10,5	7 700	14 500	372	2



Designation	Recommended INA locknut; to be ordered separately			Rotary shaft seal to DIN 3 760; to be ordered separately
	Designation		Tightening torque <sup>3)</sup>	
			MA	Axial preload force
			Nm	N
ZARN55115-TV	ZMA55/98	AM55	220	40 772
ZARN55115-L-TV	ZMA55/98	AM55	220	40 772
ZARN60120-TV	ZMA60/98	AM60	250	42 190
ZARN60120-L-TV	ZMA60/98	AM60	250	42 190
ZARN65125-TV	ZMA65/105	AM65	270	41 778
ZARN65125-L-TV	ZMA65/105	AM65	270	41 778
ZARN70130-TV	ZMA70/110	AM70	330	47 692
ZARN70130-L-TV	ZMA70/110	AM70	330	47 692
ZARN75155-TV	ZMA75/125	AM75	580	76 339
ZARN75155-L-TV	ZMA75/125	AM75	580	76 339
ZARN90180-TV	ZMA90/155	AM90	960	102 246
ZARN90180-L-TV	ZMA90/155	AM90	960	102 246



## Seal carrier assemblies Precision locknuts

# Seal carrier assemblies

## Precision locknuts

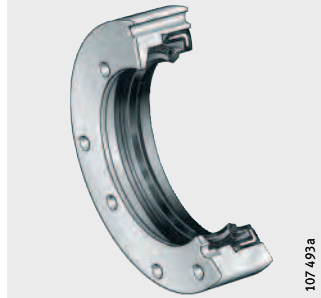
		Page
<b>Product overview</b>	Seal carrier assemblies, precision locknuts.....	1094
<b>Features</b>	Seal carrier assemblies.....	1095
	Operating temperature .....	1095
	Precision locknuts .....	1096
<b>Design and safety guidelines</b>	Breakaway torque.....	1098
	Ultimate axial load .....	1098
	Fitting and dismantling .....	1098
<b>Accuracy</b>	.....	1100
<b>Dimension tables</b>	Seal carrier assemblies DRS.....	1101
	Precision locknuts AM .....	1102
	Adapters AMS.....	1103
	Precision locknuts ZM, ZMA .....	1104



# Product overview Seal carrier assemblies Precision locknuts

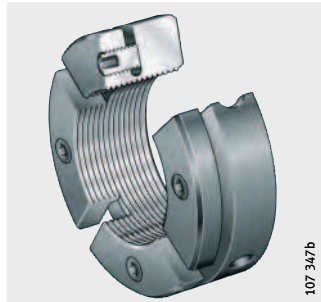
## Seal carrier assemblies

DRS



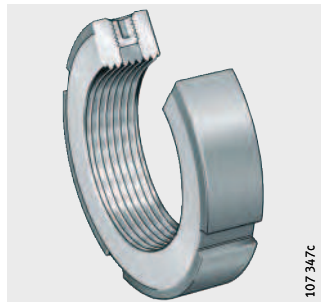
## Precision locknuts For axial locking

AM



## For radial locking

ZM, ZMA



# Seal carrier assemblies Precision locknuts

## Features

### Seal carrier assemblies

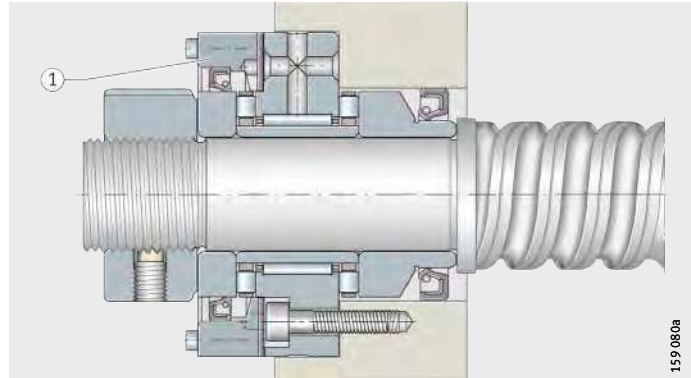
Seal carrier assemblies DRS are screw mounted to the outer ring of needle roller/axial cylindrical roller bearings ZARF(L) and precisely centred in this position, *Figure 1*, ①. They seal the bearings against outside influences.

The sealing elements are supplied as a complete kit and comprise a seal carrier with an integral rotary shaft seal, a gasket and hexagonal socket cap screws for fixing the carrier to the central washer of the bearing.

DRS  
ZMA  
ZARF.-L

① Seal carrier assembly DRS

*Figure 1*  
Needle roller/  
axial cylindrical roller bearing,  
seal carrier assembly, locknut



### Operating temperature

Seal carrier assemblies are suitable for operating temperatures from  $-30\text{ }^{\circ}\text{C}$  to  $+120\text{ }^{\circ}\text{C}$ , restricted by the seal material.

# Seal carrier assemblies

## Precision locknuts

### Precision locknuts

Precision locknuts are used where high axial forces must be supported and high runout accuracy and rigidity are required, *Figure 2*, ①, *Figure 3*, page 1097, ①.

The thread and the axial face of the locknut in contact with the rolling bearing are produced in a single clamping operation. This allows very high runout accuracy to be achieved.

Locknuts are available in the designs AM, ZM and ZMA. If handled correctly, they can be reused several times.

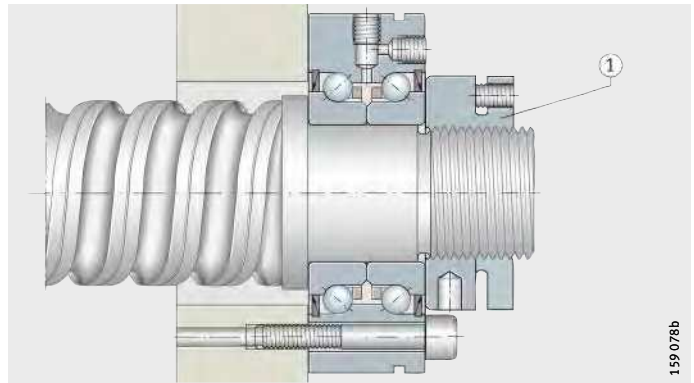
### Axial locking by segments

Locknuts of series AM are divided into several segments for applying the locking forces. When the hexagonal socket grub screws are tightened, the segments are elastically deformed. As a result, the thread flanks of the segments are pressed against the flanks of the shaft thread and give a high frictional force that acts to prevent loosening of the nut. The runout of the nut is not affected by this method of locking.

**AM**  
**ZKLF.-2RS**

① Precision locknut AM

*Figure 2*  
Axial angular contact ball bearings



159 078b



### Locking by radial locking pegs

Locknuts ZM and ZMA are secured against rotation by means of two radially acting locking pegs, *Figure 3*, ①. ZMA is the heavy series.

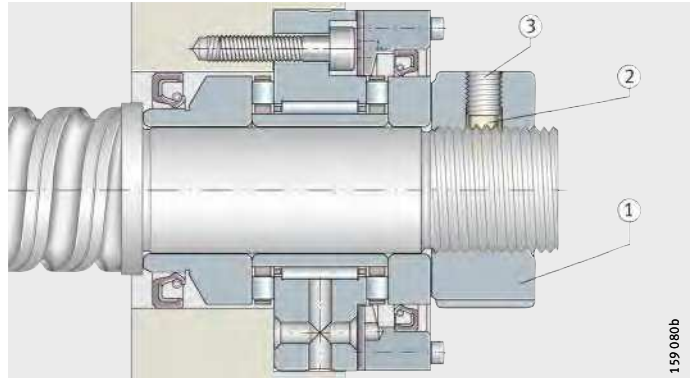
The locking pegs are manufactured together with the internal thread of the locknut. They mesh in the thread of the shaft without affecting the runout or damaging the thread, *Figure 3*, ②.

The locking pegs are secured by grub screws with a hexagonal socket arranged concentrically over the locking pegs, *Figure 3*, ③.

DRS  
ZMA  
ZARF.-L

- ① Precision locknut ZMA
- ② Locking peg
- ③ Grub screw

*Figure 3*  
Needle roller/  
axial cylindrical roller bearings



# Seal carrier assemblies

## Precision locknuts

### Design and safety guidelines

Shaft threads for the precision locknuts must be precision machined, see table.

#### Recommended shaft thread

Shaft thread	
Tolerance class "medium"	Tolerance class "fine"
6g DIN 13 T21-24	4h DIN 13 T21-24



The journal thread must support the locknut over its whole width.

#### Breakaway torque

The breakaway torques  $M_L$  given in the dimension tables are based on a locknut tightened against a rigid shaft shoulder to the reference tightening torque  $M_{AL}$  and secured.

#### Ultimate axial load

The axial ultimate loads  $F_{aB}$  are valid for a journal thread with a tolerance 6g or better and a minimum strength of 700 N/mm<sup>2</sup>. For dynamic loading, the permissible value can be taken as 75% of the ultimate load  $F_{aB}$ .

#### Fitting and dismantling



For the fitting and dismantling of bearings and precision locknuts, the information in the INA Fitting and maintenance manual, TPI 100 must be observed.

Locknuts must be fully screwed onto the shaft thread.

### Precision locknuts with axial locking

Locknuts AM can be tightened using a hook wrench to DIN 1810B that engages in four, six or eight holes around the circumference. The grub screws are then tightened in a crosswise sequence to the specified tightening torque  $M_A$  using an Allen key. Dismantling is carried out by uniformly loosening the grub screws of all segments in order to prevent a single segment being left tensioned.



Tightening by means of just one segment is not permissible. For tightening, an adapter of series AMS can be used that ensures uniform loading of all segments. The adapter AMS must be ordered separately, see dimension table, page 1103.

For tightening using the adapter AMS, a hook wrench to DIN 1810A or to DIN 1810B can be used.

If precision locknuts AM are fitted using the adapter AMS, a maximum tightening torque of twice the value given in the dimension table for the bearing is permissible.

Segments can be axially deformed if the grub screws are not tightened uniformly in a crosswise sequence or the locknut AM is not fully screwed onto the shaft thread. The specified tightening torque  $M_A$  according to the dimension table must be observed.



# Seal carrier assemblies

## Precision locknuts

### Precision locknuts with radial locking

Locknuts ZM and ZMA can be tightened using a hook wrench to DIN 1810A that engages in one of the four slots around the circumference.

The two grub screws are then tightened alternately to the specified tightening torque  $M_A$  using an Allen key; for  $M_A$ , see dimension tables for the bearings.

For dismantling, the two grub screws are first loosened and the locking pegs loosened by light impacts with a plastic hammer on the outside surface of the locknut (in the vicinity of the screw holes).

The locknut can then be easily unscrewed without damaging the journal thread.

### Accuracy

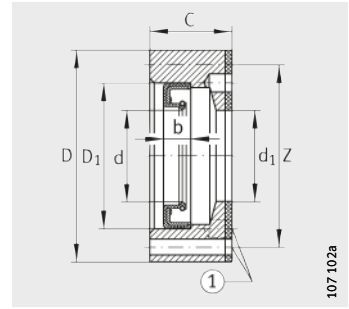
Accuracy of precision locknuts, see table.

### Axial runout

Axial runout of face to thread <sup>1)</sup> μm	Metric ISO thread "fine"
5	5H, DIN 13 T21-24

<sup>1)</sup> The face and thread are machined in a single clamping operation in order to achieve the highest accuracy. Before measurement, the precision locknut is clamped on a threaded mandrel with a defined tightening torque against a rigid shoulder. The grub screws are left untightened.

# Seal carrier assemblies



DRS<sup>1)</sup>  
 ① 4 holes, offset by 90°

107102a

**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions				Rotary shaft seal				Corresponding bearing in standard or L design Designation
		D	C	d <sub>1</sub>	Z <sup>2)</sup>	d	D <sub>1</sub>	b	Socket head screws DIN 912 4 each	
<b>DRS1560</b>	0,16	60	14	35	52,4	35	45	7	M3X20	<b>ZARF1560-TV</b>
<b>DRS1762</b>	0,18	62	15,5	38	54,4	38	47	7	M3X25	<b>ZARF1762-TV</b>
<b>DRS2068</b>	0,11	68	17	42	60,4	42	55	8	M3X25	<b>ZARF2068-TV</b>
<b>DRS2080</b>	0,2	80	22	52	73,4	52	68	8	M3X30	<b>ZARF2080-TV</b>
<b>DRS2575</b>	0,16	75	17	47	67,4	47	62	6	M3X25	<b>ZARF2575-TV</b>
<b>DRS2590</b>	0,3	90	22	62	81	62	75	10	M3X30	<b>ZARF2590-TV</b>
<b>DRS3080</b>	0,15	80	17	52	73,4	52	68	8	M3X25	<b>ZARF3080-TV</b>
<b>DRS30105</b>	0,35	105	25	68	95	68	85	10	M4X35	<b>ZARF30105-TV</b>
<b>DRS3590</b>	0,15	90	19	60	80	60	72	8	M4X25	<b>ZARF3590-TV</b>
<b>DRS35110</b>	0,3	110	25	73	101	73	95	10	M3X30	<b>ZARF35110-TV</b>
<b>DRS40100</b>	0,25	100	19	65	90	65	80	8	M4X30	<b>ZARF40100-TV</b>
<b>DRS40115</b>	0,5	115	27,5	78	106	78	100	10	M3X35	<b>ZARF40115-TV</b>
<b>DRS45105</b>	0,3	105	20	70	95	70	85	8	M4X30	<b>ZARF45105-TV</b>
<b>DRS45130</b>	0,7	130	31	90	120	90	110	12	M4X40	<b>ZARF45130-TV</b>
<b>DRS50115</b>	0,2	115	20	78	106	78	100	10	M3X30	<b>ZARF50115-TV</b>
<b>DRS50140</b>	0,8	140	30	95	127,5	95	115	13	M5X40	<b>ZARF50140-TV</b>
<b>DRS55145</b>	0,9	145	30	100	132,5	100	120	12	M5X40	<b>ZARF55145-TV</b>
<b>DRS60150</b>	0,9	150	30	105	137,5	105	125	12	M5X40	<b>ZARF60150-TV</b>
<b>DRS65155</b>	1	155	30	110	142,5	110	130	12	M5X40	<b>ZARF65155-TV</b>
<b>DRS70160</b>	1	160	30	115	147,5	115	135	13	M5X40	<b>ZARF70160-TV</b>
<b>DRS75185</b>	1,8	185	36	135	172,5	135	160	15	M5X50	<b>ZARF75185-TV</b>
<b>DRS90210</b>	2,7	210	38	160	194	160	180	15	M5X50	<b>ZARF90210-TV</b>

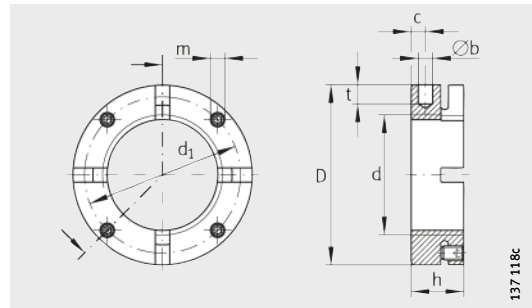
1) The seal carrier assembly is supplied as a kit comprising:

- seal carrier
- rotary shaft seal
- flange seal
- socket head screws.

2) Four holes offset by 90°.



# Precision locknuts



AM15 to AM40 with 4 segments  
 AM45 to AM90 with 6 segments  
 AM100 to AM130 with 8 segments

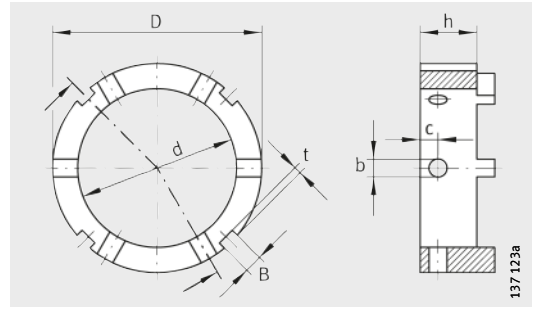
**Dimension table** - Dimensions in mm

Designation	Nut thread	Mass m ≈kg	Dimensions								Grub screw Tightening torque M <sub>A</sub> Nm	Locknut <sup>1)</sup>			
			D	h	b H11	t	d <sub>1</sub>	c	m	Axial rupture load F <sub>aB</sub> N		Break- away torque M <sub>L</sub> at Nm	Reference tightening torque M <sub>AL</sub> Nm	Mass moment of inertia M <sub>M</sub> kg · cm <sup>2</sup>	
															d
AM15	M15X1	0,06	30	18	4	5	24	5	M5	3	100 000	20	10	0,09	
AM17	M17X1	0,07	32	18	4	5	26	5	M5	3	120 000	25	15	0,11	
AM20	M20X1	0,13	38	18	4	6	31	5	M6	5	145 000	45	18	0,23	
AM25	M25X1,5	0,16	45	20	5	6	38	6	M6	5	205 000	60	25	0,49	
AM30	M30X1,5	0,20	52	20	5	7	45	6	M6	5	250 000	70	32	0,86	
AM30/65	M30X1,5	0,50	65	30	6	8	45	6	M6	5	400 000	70	32	2,8	
AM35/58	M35X1,5	0,23	58	20	5	7	51	6	M6	5	280 000	90	40	1,3	
AM35	M35X1,5	0,33	65	22	6	8	58	6	M6	5	330 000	100	40	2,4	
AM40	M40X1,5	0,30	65	22	6	8	58	6	M6	5	350 000	120	55	2,3	
AM40/85	M40X1,5	0,75	85	32	6	8	58	6	M6	5	570 000	120	55	7,6	
AM45	M45X1,5	0,34	70	22	6	8	63	6	M6	5	360 000	220	65	2,9	
AM50	M50X1,5	0,43	75	25	6	8	68	8	M6	5	450 000	280	85	4,3	
AM55	M55X2	0,60	85	26	6	8	75	8	M8	15	520 000	320	95	7,7	
AM60	M60X2	0,65	90	26	6	8	80	8	M8	15	550 000	365	100	9,4	
AM65	M65X2	0,83	100	26	8	10	88	8	M8	15	560 000	400	120	14,6	
AM70	M70X2	0,79	100	28	8	10	90	9	M8	15	650 000	450	130	14,7	
AM75	M75X2	1,23	115	30	8	10	102	10	M10	20	750 000	610	150	29	
AM80	M80X2	0,93	110	30	8	10	98	10	M10	20	670 000	770	160	21,3	
AM85	M85X2	0,97	115	30	8	10	102	10	M10	20	690 000	930	180	24,8	
AM90	M90X2	1,53	130	32	8	10	118	13	M10	20	900 000	1 100	200	48	
AM100	M100X2	1,12	130	30	8	10	118	10	M10	20	740 000	1 200	250	38	
AM110	M110X2	1,22	140	30	8	10	128	10	M10	20	770 000	1 300	250	48	
AM120	M120X2	1,56	155	30	8	10	142	10	M10	20	880 000	1 450	250	75	
AM130	M130X2	1,67	165	30	8	10	152	10	M10	20	900 000	1 600	250	92	

<sup>1)</sup> Caution!

If precision locknuts AM are fitted using the adapter AMS, a maximum tightening torque of twice the value given in the dimension table for the bearing is permissible.

# Adapters



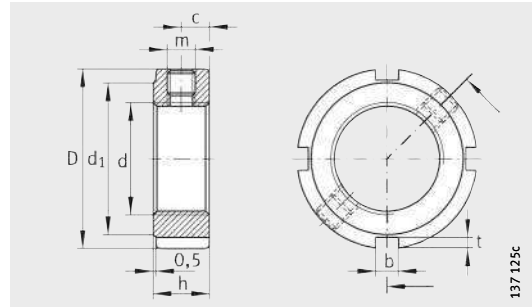
AMS

**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions							For precision locknuts
		D	h	d	b H11	c	B	t	
<b>AMS20</b>	0,047	32	14	22	4	5	4	2	<b>AM15, AM17, AM20</b>
<b>AMS30</b>	0,093	45	15	35	5	5	5	2	<b>AM25, AM30, AM35/58, AM30/65</b>
<b>AMS40</b>	0,217	65	16	45	6	6	6	2,5	<b>AM35, AM40</b>
<b>AMS50</b>	0,245	70	19	53	6	6	6	2,5	<b>AM45, AM50</b>
<b>AMS60</b>	0,37	85	20	65	6	6	7	3	<b>AM55, AM60</b>
<b>AMS70</b>	0,615	98	25	75	8	10	8	3,5	<b>AM65, AM70</b>
<b>AMS80</b>	0,755	110	25	85	8	10	8	3,5	<b>AM75, AM80, AM85</b>
<b>AMS90</b>	1,215	130	25	95	8	10	10	4	<b>AM90</b>
<b>AMS110</b>	0,74	130	25	110	8	10	10	4	<b>AM100, AM110</b>
<b>AMS130</b>	1,485	155	25	130	8	10	12	5	<b>AM120, AM130</b>



# Precision locknuts



ZM, ZMA

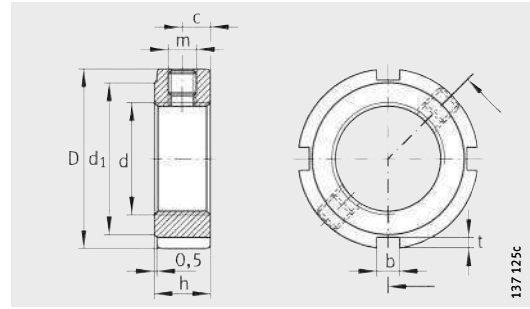
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Dimension table - Dimensions in mm														
Designation	Thread	Mass  m ≈ kg	Dimensions							Grub screw  Tightening torque M <sub>A</sub> Nm	Locknut			
			D	h	b	t	d <sub>1</sub>	c	m		Axial rupture load F <sub>aB</sub> N	Break-away torque M <sub>L</sub> at Nm	Reference tightening torque M <sub>AL</sub> Nm	Mass moment of inertia M <sub>M</sub> kg · cm <sup>2</sup>
ZM06	M6X0,5	0,01	16	8	3	2	11	4	M4	1	17 000	20	2	0,004
ZM08 <sup>1)</sup>	M8X0,75	0,01	16	8	3	2	11	4	M4	1	23 000	25	4	0,004
ZM10 <sup>1)</sup>	M10X1	0,01	18	8	3	2	14	4	M4	1	31 000	30	6	0,006
ZM12	M12X1	0,015	22	8	3	2	18	4	M4	1	38 000	30	8	0,013
ZM15	M15X1	0,018	25	8	3	2	21	4	M4	1	50 000	30	10	0,021
ZMA15/33	M15X1	0,08	33	16	4	2	28	8	M5	3	106 000	30	10	0,14
ZM17	M17X1	0,028	28	10	4	2	23	5	M5	3	57 000	30	15	0,401
ZM20	M20X1	0,035	32	10	4	2	27	5	M5	3	69 000	40	18	0,068
ZMA20/38	M20X1	0,12	38	20	5	2	33	10	M5	3	174 000	40	18	0,297
ZMA20/52	M20X1	0,32	52	25	5	2	47	12,5	M5	3	218 000	40	18	1,38
ZM25	M25X1,5	0,055	38	12	5	2	33	6	M6	5	90 000	60	25	0,157
ZMA25/45	M25X1,5	0,16	45	20	5	2	40	10	M6	5	211 000	60	25	0,572
ZMA25/58	M25X1,5	0,43	58	28	6	2,5	52	14	M6	5	305 000	60	25	2,36
ZM30	M30X1,5	0,075	45	12	5	2	40	6	M6	5	112 000	70	32	0,304
ZMA30/52	M30X1,5	0,22	52	22	5	2	47	11	M6	5	270 000	70	32	1,1
ZMA30/65	M30X1,5	0,55	65	30	6	2,5	59	15	M6	5	390 000	70	32	3,94
ZM35	M35X1,5	0,099	52	12	5	2	47	6	M6	5	134 000	80	40	0,537
ZMA35/58	M35X1,5	0,26	58	22	6	2,5	52	11	M6	5	300 000	80	40	1,66
ZMA35/70	M35X1,5	0,61	70	30	6	2,5	64	15	M6	5	460 000	80	40	5,2
ZM40	M40X1,5	0,14	58	14	6	2,5	52	7	M6	5	157 000	95	55	0,945
ZMA40/62	M40X1,5	0,27	62	22	6	2,5	56	11	M8	15	310 000	95	55	2,07
ZMA40/75	M40X1,5	0,67	75	30	6	2,5	69	15	M8	15	520 000	95	55	6,72
ZM45	M45X1,5	0,17	65	14	6	2,5	59	7	M6	5	181 000	110	65	1,48
ZMA45/68	M45X1,5	0,35	68	24	6	2,5	62	12	M8	15	360 000	110	65	3,2
ZMA45/85	M45X1,5	0,92	85	32	7	3	78	16	M8	15	630 000	110	65	11,9
ZM50	M50X1,5	0,19	70	14	6	2,5	64	7	M6	5	205 000	130	85	1,92
ZMA50/75	M50X1,5	0,43	75	25	6	2,5	68	12,5	M8	15	415 000	130	85	4,89
ZMA50/92	M50X1,5	1,06	92	32	8	3,5	84	16	M8	15	680 000	130	85	16,1
ZM55	M55X2	0,23	75	16	7	3	68	8	M6	5	229 000	150	95	2,77
ZMA55/98	M55X2	1,17	98	32	8	3,5	90	16	M8	15	620 000	150	95	20,5

<sup>1)</sup> When clamped, the grub screw protrudes by approx. 0,5 mm.



# Precision locknuts



ZM, ZMA

137125c

**Dimension table** (continued) - Dimensions in mm

Designation	Thread	Mass m ≈kg	Dimensions							Grub screw Tight- ening torque M <sub>A</sub> Nm	Locknut			
			D	h	b	t	d <sub>1</sub>	c	m		Axial rupture load F <sub>aB</sub> N	Break- away torque M <sub>L</sub> at Nm	Reference tightening torque M <sub>AL</sub> Nm	Mass moment of inertia M <sub>M</sub> kg · cm <sup>2</sup>
ZM60	M60X2	0,25	80	16	7	3	73	8	M6	5	255 000	180	100	3,45
ZMA60/98	M60X2	1,07	98	32	8	3,5	90	16	M8	15	680 000	180	100	19,6
ZM65	M65X2	0,27	85	16	7	3	78	8	M6	5	280 000	200	120	4,24
ZMA65/105	M65X2	1,21	105	32	8	3,5	97	16	M8	15	750 000	200	120	25,6
ZM70	M70X2	0,36	92	18	8	3,5	85	9	M8	15	305 000	220	130	6,61
ZMA70/110	M70X2	1,4	110	35	8	3,5	102	17,5	M8	15	810 000	220	130	33
ZM75	M75X2	0,4	98	18	8	3,5	90	9	M8	15	331 000	260	150	8,41
ZMA75/125	M75X2	2,11	125	38	8	3,5	117	19	M8	15	880 000	260	150	62,2
ZM80	M80X2	0,46	105	18	8	3,5	95	9	M8	15	355 000	285	160	11,2
ZMA80/120	M80X2	1,33	120	35	8	4	105	17,5	M8	15	810 000	285	160	44,6
ZM85	M85X2	0,49	110	18	8	3,5	102	9	M8	15	385 000	320	190	13,1
ZM90	M90X2	0,7	120	20	10	4	108	10	M8	15	410 000	360	200	21,8
ZMA90/130	M90X2	2,01	130	38	10	4	120	19	M8	15	910 000	360	200	64,1
ZMA90/155	M90X2	3,36	155	38	10	4	146	19	M8	15	1 080 000	360	200	150
ZM100	M100X2	0,77	130	20	10	4	120	10	M8	15	465 000	425	250	28,6
ZMA100/140	M100X2	2,23	140	38	12	5	128	19	M10	20	940 000	425	250	82,8
ZM105	M105X2	1,05	140	22	12	5	126	11	M10	20	495 000	475	300	44,5
ZM110	M110X2	1,09	145	22	12	5	133	11	M10	20	520 000	510	350	50,1
ZM115	M115X2	1,13	150	22	12	5	137	11	M10	20	550 000	550	400	56,2
ZM120	M120X2	1,28	155	24	12	5	138	12	M10	20	580 000	600	450	68,4
ZM125	M125X2	1,33	160	24	12	5	148	12	M10	20	610 000	640	500	76,1
ZM130	M130X2	1,36	165	24	12	5	149	12	M10	20	630 000	700	550	84,3
ZM140	M140X2	1,85	180	26	14	6	160	13	M12	38	690 000	800	600	133
ZM150	M150X2	2,24	195	26	14	6	171	13	M12	38	750 000	900	650	188







**FAG**



## High precision bearings for combined loads

Axial/radial bearings  
Axial angular contact ball bearings  
Axial/radial bearings  
with integral angular measuring system



# High precision bearings for combined loads

## **Axial/radial bearings** ..... 1110

Axial/radial bearings are double direction axial bearings for screw mounting, with a radial guidance bearing. These ready-to-fit, pregreased units are very rigid, have high load carrying capacity and run with particularly high accuracy. They can support radial forces, axial forces from both directions and tilting moments free from clearance. The bearings are available in several series.

For applications with low speeds and small operating durations, such as indexing tables and swivel type milling heads, the most suitable bearing is generally series YRT.

Where comparatively lower friction and higher speeds are required, RTC bearings can be used. For higher requirements in accuracy, these bearings are also available with restricted axial runout accuracy.

For the bearing arrangements of direct drive axes, there is the series YRT<sub>Speed</sub>. Due to their high limiting speeds and very low, uniform frictional torque across the whole speed range, these bearings are particularly suitable for combination with torque motors.

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## **Axial angular contact ball bearings** ..... 1110

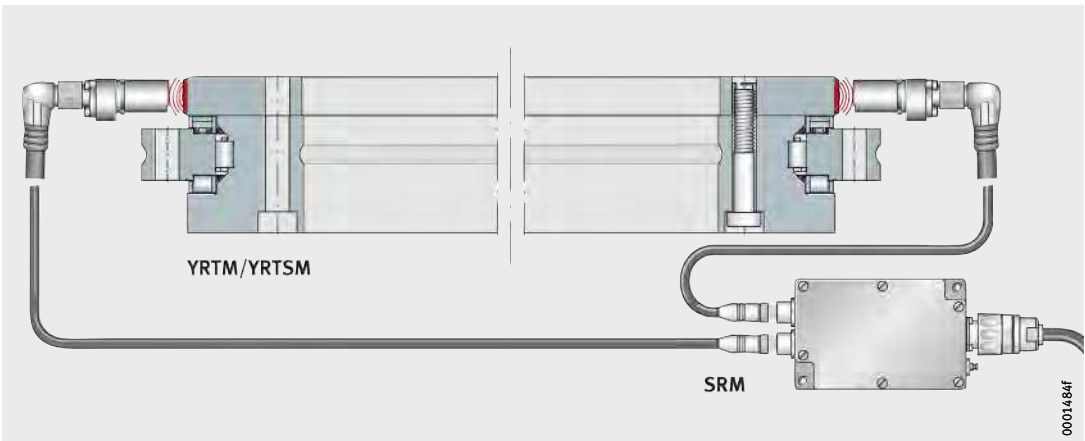
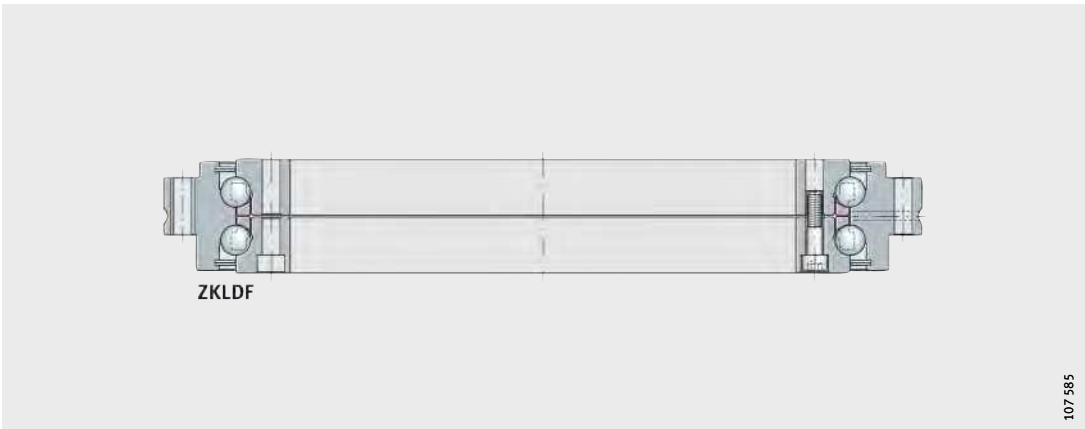
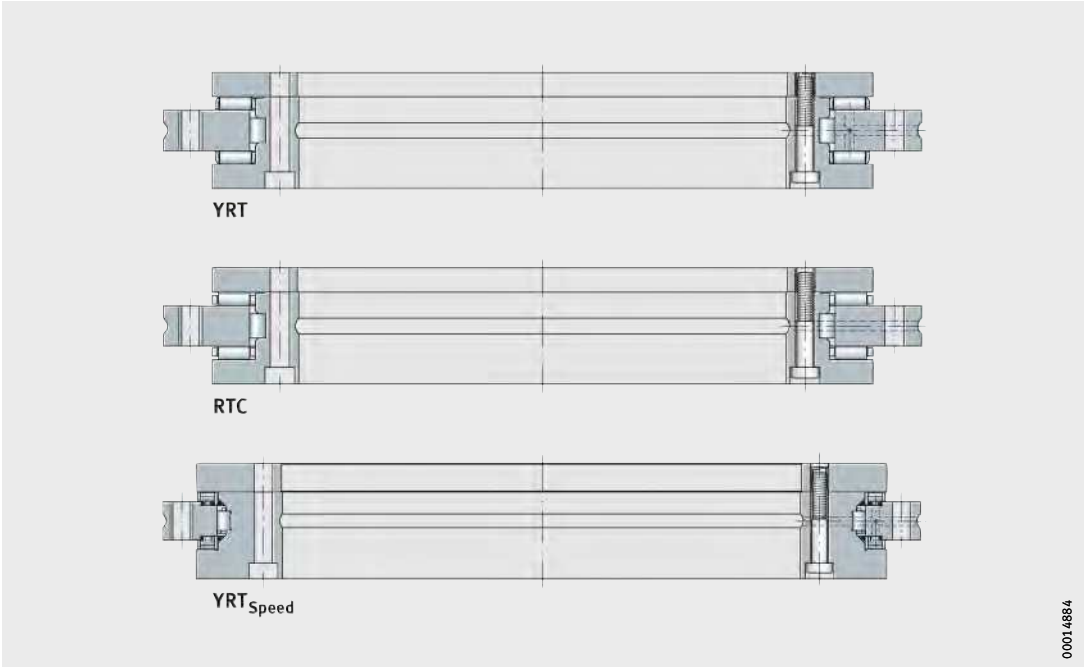
Axial angular contact ball bearings ZKLDF are low-friction, ready-to-fit, pregreased bearing units with high accuracy for very high speeds, high axial and radial loads and high demands on tilting rigidity.

Axial angular contact ball bearings are particularly suitable for precision applications involving combined loads. Their preferred areas of use are bearing arrangements in rotary tables, milling, grinding and honing heads as well as measurement and testing equipment.

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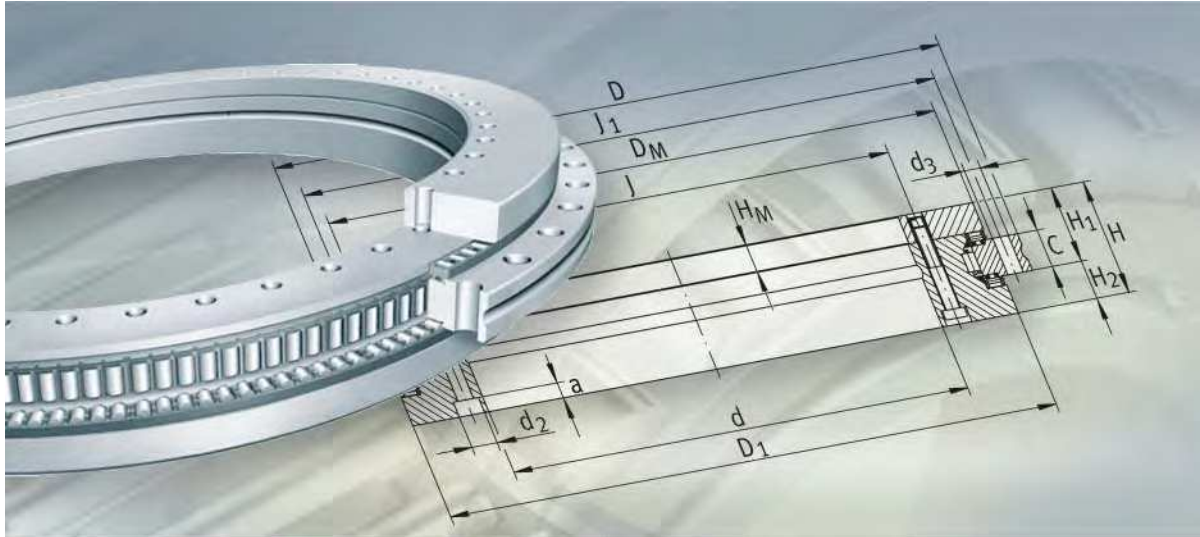
## **Axial/radial bearings with integral angular measuring system** ..... 1144

Axial/radial bearings with integral angular measuring system YRTM and YRTSM correspond in mechanical terms to the series YRT and YRTS but are additionally fitted with an angular measuring system. The measuring system can measure angles to an accuracy of a few angular seconds by noncontact, magneto-resistive means.





**FAG**



**Axial/radial bearings**  
**Axial angular contact ball bearings**

# Axial/radial bearings

## Axial angular contact ball bearings

		Page
<b>Product overview</b>	Axial/radial bearings, axial angular contact ball bearings .....	1112
<b>Features</b>	Areas of application.....	1114
	Axial/radial bearings .....	1115
	Axial angular contact ball bearings .....	1115
	Operating temperature .....	1115
	Suffixes.....	1115
<b>Design and safety guidelines</b>	Basic rating life .....	1116
	Static load safety factor .....	1116
	Static limiting load diagrams .....	1116
	Limiting speeds .....	1120
	Bearing preload.....	1120
	Frictional torque .....	1121
	Lubrication .....	1122
	Design of adjacent construction.....	1123
	Fits.....	1124
	L-section ring without support ring/with support ring .....	1128
	Fitting.....	1130
<b>Accuracy</b>	.....	1131
<b>Rigidity</b>	Static rigidity.....	1133
<b>Special designs</b>	.....	1133
<b>Dimension tables</b>	Axial/radial bearings, double direction, YRT.....	1134
	Axial/radial bearings, double direction, RTC.....	1138
	Axial/radial bearings, double direction, YRT <sub>Speed</sub> .....	1140
	Axial angular contact ball bearings, double direction, ZKLDF .....	1142



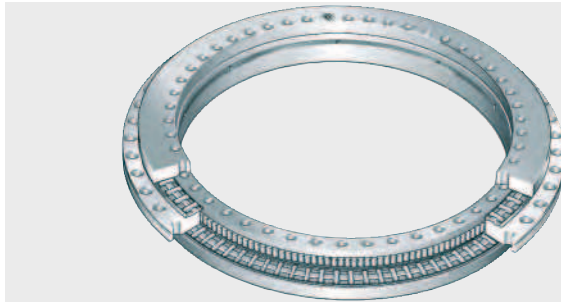
# Product overview

## Axial/radial bearings

### Axial angular contact ball bearings

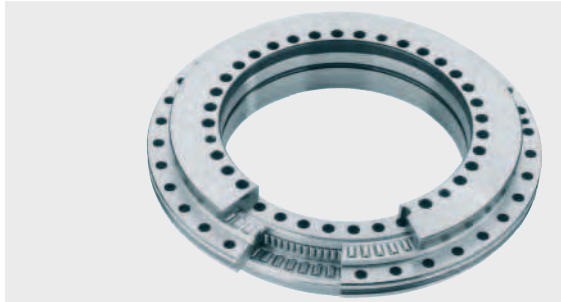
#### Axial/radial bearings

YRT



107 305a

RTC



107 520b

#### For higher speeds

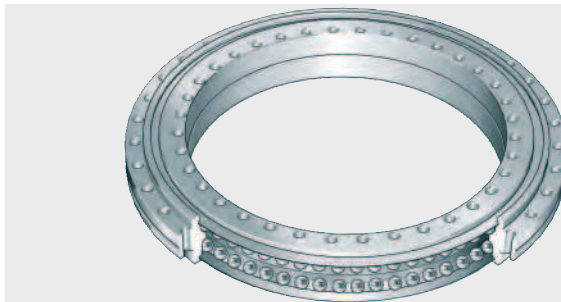
YRT<sub>Speed</sub>



107 485c

#### Axial angular contact ball bearings

ZKLDF



107 306a



# Axial/radial bearings

## Axial angular contact ball bearings

**Features** Axial/radial bearings YRT, RTC and YRT<sub>Speed</sub> and axial angular contact ball bearings ZKLDF are ready-to-fit high precision bearings for high precision applications with combined loads. They can support radial loads, axial loads from both sides and tilting moments without clearance and are particularly suitable for bearing arrangements with high requirements for running accuracy, such as rotary tables, face plates, milling heads and reversible clamps.

Due to the fixing holes in the bearing rings, the units are very easy to fit.

The bearings are radially and axially preloaded after fitting.

The mounting dimensions of all series are identical.

**With angular measuring system** Axial/radial bearings are also available with an angular measuring system. The measuring system can measure angles to an accuracy of a few angular seconds by non-contact, magneto-resistive means, see section Axial/radial bearings with integral angular measuring system, page 1144.



# Axial/radial bearings

## Axial angular contact ball bearings

### Areas of application

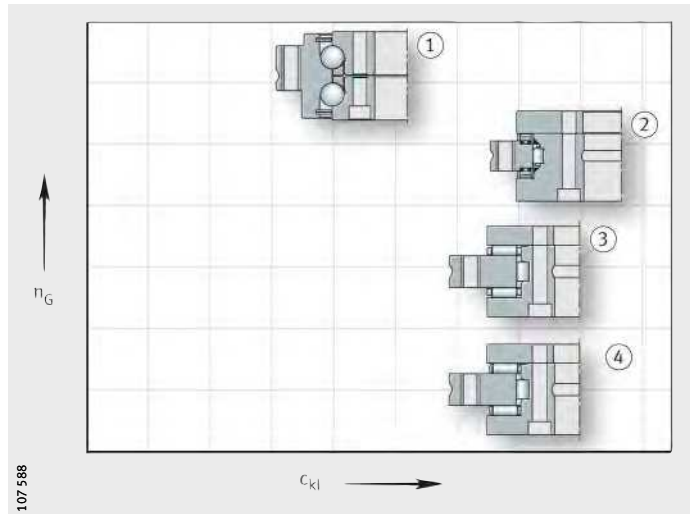
For standard applications with low speeds and small operating durations, such as indexing tables and swivel type milling heads, the most suitable bearing is generally series YRT, *Figure 1*. These bearings are available in two axial and radial runout accuracies.

Where comparatively lower friction and higher speeds are required, RTC bearings can be used, *Figure 1*. For higher requirements in accuracy, these bearings are also available with restricted axial runout accuracy.

For the bearing arrangements of direct drive axes, there is the series YRT<sub>Speed</sub>. Due to their high limiting speeds and very low, uniform frictional torque across the whole speed range, these bearings are particularly suitable for combination with torque motors, *Figure 1*.

Axial angular contact ball bearings ZKLDF are particularly suitable for high speed applications with long operating duration, *Figure 1*. They are characterised by high tilting rigidity, low friction and low lubricant consumption.

- ① ZKLDF
  - ② YRT<sub>Speed</sub>
  - ③ RTC
  - ④ YRT
- $n_G$  = limiting speed  
 $c_{kl}$  = tilting rigidity



*Figure 1*  
 Speed and tilting rigidity

## Axial/radial bearings

Axial/radial bearings YRT, RTC and YRT<sub>Speed</sub> have an axial component and a radial component.

The axial component comprises an axial needle roller or cylindrical roller and cage assembly, an outer ring, L-section ring and shaft locating washer and is axially preloaded after fitting.

The radial component is a full complement (YRT, RTC) or cage-guided, preloaded cylindrical roller set. The outer ring, L-section ring and shaft locating washer have fixing holes.

The unit is located by means of retaining screws for transport and safe handling.

**Sealing** Axial/radial bearings are supplied without seals.

**Lubrication** Bearings of series YRT and YRT<sub>Speed</sub> are greased using a lithium complex soap grease to GA08 and can be lubricated via the outer ring and L-section ring.

Arcanol LOAD150 is suitable for relubrication.

Bearings of series RTC are greased with Arcanol MULTITOP.

## Axial angular contact ball bearings

Axial angular contact ball bearings ZKLDF comprise a single-piece outer ring, a two-piece inner ring and two ball and cage assemblies with a contact angle of 60°. The outer ring and inner ring have fixing holes for screw mounting of the bearing on the adjacent construction.

The unit is located by means of retaining screws for transport and safe handling.

**Sealing** Axial angular contact ball bearings have sealing shields on both sides.

**Lubrication** The bearings are greased with a barium complex soap grease to DIN 51 825–KPE2K–30 and can be lubricated via the outer ring.

**Operating temperature** Axial/radial bearings and axial angular contact ball bearings are suitable for operating temperatures from –30 °C to +120 °C.

**Suffixes** Suffixes for available designs: see table.

### Available designs

Suffix	Description	Design
H <sub>1</sub> ...	Reduced tolerance on mounting dimension H <sub>1</sub> (postscript: H <sub>1</sub> with tolerance ± ...) Restricted tolerance value, see table, page 1131	Special design, available by agreement
H <sub>2</sub> ...	Reduced tolerance on mounting dimension H <sub>2</sub> (postscript: H <sub>2</sub> with tolerance ± ...) Restricted tolerance value, see table, page 1131	
–	Axial and radial runout tolerances restricted by 50% (additional text: axial/radial runout 50%)	



# Axial/radial bearings

## Axial angular contact ball bearings

### Design and safety guidelines

#### Basic rating life

The load carrying capacity and life must be checked for the radial and axial bearing component.

Please contact us in relation to checking of the basic rating life. The speed, load and operating duration must be given.

#### Static load safety factor

The static load safety factor  $S_0$  indicates the security against impermissible permanent deformations in the bearing:

$$S_0 = \frac{C_{0r}}{F_{0r}} \text{ or } \frac{C_{0a}}{F_{0a}}$$

$S_0$  – Static load safety factor  
 $C_{0r}, C_{0a}$  – Basic static load rating according to dimension tables  
 $F_{0r}, F_{0a}$  – Equivalent static load on the radial or axial bearing.



In machine tools and similar areas of application,  $S_0$  should be  $> 4$ .

#### Static limiting load diagrams

The static limiting load diagrams can be used:

- for rapid checking of the selected bearing size under predominantly static load
- for calculation of the tilting moment  $M_k$  that can be supported by the bearing in addition to the axial load.

The limiting load diagrams are based on a rolling element set with a static load safety factor  $S_0 \geq 4$ , as well as the screw and bearing ring strength.



The static limiting load must not be exceeded when dimensioning the bearing arrangement. Example: see *Figure 2*.

#### Axial/radial bearings

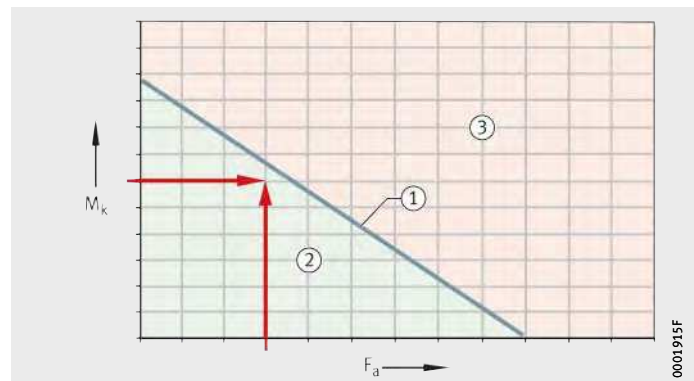
The static limiting load diagrams for YRT, YRTS and RTC are shown in *Figure 3*, page 1117 to *Figure 9*, page 1119.

#### Axial angular contact ball bearings

The static limiting load diagrams for the series ZKLDF are shown in *Figure 10* and *Figure 11*, page 1119.

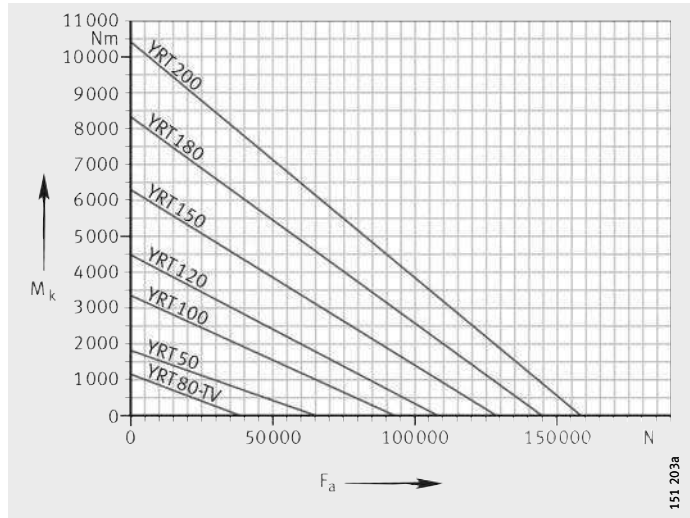
- ① Bearing, size
  - ② Permissible range
  - ③ Impermissible range
- $M_k$  = maximum tilting moment  
 $F_a$  = axial load

*Figure 2*  
 Static limiting load diagram (example)



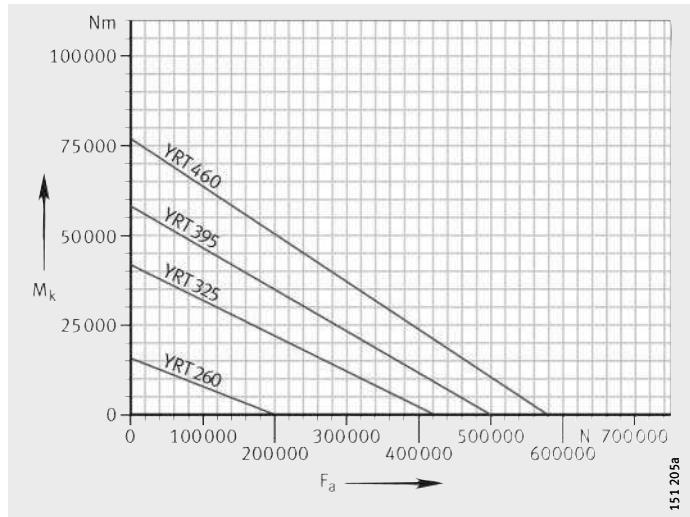
$M_k$  = maximum tilting moment  
 $F_a$  = axial load

*Figure 3*  
 Static limiting load diagram  
 YRT50 to YRT200



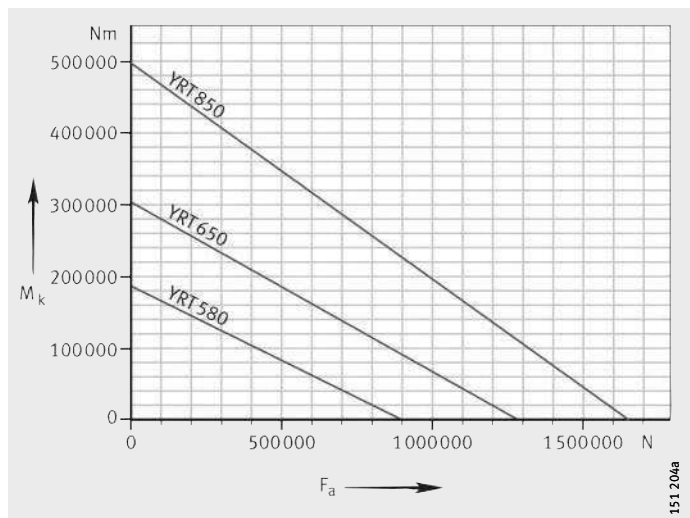
$M_k$  = maximum tilting moment  
 $F_a$  = axial load

*Figure 4*  
 Static limiting load diagram  
 YRT260 to YRT460



$M_k$  = maximum tilting moment  
 $F_a$  = axial load

*Figure 5*  
 Static limiting load diagram  
 YRT580 to YRT850

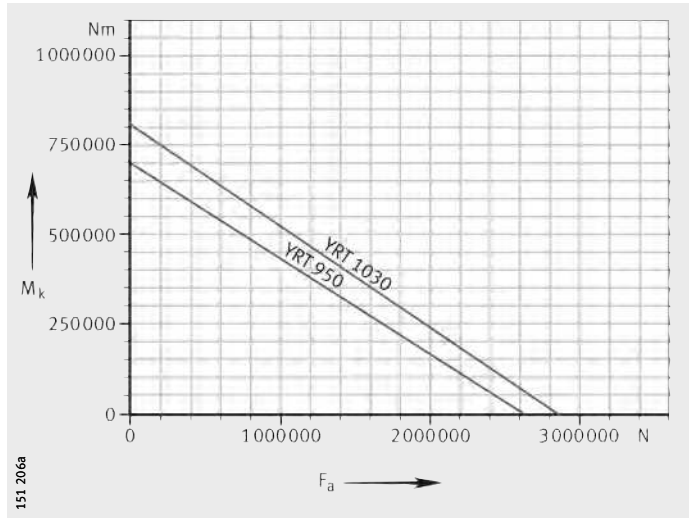


# Axial/radial bearings

## Axial angular contact ball bearings

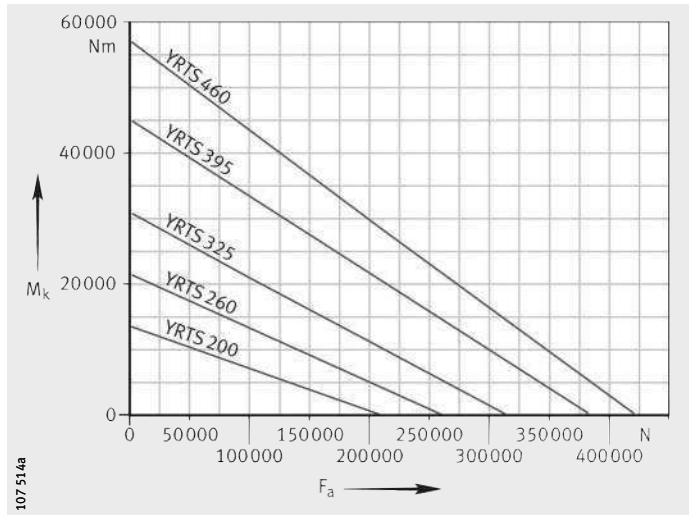
$M_k$  = maximum tilting moment  
 $F_a$  = axial load

*Figure 6*  
 Static limiting load diagram  
 YRT950 and YRT1030



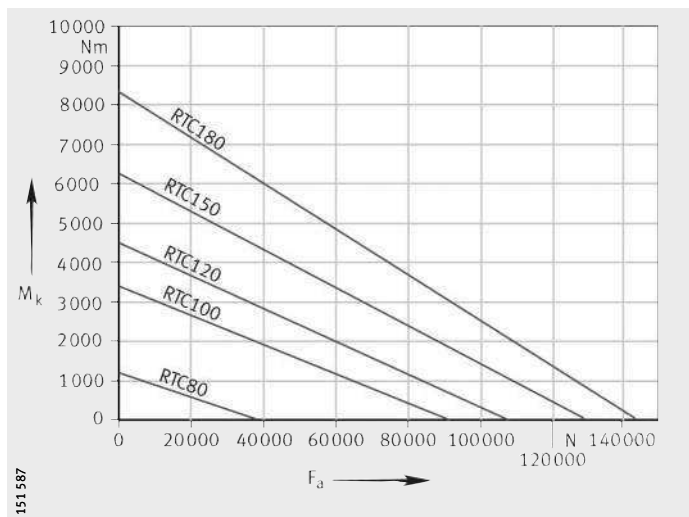
$M_k$  = maximum tilting moment  
 $F_a$  = axial load

*Figure 7*  
 Static limiting load diagram  
 YRT<sub>Speed</sub>200 to YRT<sub>Speed</sub>460



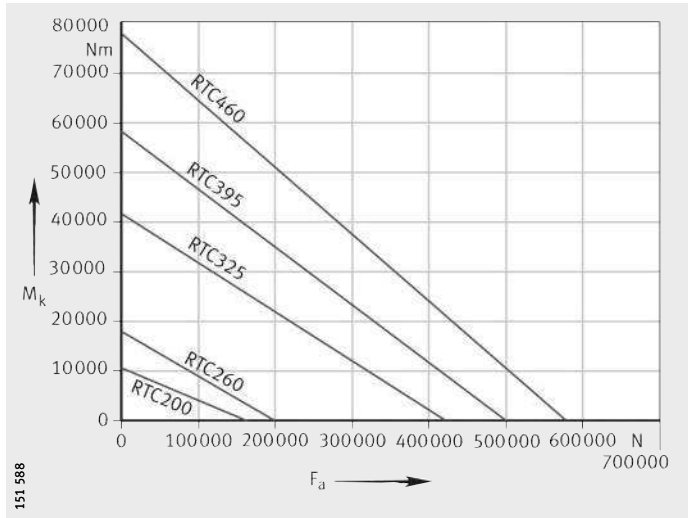
$M_k$  = maximum tilting moment  
 $F_a$  = axial load

*Figure 8*  
 Static limiting load diagram  
 RTC80 to RTC180



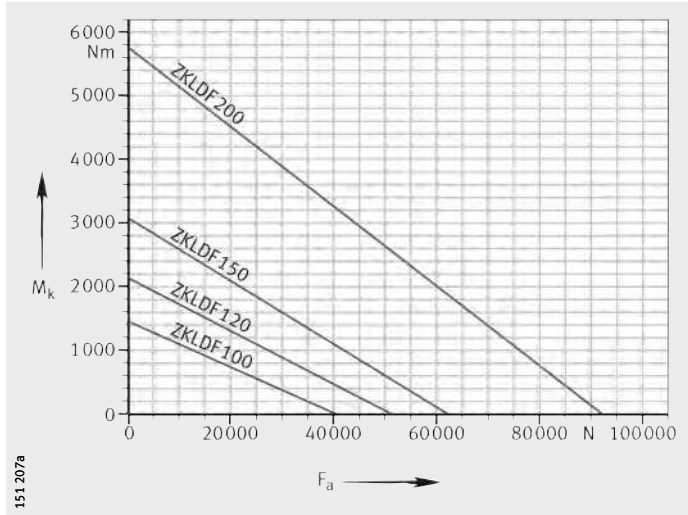
$M_k$  = maximum tilting moment  
 $F_a$  = axial load

*Figure 9*  
 Static limiting load diagram  
 RTC200 to RTC460



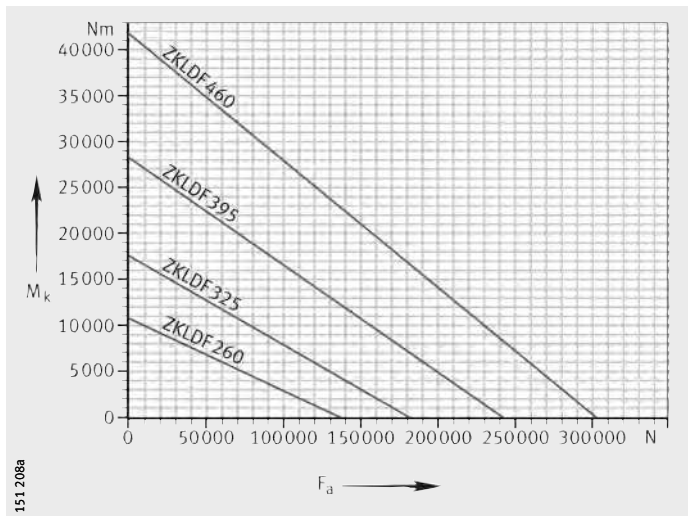
$M_k$  = maximum tilting moment  
 $F_a$  = axial load

*Figure 10*  
 Static limiting load diagram  
 ZKLDF100 to ZKLDF200



$M_k$  = maximum tilting moment  
 $F_a$  = axial load

*Figure 11*  
 Static limiting load diagram  
 ZKLDF260 to ZKLDF460



# Axial/radial bearings

## Axial angular contact ball bearings

### Limiting speeds

The bearings allow the limiting speeds  $n_G$  given in the dimension tables. The operating temperatures occurring are heavily dependent on the environmental conditions. Calculation is possible by means of a thermal balance analysis based on frictional torque data.



If the environmental conditions differ from the specifications in relation to adjacent construction tolerances, lubrication, ambient temperature, heat dissipation or from the normal operating conditions for machine tools, checking must be carried out again. Please contact us.

### Bearing preload

Once the bearings have been fitted and fully screw mounted, they are radially and axially clearance-free and preloaded.

### Temperature differences

Temperature differences between the shaft and housing influence the radial bearing preload and thus the operating behaviour of the bearing arrangement.

If the shaft temperature is higher than the housing temperature, the radial preload will increase proportionally, so there will be an increase in the rolling element load, bearing friction and bearing temperature.

If the shaft temperature is lower than the housing temperature, the radial preload will decrease proportionally, so the rigidity will decrease to the point of bearing clearance and wear will increase.



## Frictional torque

The bearing frictional torque  $M_{RL}$  is influenced primarily by the viscosity and quantity of the lubricant and the bearing preload:

- The lubricant viscosity and quantity are dependent on the lubricant grade and operating temperature.
- The bearing preload is dependent on the mounting fits, the geometrical accuracy of the adjacent parts, the temperature difference between the inner and outer ring, the screw tightening torque and the mounting situation (bearing inner ring axially supported on one or both sides).

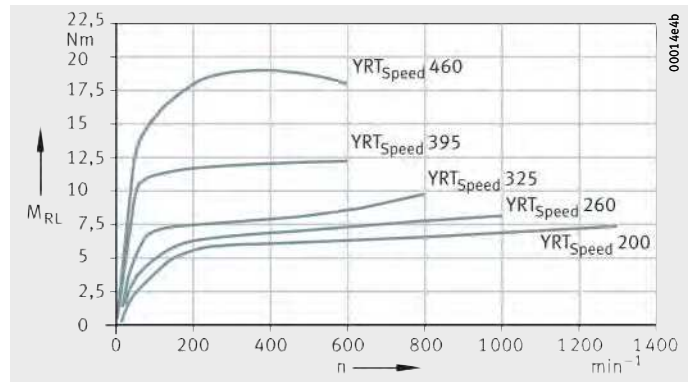
The frictional torques  $M_{RL}$  in the dimension tables are statistically determined guide values for bearings with grease lubrication (measurement speed  $n_{const} = 5 \text{ min}^{-1}$ ). Figure 12 shows measured frictional torques for mounting with an unsupported L-section ring for  $YRT_{Speed}$ .



Deviations from the tightening torque of the fixing screws will have a detrimental effect on the preload and the frictional torque.

$M_{RL}$  = frictional torque  
n = speed

Figure 12  
Frictional torques as guide values  
for  $YRT_{Speed}$ ,  
statistically determined values  
from series of measurements



## Frictional energy and dimensioning of the drive



For YRT and RTC bearings, it must be taken into consideration that the frictional torque can increase by a factor of 2 to 2,5 with increasing speed.

For ZKLDF bearings, it must be taken into consideration that the starting frictional torque can be 1,5 times higher than the values  $M_{RL}$  in the dimension tables.

# Axial/radial bearings

## Axial angular contact ball bearings

**Lubrication** Axial/radial bearings YRT, RTC and YRT<sub>Speed</sub> can be relubricated via the L-section ring and outer ring.

Axial angular contact ball bearings ZKLDf can be relubricated via the outer ring.

The initial greasing is compatible with lubricating oils having a mineral oil base.

For calculation of the relubrication quantities and intervals based on a stated load spectrum (speed, load, operating duration) and the environmental conditions, please contact us.

**Overlubrication** If the bearing is overlubricated, the bearing frictional torque and the temperature will increase.

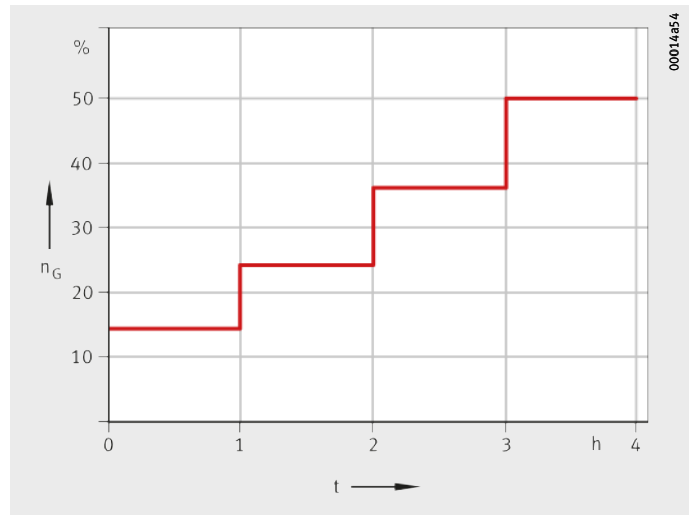
In order to achieve the original frictional torque again, the running-in cycle in accordance with *Figure 13* should be carried out.



Further information on lubrication in the section Lubrication, page 76, must be observed.

$n_G$  = limiting speed according to dimension tables  
t = time

*Figure 13*  
Running-in cycle after overlubrication



### Grease Application Group GA08

Designation	Classification	Type of grease	Operating temperature °C	NLGI class	Speed parameter $n \cdot d_M$ $\text{min}^{-1} \cdot \text{mm}$	ISO VG class (base oil) <sup>1)</sup>
GA08	Grease for line contact	Lithium complex soap Mineral oil	-30 to +140	2 to 3	500 000	150 to 320

<sup>1)</sup> Dependent on bearing type.

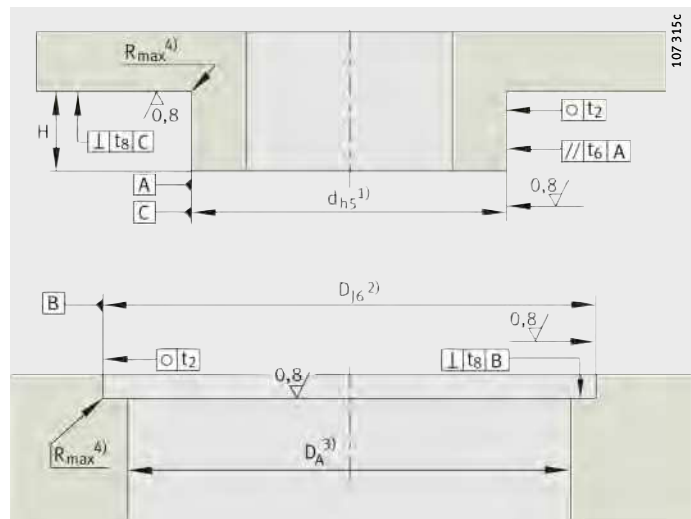
## Design of adjacent construction



YRT, RTC, YRT<sub>Speed</sub> and ZKLDF have almost the same mounting dimensions.

Geometrical defects in the screw mounting surfaces and fits will influence the running accuracy, preload and running characteristics of the bearing arrangement. The accuracy of the adjacent surfaces must therefore be matched to the overall accuracy requirement of the subassembly. The tolerances of the adjacent surfaces must lie within the running tolerance of the bearing.

The adjacent construction should be produced in accordance with *Figure 14* and the tolerances must be in accordance with the tables starting on page 1126. Any deviations will influence the bearing frictional torque, running accuracy and running characteristics.



*Figure 14*  
Requirements for  
the adjacent construction,  
YRT, RTC, YRT<sub>Speed</sub>, ZKLDF

### Legend to *Figure 14*

- 1) Support over whole bearing height.  
It must be ensured that the means of support has adequate rigidity.
- 2) A precise fit is only necessary if radial support due to the load or a precise bearing position is required.
- 3) Note the bearing diameter  $D_1$  according to the dimension tables.  
Ensure that there is sufficient distance between the rotating bearing rings and the adjacent construction.
- 4) For values, see table Maximum corner radii of fit surfaces, page 1127.

# Axial/radial bearings

## Axial angular contact ball bearings

**Fits** The selection of fits leads to transition fits which means that, depending on the actual dimensional position of the bearing diameter and mounting dimensions, clearance fits or interference fits can arise.



The fit influences, for example, the running accuracy of the bearing and its dynamic characteristics.

An excessively tight fit will increase the radial bearing preload. As a result:

- there is an increase in bearing friction and heat generation in the bearing as well as the load on the raceway system and wear
- there will be a decrease in the achievable speed and the bearing operating life.

For easier matching of the adjacent construction to the actual bearing dimensions, each bearing of series RTC and YRT<sub>Speed</sub> is supplied with a measurement record (this is supplied by agreement for other series).

### Axial and radial runout accuracy of the bearing arrangement

The axial and radial runout accuracy is influenced by:

- the running accuracy of the bearing
- the geometrical accuracy of the adjacent surfaces
- the fit between the rotating bearing ring and adjacent component.



In order to achieve very high running accuracy, the aim should be to achieve as close as possible to a fit clearance 0.

### Recommended fits for shafts

The shaft should be produced to tolerance zone h5 and for series YRT<sub>Speed</sub> in accordance with the table, page 1127.

If there are special requirements, the fit clearance must be further restricted within the tolerance zone h5:

- Requirements for running accuracy:  
For maximum running accuracy and with a rotating bearing inner ring, the aim should be to achieve as close as possible to a fit clearance of 0. The fit clearance may otherwise increase the bearing runout. With normal requirements for running accuracy or a stationary bearing inner ring, the shaft should be produced to h5.
- Requirements for dynamic characteristics:
  - For swivel type operation ( $n \times d < 35\,000 \text{ min}^{-1} \cdot \text{mm}$ , operating duration  $ED < 10\%$ ) the shaft should be produced to h5
  - For higher speeds and longer operating duration 0,01 mm the fit clearance must not be exceeded.  
For series YRT<sub>Speed</sub> the fit clearance must not exceed 0,005 mm.

For series ZKLDF, the fit clearance should be based on the inner ring with the smallest bore dimension.

### Recommended fits for housings

The housing should be produced to tolerance zone J6 and for series YRT<sub>Speed</sub> according to the table Recommended fits, page 1127.

If there are special requirements, the fit clearance must be further restricted within the tolerance zone J6:

- Requirements for running accuracy:  
For maximum running accuracy and with a rotating bearing outer ring, the aim should be to achieve as close as possible to a fit clearance of 0.  
With a static bearing outer ring, a clearance fit or a design without radial centring should be selected.
- Requirements for dynamic characteristics:
  - For predominantly swivel type operation ( $n \times d < 35\,000 \text{ min}^{-1} \cdot \text{mm}$ , operating duration  $ED < 10\%$ ) and a rotating bearing outer ring, the housing fit should be produced to tolerance zone J6
  - For higher speed and operating duration, the bearing outer ring should not be radially centred or the housing fit should be produced as a clearance fit with at least 0,02 mm clearance. This reduces the increase in preload when heat is generated in the bearing position.

### Fit selection depending on the screw connection of the bearing rings

If the bearing outer ring is screw mounted on the static component, a fit seating is not required or a fit seating in accordance with the table Recommended fits for adjacent construction, page 1127, can be produced. If the values in the table are used, this will give a transition fit with a tendency towards clearance fit. This generally allows easy fitting.

If the bearing inner ring is screw mounted on the static component, it should nevertheless for functional reasons be supported by the shaft over the whole bearing height. The shaft dimensions should then be selected in accordance with the tables starting on page 1126. If these values in the table are used, this will give a transition fit with a tendency towards clearance fit.



# Axial/radial bearings

## Axial angular contact ball bearings

**Geometrical and positional accuracy of the adjacent construction**



The values given in the following tables for geometrical and positional accuracy of the adjacent construction have proved effective in practice and are adequate for the majority of applications.

The geometrical tolerances influence the axial and radial runout accuracy of the subassembly as well as the bearing frictional torque and the running characteristics.

**Geometrical and positional accuracy for shafts with YRT, RTC, ZKLDF**

Nominal shaft diameter d mm		Deviation d		Roundness Parallelism Perpendicularity $t_2, t_6, t_8$
over	incl.	for tolerance zone h5 $\mu\text{m}$		$\mu\text{m}$
50	80	0	-13	3
80	120	0	-15	4
120	180	0	-18	5
180	250	0	-20	7
250	315	0	-23	8
315	400	0	-25	9
400	500	0	-27	10
500	630	0	-32	11
630	800	0	-36	13
800	1 000	0	-40	15
1 000	1 250	0	-47	18

**Geometrical and positional accuracy for housings with YRT, RTC, ZKLDF**

Nominal housing bore diameter D mm		Deviation D		Roundness Perpendicularity $t_2, t_8$
over	incl.	for tolerance zone J6 $\mu\text{m}$		$\mu\text{m}$
120	180	+18	-7	5
180	250	+22	-7	7
250	315	+25	-7	8
315	400	+29	-7	9
400	500	+33	-7	10
500	630	+34	-7	11
630	800	+38	-8	13
800	1 000	+44	-12	15
1 000	1 250	+52	-14	18

**Recommended fits for shaft and housing bore with YRT<sub>Speed</sub>**

Axial/radial bearing	Shaft diameter d mm	Housing bore D mm
YRT <sub>Speed</sub> 200	200 <sup>-0,01</sup> <sub>-0,024</sub>	300 <sup>+0,011</sup> <sub>-0,005</sub>
YRT <sub>Speed</sub> 260	260 <sup>-0,013</sup> <sub>-0,029</sub>	385 <sup>+0,013</sup> <sub>-0,005</sub>
YRT <sub>Speed</sub> 325	325 <sup>-0,018</sup> <sub>-0,036</sub>	450 <sup>+0,015</sup> <sub>-0,005</sub>
YRT <sub>Speed</sub> 395	395 <sup>-0,018</sup> <sub>-0,036</sub>	525 <sup>+0,017</sup> <sub>-0,005</sub>
YRT <sub>Speed</sub> 460	460 <sup>-0,018</sup> <sub>-0,038</sub>	600 <sup>+0,017</sup> <sub>-0,005</sub>

**Geometrical and positional accuracy for shafts with YRT<sub>Speed</sub>**

Axial/radial bearing	Roundness t <sub>2</sub> μm	Parallelism t <sub>6</sub> μm	Perpendicularity t <sub>8</sub> μm
YRT <sub>Speed</sub> 200	6	5	5
YRT <sub>Speed</sub> 260 to YRT <sub>Speed</sub> 460	8	5	7

**Geometrical and positional accuracy for housings with YRT<sub>Speed</sub>**

Axial/radial bearing	Roundness t <sub>2</sub> μm	Perpendicularity t <sub>8</sub> μm
YRT <sub>Speed</sub> 200 to YRT <sub>Speed</sub> 460	6	8

**Maximum corner radii of fit surfaces with YRT, RTC, YRT<sub>Speed</sub>, ZKLDf**

Bore diameter d mm	Maximum corner radius R <sub>max</sub> mm
50 incl. 150	0,1
over 150 incl. 460	0,3
over 460 incl. 950	1



# Axial/radial bearings

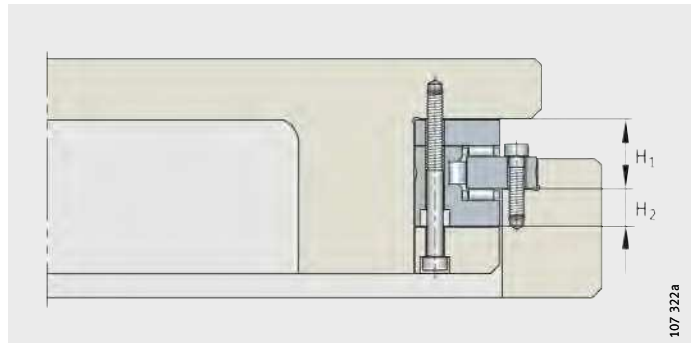
## Axial angular contact ball bearings

### Mounting dimensions $H_1$ , $H_2$



If the height variation must be as small as possible, the  $H_1$  dimensional tolerance must conform to the tables on page 1131, page 1132 and *Figure 15*.

The mounting dimension  $H_2$  defines the position of any worm wheel used, *Figure 15* and *Figure 16*, page 1129, L-section ring with support ring.



*Figure 15*  
Mounting dimension  $H_1$ ,  $H_2$

### L-section ring without support ring or with support ring

The L-section ring of bearings YRT and RTC can be mounted unsupported or supported over its whole surface, *Figure 16*. If the L-section ring is supported, the tilting rigidity is higher. The support ring (for example a worm wheel) is not included in the delivery.

Depending on the application, series YRT and RTC require bearings with a different preload match in order to achieve the same preload forces in the axial bearing.

For series YRT<sub>Speed</sub> and ZKLDF, there is only one preload match. The increase in rigidity and frictional torque in YRT<sub>Speed</sub> bearings is slight and can normally be ignored.

In bearings of series ZKLDF, the rigidity and frictional torque are not influenced by the support ring.

### L-section ring without support ring

For the case “L-section ring without support ring”, the bearing designation is:

- YRT <bore diameter> or
- RTC <bore diameter>.



**L-section ring  
with support ring**

For the case "L-section ring with support ring",  
the bearing designation is:

■ YRT <bore diameter> **VSP**

■ RTC <bore diameter> **T52EB**.

For RTC with an additionally restricted axial runout, the bearing designation is:

■ RTC <bore diameter> **T52EA**.

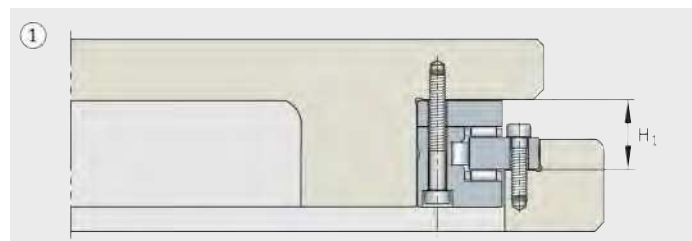


For bearing arrangements with a supported L-section ring,  
only bearings with the suffix VSP, EB or T52EA can be ordered.

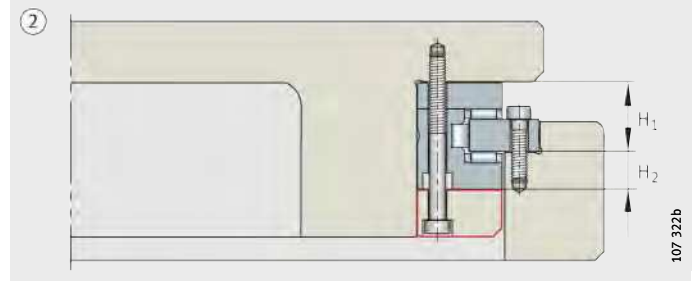
If the normal design is mounted with a supported L-section ring,  
there will be a considerable increase in the bearing frictional torque.

The support ring should be at least twice as high as the shaft locating  
washer of the bearing.

YRT  
RTC



YRT..VSP  
RTC..T52EB  
RTC..T52EA



*Figure 16*  
① L-section ring  
without support ring,  
② L-section ring  
with support ring for YRT, RTC



107 322b

# Axial/radial bearings

## Axial angular contact ball bearings

**Fitting** Retaining screws secure the bearing components during transport. For easier centring of the bearing, the screws should be loosened before fitting and either secured again or removed after fitting. Tighten the fixing screws in crosswise sequence using a torque wrench in three stages to the specified tightening torque  $M_A$ , while rotating the bearing ZKLDf, *Figure 17*:

- Stage 1: 40% of  $M_A$
- Stage 2: 70% of  $M_A$
- Stage 3: 100% of  $M_A$ .

Observe the correct grade of the fixing screws.

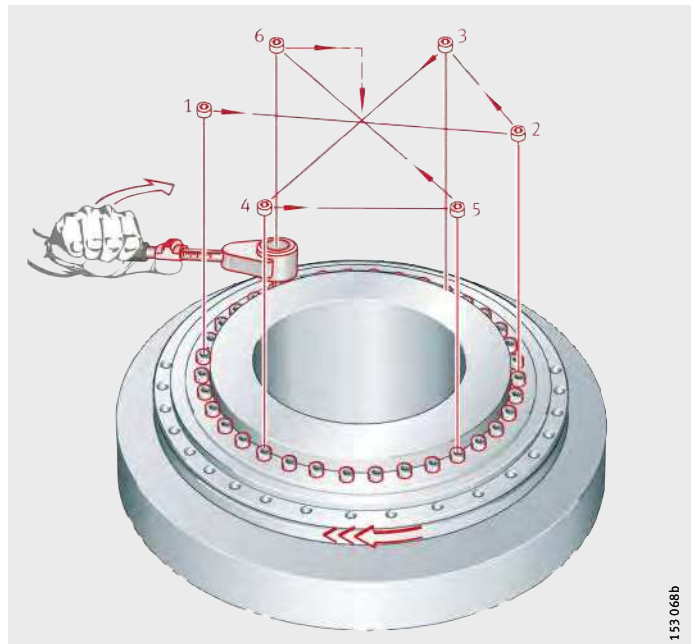


Mounting forces must only be applied to the bearing ring to be fitted, never through the rolling elements.

Bearing components must not be separated or interchanged during fitting and dismantling.

If the bearing is unusually difficult to move, loosen the fixing screws and tighten them again in steps in a crosswise sequence. This will eliminate any distortion.

Bearings should only be fitted in accordance with TPI 103, Fitting and Maintenance Manual.



*Figure 17*  
Tightening of fixing screws

**Accuracy** The dimensional tolerances are derived from tolerance class P5. The diameter tolerances stated are mean values in accordance with ISO 1132.

The geometrical tolerances correspond to P4 in DIN 620, see table.

The bearing bore in the series YRT, RTC and YRT<sub>Speed</sub> may be slightly conical when delivered. This is typical of the bearing design and is a result of the radial bearing preload forces. The bearing will regain its ideal geometry when fitted.

**Dimensional tolerances, mounting dimensions, axial and radial runout for YRT, ZKLDF**

Dimensional tolerances <sup>1)</sup>				Mounting dimensions					Axial and radial runout <sup>2)</sup>	
Bore		Outside diameter		H <sub>1</sub> mm	Δ <sub>H1s</sub> mm	Re-stricted <sup>3)</sup> Δ <sub>H1s</sub> mm	H <sub>2</sub> mm	Re-stricted <sup>3)</sup> Δ <sub>H2s</sub> mm	Nor-mal μm	Re-stricted <sup>3)</sup> μm
d mm	Δ <sub>ds</sub> mm	D mm	Δ <sub>Ds</sub> mm							
50	-0,008	126	-0,011	20	±0,125	±0,025	10	±0,02	2	1
80	-0,009	146	-0,011	23,35	±0,15	±0,025	11,65	±0,02	3	1,5
100	-0,01	185	-0,015	25	±0,175	±0,025	13	±0,02	3	1,5
120	-0,01	210	-0,015	26	±0,175	±0,025	14	±0,02	3	1,5
150	-0,013	240	-0,015	26	±0,175	±0,03	14	±0,02	3	1,5
180	-0,013	280	-0,018	29	±0,175	±0,03	14	±0,025	4	2
200	-0,015	300	-0,018	30	±0,175	±0,03	15	±0,025	4	2
260	-0,018	385	-0,02	36,5	±0,2	±0,04	18,5	±0,025	6	3
325	-0,023	450	-0,023	40	±0,2	±0,05	20	±0,025	6	3
395	-0,023	525	-0,028	42,5	±0,2	±0,05	22,5	±0,025	6	3
460	-0,023	600	-0,028	46	±0,225	±0,06	24	±0,03	6	3
580	-0,025	750	-0,035	60	±0,25	±0,075	30	±0,03	10	5 <sup>4)</sup>
650	-0,038	870	-0,05	78	±0,25	±0,1	44	±0,03	10	5 <sup>4)</sup>
850	-0,05	1 095	-0,063	80,5	±0,3	±0,12	43,5	±0,03	12	6 <sup>4)</sup>
950	-0,05	1 200	-0,063	86	±0,3	±0,12	46	±0,03	12	6 <sup>4)</sup>
1 030	-0,063	1 300	-0,08	92,5	±0,3	±0,15	52,5	±0,03	12	6 <sup>4)</sup>

1) The diameter tolerances stated are mean values (DIN 620).

2) For rotating inner and outer ring, measured on fitted bearing, with ideal adjacent construction.

3) Special design, YRT only.

4) By agreement only for rotating outer ring.



# Axial/radial bearings

## Axial angular contact ball bearings

Dimensional tolerances,  
mounting dimensions,  
axial and radial runout  
for RTC

Dimensional tolerances						Mounting dimensions		Axial and radial runout <sup>1)</sup>	
Bore		Outside diameter		Bearing height					
d	$\Delta_{ds}$	D	$\Delta_{Ds}$	H	$\Delta_{Hs}$	H <sub>1</sub>	$\Delta_{H1s}$	Normal	Restricted
mm	mm	mm	mm	mm	mm	mm	mm	$\mu\text{m}$	$\mu\text{m}$
80	-0,009	146	-0,011	35	+0,025 -0,15	23,35	$\pm 0,025$	3	1,5
100	-0,01	185	-0,015	38	+0,025 -0,15	25	$\pm 0,025$	3	1,5
120	-0,01	210	-0,015	40	+0,025 -0,15	26	$\pm 0,025$	3	1,5
150	-0,013	240	-0,015	40	+0,03 -0,175	26	$\pm 0,03$	3	1,5
180	-0,013	280	-0,018	43	+0,03 -0,175	29	$\pm 0,03$	4	2
200	-0,015	300	-0,018	45	+0,03 -0,2	30	$\pm 0,03$	4	2
260	-0,018	385	-0,020	55	+0,04 -0,25	36,5	$\pm 0,04$	5	3
325	-0,023	450	-0,023	60	+0,05 -0,3	40	$\pm 0,05$	5	3
395	-0,023	525	-0,028	65	+0,05 -0,3	42,5	$\pm 0,05$	5	3
460	-0,027	600	-0,028	70	+0,06 -0,35	46	$\pm 0,06$	6	3

1) For rotating inner and outer ring, measured on fitted bearing, with ideal adjacent construction.

Dimensional tolerances,  
mounting dimensions,  
axial and radial runout  
for YRT<sub>Speed</sub>

Dimensional tolerances				Mounting dimensions			Axial and radial runout <sup>1)</sup>	
Bore		Outside diameter						
d	$\Delta_{ds}$	D	$\Delta_{Ds}$	H <sub>1</sub>	$\Delta_{H1s}$	H <sub>2</sub>	Normal	Restricted <sup>2)</sup>
mm	mm	mm	mm	mm	mm	mm	$\mu\text{m}$	$\mu\text{m}$
200	-0,015	300	-0,018	30	+0,04 -0,06	15	4	2
260	-0,018	385	-0,02	36,5	+0,05 -0,07	18,5	6	3
325	-0,023	450	-0,023	40	+0,06 -0,07	20	6	3
395	-0,023	525	-0,028	42,5	+0,06 -0,07	22,5	6	3
460	-0,023	600	-0,028	46	+0,07 -0,08	24	6	3

1) For rotating inner and outer ring, measured on fitted bearing, with ideal adjacent construction.

2) Restricted axial and radial runout only available for rotating inner ring.

## Rigidity

### Static rigidity

The overall rigidity of a bearing position is a description of the magnitude of the displacement of the rotational axis from its ideal position under load. The static rigidity thus has a direct influence on the accuracy of the machining results.

The dimension tables give the rigidity values for the complete bearing position, see page 1134 to page 1143.

These take account of the deflection of the rolling element set as well as the deformation of the bearing rings and the screw connections.

The values for the rolling element sets are calculated rigidity values and are for information purposes only. They facilitate comparison with other bearing types, since rolling bearing catalogues generally only give the higher rigidity values for the rolling element set.

### Special designs

Available by agreement:

For YRT, axial and radial runout tolerance restricted by 50%.

Additional text: axial and radial runout 50%.

For RTC, axial runout tolerance restricted by 50%.

Additional text: axial runout 50%.

For YRT, closer tolerance on mounting dimension  $H_1$  and  $H_2$ .

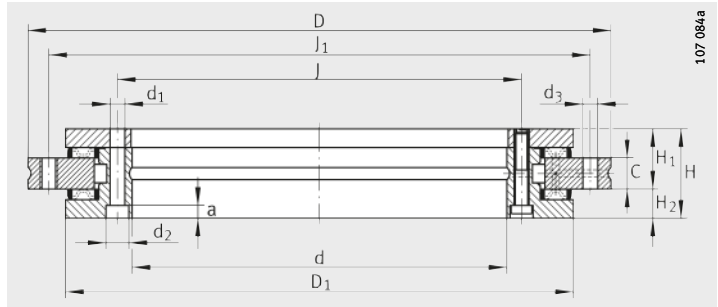
Additional text:  $H_1$  with tolerance  $\pm \dots$ ,  $H_2$  with tolerance  $\pm \dots$

For restricted tolerance value, see table, page 1131.



# Axial/radial bearings

Double direction



YRT

**Dimension table** - Dimensions in mm

Designation	Mass m ≈ kg	Dimensions									Fixing holes					
		d	D	H	H <sub>1</sub>	H <sub>2</sub>	C	D <sub>1</sub> max.	J	J <sub>1</sub>	Inner ring			Outer ring		
											d <sub>1</sub>	d <sub>2</sub>	a	Quantity <sup>4)</sup>	d <sub>3</sub>	Quantity <sup>4)</sup>
<b>YRT50</b>	1,6	<b>50</b>	126	30	20	10	10	105	63	116	5,6	–	–	10	5,6	12
<b>YRT80-TV<sup>5)7)</sup></b>	2,4	<b>80</b>	146	35	23,35	11,65	12	130	92	138	5,6	10	4	10	4,6	12
<b>YRT100<sup>5)</sup></b>	4,1	<b>100</b>	185	38	25	13	12	161	112	170	5,6	10	5,4	16	5,6	15
<b>YRT120</b>	5,3	<b>120</b>	210	40	26	14	12	185	135	195	7	11	6,2	22	7	21
<b>YRT150</b>	6,2	<b>150</b>	240	40	26	14	12	214	165	225	7	11	6,2	34	7	33
<b>YRT180</b>	7,7	<b>180</b>	280	43	29	14	15	244	194	260	7	11	6,2	46	7	45
<b>YRT200</b>	9,7	<b>200</b>	300	45	30	15	15	274	215	285	7	11	6,2	46	7	45
<b>YRT260</b>	18,3	<b>260</b>	385	55	36,5	18,5	18	345	280	365	9,3	15	8,2	34	9,3	33

1) Including retaining screws or threaded extraction holes.

2) Tightening torque for screws to DIN 912, grade 10.9.

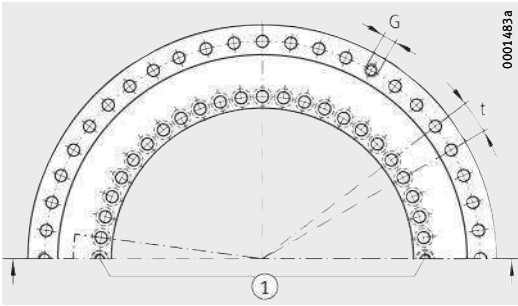
3) Rigidity values taking account of the rolling element set, the deformation of the bearing rings and the screw connections. For explanations, see page 1133.

4) Attention!  
For fixing holes in the adjacent construction. Observe the pitch of the bearing holes.

5) Screw counterbores in the L-section ring open to the bearing bore. The bearing inside diameter is unsupported in the area ②.

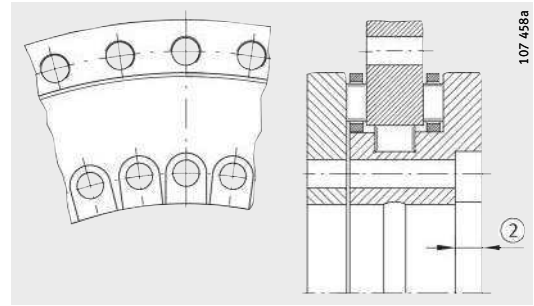
6) For high operating durations or continuous operation, please contact us.

7) Cages made from glass fibre reinforced polyamide 66.



Hole pattern

① Two retaining screws



For YRT80-TV and YRT100:

② Screw counterbores open<sup>5)</sup>

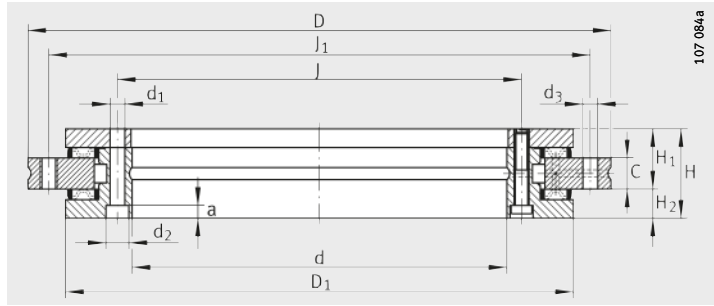
Pitch $t^1)$	Threaded extraction hole		Screw tightening torque $M_A^{2)}$ Nm	Basic load ratings				Limiting speed <sup>6)</sup> $n_G$ min <sup>-1</sup>	Bearing frictional torque $M_{RL}$ Nm
	G	Quantity		axial		radial			
				dyn. $C_a$ N	stat. $C_{0a}$ N	dyn. $C_r$ N	stat. $C_{0r}$ N		
12X30°	–	–	8,5	56 000	280 000	28 500	49 500	440	2,5
12X30°	–	–	8,5/4,5	38 000	158 000	44 000	98 000	350	3
18X20°	M5	3	8,5	73 000	370 000	52 000	108 000	280	3
24X15°	M8	3	14	80 000	445 000	70 000	148 000	230	7
36X10°	M8	3	14	85 000	510 000	77 000	179 000	210	13
48X 7,5°	M8	3	14	92 000	580 000	83 000	209 000	190	14
48X 7,5°	M8	3	14	98 000	650 000	89 000	236 000	170	15
36X10°	M12	3	34	109 000	810 000	102 000	310 000	130	25



Designation	Rigidity					
	of bearing position <sup>3)</sup>			of rolling element set		
	axial $c_{aL}$ kN/ $\mu$ m	radial $c_{rL}$ kN/ $\mu$ m	Tilting rigidity $c_{kL}$ kNm/mrad	axial $c_{aL}$ kN/ $\mu$ m	radial $c_{rL}$ kN/ $\mu$ m	Tilting rigidity $c_{kL}$ kNm/mrad
<b>YRT50</b>	1,3	1,1	1,25	6,2	1,5	5,9
<b>YRT80-TV<sup>5)7)</sup></b>	1,6	1,8	2,5	4	2,6	6,3
<b>YRT100<sup>5)</sup></b>	2	2	5	6,8	2,4	15
<b>YRT120</b>	2,1	2,2	7	7,8	3,8	24
<b>YRT150</b>	2,3	2,6	11	8,7	4,6	38
<b>YRT180</b>	2,6	3	17	9,9	5,3	57
<b>YRT200</b>	3	3,5	23	11,2	6,2	80
<b>YRT260</b>	3,5	4,5	45	13,7	8,1	155

# Axial/radial bearings

Double direction



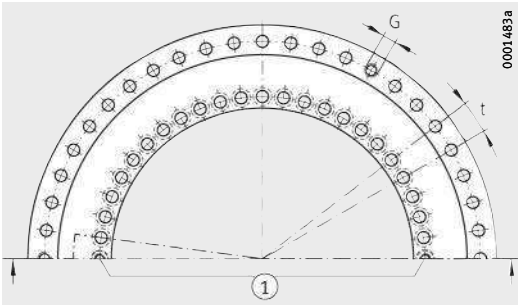
YRT

**Dimension table** (continued) · Dimensions in mm

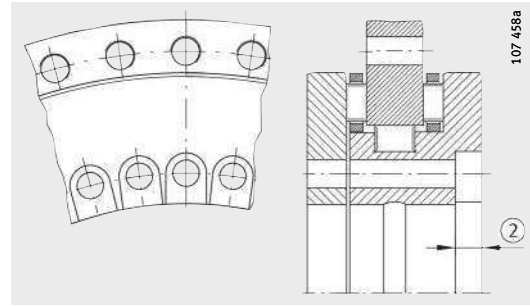
Designation	Mass m ≈ kg	Dimensions										Fixing holes					
		d	D	H	H <sub>1</sub>	H <sub>2</sub>	C	D <sub>1</sub>	J	J <sub>1</sub>	Inner ring				Outer ring		
											d <sub>1</sub>	d <sub>2</sub>	a	Quantity <sup>4)</sup>	d <sub>3</sub>	Quantity <sup>4)</sup>	
<b>YRT325</b> <sup>5)</sup>	25	<b>325</b>	450	60	40	20	20	415	342	430	9,3	15	8,2	34	9,3	33	
<b>YRT395</b>	33	<b>395</b>	525	65	42,5	22,5	20	486	415	505	9,3	15	8,2	46	9,3	45	
<b>YRT460</b>	45	<b>460</b>	600	70	46	24	22	560	482	580	9,3	15	8,2	46	9,3	45	
<b>YRT580</b>	89	<b>580</b>	750	90	60	30	30	700	610	720	11,4	18	11	46	11,4	42	
<b>YRT650</b>	170	<b>650</b>	870	122	78	44	34	800	680	830	14	20	13	46	14	42	
<b>YRT850</b>	253	<b>850</b>	1095	124	80,5	43,5	37	1018	890	1055	18	26	17	58	18	54	
YRT950 <sup>7)</sup>	312	950	1200	132	86	46	40	1130	990	1160	18	26	17	58	18	54	
<b>YRT1030</b>	375	<b>1030</b>	1300	145	92,5	-	40	1215	1075	1255	18	26	17	70	18	66	

- 1) Including retaining screws or threaded extraction holes.
- 2) Tightening torque for screws to DIN 912, grade 10.9.
- 3) Rigidity values taking account of the rolling element set, the deformation of the bearing rings and the screw connections. For explanations, see page 1133.
- 4) Attention!  
For fixing holes in the adjacent construction. Observe the pitch of the bearing holes.
- 5) Screw counterbores in the L-section ring open to the bearing bore. The bearing inside diameter is unsupported in the area ②.
- 6) For high operating durations or continuous operation, please contact us.
- 7) Available by agreement only.





Hole pattern  
① Two retaining screws



For YRT325:  
② Screw counterbores open<sup>5)</sup>

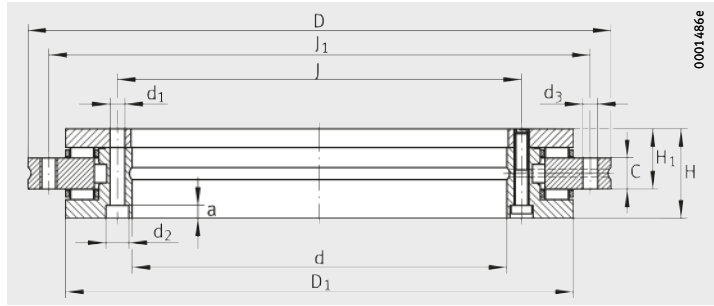
Pitch $t^1)$	Threaded extraction hole		Screw tightening torque $M_A^{2)}$ Nm	Basic load ratings				Limiting speed <sup>6)</sup> $n_G$ min <sup>-1</sup>	Bearing frictional torque $M_{RL}$ Nm
	G	Quantity		axial		radial			
				dyn. $C_a$ N	stat. $C_{0a}$ N	dyn. $C_r$ N	stat. $C_{0r}$ N		
36X10°	M12	3	34	186 000	1 710 000	134 000	415 000	110	48
48X 7,5°	M12	3	34	202 000	2 010 000	133 000	435 000	90	55
48X 7,5°	M12	3	34	217 000	2 300 000	187 000	650 000	80	70
48X 7,5°	M12	6	68	390 000	3 600 000	211 000	820 000	60	140
48X 7,5°	M12	6	116	495 000	5 200 000	415 000	1 500 000	55	200
60X 6°	M12	6	284	560 000	6 600 000	475 000	1 970 000	40	300
60X 6°	M16	6	284	1 040 000	10 300 000	600 000	2 450 000	40	600
72X 5°	M16	6	284	1 080 000	11 000 000	620 000	2 650 000	35	800



Designation	Rigidity					
	of bearing position <sup>3)</sup>			of rolling element set		
	axial $c_{aL}$ kN/ $\mu$ m	radial $c_{rL}$ kN/ $\mu$ m	Tilting rigidity $c_{kL}$ kNm/mrad	axial $c_{aL}$ kN/ $\mu$ m	radial $c_{rL}$ kN/ $\mu$ m	Tilting rigidity $c_{kL}$ kNm/mrad
YRT325 <sup>5)</sup>	4,3	5	80	26,1	9,4	422
YRT395	4,9	6	130	30,3	11,3	684
YRT460	5,7	7	200	33,5	13,9	1 049
YRT580	6,9	9	380	42,1	17,4	2 062
YRT650	7,6	10	550	58,3	13,7	3 669
YRT850	9,3	13	1 100	73,4	20,2	7 587
YRT950 <sup>7)</sup>	10,4	14	1 500	74,5	16,4	9 692
YRT1030	11,2	16	1 900	79,7	18,8	12 025

# Axial/radial bearings

Double direction

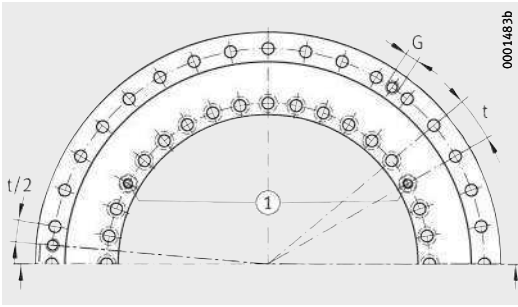


RTC

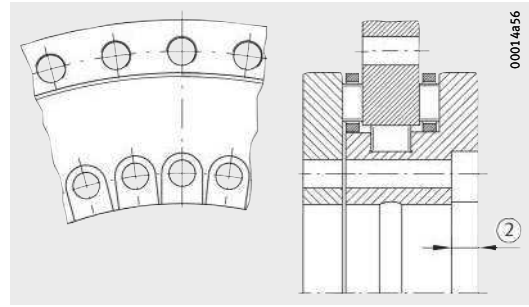
**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions <sup>7)</sup>								Fixing holes					
		d	D	H	H <sub>1</sub>	C	D <sub>1</sub> max.	J	J <sub>1</sub>	Inner ring			Outer ring		
										d <sub>1</sub>	d <sub>2</sub>	a	Quantity <sup>4)</sup>	d <sub>3</sub>	Quantity <sup>4)</sup>
<b>RTC80</b> <sup>5)</sup>	2	<b>80</b>	146	35	23,35	12	130	92	138	5,6	10	5,7	12	4,6	12
<b>RTC100</b> <sup>5)</sup>	4	<b>100</b>	185	38	25	12	161	112	170	5,6	10	5,7	15	5,6	18
<b>RTC120</b>	5	<b>120</b>	210	40	26	12	185	135	195	7	11	7	21	7	24
<b>RTC150</b>	5,8	<b>150</b>	240	40	26	12	214	165	225	7	11	7	33	7	36
<b>RTC180</b>	8	<b>180</b>	280	43	29	15	244	194	260	7	11	7	45	7	48
<b>RTC200</b>	9,3	<b>200</b>	300	45	30	15	274	215	285	7	11	7	45	7	48
<b>RTC260</b>	18	<b>260</b>	385	55	36,5	18	345	280	365	9,3	15	9,3	33	9,3	36
<b>RTC325</b> <sup>5)</sup>	25	<b>325</b>	450	60	40	20	415	342	430	9,3	15	9,3	33	9,3	36
<b>RTC395</b>	33	<b>395</b>	525	65	42,5	20	486	415	505	9,3	15	9,3	45	9,3	48
<b>RTC460</b>	48	<b>460</b>	600	70	46	22	560	482	580	9,3	15	9,3	45	9,3	48

- 1) Including retaining screws or threaded extraction holes.
- 2) Tightening torque for screws to DIN 912, grade 10.9.
- 3) Rigidity values taking account of the rolling element set, the deformation of the bearing rings and the screw connections. For explanations, see page 1133.
- 4) Attention!  
For fixing holes in the adjacent construction. Observe the pitch of the bearing holes.
- 5) Screw counterbores in the L-section ring open to the bearing bore. The bearing inside diameter is unsupported in the area ②.
- 6) For high operating durations or continuous operation, please contact us.
- 7) Sizes d > 460 mm available by agreement.



Hole pattern  
① Three retaining screws



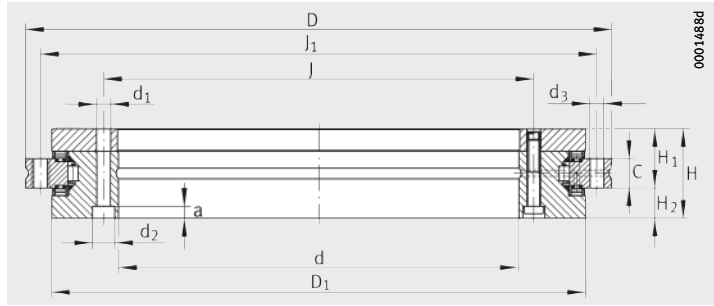
For RTC80, RTC100 and RTC325:  
② Screw counterbores open<sup>5)</sup>

Pitch $t^1)$	Threaded extraction hole		Screw tightening torque $M_A^{2)}$ Nm	Basic load ratings				Limiting speed <sup>6)</sup> $n_G$ $\text{min}^{-1}$	Bearing frictional torque $M_{RL}$ Nm
	G	Quantity		axial		radial			
				dyn. $C_a$ N	stat. $C_{0a}$ N	dyn. $C_r$ N	stat. $C_{0r}$ N		
12X30°	–	–	8,5	56 000	255 000	42 500	100 000	530	1
18X20°	M5	3	8,5	76 500	415 000	47 500	120 000	430	4
24X15°	M6	3	14	102 000	540 000	52 000	143 000	340	5
36X10°	M6	3	14	112 000	630 000	56 000	170 000	320	7
48X 7,5°	M6	3	14	118 000	710 000	69 500	200 000	280	9
48X 7,5°	M6	3	14	120 000	765 000	81 500	220 000	260	11
36X10°	M8	3	34	160 000	1 060 000	93 000	290 000	200	16
36X10°	M8	3	34	275 000	1 930 000	120 000	345 000	170	27
48X 7,5°	M8	3	34	300 000	2 280 000	186 000	655 000	140	42
48X 7,5°	M8	3	34	355 000	2 800 000	200 000	765 000	120	55

Designation	Rigidity					
	of bearing position <sup>3)</sup>			of rolling element set		
	axial $c_{aL}$ kN/ $\mu\text{m}$	radial $c_{rL}$ kN/ $\mu\text{m}$	Tilting rigidity $c_{kL}$ kNm/mrad	axial $c_{aL}$ kN/ $\mu\text{m}$	radial $c_{rL}$ kN/ $\mu\text{m}$	Tilting rigidity $c_{kL}$ kNm/mrad
<b>RTC80<sup>5)</sup></b>	0,71	1,8	1,6	5,6	2,1	9
<b>RTC100<sup>5)</sup></b>	1,2	2	5	9,1	3,5	21
<b>RTC120</b>	1,3	2,2	7	9,1	5,7	29
<b>RTC150</b>	1,5	2,6	11	10,6	7,1	45
<b>RTC180</b>	1,7	3	17	11,6	6,3	67
<b>RTC200</b>	1,8	3,5	23	12,2	5,8	88
<b>RTC260</b>	2,1	4,5	45	17,4	7,5	201
<b>RTC325<sup>5)</sup></b>	2,8	5	80	25	6,5	429
<b>RTC395</b>	3,4	6	130	28,9	11,9	698
<b>RTC460</b>	3,9	7	200	32,6	13,7	1 020

# Axial/radial bearings

Double direction



YRT<sub>Speed</sub>

**Dimension table** - Dimensions in mm

Designation	Mass m  ≈kg	Dimensions										Fixing holes					
		d	D	H	H <sub>1</sub>	H <sub>2</sub>	C	D <sub>1</sub>	J	J <sub>1</sub>	Inner ring			Outer ring			
											d <sub>1</sub>	d <sub>2</sub>	a	Quantity <sup>3)</sup>	d <sub>3</sub>	Quantity <sup>3)</sup>	
<b>YRTS200</b>	9,7	<b>200</b>	300	45	30	15	15	274	215	285	7	11	6,2	46	7	45	
<b>YRTS260</b>	18,3	<b>260</b>	385	55	36,5	18,5	18	345	280	365	9,3	15	8,2	34	9,3	33	
<b>YRTS325<sup>5)</sup></b>	25	<b>325</b>	450	60	40	20	20	415	342	430	9,3	15	8,2 <sup>5)</sup>	34	9,3	33	
<b>YRTS395</b>	33	<b>395</b>	525	65	42,5	22,5	20	486	415	505	9,3	15	8,2	46	9,3	45	
<b>YRTS460</b>	45	<b>460</b>	600	70	46	24	22	560	482	580	9,3	15	8,2	46	9,3	45	

1) Including retaining screws or threaded extraction holes.

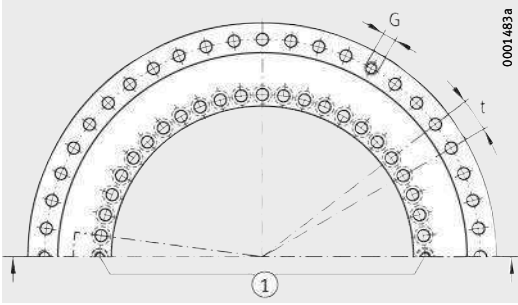
2) For screws to DIN 912, grade 10.9.

3) Attention!

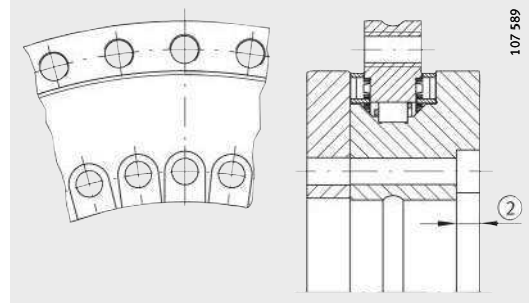
For fixing holes in the adjacent construction.  
Observe the pitch of the bearing holes.

4) Rigidity values taking account of the rolling element set,  
the deformation of the bearing rings and the screw connections.  
For explanations, see page 1133.

5) Screw counterbores in the L-section ring open to the bearing bore.  
The bearing inside diameter is unsupported in the area ②.



Hole pattern  
 ① Two retaining screws



For YRTS325:  
 ② Screw counterbores open<sup>5)</sup>

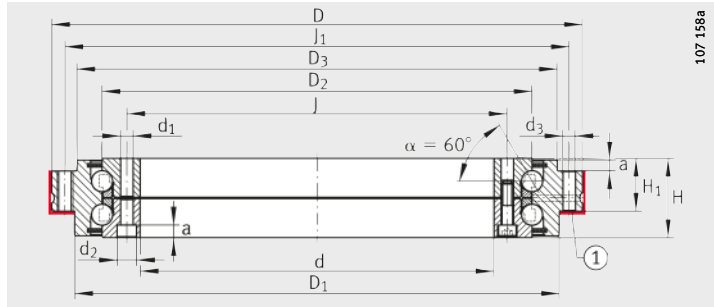
Pitch $t^1)$	Threaded extraction hole		Screw tightening torque $M_A^{2)}$ Nm	Basic load ratings				Limiting speed $n_G$ min <sup>-1</sup>	Mass moment of inertia for rotating	
	G	Quantity		axial		radial			inner ring IR $M_M$ kg·cm <sup>2</sup>	outer ring AU kg·cm <sup>2</sup>
				dyn. $C_a$ N	stat. $C_{0a}$ N	dyn. $C_r$ N	stat. $C_{0r}$ N			
48X 7,5°	M8	3	14	155 000	840 000	94 000	226 000	1 160	667	435
36X10°	M12	3	34	173 000	1 050 000	110 000	305 000	910	2 074	1 422
36X10°	M12	3	34	191 000	1 260 000	109 000	320 000	760	4 506	2 489
48X 7,5°	M12	3	34	214 000	1 540 000	121 000	390 000	650	8 352	4 254
48X 7,5°	M12	3	34	221 000	1 690 000	168 000	570 000	560	15 738	7 379



Designation	Rigidity					
	of bearing position <sup>4)</sup>			of rolling element set		
	axial $c_{aL}$ kN/μm	radial $c_{rL}$ kN/μm	Tilting rigidity $c_{kL}$ kNm/mrad	axial $c_{aL}$ kN/μm	radial $c_{rL}$ kN/μm	Tilting rigidity $c_{kL}$ kNm/mrad
<b>YRTS200</b>	4	1,2	29	13,6	3,9	101
<b>YRTS260</b>	5,4	1,6	67	16,8	5,8	201
<b>YRTS325<sup>5)</sup></b>	6,6	1,8	115	19,9	7,1	350
<b>YRTS395</b>	7,8	2	195	23,4	8,7	582
<b>YRTS460</b>	8,9	1,8	280	25,4	9,5	843

# Axial angular contact ball bearings

Double direction



ZKLDF

① Contact surface/centring diameter

**Dimension table** - Dimensions in mm

Designation	Mass m  ≈kg	Dimensions <sup>6)</sup>										Inner ring		
		d	D	H	H <sub>1</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	J	J <sub>1</sub>	a	Fixing screws		
												d <sub>1</sub>	d <sub>2</sub>	Quantity <sup>4)</sup>
<b>ZKLDF100</b> <sup>5)</sup>	4,5	<b>100</b>	185	38	25	161	136	158	112	170	5,4	5,6	10	16
<b>ZKLDF120</b>	6	<b>120</b>	210	40	26	185	159	181	135	195	6,2	7	11	22
<b>ZKLDF150</b>	7,5	<b>150</b>	240	40	26	214	188	211	165	225	6,2	7	11	34
<b>ZKLDF200</b>	11	<b>200</b>	300	45	30	274	243	271	215	285	6,2	7	11	46
<b>ZKLDF260</b>	22	<b>260</b>	385	55	36,5	345	313	348	280	365	8,2	9,3	15	34
<b>ZKLDF325</b> <sup>5)</sup>	28	<b>325</b>	450	60	40	415	380	413	342	430	8,2	9,3	15	34
<b>ZKLDF395</b>	39	<b>395</b>	525	5	42,5	486	450	488	415	505	8,2	9,3	15	46
<b>ZKLDF460</b>	50	<b>460</b>	600	70	46	560	520	563	482	580	8,2	9,3	15	46

1) Including retaining screws or threaded extraction holes.

2) Tightening torque for screws to DIN 912, grade 10.9.

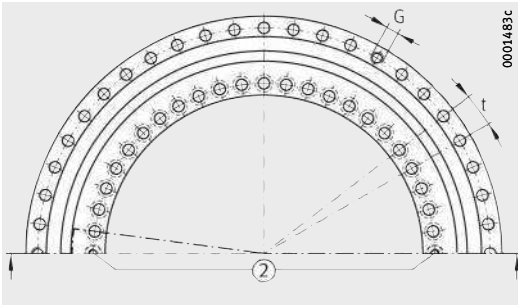
3) Rigidity values taking account of the rolling element set, deformation of the bearing rings and the screw connections. For explanations, see page 1133.

4) Attention!  
For fixing holes in the adjacent construction. Observe the pitch of the bearing holes.

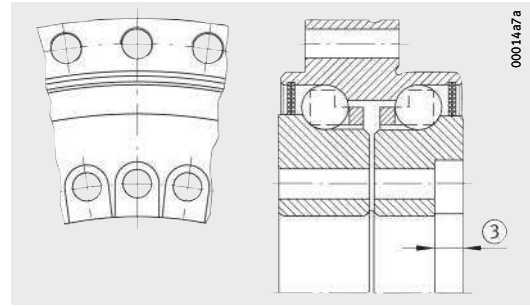
5) Screw counterbores in the L-section ring open to the bearing bore. The bearing inside diameter is unsupported in the area ③.

6) Sizes d > 460 mm available by agreement.

7) Valid for matched adjacent construction.



Hole pattern  
 ② Two retaining screws



For ZKLDF100, ZKLDF325:  
 ③ Screw counterbores open<sup>5)</sup>

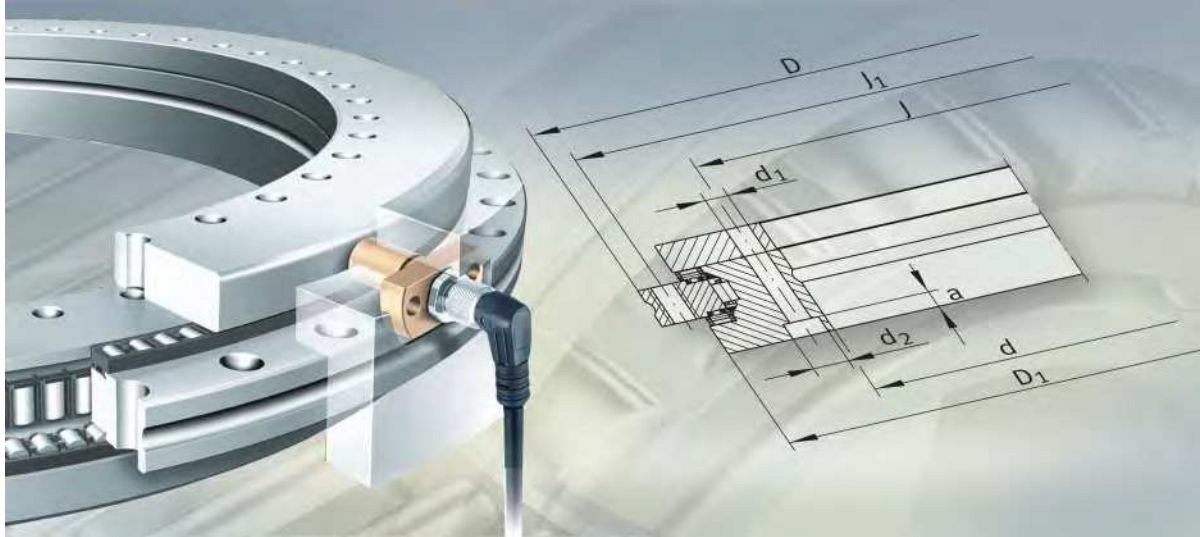
Outer ring				Pitch $t^1)$	Screw tightening torque	Basic load ratings		Limiting speed <sup>7)</sup>	Bearing frictional torque
Fixing screws		Threaded extraction hole				axial			
$d_3$	Quan- tity <sup>4)</sup>	G	Quan- tity			QuantityXt	$M_A^{2)}$		
					Nm	N	N	$\text{min}^{-1}$	Nm
5,6	15	M5	3	18X20°	8,5	71 000	265 000	2 800	1,6
7	21	M8	3	24X15°	14	76 000	315 000	2 400	2
7	33	M8	3	36X10°	14	81 000	380 000	2 000	3
7	45	M8	3	48X 7,5°	14	121 000	610 000	1 600	4,5
9,3	33	M12	3	36X10°	34	162 000	920 000	1 200	7,5
9,3	33	M12	3	36X10°	34	172 000	1 110 000	1 000	11
9,3	45	M12	3	48X 7,5°	34	241 000	1 580 000	800	16
9,3	45	M12	3	48X 7,5°	34	255 000	1 860 000	700	21



Designation	Rigidity					
	of bearing position <sup>3)</sup>			of rolling element set		
	axial	radial	Tilting rigidity	axial	radial	Tilting rigidity
$c_{aL}$ kN/ $\mu\text{m}$	$c_{rL}$ kN/ $\mu\text{m}$	$c_{kL}$ kNm/mrad	$c_{aL}$ kN/ $\mu\text{m}$	$c_{rL}$ kN/ $\mu\text{m}$	$c_{kL}$ kNm/mrad	
ZKLDF100 <sup>5)</sup>	1,2	0,35	3,6	2,2	0,35	5
ZKLDF120	1,5	0,4	5,5	2,5	0,4	8
ZKLDF150	1,7	0,4	7,8	2,9	0,4	12
ZKLDF200	2,5	0,6	17,5	3,7	0,6	26
ZKLDF260	3,2	0,7	40	4,7	0,7	54
ZKLDF325 <sup>5)</sup>	4	0,8	60	5,4	0,8	90
ZKLDF395	4,5	0,9	100	6,3	0,9	148
ZKLDF460 <sup>6)</sup>	5,3	1,1	175	7,1	1,1	223



**FAG**



**Axial/radial bearings  
with integral angular measuring system**



# Axial/radial bearings with integral angular measuring system

	Page
<b>Product overview</b>	
Axial/radial bearings with integral angular measuring system .....	1146
<b>Features</b>	
Advantages of the angular measuring system.....	1148
Axial/radial bearings with integral angular measuring system .....	1149
Measuring heads with magneto-resistive sensors.....	1150
Electronic evaluation system .....	1150
Cables for signal transmission .....	1151
Measurement accuracy.....	1152
Further information.....	1153



# Product overview Axial/radial bearings with integral angular measuring system

**Axial/radial bearings**  
With magnetic dimensional scale

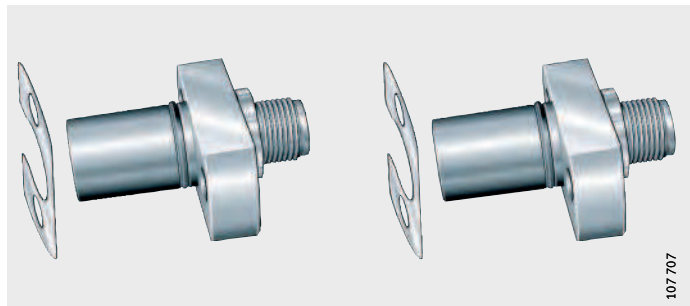
YRTM, YRTSM



107 485c

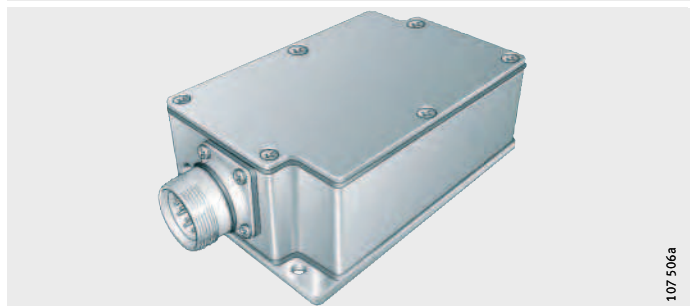
**Electronic measuring system**  
Measuring heads with shims

SRM



107 707

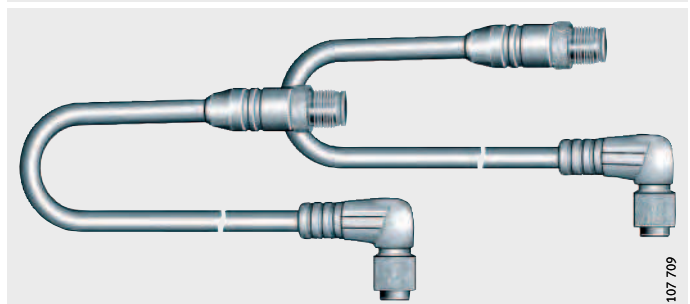
**Electronic evaluation system**



107 506a

**Connection cable**  
For measuring heads and electronic measuring system

SRMC



107 709

# Axial/radial bearings with angular measuring system

**Features** Axial/radial bearings with integral angular measuring system comprise:

- an axial/radial bearing YRTM or YRTSM with a dimensional scale, an SRM electronic measuring system and signal leads SRMC. The electronic measuring system SRM comprises two measuring heads, two stacks of shims and an electronic evaluation system. The signal leads for connecting the measuring heads to the electronic evaluation system can be ordered individually in various designs. The electronic measuring system MEKO/U will continue to be available but should no longer be used for new designs.

Bearings of series YRTM or YRTSM correspond in mechanical terms to axial/radial bearings YRT or YRTS but are additionally fitted with a magnetic dimensional scale. The measuring system can measure angles to an accuracy of a few angular seconds by noncontact, magneto-resistive means.

For the mechanical part of axial/radial bearings YRTM or YRTSM, please refer to the information from page 1113 to page 1133.



# Axial/radial bearings with angular measuring system

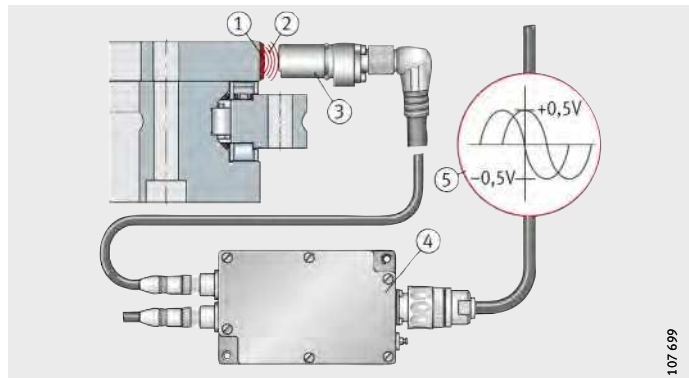
## Advantages of the angular measuring system

The measuring system, *Figure 1*:

- allows, due to the rigid connection to the adjacent construction, very good control characteristics (control stability and dynamics) and is therefore particularly suitable for axes with torque motor drive
- offers a high maximum speed of up to 16,5 m/s
- operates by non-contact means and is therefore not subject to wear
- carries out measurement irrespective of tilting and position
- has automatically self-adjusting electronics
- has a self-centring function
- is unaffected by lubricants
- is easy to fit, the measuring heads are easily adjustable, there is no need for alignment of the bearing and a separate measuring system
- requires no additional parts
  - the dimensional scale and measuring heads are integrated in the bearing and adjacent construction respectively
  - the resulting space saved can be used for the machining area of the machine
- does not give any problems relating to supply cables. The cables can be laid within the adjacent construction directly through the large bearing bore
- gives savings on design envelope size and costs due to the compact, integrated design requiring fewer components.

- ① Magnetic scale
- ② Magnetic field lines
- ③ Measuring head with magneto-resistive sensor
- ④ Electronic evaluation system
- ⑤ Analogue signals at output

*Figure 1*  
Measurement principle

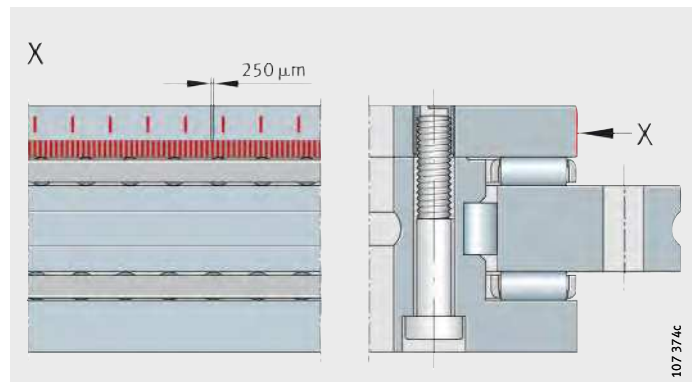


## Axial/radial bearings with integral angular measuring system

### Dimensional scale

The dimensional scale is applied without seams or joins to the outside diameter of the shaft locating washer. Magnetic poles are present as angle references, *Figure 2* on the magnetisable, electroplated coating at a pitch of 250  $\mu\text{m}$ .

The angular position is measured incrementally, i. e. by counting the individual increments. For a fixed datum point for the angular position after the machine is switched on, an additional reference mark is therefore also required.



*Figure 2*  
Dimensional scale

### Reference marks

The system has pitch-coded reference marks in order to quickly create the absolute datum point. Every 15°, reference marks are applied with defined different pitches, so that the absolute datum point is achieved by passing over two adjacent reference marks (maximum 30°).

# Axial/radial bearings with angular measuring system

## Measuring heads with magneto-resistive sensors

The measuring heads are colour coded:

- the silver measuring head (white) scans the incremental track
- the gold measuring head (yellow) scans the incremental track and the reference marks.

The two measuring heads are designed for optimum use of space. They are fixed in a slot in the adjacent construction by means of two fixing screws.

## MR effect

The small magnetic fields are detected as a result of the magneto-resistive effect (MR effect). Compared with magnetic heads, the MR sensors allow static measurement of magnetic fields, i. e. electrical signals are derived without movement, in contrast to magnetic heads.

The resistance layer of the MR sensors is designed such that the resistance changes when a magnetic field is perpendicular to the current flow.

When the magnetic pitch moves past the MR sensor, two sine wave signals with a phase offset of  $90^\circ$  are generated with a period length of  $500\ \mu\text{m}$ .

## O rings for sealing

The measuring heads have O rings to seal against the egress of oil and the ingress of fluids such as cooling lubricants.

## Electronic evaluation system

The electronic evaluation system operates with the aid of a digital signal processor (DSP).

The input signals are digitised by an analogue/digital converter. The high performance processor (DSP) automatically compares the sensor signals and calculates the effective angular value from the sensor signals by means of vector addition. Correction is carried out, for example, on the offset of the analogue signals. A digital/analogue converter generates synthetic analogue signals as a  $1\ V_{SS}$  value.

The electronic evaluation system can be positioned at any location or within the adjacent construction. It is connected to the controller by means of a conventional 12-pin extension cable.

The lead for transmitting the voltage signals from the electronic evaluation system to the electronic post-processor can be up to 100 m long.

## Cables for signal transmission

The signal cables for connecting the measuring heads to the electronic evaluation system are available in the lengths 1 m, 2 m and 3 m, see table.

The connection side for the electronic evaluation system has a straight plug. The connection side to the measuring head is suitable for straight plugs or 90° elbow plugs.

In the case of the elbow plug, the cable outlet direction is defined in relation to the mounting position of the measuring heads.

### Advantages

The cables are suitable for use in machinery and plant for chip-forming machining:

- the cables and plugs are shielded
- the cable sheathing is made from polyurethane (PUR), halogen-free and flame-resistant
- the signal cables are free from halogens, silicones and PVC as well as resistant to microbes and hydrolysis
- the cables are resistant to oils, greases and cooling lubricants, see TPI 154, Integral angular measuring system
- the cables are suitable for dynamic use in flexible trunking (it must be ensured that they are laid correctly).

### Bending cycles

When laid in flexible trunking, the cables can achieve  $\geq 2$  million bending cycles under the following test conditions:

- bending radius 65 mm ( $10 \times D$ )
- acceleration  $5 \text{ m/s}^2$
- travel speed 200 m/min
- travel distance 5 m, horizontally.

### Plug connectors

INA plug connectors are robust and designed for use in industrial environments. When connected, they conform to protection grade IP 65 (EN 60 529).

The large sheathed areas of the plugs ensure effective shielding.

### Connection cables

Plug design	Cable length m	Ordering designation
Straight plugs on both ends	1	<b>SRMC 1-S</b>
	2	<b>SRMC 2-S</b>
	3	<b>SRMC 3-S</b>
Straight plug and 90° elbow plug	1	<b>SRMC 1-A</b>
	2	<b>SRMC 2-A</b>
	3	<b>SRMC 3-A</b>



# Axial/radial bearings with angular measuring system

## Measurement accuracy

The more accurate the angular measurement, the more accurately a rotary axis can be positioned. The accuracy of angular measurement is essentially determined by:

- ① the quality of the dimensional scale
- ② the quality of scanning
- ③ the quality of the electronic evaluation system
- ④ the eccentricity of the dimensional scale to the bearing raceway system
- ⑤ the runout deviation of the bearing arrangement
- ⑥ the elasticity of the measurement system shaft and its linkage to the shaft to be measured
- ⑦ the elasticity of the stator shaft and shaft coupling.

For the measuring system integrated in the bearing, only points ① to ③ are relevant.

The eccentricity in point ④ is completely eliminated by the diametrically opposed arrangement of the MR sensors.

Points ⑤ to ⑦ play only a very minor role in the INA measuring system.

## Positional deviations

Positional deviations within a revolution are the absolute measurement errors over one revolution of the system (measured at +20 °C ambient temperature):

- YRTM150  $\cong \pm 6''$
- YRTM180  $\cong \pm 5''$
- YRT(S)M200, YRT(S)M260, YRT(S)M325, YRT(S)M395, YRT(S)M460  $\cong \pm 3''$ .

Since the dimensional scale is directly connected, i.e. without any compensation elements, with the rolling bearing, deflections in the bearing raceway system due to machining forces could affect the measurement result. This effect is eliminated by the diametrically opposed arrangement of the measuring heads in the electronic evaluation system.



### Measurement record

Each INA measuring system is supplied with an accuracy measurement record, *Figure 3*.

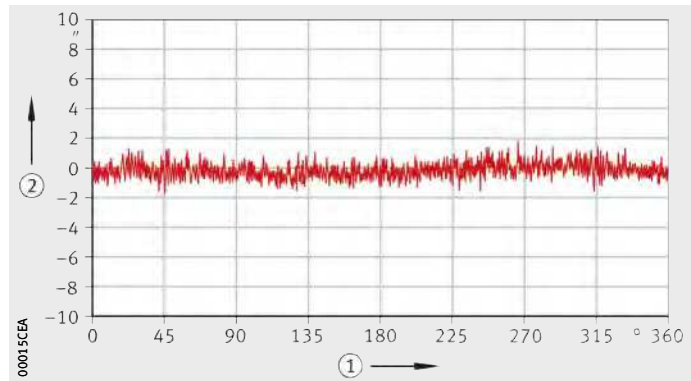
The accuracy is measured on the coded washer of the YRTM or YRTSM bearing when the coding is applied and is documented.

The measurement trace shows the pitch error of the coding.

- ① Measurement travel in degrees
- ② Deviation in angular seconds

*Figure 3*

Excerpt from a measurement trace,  
example:  
YRTM 395 – S.Nr. 03/09/004



### Further information

Comprehensive information on axial/radial bearings with an integral measuring system is given in TPI 120, High precision bearings for combined loads. This publication is available on request.







## Radial insert ball bearings Housing units



# Radial insert ball bearings Housing units

## Radial insert ball bearings ..... 1158

INA radial insert ball bearings are ready-to-fit rolling bearings for the design of particularly economical bearing arrangements. These robust machine elements are available in numerous designs that differ essentially in the outside surface of the outer ring, the method of location on the shaft and the sealing arrangement.

Radial insert ball bearings with a spherical outer ring, fitted in housings with a concave bore, can compensate for static misalignment of the shaft. They can be relubricated if necessary and are particularly easy to fit due to the special location methods. Operation even under difficult operating conditions is ensured by seals of a three-piece design that are matched to the application.

The classic areas of application for these bearings include the agricultural, construction and mining sector, conveying equipment, textile, paper and woodworking machinery as well as machines for the filling, timber and packaging industries.

---

## Housing units ..... 1212

With cast iron housings  
With sheet steel housings

Housing units comprise INA cast iron or sheet steel housings with a concave bore in which INA radial insert ball bearings are mounted. These units are matched to each other and are available as plumber block, flanged and take-up housing units. A wide range of housing designs offers the right solution for any specific application.

The areas of application of the units correspond to those of the insert bearings.

Cast iron housings are single-piece units that can support high loads. Sheet steel housings are two-piece units and are used where the priority is not the load carrying capacity of the housing but the low mass of the unit.

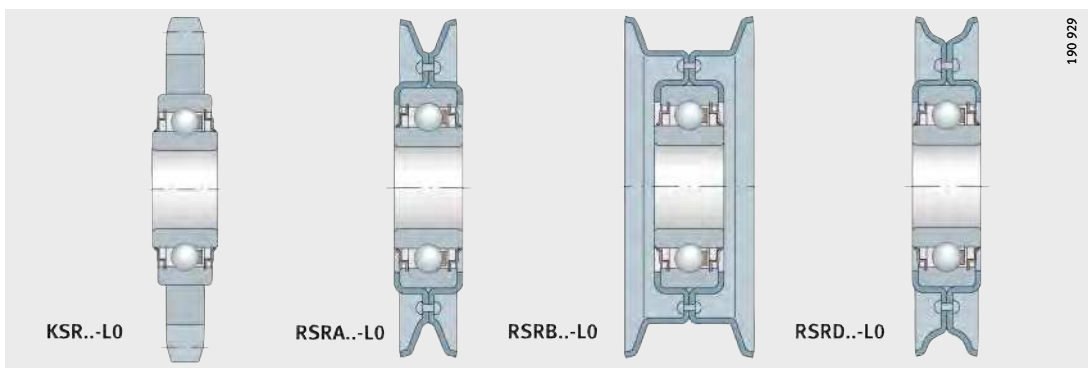
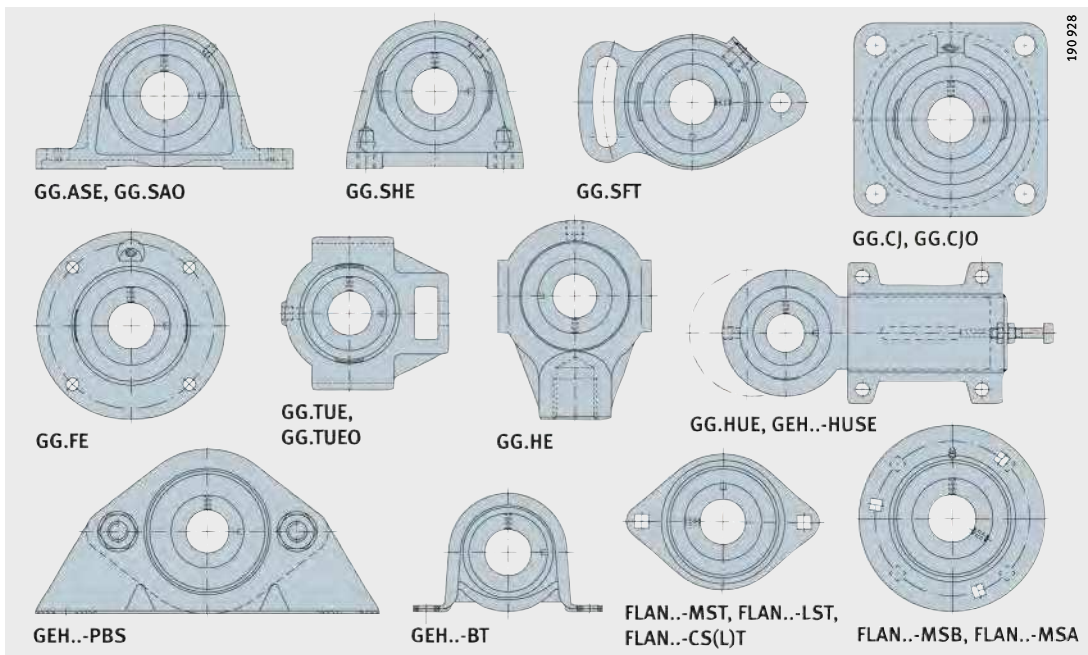
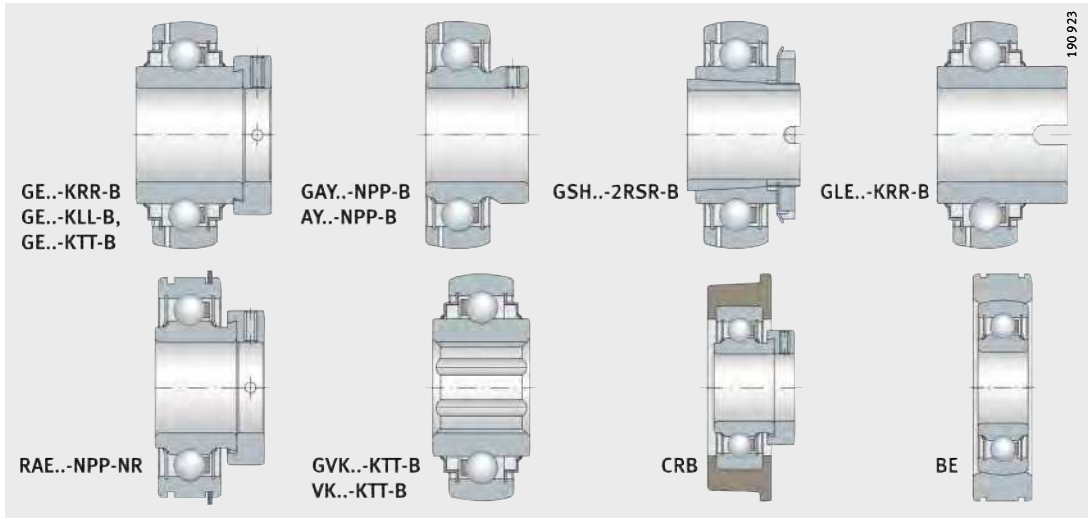
Depending on the series, INA take-up housing units have integral fixing eyes with holes, slots and guide surfaces. They can therefore be moved in an axial direction or swivelled in a radial direction.

---

## Roller chain idler sprocket units Idler pulley units ..... 1310

Roller chain idler sprocket units are guidance and return units for roller bush chains and roller chains. They can compensate for chain stretch resulting from operation and give smoother running under high loads and speeds.

Idler pulley units are tensioning systems for belt drives and idler pulleys. They are suitable for vee, flat or round belts as well as for steel and hemp cables. Idler pulley units increase the wrap angle, compensate for belt stretch resulting from operation, allow shorter centre distances and reduce belt wear.





## Radial insert ball bearings

# Radial insert ball bearings

	Page
<b>Product overview</b>	Radial insert ball bearings ..... 1160
<b>Features</b>	Radial insert ball bearings ..... 1165
	Radial insert ball bearings with eccentric locking collar ..... 1167
	Radial insert ball bearings with grub screws in inner ring..... 1168
	Radial insert ball bearings with integral adapter sleeve ..... 1169
	Radial insert ball bearings with drive slot..... 1170
	Self-aligning deep groove ball bearings..... 1171
	Deep groove ball bearings with extended inner ring..... 1172
	Radial insert ball bearings with steel aligning ring ..... 1173
	Radial insert ball bearings with eccentric locking collar, cylindrical outer ring and slots in outer ring..... 1174
	Radial insert ball bearings with rubber interliner ..... 1175
	Suffixes..... 1176
	Sealing..... 1177
	Features of radial insert ball bearings, comparison of series.. 1178
<b>Design and safety guidelines</b>	Compensation of misalignments..... 1180
	Axial load carrying capacity of radial insert ball bearings ..... 1181
	Speed limits for radial insert ball bearings, guide values ..... 1182
	Shaft tolerances for radial insert ball bearings, recommendations ..... 1182
<b>Accuracy</b>	Standard tolerances of radial insert ball bearings..... 1183
	Radial internal clearance of radial insert ball bearings..... 1183
<b>Dimension tables</b>	Radial insert ball bearings with spherical outer ring..... 1184
	Radial insert ball bearings with grub screws in inner ring ..... 1192
	Radial insert ball bearings with integral adapter sleeve ..... 1196
	Radial insert ball bearings with drive slot..... 1197
	Radial insert ball bearings with eccentric locking collar, cylindrical outer ring..... 1198
	Inch size radial insert ball bearings, spherical or cylindrical outer ring..... 1200
	Radial insert ball bearings with rubber interliner ..... 1204
	Radial insert ball bearings with steel aligning ring ..... 1206
	Deep groove ball bearings with extended inner ring..... 1207
	Self-aligning deep groove ball bearings with square or hexagonal bore ..... 1208
	Self-aligning deep groove ball bearings with bore for fit..... 1210

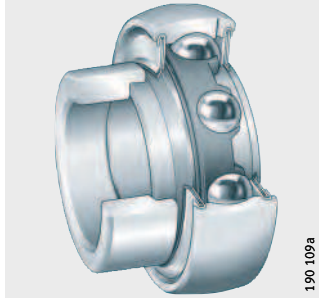


# Product overview Radial insert ball bearings

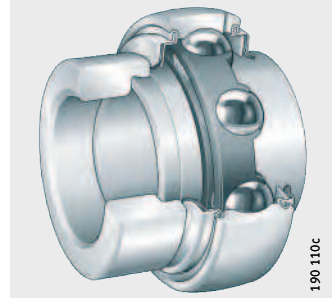
**With eccentric locking collar**  
With spherical outer ring

Features: see page 1167

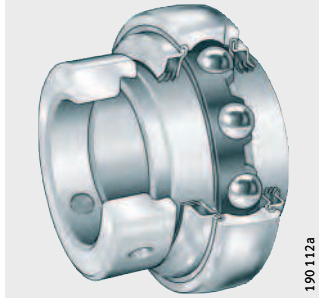
GRAE...NPP-B, RAE...NPP-B,  
RALE...NPP-B



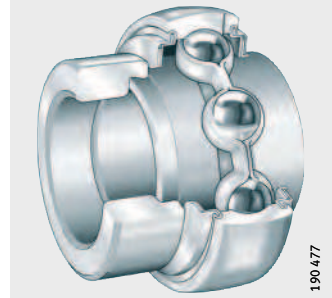
GE...KRR-B, GNE...KRR-B,  
E...KRR-B, NE...KRR-B



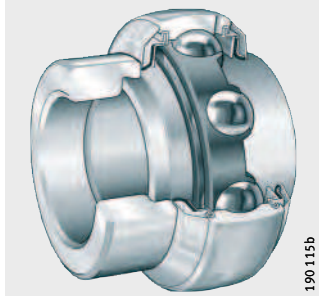
GE...KTT-B



GE...KLL-B



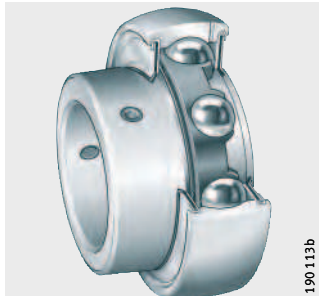
GE...KRR-B-2C



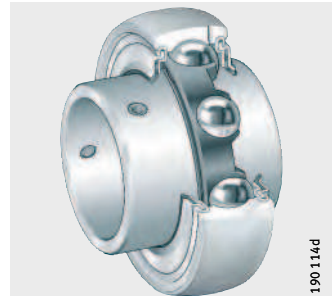
**With grub screws**  
**in inner ring**  
With spherical outer ring

Features: see page 1168

GAY...NPP-B, AY...NPP-B



GYE...KRR-B



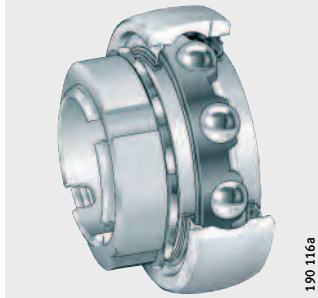


**With integral adapter sleeve**

With spherical outer ring

Features: see page 1169

GSH..-2RSR-B



**With drive slot**

With spherical outer ring

Features: see page 1170

GLE..-KRR-B

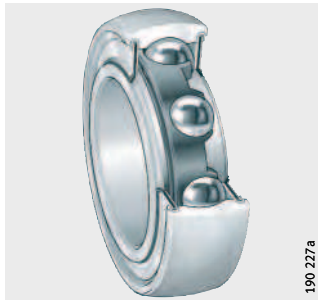


**Self-aligning  
radial ball bearings**

With spherical outer ring  
With fit

Features: see page 1171

2..-NPP-B



With spherical outer ring  
With square or hexagonal bore

Features: see page 1171

GVK..-KTT-B-AS2/V,  
VK..-KTT-B



SK..-KRR-B



# Product overview Radial insert ball bearings

## Deep groove ball bearings with extended inner ring

With cylindrical outer ring

Features: see page 1172

2..-KRR, 2..-KRR-AH

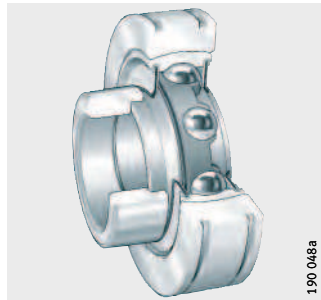


## With steel aligning ring

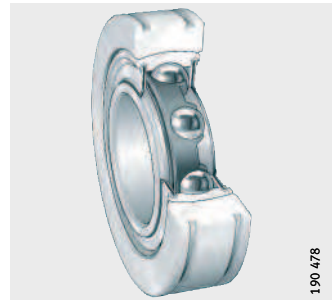
With cylindrical outer ring

Features: see page 1173

PE



BE

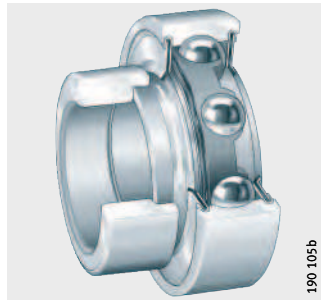


## With eccentric locking collar

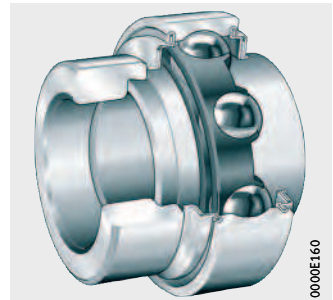
With cylindrical outer ring

Features: see page 1167

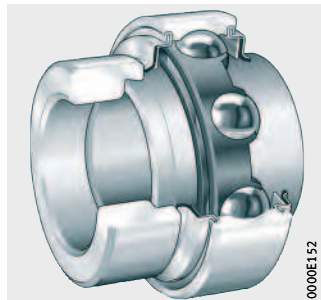
RAE..-NPP, RALE..-NPP



E..-KLL



E..-KRR

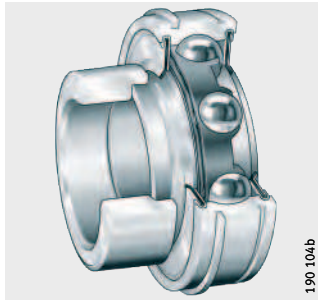


**With eccentric locking collar**

With cylindrical outer ring  
One snap ring in outer ring

Features: see page 1174

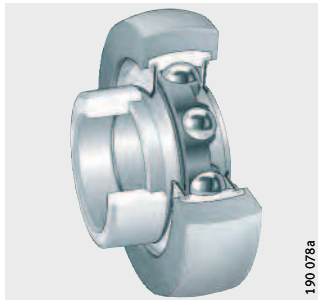
RAE...NPP-NR



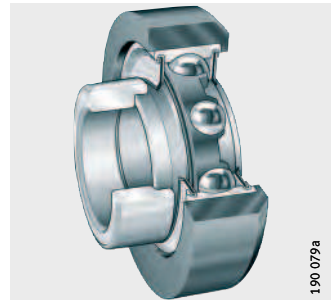
**With rubber interliner**

Features: see page 1175

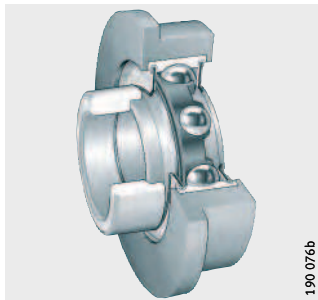
RABRA, RABRB



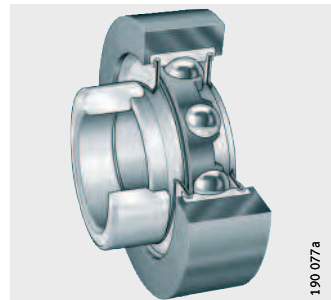
RCRA, RCRB



CRB



RCSMA, RCSMB



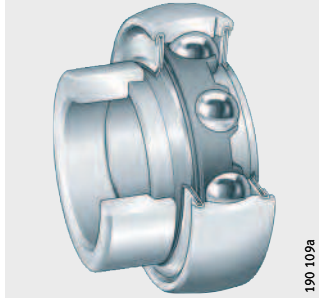
# Product overview Radial insert ball bearings

## Inch size radial insert ball bearings

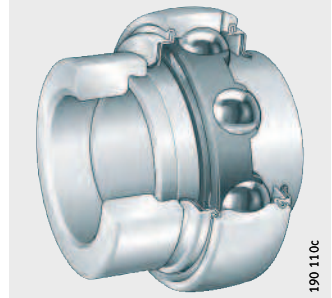
With spherical or cylindrical outer ring

Features:  
see page 1167 and page 1168

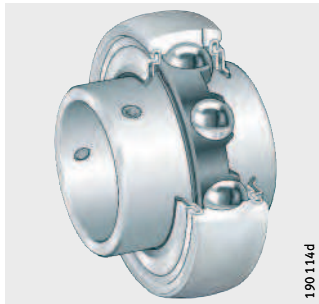
GRA..-NPP-B-AS2/V,  
RA..-NPP-B



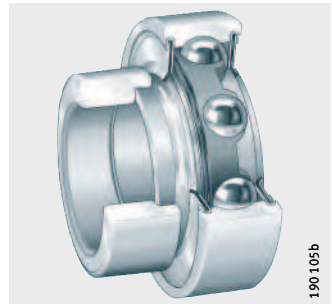
G..-KRR-B-AS2/V



GY..-KRR-B-AS2/V



RA..-NPP, RAL..-NPP



# Radial insert ball bearings

**Features** Radial insert ball bearings are single row, ready-to-fit units comprising a solid outer ring, an inner ring extended on one or both sides, cages made from plastic or sheet steel and seals of type P, R, L or T. Bearings with an inner ring extended on both sides undergo less tilting of the inner ring and therefore run more smoothly.

The outer ring has a spherical or cylindrical outside surface. In combination with an INA housing matched to the design, bearings with a spherical outer ring can compensate for misalignment of the shaft, see Compensation of static misalignments, page 1180.

With only a few exceptions, radial insert ball bearings can be relubricated. For this purpose, they have two lubrication holes in one plane of the outer ring offset by 180°.

Radial insert ball bearings are particularly easy to fit and are suitable for drawn shafts of grade h6 up to h9. They are located on the shaft by means of eccentric locking collars, grub screws in the inner ring, adapter sleeves, drive slots or fit.



The table, page 1178, presents the features of the series in detail. Please take these into consideration.

**Inch size designs** Some series with eccentric locking collar or grub screws in the inner ring are also available with inch size bore dimensions, see dimension tables, page 1200 to page 1202. For further inch size bearings and bearing units, see TPI 127, Radial insert ball bearings/housing units in inch sizes.

**Corrosion-resistant radial insert ball bearings** For corrosion-resistant bearing arrangements and for applications in the food and drinks industry, there are Corrotect®-coated bearings with the suffix FA125 and bearings of a corrosion-resistant design. Corrosion-resistant radial insert ball bearings are suitable where moisture, contaminated water, salt spray mist or weakly alkaline and weakly acidic cleaning agents are present, see also TPI 64, Corrosion-resistant products.



# Radial insert ball bearings

## Corrotect® coating

The special INA coating Corrotect® is an economical alternative to conventional corrosion-resistant radial insert ball bearings. The coating thickness is between 2 µm and 5 µm.

## Advantages of the Corrotect® coating

- Anti-rust protection on all sides, including the machined surfaces of chamfers and radii
- Long term prevention of rust penetration beneath seals
- Small bright spots are protected against corrosion by the cathodic protection mechanism
- Anti-corrosion protection allows a significantly longer operating life compared to uncoated parts
- Uncoated bearings and housings are fully interchangeable with the coated versions of the same design
- Bearings and housings made from corrosion-resistant rolling bearing steel are often no longer required.

For further information on Corrotect® see also section Corrotect® coating, page 119.

## Radial insert ball bearings for high and low temperatures

At high temperatures, rolling bearings expand in volume due to a change in the material microstructure. Depending on the location of the heat source, there may also be a significant temperature difference between the inner and outer ring.

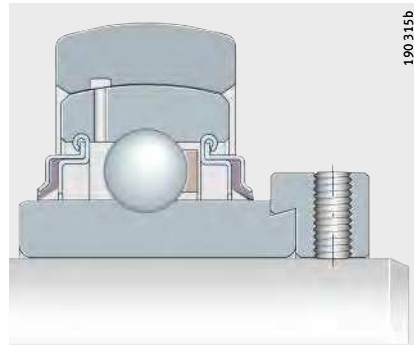
The radial insert ball bearings have cages made from metal or a high temperature plastic, increased radial internal clearance, lubricants with improved thermal resistance and special seals.

These bearings have the suffix FA164 or FA101, see table, page 1176 and table, page 1179. An extended temperature range can be covered by using the series GLE...-KRR-B and GE...-KLL-B, see table, page 1179.

## Radial insert ball bearings with eccentric locking collar

These “classic” INA radial insert ball bearings are located on the shaft by means of a locking collar, *Figure 1*. They are particularly suitable for bearing arrangements with a constant direction of rotation or, under low speed and load, for an alternating direction of rotation.

The locking collar is preferably tightened in the direction of rotation and secured by means of a grub screw. This location method prevents damage to the shaft and can be easily loosened again.



**GE..-KRR-B**

*Figure 1*  
Location using  
eccentric locking collar

### Sealing

The radial insert ball bearings are fitted with P, R, L or T type seals. In series GE..-KRR-B-2C, the R seals are fitted with Corrotect®-coated flinger shields to protect against mechanical damage.

### Lubrication

With the exception of a few series, sealed bearings can be relubricated.

### Anti-corrosion protection

Several series are also available in a corrosion-resistant design. These bearings have the suffix FA125.

The inner rings up to  $d = 60$  mm, as well as locking collars in general, have a Corrotect® coating and are thus protected against fretting corrosion; the exception is the series RALE..-NPP(-B).



### Radial insert ball bearings for high and low temperatures

The series for high or expanded temperature ranges have the suffix FA164 or FA101, see table, page 1179.

### Cylindrical outer ring

In addition to the bearings with a spherical outer ring, there are also the following series with a cylindrical outer ring: RAE..-NPP, RALE..-NPP, E..-KRR and E..-KLL.

### Inch size designs

The series GRA..-NPP-B-AS2/V, RA..-NPP-B, G..-KRR-B-AS2/V, RA..-NPP, RAL..-NPP have an inch size bore diameter, see dimension table, page 1200.

### Tightening torques

Tightening torques for metric and inch size grub screws, see table, page 1234.

## Radial insert ball bearings

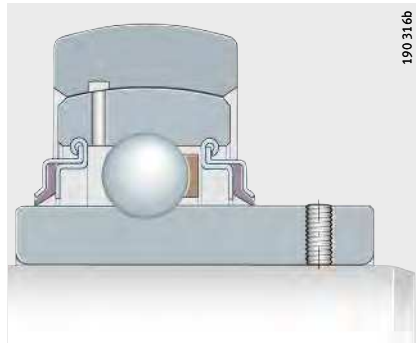
### Radial insert ball bearings with grub screws in inner ring

In these radial insert ball bearings, the inner ring is located on the shaft by means of two grub screws offset by 120°, *Figure 2*. This location method is suitable for bearing arrangements with a constant direction of rotation or, under low speed and load, for an alternating direction of rotation.

The grub screws are self-retaining and have a fine pitch thread with cup point for secure location of the bearings.

**GYE...-KRR-B**

*Figure 2*  
Location using grub screws  
in the inner ring



#### Sealing

The radial insert ball bearings are fitted on both sides with P or R type seals.

#### Lubrication

With the exception of series AY...-NPP-B, the bearings can be relubricated.

#### Anti-corrosion protection

These bearings have the suffix VA. In this design, the bearing rings and rolling elements are made from high alloy, corrosion-resistant rolling bearing steel with an increased chromium molybdenum content and the steel cages are made from corrosion-resistant steel. The bearings are sealed on both sides with RSR seals and have additional flinger shields made from corrosion-resistant steel, see also TPI 64, Corrosion-resistant products.

#### Radial insert ball bearings for high temperatures

The radial insert ball bearings for high temperatures have the suffix FA164, see table, page 1179.

#### Inch size designs

In the case of series GY...-KRR-B-AS2/V, the bore is an inch size bore, see dimension table.

#### Tightening torques

Tightening torques for metric and imperial grub screws, see table, page 1234.



## Radial insert ball bearings with integral adapter sleeve

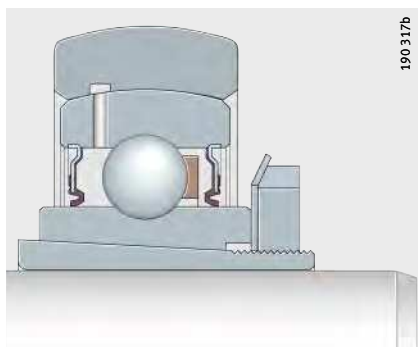
In this series, the inner ring is located on the shaft by an adapter sleeve with a locknut and a tab washer, *Figure 3*.

The adapter sleeve and locknut give concentric, force locking location of the bearing inner ring on the shaft. As a result, the speeds that can be achieved are the same as with deep groove ball bearings. These bearings also give quieter running than normal radial insert ball bearings. The adapter sleeve, locknut and tab washer are all zinc-coated.

Due to the integral adapter sleeve, the bearings have the same radial dimensions and basic load ratings as radial insert ball bearings with an eccentric locking collar or with grub screws in the inner ring and are interchangeable with these bearings.

**GSH..-2RSR-B**

*Figure 3*  
Location using  
adapter sleeve and locknut



### Sealing

Radial insert ball bearings with integral adapter sleeve are sealed by means of RSR seals.

### Lubrication

The bearings can be relubricated.

### Hook wrenches and tightening torques

See table, page 1236.

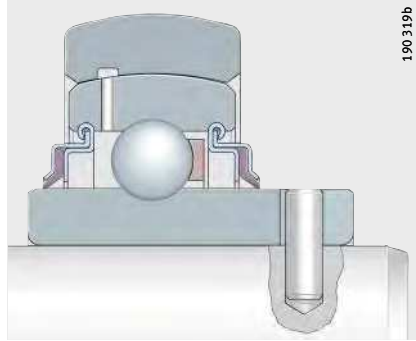


# Radial insert ball bearings

## Radial insert ball bearings with drive slot

Radial insert ball bearings with a drive slot in the inner ring are non-locating bearings with good high temperature characteristics, *Figure 4*. Non-locating bearings are used at low speeds and loads to compensate for thermal elongation of the shaft.

Due to the slot, they are easy to locate in a radial direction. Rotation is prevented by a drive pin on the shaft or a set collar with a pin. The non-locating bearings are suitable for drawn shafts up to grade h7.



**GLE..-KRR-B**

*Figure 4*  
Location using drive slot

### Anti-corrosion protection

Inner rings up to a bore diameter 60 mm have a Corrotect® coating and are thus protected against fretting corrosion.

### Sealing

Radial insert ball bearings with a drive slot have R type seals with PTFE seal lips.

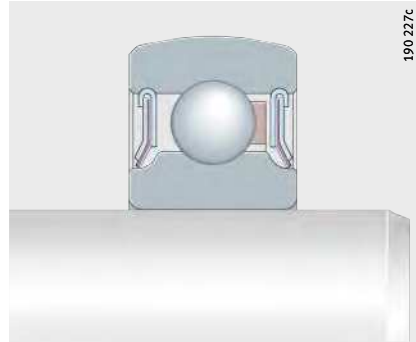
### Lubrication

The bearings can be relubricated.

## Self-aligning deep groove ball bearings

Self-aligning deep groove ball bearings are available with a cylindrical bore for a fit seat, *Figure 5* or with a reamed square or hexagonal bore, *Figure 6*.

**With fit** Bearings with a fit on the shaft allow speeds equivalent to those of standard ball bearings, are suitable for bearing arrangements with an alternating direction of rotation and offer smooth running.



2...-NPP-B

*Figure 5*  
Self-aligning deep groove ball bearings

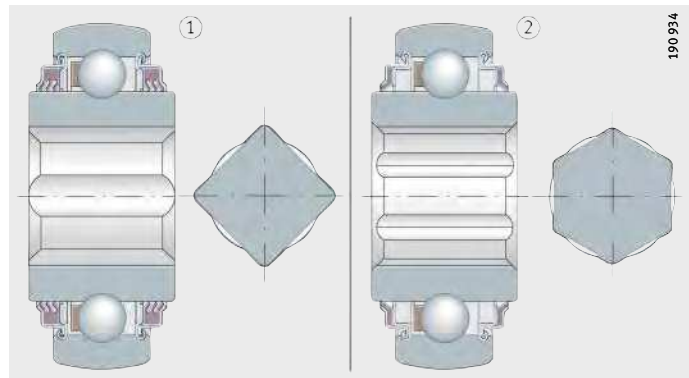
**Sealing** The bearings are sealed on both sides using P type seals with a vulcanised seal lip or three-piece designs.



For self-aligning deep groove ball bearings with a fit seat, the fit data for ball bearings apply.

### With square or hexagonal bore

Bearings with a profiled bore are used where shafts must transmit very high torques and this is only possible using square or hexagonal shafts, *Figure 6*. Rotation is prevented by the geometrical locking effect.



VK...-KTT-B  
SK...-KRR-B

*Figure 6*  
① Square bore  
② Hexagonal bore

**Anti-corrosion protection** The bearings have a Corrotect® coating.

**Sealing** Self-aligning deep groove ball bearings are sealed using R or T type seals.

**Lubrication** The bearings are greased to their maximum, some designs can be relubricated.

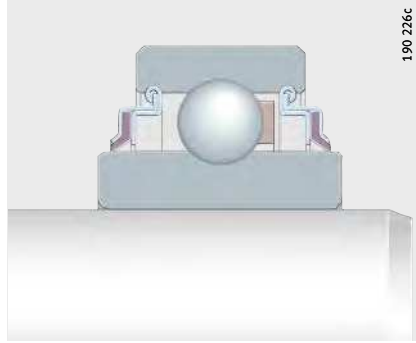
# Radial insert ball bearings

## Deep groove ball bearings with extended inner ring

These bearings have a cylindrical outer ring and are fitted in cylindrical bores, *Figure 7*. The inner ring is extended on both sides and is located on the shaft using a location fit. Due to the extended inner ring, additional axial spacer rings are not required.

The concentric seat allows speeds equivalent to those of standard ball bearings, while the load can be either constant or alternating. Smooth running is also achieved.

The tolerance of the inner ring bore corresponds to tolerance class PN in accordance with DIN 620.



2..-KRR  
2..-KRR-AH

*Figure 7*  
Deep groove ball bearings with extended inner ring

### Sealing

The bearings are sealed on both sides using R type seals.

### Lubrication

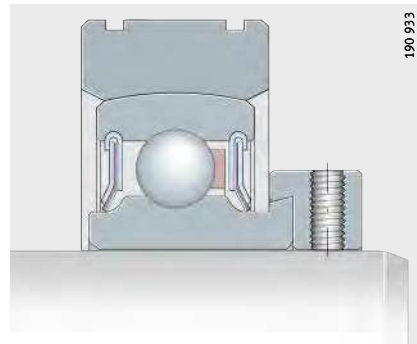
The sheet steel washers extended outwards and angled downwards form a large grease reservoir.

## Radial insert ball bearings with steel aligning ring

These bearings are based on radial insert ball bearings with an eccentric locking collar or on self-aligning deep groove ball bearings, but additionally have an axially split outer ring as an aligning ring, *Figure 8*. They are mounted in cylindrical bores and can compensate for static misalignment of the shaft up to  $\pm 5^\circ$ .

Due to the annular slots in the outer ring to DIN 616, they are highly suitable for sheet metal constructions. In this case, they are axially located using snap rings to DIN 5 417.

In series PE, the inner ring is located on the shaft using a locking collar, in series BE by a location fit.



*Figure 8*  
Radial insert ball bearings with steel aligning ring

### Anti-corrosion protection

The aligning ring has a Corrotect® coating and is thus protected against fretting corrosion. In series PE, the inner ring and locking collar are also coated.

### Sealing

The bearings are sealed on both sides using P type seals.

### Lubrication

Radial insert ball bearings with an aligning ring cannot be relubricated.



The fit tolerances of the aligning rings are those of the deep groove ball bearings. Select the fit for the shaft and housing such that the outer ring of the insert bearing can undergo self-alignment.



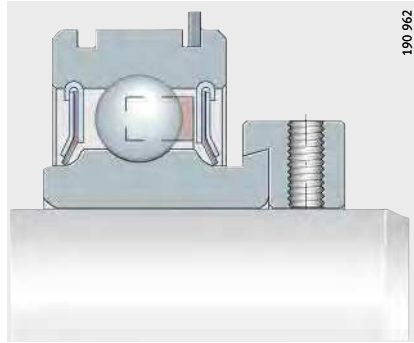
## Radial insert ball bearings

### Radial insert ball bearings with eccentric locking collar, cylindrical outer ring and slots in outer ring

The basic design of series RAE..-NPP-NR is a radial insert ball bearing with an eccentric locking collar and an inner ring extended on one side, *Figure 9*. The outer ring has a cylindrical outside surface and two slots to DIN 616. The bearings are fitted in cylindrical bores and axially located by easy-to-fit snap rings. The bearing is supplied with one snap ring to DIN 5 417 already fitted.

RAE..-NPP-NR

*Figure 9*  
Radial insert ball bearings with cylindrical outer ring and two slots in outer ring



#### Sealing

The bearings are sealed on both sides using P type seals.

#### Lubrication

The radial insert ball bearings are greased and cannot be relubricated.

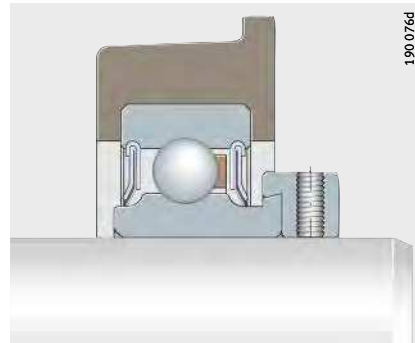
## Radial insert ball bearings with rubber interliner

These radial insert ball bearings are located on the shaft using an eccentric locking collar. The outer ring is encased in a thick-walled NBR interliner, *Figure 10*.

The interliner absorbs vibrations and shocks and thus gives damping of running noises.

The interliners have a spherical or cylindrical outside surface.

For roll bearing arrangements, one series has a locating shoulder on the rubber ring.



CRB

*Figure 10*  
Radial insert ball bearings with rubber interliner

### Anti-corrosion protection

The inner ring and locking collar have a Corrotect® coating and are thus protected against fretting corrosion; the exception is the series with radial insert ball bearings RALE...NPP(-B).

### Sealing

The radial insert ball bearings are sealed on both sides using P type seals.

### Lubrication

Bearings with rubber interliners cannot be lubricated.



Note the tube and housing diameters for radial insert ball bearings with rubber interliner:

- CRB, tube inside diameter D –0,6 to 1,6
- RABR, RCR, RCSM, housing diameter D –0,25 to –0,35.



# Radial insert ball bearings

## Suffixes

Suffixes for available designs: see table.

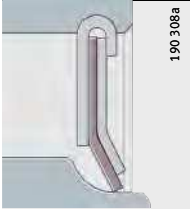
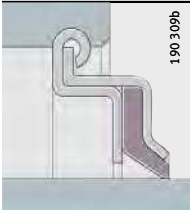
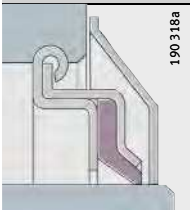


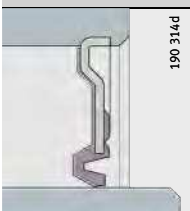
### Available designs

Suffix	Description	Design
AS2/V	Bearing outer ring with 2 lubrication holes in offset planes	Standard
B	Bearing with spherical outer ring	
2C	Flinger shields on both sides	
FA101	High and low temperature design –40 °C to +180 °C	
FA106	Bearing subjected to special noise testing	
FA107	Bearing with lubrication holes on the locating side	
FA125.5	With Corroprotect® coating, protected against corrosion	
FA164	High temperature design up to +250 °C	
KRR	Lip seals on both sides (R type seal)	
KLL	Labyrinth seals on both sides (L type seal)	
KTT	Triple lip seals on both sides (T type seal)	
NR	Slot and snap ring for radial insert ball bearings with cylindrical outer ring	
NPP	Lip seals on both sides (P type seal)	
OSE	Bearing without locking element (eccentric locking collar)	
2RSR	Lip seals on both sides (vulcanised)	
VA	Corrosion-resistant design made from high alloy rolling bearing steel	



**Sealing** Seals for radial insert ball bearings are of a three-piece design. This concept offers, due to the rigidly rolled-in sheet steel washer, optimum seating in the bearing as well as concentric alignment of the seal lip to the inner ring.

**Seal types**

	<p><b>P seal</b></p> <p>190 308a</p> <p>Two zinc-coated sheet steel washers with intermediate NBR part, seal lip axially preloaded.</p> <p>In order to protect the seal lip from mechanical damage, the outer sheet steel washer extends a considerable distance down towards the bearing inner ring.</p> <p>Used in narrow radial insert ball bearings with inner ring extended on one side.</p>
	<p><b>R seal</b></p> <p>190 309b</p> <p>Two zinc-coated sheet steel washers extended outwards and angled downwards with intermediate NBR part and radially preloaded seal lip.</p> <p>Better protection against mechanical damage.</p> <p>Substantial grease reservoir due to the space between the extended and angled sheet steel washers.</p> <p>Used in radial insert ball bearings with inner ring extended on both sides.</p>
	<p><b>R seal with flinger shield</b></p> <p>190 318a</p> <p>As R seal, but with outer flinger shield with anti-corrosion protection.</p> <p>Additional sealing action without restriction on speed and with additional protection against mechanical damage.</p>
	<p><b>T seal</b></p> <p>190 310c</p> <p>Two zinc-coated sheet steel washers with intermediate NBR part and three radially preloaded seal lips for heavily contaminated conditions.</p> <p>For better protection of the seal lip against mechanical damage, the outer sheet steel washer is angled outwards.</p> <p>Lower speeds due to higher friction.</p>
	<p><b>L seal (labyrinth seal)</b></p> <p>190 311b</p> <p>Two zinc-coated sheet steel washers extended outwards in the outer ring with a zinc-coated intermediate sheet steel L-section ring pressed onto the inner ring.</p> <p>Substantial grease reservoir due to the space between the extended and angled sheet steel washers.</p> <p>Used in radial insert ball bearings with inner ring extended on both sides. For increased temperatures and lower friction.</p>
	<p><b>RSR seal</b></p> <p>190 314d</p> <p>Single-piece, zinc-coated sheet steel washer with moulded, radially preloaded NBR seal lip.</p> <p>Used in radial insert ball bearings with integral adapter sleeve.</p>



# Radial insert ball bearings

## Features of radial insert ball bearings, comparison of series

Series	For shaft diameters from ... to ...	Compensation of misalignment	Internal clearance		
<b>GRAE..-NPP-B</b>	12 mm – 60 mm	yes	C3		
<b>GRAE..-NPP-B-FA125.5</b>	20 mm – 60 mm				
<b>GRA..-NPP-B-AS2/V</b>	5/8 inch – 1 3/4 inch				
<b>RAE..-NPP-B</b>	12 mm – 50 mm				
<b>RA..-NPP-B</b>	3/4 inch – 1 1/2 inch				
<b>RALE..-NPP-B</b>	20 mm – 30 mm				
<b>GE..-KRR-B</b>	17 mm – 120 mm				
<b>GE..-KRR-B-FA125.5</b>	20 mm – 50 mm				
<b>GE..-KRR-B-FA164</b>	20 mm – 70 mm, 80 mm – 90 mm			C5	
<b>GE..-KRR-B-FA101</b>	20 mm – 75 mm			C4	
<b>G..-KRR-B-AS2/V</b>	15/16 inch – 2 15/16 inch			C3	
<b>GE..-KRR-B-2C</b>	25 mm – 40 mm				
<b>E..-KRR-B</b>	25 mm – 40 mm				
<b>GNE..-KRR-B</b>	30 mm – 100 mm				
<b>GE..-KTT-B</b>	20 mm – 80 mm				
<b>GE..-KLL-B</b>	20 mm – 50 mm	C5			
<b>GYE..-KRR-B</b>	12 mm – 90 mm	yes	C3		
<b>GY..-KRR-B-AS2/V</b>	3/4 inch – 2 inch				
<b>GYE..-KRR-B-VA</b>	12 mm – 50 mm				
<b>GAY..-NPP-B</b>	12 mm – 60 mm				
<b>GAY..-NPP-B-FA164</b>	12 mm, 15 mm			C5	
<b>AY..-NPP-B</b>	12 mm – 30 mm	C3			
<b>GSH..-2RSR-B</b>	20 mm – 50 mm	yes	C4		
<b>GLE..-KRR-B</b>	20 mm – 70 mm	yes	C4		
<b>2..-NPP-B</b>	12 mm – 50 mm	yes	CN		
<b>GVK..-KTT-B-AS2/V</b>	25,4 mm – 39,6875 mm	yes	C3		
<b>VK..-KTT-B</b>	25,4 mm				
<b>SK..-KRR-B</b>	17 mm – 31,8 mm	yes	C3		
<b>RABRA</b>	30 mm	yes	C3		
<b>RABRB</b>	12 mm – 50 mm				
<b>PE</b>	20 mm – 40 mm				
<b>BE</b>	20 mm – 40 mm	yes	CN		
<b>RAE..-NPP</b>	12 mm – 60 mm	no	C3		
<b>RA..-NPP</b>	5/8 inch – 1 1/2 inch				
<b>RALE..-NPP</b>	20 mm – 30 mm				
<b>RAL..-NPP</b>	3/4 inch				
<b>RAE..-NPP-NR</b>	20 mm – 40 mm				
<b>E..-KRR</b>	20 mm – 70 mm				
<b>E..-KLL</b>	20 mm – 50 mm				
<b>RCRA</b>	20 mm				
<b>RCRB</b>	25 mm				
<b>CRB</b>	20 mm – 35 mm				
<b>RCSMA</b>	30 mm				
<b>RCSMB</b>	15 mm – 25 mm				
<b>2..-KRR(-AH)</b>	13 mm – 60 mm			no	CN

Location	Sealing	Cage material	Greasing <sup>1)</sup>	Relubrication facility	Temperature <sup>2)</sup> °C	Comments	Dimension table			
Eccentric locking collar	P	PA66	GA13	yes	-20 to +120		1184			
			GA47				Anti-corrosion protection	1184		
			GA13					1200		
			no				1184			
							1200			
				Light series		1184				
	R	Steel	GA11	yes	+150 to +250	PTFE seal lip	1184			
						PAES	L069	-40 to +180	PTFE seal lip	1184
						PA66	GA13	-20 to +120		1200
		no			Flinger shields	1184				
			yes		Heavy series	1186				
						1184				
		T								
		L	Steel	L069		-40 to +180		1184		
Grub screws	R	PA66	GA13	yes	-20 to +120		1192			
								1200		
	RSR	Corrosion-resistant steel	FM222			-35 to +100	Anti-corrosion protection, flinger shields	1192		
	P	PA66	GA13		-20 to +120		1192			
		Steel	GA11		+150 to +250	PTFE seal lip	1192			
	PA66	GA13	no	-20 to +120		1192				
Adapter sleeve	RSR	PA66	GA13	yes	-20 to +120		1196			
Drive slot	R	PAES	L069	yes	-40 to +180	PTFE seal lip	1197			
Fit	P	PA66	GA13	no	-20 to +120		1210			
Square bore	T	PA66	GA13	yes	-20 to +120	Anti-corrosion protection, maximum grease filling	1208			
				no			1208			
Hexagonal bore	R	PA66	GA13	no	-20 to +120	Anti-corrosion protection, maximum grease filling	1208			
Eccentric locking collar	P	PA66	GA13	no	-20 to +85	Light series	1204			
							1204			
						-20 to +120	Annular slots in aligning ring	1206		
Fit	P	PA66	GA13	no	-20 to +120	Annular slots in aligning ring	1206			
Eccentric locking collar	P	PA66	GA13	no	-20 to +120		1198			
							1200			
							1198			
							1200			
						Two slots, one snap ring	1198			
							1198			
	R									
	L									
	P	PA66	GA13	no	-20 to +85	Light series, lead chamfer	1204			
						Lead chamfer	1204			
Abutment shoulder						1204				
Light series						1204				
					1204					
Fit	R	PA66	GA13	no	-20 to +120		1207			



<sup>1)</sup> Precise information on greasing is given in the section Lubrication from page 76.

<sup>2)</sup> Attention! Recommended operating temperature. If temperatures exceed +100 °C, relubrication must be carried out regularly.

# Radial insert ball bearings

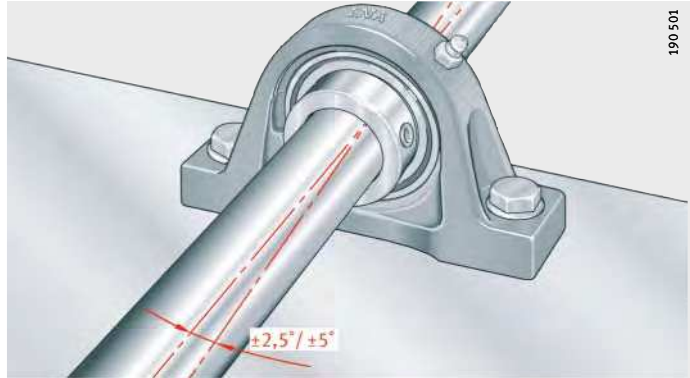
## Design and safety guidelines Compensation of static misalignments

Bearings with a spherical outer ring, fitted in housings with a concave bore, can compensate for static misalignment of the shaft, *Figure 11*:

- if relubrication is carried out, up to  $\pm 2,5^\circ$
- if relubrication is not carried out, up to  $\pm 5^\circ$ .



The units must not be used to support swivelling or tumbling motion.



*Figure 11*  
Compensation of static shaft misalignment

## Axial load carrying capacity of radial insert ball bearings

The axial load carrying capacity  $F_a$  of radial insert ball bearings depends essentially on how they are located on the shaft. The load carrying capacity of the location method is shown in *Figure 12*.

The precondition for this is that:

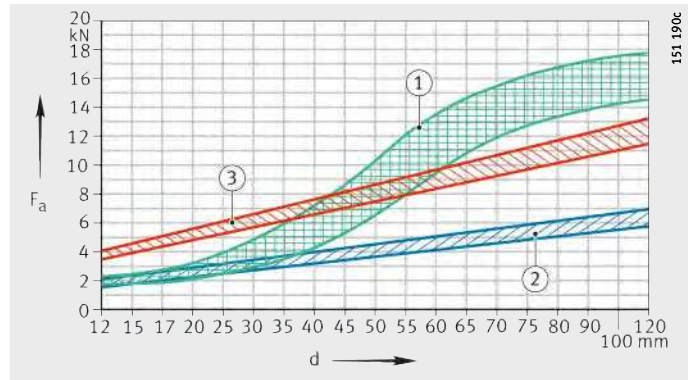
- the shaft design complies with the data in *Figure 12*
- the bearings are located using the specified tightening torque  $M_A$ .



For very high axial loads, the forces should be directed through a shoulder on the shaft. If the bearing is subjected to its maximum permissible axial load, please contact us.

- ① Locking collar and adapter sleeve
  - ② Grub screw and hard, ground shafts
  - ③ Grub screw and soft shaft
- $d$  = bearing bore diameter  
 $F_a$  = axial load carrying capacity of location method

*Figure 12*  
 Axial load carrying capacity of location method



# Radial insert ball bearings

## Speed limits for radial insert ball bearings, guide values

The speed limits are dependent on the load, the clearance between the bearing bore and shaft and the friction of the seals in bearings with contact seals.

Figure 13 gives guide values for the permissible speeds. For load ratios  $C_r/P > 13$ , the speeds can be increased. For  $C_r/P < 5$ , location by means of a fit is recommended, see section Conditions of rotation, page 148. For both types of applications, please contact us.

### Example of permissible speed calculation

Given:

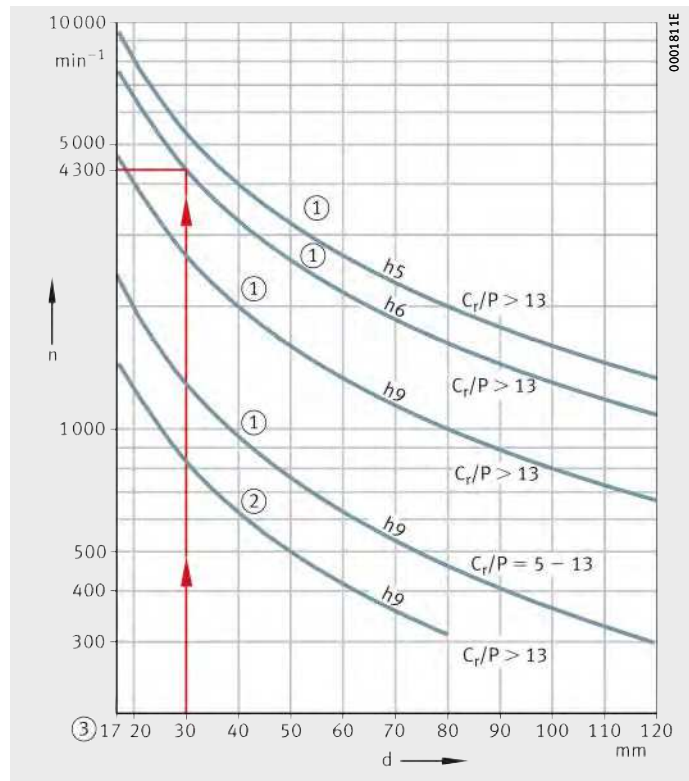
- Shaft tolerance h6
- Radial insert ball bearing GRAE30-NPP-B
- Basic dynamic load rating  $C_r$  19 500 N
- Load P 1 300 N
- Sealing P seals.

Required:

- Load ratio  $C_r/P = 19\,500\text{ N}/1\,300\text{ N}$   $C_r/P > 13$
- Permissible speed  $n \approx 4\,300\text{ min}^{-1}$ , Figure 13.

- ① For radial insert ball bearings with L, P, R seals
- ② For radial insert ball bearings with T seals
- ③ Ball set identical for  $d = 12\text{ mm}$ ,  $15\text{ mm}$  and  $17\text{ mm}$   
 $d =$  bearing bore diameter  
 $n =$  permissible speed

Figure 13 Permissible speeds for radial insert ball bearings



## Shaft tolerances for radial insert ball bearings, recommendations

The permissible shaft tolerance is dependent on the speed and load. Tolerances up to h9 are possible.

Conventional drawn shafts will suffice for most applications.

## Accuracy Standard tolerances of radial insert ball bearings

The outside diameter of the bearings corresponds to tolerance class PN to DIN 620-2. The inner ring bore has a plus tolerance to facilitate mounting of the bearing.

Normal tolerances of bearings, see table.

### Tolerances of radial insert ball bearings

Inner ring				Outer ring			
Nominal dimension d mm		Bore <sup>1)</sup> μm		Nominal dimension D mm		Outside diameter <sup>2)</sup> μm	
over	incl.	min.	max.	over	incl.	max.	min.
12	18	0	+18	30	50	0	-11
18	24	0	+18	50	80	0	-13
24	30	0	+18	80	120	0	-15
30	40	0	+18	120	150	0	-18
40	50	0	+18	150	180	0	-25
50	60	0	+18	180	250	0	-30
60	90	0	+25	-	-	-	-
90	120	0	+30	-	-	-	-

<sup>1)</sup> This corresponds to the arithmetic mean value derived from the largest and smallest diameters (measured using a two-point measuring device).

<sup>2)</sup> In the case of sealed bearings, the largest and smallest values of the outside diameter can deviate from the mean value by approximately 0,03 mm.

## Radial internal clearance of radial insert ball bearings

The radial internal clearance is given in the table.

For most series, the radial clearance is C3 and is thus larger than for normal deep groove ball bearings.

The larger internal clearance allows better support of angular misalignment and shaft deflection. Overview of all series and the corresponding internal clearance: see page 1178.

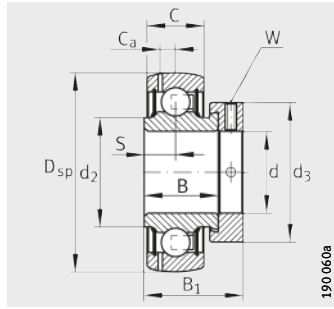


### Radial internal clearance

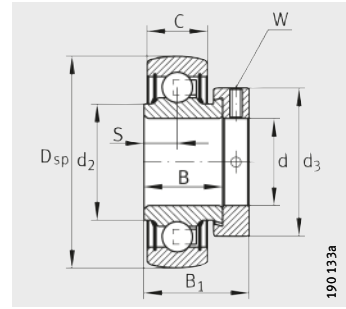
Bore		Radial internal clearance							
d mm		CN μm		C3 μm		C4 μm		C5 μm	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.
2,5	10	2	13	8	23	14	29	20	37
10	18	3	18	11	25	18	33	25	45
18	24	5	20	13	28	20	36	28	48
24	30	5	20	13	28	23	41	30	53
30	40	6	20	15	33	28	46	40	64
40	50	6	23	18	36	30	51	45	73
50	65	8	28	23	43	38	61	55	90
65	80	10	30	25	51	46	71	65	105
80	100	12	36	30	58	53	84	75	120
100	120	15	41	36	66	61	97	90	140
120	140	18	48	41	81	71	114	105	160
140	160	18	53	46	91	81	130	120	180

# Radial insert ball bearings with eccentric locking collar

Spherical outer ring



GRAE..-NPP-B



RAE..-NPP-B, RALE..-NPP-B

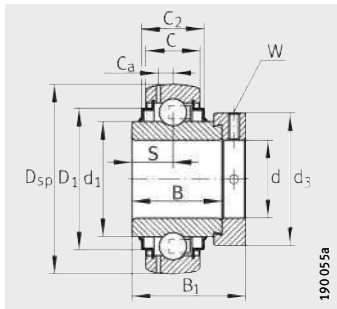
**Dimension table** - Dimensions in mm

Designation <sup>1)</sup>	Mass m ≈kg	Dimensions					
		d	D <sub>sp</sub>	C	C <sub>2</sub>	B	S
GRAE12-NPP-B	0,13	12	40	12	–	19	6,5
RAE12-NPP-B	0,13	12	40	12	–	19	6,5
GRAE15-NPP-B	0,11	15	40	12	–	19	6,5
RAE15-NPP-B	0,12	15	40	12	–	19	6,5
GRAE17-NPP-B	0,1	17	40	12	–	19	6,5
RAE17-NPP-B	0,1	17	40	12	–	19	6,5
GE17-KRR-B	0,2	17	40	12	16,6	27,8	13,9
GRAE20-NPP-B	0,16	20	47	14	–	21,4	7,5
GRAE20-NPP-B-FA125.5	0,16	20	47	14	–	21,4	7,5
RAE20-NPP-B	0,16	20	47	14	–	21,4	7,5
RALE20-NPP-B	0,1	20	42	12	–	16,7	6
GE20-KRR-B	0,19	20	47	14	16,6	34,1	17,1
GE20-KRR-B-FA125.5	0,2	20	47	14	16,6	34,1	17,1
GE20-KRR-B-FA164	0,2	20	47	14	16,6	34,1	17,1
GE20-KTT-B	0,19	20	47	14	16,6	34,1	17,1
GE20-KLL-B	0,2	20	47	14	16,6	34,1	17,1
GRAE25-NPP-B	0,19	25	52	15	–	21,4	7,5
GRAE25-NPP-B-FA125.5	0,19	25	52	15	–	21,4	7,5
RAE25-NPP-B	0,19	25	52	15	–	21,4	7,5
RALE25-NPP-B	0,12	25	47	12	–	17,5	6
E25-KRR-B	0,24	25	52	15	16,7	34,9	17,5
GE25-KRR-B	0,25	25	52	15	16,7	34,9	17,5
GE25-KRR-B-FA125.5	0,25	25	52	15	16,7	34,9	17,5
GE25-KRR-B-FA164	0,25	25	52	15	16,7	34,9	17,5
GE25-KRR-B-FA101	0,24	25	52	15	16,7	34,9	17,5
GE25-KTT-B	0,24	25	52	15	20,2	34,9	17,5
GE25-KRR-B-2C	0,26	25	52	15	24,6	34,9	17,5
GE25-KLL-B	0,25	25	52	15	20,2	34,9	17,5

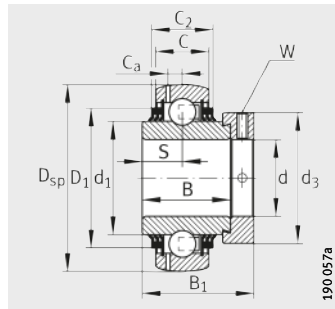
<sup>1)</sup> Permissible speeds of radial insert ball bearings: see page 1182.

<sup>2)</sup> Reference bearings for determining the equivalent bearing load: see page 204.

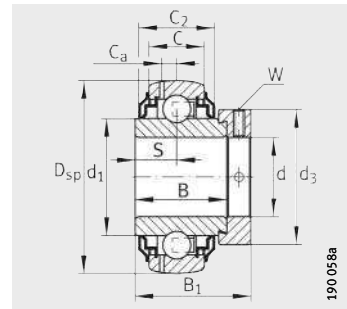




GE..-KRR-B, E..-KRR-B, GE..-KLL-B



GE..-KTT-B



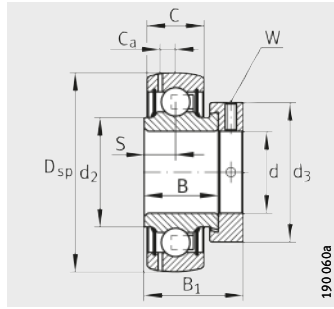
GE..-KRR-B-2C

d <sub>1</sub>	d <sub>2</sub>	D <sub>1</sub>	C <sub>a</sub>	B <sub>1</sub>	d <sub>3</sub> max.	W	Basic load ratings		Reference bearing <sup>2)</sup>
							dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
-	23	-	3,4	28,6	28	3	9 800	4 750	6203
-	23	-	-	28,6	28	3	9 800	4 750	6203
-	23	-	3,4	28,6	28	3	9 800	4 750	6203
-	23	-	-	28,6	28	3	9 800	4 750	6203
-	23	-	3,4	28,6	28	3	9 800	4 750	6203
-	23	-	-	28,6	28	3	9 800	4 750	6203
23,9	-	31,6	3,4	37,4	28	3	9 800	4 750	6203
-	26,9	-	4	31	33	3	12 800	6 600	6204
-	26,9	-	4	31	33	3	12 800	6 600	6204
-	26,9	-	-	31	33	3	12 800	6 600	6204
-	25,4	-	-	24,5	30	2,5	9 400	5 000	6004
27,6	-	37,4	4	43,7	33	3	12 800	6 600	6204
27,6	-	37,4	4	43,7	33	3	12 800	6 600	6204
27,6	-	37,4	4	43,7	33	3	12 800	6 600	6204
27,6	-	37,4	4	43,7	33	3	12 800	6 600	6204
27,6	-	37,4	4	43,7	33	3	12 800	6 600	6204
-	30,5	-	3,9	31	37,5	3	14 000	7 800	6205
-	30,5	-	3,9	31	37,5	3	14 000	7 800	6205
-	30,5	-	-	31	37,5	3	14 000	7 800	6205
-	30	-	-	25,5	36	2,5	10 100	5 900	6005
33,8	-	42,5	-	44,5	37,5	3	14 000	7 800	6205
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800	6205
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800	6205
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800	6205
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800	6205
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800	6205
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800	6205
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800	6205
33,8	-	42,5	3,9	44,5	37,5	3	14 000	7 800	6205

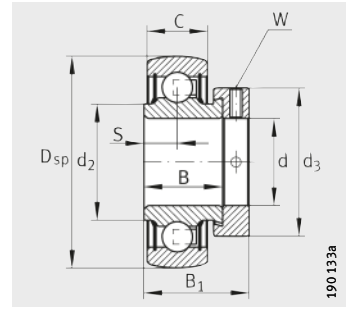


# Radial insert ball bearings with eccentric locking collar

Spherical outer ring



GRAE...-NPP-B



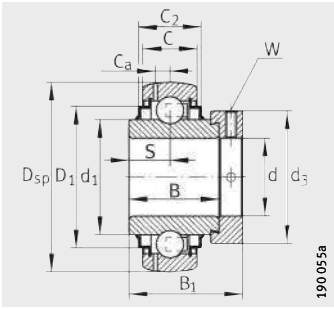
RAE...-NPP-B, RALE...-NPP-B

## Dimension table (continued) · Dimensions in mm

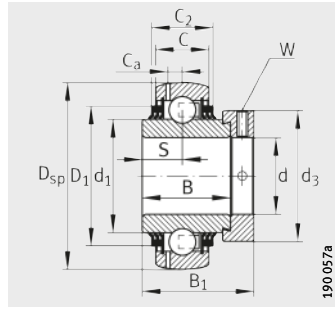
Designation <sup>1)</sup>	Mass m ≈kg	Dimensions					
		d	D <sub>sp</sub>	C	C <sub>2</sub>	B	S
GRAE30-NPP-B	0,32	30	62	18	–	23,8	9
GRAE30-NPP-B-FA125.5	0,32	30	62	18	–	23,8	9
RAE30-NPP-B	0,32	30	62	18	–	23,8	9
RALE30-NPP-B	0,18	30	55	13	–	18,5	6,5
E30-KRR-B	0,39	30	62	18	20,7	36,5	18,3
GE30-KRR-B	0,39	30	62	18	20,7	36,5	18,3
GE30-KRR-B-FA125.5	0,38	30	62	18	20,7	36,5	18,3
GE30-KRR-B-FA164	0,39	30	62	18	20,7	36,5	18,3
GE30-KRR-B-FA101	0,38	30	62	18	20,7	36,5	18,3
GNE30-KRR-B	0,63	30	72	20	24	36,6	17,5
GE30-KTT-B	0,38	30	62	18	20,7	36,5	18,3
GE30-KRR-B-2C	0,41	30	62	18	27,2	36,5	18,3
GE30-KLL-B	0,39	30	62	18	20,6	36,5	18,3
GRAE35-NPP-B	0,47	35	72	19	–	25,4	9,5
GRAE35-NPP-B-FA125.5	0,48	35	72	19	–	25,4	9,5
RAE35-NPP-B	0,47	35	72	19	–	25,4	9,5
E35-KRR-B	0,55	35	72	19	22,5	37,7	18,8
GE35-KRR-B	0,55	35	72	19	22,5	37,7	18,8
GE35-KRR-B-FA125.5	0,55	35	72	19	22,5	37,7	18,8
GE35-KRR-B-FA164	0,55	35	72	19	22,5	37,7	18,8
GNE35-KRR-B	0,74	35	80	22	25	38,1	18,3
GE35-KTT-B	0,56	35	72	19	22,5	37,7	18,8
GE35-KRR-B-2C	0,58	35	72	19	29,2	37,7	18,8
GE35-KLL-B	0,56	35	72	19	25,4	37,7	18,8

<sup>1)</sup> Permissible speeds of radial insert ball bearings: see page 1182.

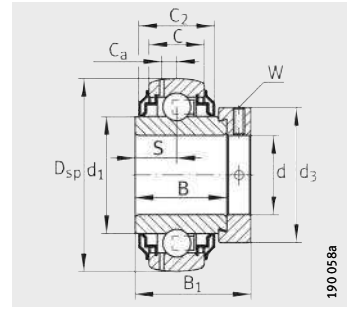
<sup>2)</sup> Reference bearings for determining the equivalent bearing load: see page 204.



GE..-KRR-B, GNE...-KRR-B,  
E..-KRR-B, GE...-KLL-B



GE..-KTT-B



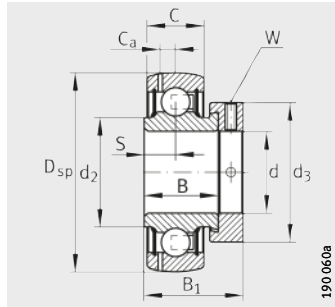
GE..-KRR-B-2C

d <sub>1</sub>	d <sub>2</sub>	D <sub>1</sub>	C <sub>a</sub>	B <sub>1</sub>	d <sub>3</sub> max.	W	Basic load ratings		Reference bearing <sup>2)</sup>
							dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
-	37,4	-	4,7	35,8	44	4	19 500	11 300	6206
-	37,4	-	4,7	35,8	44	4	19 500	11 300	6206
-	37,4	-	-	35,8	44	4	19 500	11 300	6206
-	35,7	-	-	26,5	42,5	2,5	13 200	8 300	6206
40,2	-	52	-	48,5	44	4	19 500	11 300	6206
40,2	-	52	4,7	48,5	44	4	19 500	11 300	6206
40,2	-	52	4,7	48,5	44	4	19 500	11 300	6206
40,2	-	52	4,7	48,5	44	4	19 500	11 300	6206
40,2	-	52	4,7	48,5	44	4	19 500	11 300	6206
44	-	60,2	6,2	50,2	51	5	29 500	16 700	6306
40,2	-	52	4,7	48,5	44	4	19 500	11 300	6206
40,2	-	-	4,7	48,5	44	4	19 500	11 300	6206
40,2	-	52	4,7	48,5	44	4	19 500	11 300	6206
-	44,6	-	5,6	39	51	5	25 500	15 300	6207
-	44,6	-	5,6	39	51	5	25 500	15 300	6207
-	44,6	-	-	39	51	5	25 500	15 300	6207
46,8	-	60,3	-	51,3	51	5	25 500	15 300	6207
46,8	-	60,3	5,6	51,3	51	5	25 500	15 300	6207
46,8	-	60,3	5,6	51,3	51	5	25 500	15 300	6207
46,8	-	60,3	5,6	51,3	51	5	25 500	15 300	6207
48	-	66,6	6,9	51,6	55	5	36 500	20 900	6307
46,8	-	60,3	5,6	51,3	51	5	25 500	15 300	6207
46,8	-	-	5,6	51,3	51	5	25 500	15 300	6207
46,8	-	60,3	5,6	51,3	51	5	25 500	15 300	6207

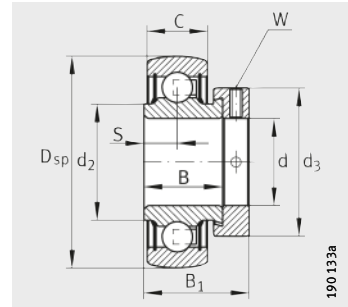


# Radial insert ball bearings with eccentric locking collar

Spherical outer ring



GRAE...-NPP-B



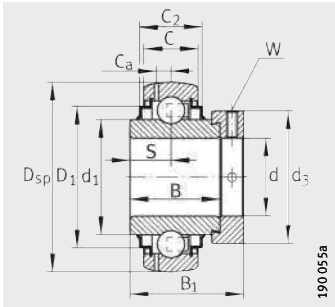
RAE...-NPP-B

Dimension table (continued) · Dimensions in mm

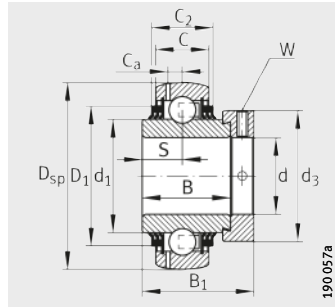
Designation <sup>1)</sup>	Mass m ≈kg	Dimensions					
		d	D <sub>sp</sub>	C	C <sub>2</sub>	B	S
GRAE40-NPP-B	0,62	40	80	21	–	30,2	11
GRAE40-NPP-B-FA125.5	0,62	40	80	21	–	30,2	11
RAE40-NPP-B	0,63	40	80	21	–	30,2	11
E40-KRR-B	0,73	40	80	21	23,5	42,9	21,4
GE40-KRR-B	0,73	40	80	21	23,5	42,9	21,4
GE40-KRR-B-FA125.5	0,74	40	80	21	23,5	42,9	21,4
GE40-KRR-B-FA164	0,75	40	80	21	23,5	42,9	21,4
GE40-KRR-B-FA101	0,74	40	80	21	23,5	42,9	21,4
GNE40-KRR-B	1,02	40	90	23	26	41	18
GE40-KTT-B	0,75	40	80	21	28,1	42,9	21,4
GE40-KRR-B-2C	0,78	40	80	21	31,9	42,9	21,4
GE40-KLL-B	0,75	40	80	21	28,1	42,9	21,4
GRAE45-NPP-B	0,7	45	85	22	–	30,2	11
GRAE45-NPP-B-FA125.5	0,69	45	85	22	–	30,2	11
GE45-KRR-B	0,83	45	85	22	26,4	42,9	21,4
GE45-KRR-B-FA125.5	0,83	45	85	22	26,4	42,9	21,4
GE45-KTT-B	0,83	45	85	22	26,4	42,9	21,4
GE45-KLL-B	0,84	45	85	22	26,4	42,9	21,4
GRAE50-NPP-B	0,77	50	90	22	–	30,2	11
GRAE50-NPP-B-FA125.5	0,77	50	90	22	–	30,2	11
RAE50-NPP-B	0,77	50	90	22	–	30,2	11
GE50-KRR-B	0,99	50	90	22	26,4	49,2	24,6
GE50-KRR-B-FA125.5	0,99	50	90	22	26,4	49,2	24,6
GE50-KRR-B-FA164	0,99	50	90	22	26,4	49,2	24,6
GE50-KRR-B-FA101	0,99	50	90	22	26,4	49,2	24,6
GNE50-KRR-B	1,82	50	110	29	31	49,2	24,6
GE50-KTT-B	0,98	50	90	22	26,4	49,2	24,6
GE50-KLL-B	1	50	90	22	26,4	49,2	24,6
GRAE55-NPP-B	1,06	55	100	25	–	32,5	12
GE55-KRR-B	1,37	55	100	25	29	55,5	27,8
GE55-KTT-B	1,37	55	100	25	29	55,5	27,8

<sup>1)</sup> Permissible speeds of radial insert ball bearings: see page 1182.

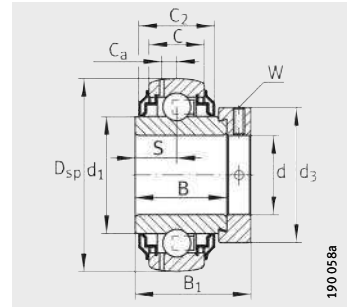
<sup>2)</sup> Reference bearings for determining the equivalent bearing load: see page 204.



GE..-KRR-B, GNE..-KRR-B,  
E..-KRR-B, GE..-KLL-B



GE..-KTT-B



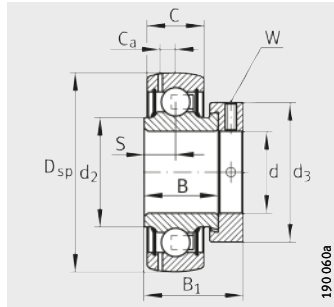
GE..-KRR-B-2C

d <sub>1</sub>	d <sub>2</sub>	D <sub>1</sub>	C <sub>a</sub>	B <sub>1</sub>	d <sub>3</sub> max.	W	Basic load ratings		Reference bearing <sup>2)</sup>
							dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
-	49,4	-	6,4	43,8	58	5	32 500	19 800	6208
-	49,4	-	6,4	43,8	58	5	32 500	19 800	6208
-	49,4	-	-	43,8	58	5	32 500	19 800	6208
52,3	-	68,3	-	56,5	58	5	32 500	19 800	6208
52,3	-	68,3	6,4	56,5	58	5	32 500	19 800	6208
52,3	-	68,3	6,4	56,5	58	5	32 500	19 800	6208
52,3	-	68,3	6,4	56,5	58	5	32 500	19 800	6208
52,3	-	68,3	6,4	56,5	58	5	32 500	19 800	6208
52,3	-	68,3	6,4	56,5	58	5	32 500	19 800	6208
53,8	-	74,5	7,5	54,6	63	5	44 500	26 000	6308
52,3	-	68,3	6,4	56,5	58	5	32 500	19 800	6208
52,3	-	-	6,4	56,5	58	5	32 500	19 800	6208
52,3	-	68,3	6,4	56,5	58	5	32 500	19 800	6208
-	54,3	-	6,4	43,8	63	5	32 500	20 400	6209
-	54,3	-	6,4	43,8	63	5	32 500	20 400	6209
57,9	-	72,3	6,4	56,5	63	5	32 500	20 400	6209
57,9	-	72,3	6,4	56,5	63	5	32 500	20 400	6209
57,9	-	72,3	6,4	56,5	63	5	32 500	20 400	6209
57,9	-	72,3	6,4	56,5	63	5	32 500	20 400	6209
-	59,4	-	6,9	43,8	69	5	35 000	23 200	6210
-	59,4	-	6,9	43,8	69	5	35 000	23 200	6210
-	59,4	-	-	43,8	69	5	35 000	23 200	6210
62,8	-	77,3	6,9	62,8	69	5	35 000	23 200	6210
62,8	-	77,3	6,9	62,8	69	5	35 000	23 200	6210
62,8	-	77,3	6,9	62,8	69	5	35 000	23 200	6210
62,8	-	77,3	6,9	62,8	69	5	35 000	23 200	6210
68,8	-	92,7	8,7	66,75	75,8	5	62 000	38 000	6310
62,8	-	77,3	6,9	62,8	69	5	35 000	23 200	6210
62,8	-	77,3	6,9	62,8	69	5	35 000	23 200	6210
-	66	-	7	48,4	76	5	43 500	29 000	6211
69,8	-	85,9	7	71,4	76	5	43 500	29 000	6211
69,8	-	85,9	7	71,4	76	5	43 500	29 000	6211

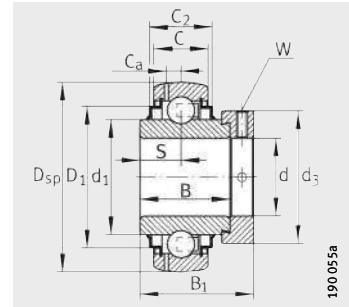


# Radial insert ball bearings with eccentric locking collar

Spherical outer ring



GRAE..-NPP-B



GE..-KRR-B, GNE..-KRR-B

Dimension table (continued) · Dimensions in mm

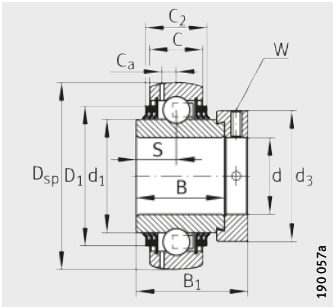
Designation <sup>1)</sup>	Mass m ≈kg	Dimensions					
		d	D <sub>sp</sub>	C	C <sub>2</sub>	B	S
GRAE60-NPP-B	1,4	60	110	24	–	37,1	13,5
GRAE60-NPP-B-FA125.5	1,4	60	110	24	–	37,1	13,5
GE60-KRR-B	1,8	60	110	24	29	61,9	31
GE60-KRR-B-FA164	1,8	60	110	24	29	61,9	31
GE60-KRR-B-FA101	1,8	60	110	24	29	61,9	31
GNE60-KRR-B	2,97	60	130	33	37,2	52	23
GE60-KTT-B	1,8	60	110	24	29	61,9	31
GE65-214-KRR-B <sup>3)</sup>	2,71	65	125	28	32	48,5	21,5
GE65-214-KRR-B-FA164 <sup>3)</sup>	2,71	65	125	28	32	48,5	21,5
GE65-214-KTT-B <sup>3)</sup>	2,71	65	125	28	32	48,5	21,5
GE70-KRR-B	2,15	70	125	28	32	48,5	21,5
GE70-KRR-B-FA164	2,15	70	125	28	32	48,5	21,5
GE70-KRR-B-FA101	2,15	70	125	28	32	48,5	21,5
GNE70-KRR-B	3,81	70	150	37	41	58	26
GE70-KTT-B	2,15	70	125	28	32	48,5	21,5
GE75-KRR-B	2,14	75	130	28	30,5	49,5	21,5
GE75-KRR-B-FA101	2,14	75	130	28	30,5	49,5	21,5
GE75-KTT-B	2,14	75	130	28	30,5	49,5	21,5
GE80-KRR-B	2,79	80	140	30	38	53,2	23,4
GE80-KRR-B-AH01-FA164	2,95	80	140	30	38	53,2	23,4
GNE80-KRR-B <sup>4)</sup>	7,1	80	170	41	51	73	34
GE80-KTT-B	2,79	80	140	30	38	53,2	23,4
GE90-KRR-B <sup>4)</sup>	3,56	90	160	32	35	52	23
GE90-KRR-B-FA164 <sup>4)</sup>	3,68	90	160	32	35	52	23
GNE90-KRR-B <sup>4)</sup>	8,07	90	190	45	52,6	77,5	35,5
GE100-KRR-B <sup>4)</sup>	5	100	180	36	39	57,5	25,5
GNE100-KRR-B <sup>4)</sup>	11,41	100	215	49	59,4	86	39,5
GE120-KRR-B <sup>4)</sup>	7,49	120	215	40	45	63,5	28,5

1) Permissible speeds of radial insert ball bearings: see page 1182.

2) Reference bearings for determining the equivalent bearing load: see page 204.

3) Different ball set 6214.

4) Lubrication groove in outer ring.



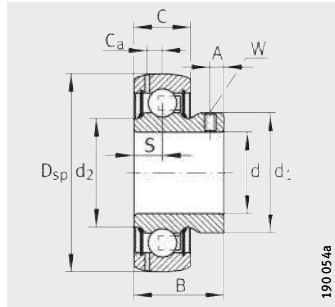
GE..-KTT-B

d <sub>1</sub>	d <sub>2</sub>	D <sub>1</sub>	C <sub>a</sub>	B <sub>1</sub>	d <sub>3</sub> max.	W	Basic load ratings		Reference bearing <sup>2)</sup>
							dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
-	72	-	7,2	53,1	84	5	52 000	36 000	6212
-	72	-	7,2	53,1	84	5	52 000	36 000	6212
76,5	-	94,5	7,2	77,9	84	5	52 000	36 000	6212
76,5	-	94,5	7,2	77,9	84	5	52 000	36 000	6212
76,5	-	94,5	7,2	77,9	84	5	52 000	36 000	6212
79,4	-	109	11,2	68	89	5	82 000	52 000	6312
76,5	-	94,5	7,2	77,9	84	5	52 000	36 000	6212
85,2	-	109	8,9	66	96	6	62 000	44 000	6214
85,2	-	109	8,9	66	96	6	62 000	44 000	6214
85,2	-	109	8,9	66	96	6	62 000	44 000	6214
85,2	-	109	8,9	66	96	6	62 000	44 000	6214
85,2	-	109	8,9	66	96	6	62 000	44 000	6214
85,2	-	109	8,9	66	96	6	62 000	44 000	6214
92,2	-	127	12	75,5	102	6	104 000	68 000	6314
85,2	-	109	8,9	66	96	6	62 000	44 000	6214
90	-	113	8,5	67	100	6	62 000	44 500	6214
90	-	113	8,5	67	100	6	62 000	44 500	6214
90	-	113	8,5	67	100	6	62 000	44 500	6214
97	-	120	8,8	70,7	108	6	72 000	54 000	6216
97	-	120	8,8	70,7	108	6	72 000	54 000	6216
109	-	142,8	13,2	93,6	108	6	123 000	87 000	6316
97	-	120	8,8	70,7	108	6	72 000	54 000	6216
109,4	-	138	10	69,5	118	6	96 000	72 000	6218
109,4	-	138	10	69,5	118	6	96 000	72 000	6218
122,2	-	161,3	14,3	101	132	6	143 000	107 000	6318
122,2	-	155,5	11,2	75	132	6	122 000	93 000	6220
137,1	-	182,8	16,7	109,4	145	6	174 000	140 000	6320
146,4	-	186,5	12,8	81	152	6	155 000	131 000	6224

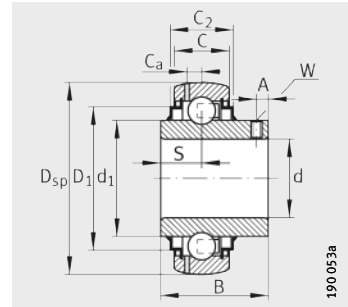


# Radial insert ball bearings with grub screws in inner ring

Spherical outer ring



GAY...-NPP-B, AY...-NPP-B



GYE...-KRR-B

**Dimension table** - Dimensions in mm

Designation <sup>1)</sup>	Mass m ≈kg	Dimensions					
		d	D <sub>sp</sub>	C	C <sub>2</sub>	B	S
GAY12-NPP-B	0,1	12	40	12	–	22	6
GAY12-NPP-B-FA164	0,1	12	40	12	–	22	6
AY12-NPP-B	0,1	12	40	12	–	22	6
GYE12-KRR-B	0,11	12	40	12	16,6	27,4	11,5
GYE12-KRR-B-VA	0,11	12	40	12	12,6	25	9,6
GAY15-NPP-B	0,09	15	40	12	–	22	6
GAY15-NPP-B-FA164	0,09	15	40	12	–	22	6
AY15-NPP-B	0,09	15	40	12	–	22	6
GYE15-KRR-B	0,1	15	40	12	16,6	27,4	11,5
GYE15-KRR-B-VA	0,1	15	40	12	12,6	25	9,6
GYE16-KRR-B	0,09	16	40	12	16,6	27,4	11,5
GAY17-NPP-B	0,08	17	40	12	–	22	6
AY17-NPP-B	0,08	17	40	12	–	22	6
GYE17-KRR-B	0,09	17	40	12	16,6	27,4	11,5
GYE17-KRR-B-VA	0,08	17	40	12	12,6	25	9,6
GAY20-NPP-B	0,13	20	47	14	–	25	7
AY20-NPP-B	0,13	20	47	14	–	25	7
GYE20-KRR-B	0,14	20	47	14	16,6	31	12,7
GYE20-KRR-B-VA <sup>3)4)</sup>	0,15	20	47	16	16,6	31	12,7
GAY25-NPP-B	0,16	25	52	15	–	27	7,5
AY25-NPP-B	0,16	25	52	15	–	27	7,5
GYE25-KRR-B	0,19	25	52	15	16,7	34,1	14,3
GYE25-KRR-B-VA <sup>3)4)</sup>	0,21	25	52	17	17,6	34,1	14,3
GAY30-NPP-B	0,26	30	62	18	–	30	9
AY30-NPP-B	0,25	30	62	18	–	30	9
GYE30-KRR-B	0,31	30	62	18	20,7	38,1	15,9
GYE30-KRR-B-VA <sup>3)4)</sup>	0,3	30	62	19	19,6	38,1	15,9
GAY35-NPP-B	0,41	35	72	19	–	35	9,5
GYE35-KRR-B	0,46	35	72	19	22,5	42,9	17,5
GYE35-KRR-B-VA <sup>3)4)</sup>	0,5	35	72	20	20,6	42,9	17,5

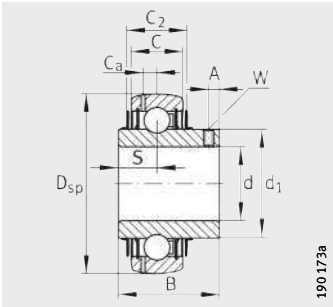
<sup>1)</sup> Permissible speeds of radial insert ball bearings: see page 1182.

<sup>2)</sup> Reference bearings for determining the equivalent bearing load: see page 204.

<sup>3)</sup> Lubrication groove in outer ring.

<sup>4)</sup> Optionally available in FA107.





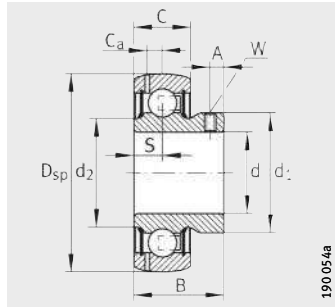
GYE...KRR-B-VA

d <sub>1</sub>	d <sub>2</sub>	D <sub>1</sub>	C <sub>a</sub>	A	W	Basic load ratings		Reference bearing <sup>2)</sup>
						dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
23,9	22,9	–	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	–	4	2,5	9 800	4 750	6203
23,9	–	31,6	3,4	4	2,5	9 800	4 750	6203
23,9	–	–	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	–	4	2,5	9 800	4 750	6203
23,9	–	31,6	3,4	4	2,5	9 800	4 750	6203
23,9	–	–	3,4	4	2,5	9 800	4 750	6203
23,9	–	31,6	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	3,4	4	2,5	9 800	4 750	6203
23,9	22,9	–	–	4	2,5	9 800	4 750	6203
23,9	–	31,6	3,4	4	2,5	9 800	4 750	6203
23,9	–	–	3,4	4	2,5	9 800	4 750	6203
28,3	26,7	–	4	4,5	2,5	12 800	6 600	6204
28,3	26,7	–	–	4,5	2,5	12 800	6 600	6204
27,6	–	37,4	4	4,5	2,5	12 800	6 600	6204
29,05	–	–	4	5	2,5	12 800	6 600	6204
33,5	30,4	–	3,9	5	2,5	14 000	7 800	6205
33,5	30,4	–	–	5	2,5	14 000	7 800	6205
33,8	–	42,5	3,9	5	2,5	14 000	7 800	6205
34,03	–	–	4,15	5	2,5	14 000	7 800	6205
39,4	37,3	–	4,7	5,8	3	19 500	11 300	6206
39,4	37,3	–	–	5,8	3	19 500	11 300	6206
40,2	–	52	4,7	5,8	3	19 500	11 300	6206
40,31	–	–	5	6	3	19 500	11 300	6206
46,9	44,5	–	5,6	6	3	25 500	15 300	6207
46,8	–	60,3	5,6	6	3	25 500	15 300	6207
47,4	–	–	5,7	6,5	3	25 500	15 300	6207

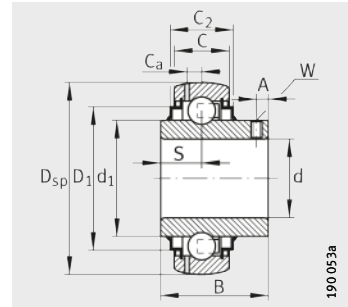


# Radial insert ball bearings with grub screws in inner ring

Spherical outer ring



GAY..-NPP-B



GYE..-KRR-B

**Dimension table** (continued) · Dimensions in mm

Designation <sup>1)</sup>	Mass m ≈kg	Dimensions					
		d	D <sub>sp</sub>	C	C <sub>2</sub>	B	S
GAY40-NPP-B	0,53	<b>40</b>	80	21	–	39,5	10,5
GYE40-KRR-B	0,62	<b>40</b>	80	21	23,5	49,2	19
GYE40-KRR-B-VA <sup>5)6)</sup>	0,6	<b>40</b>	80	21	21,6	49,2	19
GAY45-NPP-B	0,6	<b>45</b>	85	22	–	41,5	11
GYE45-KRR-B	0,71	<b>45</b>	85	22	26,4	49,2	19
GYE45-210-KRR-B <sup>3)</sup>	0,8	<b>45</b>	90	22	26,4	51,6	19
GYE45-KRR-B-VA <sup>5)6)</sup>	0,66	<b>45</b>	85	22	22,6	49,2	19
GAY50-NPP-B	0,67	<b>50</b>	90	22	–	43	11
GYE50-KRR-B	0,79	<b>50</b>	90	22	26,4	51,6	19
GYE50-KRR-B-VA <sup>5)6)</sup>	0,78	<b>50</b>	90	23	23,6	51,6	19
GYE55-KRR-B	1,08	<b>55</b>	100	25	29	55,6	22,2
GAY60-NPP-B	1,17	<b>60</b>	110	24	–	47	13
GYE60-KRR-B	1,46	<b>60</b>	110	24	29	65,1	25,4
GYE65-214-KRR-B <sup>4)</sup>	2,25	<b>65</b>	125	28	32	74,6	30,2
GYE70-KRR-B	1,95	<b>70</b>	125	28	32	74,6	30,2
GYE75-KRR-B	2,07	<b>75</b>	130	28	30,5	77,8	33,3
GYE80-KRR-B	2,7	<b>80</b>	140	30	38	82,6	33,3
GYE90-KRR-B <sup>5)</sup>	3,93	<b>90</b>	160	32	35	96	39,7

1) Permissible speeds of radial insert ball bearings: see page 1182.

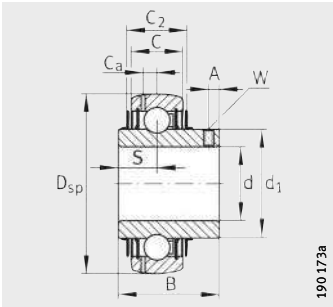
2) Reference bearings for determining the equivalent bearing load: see page 204.

3) Different ball set 6210.

4) Different ball set 6214.

5) Lubrication groove in outer ring.

6) Optionally available in FA107.



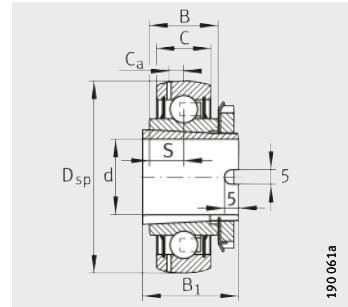
GYE...KRR-B-VA

d <sub>1</sub>	d <sub>2</sub>	D <sub>1</sub>	C <sub>a</sub>	A	W	Basic load ratings		Reference bearing <sup>2)</sup>
						dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
52,4	49,3	–	6,4	8	4	32 500	19 800	6208
52,3	–	68,3	6,4	8	4	32 500	19 800	6208
52,83	–	–	5,9	8	4	32 500	19 800	6208
57	54,3	–	6,4	8	4	32 500	20 400	6209
57	–	72,3	6,4	8	4	32 500	20 400	6209
62,9	–	77,3	6,9	8,5	4	35 000	23 200	6210
57,3	–	–	6,5	8	4	32 500	20 400	6209
62	59,3	–	6,9	9	4	35 000	23 200	6210
62,8	–	77,3	6,9	8,5	4	35 000	23 200	6210
62,92	–	–	6,5	9	5	35 000	23 200	6210
69,8	–	85,9	7	9	4	43 500	29 000	6211
76	73,6	–	7,2	10	5	52 000	36 000	6212
76,5	–	94,5	7,2	10,1	5	52 000	36 000	6212
85,2	–	109	8,9	12,1	5	62 000	44 000	6214
85,2	–	109	8,9	12	5	62 000	44 000	6214
90	–	113	8,5	12,7	5	62 000	44 500	6215
97	–	120	8,8	12	5	72 000	54 000	6216
109,4	–	138	10	12	6	96 000	72 000	6216



# Radial insert ball bearings with integral adapter sleeve

Spherical outer ring



GSH...2RSR-B

**Dimension table** - Dimensions in mm

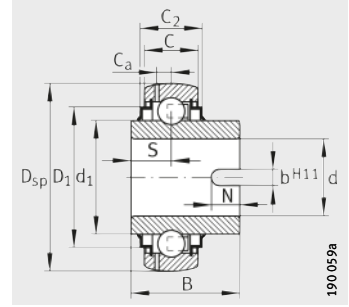
Designation	Mass m ≈kg	Dimensions							Limiting speed <sup>1)</sup> n <sub>G</sub> grease min <sup>-1</sup>	Basic load ratings		Reference bearing <sup>2)</sup>
		d	D <sub>sp</sub>	C	B	S	C <sub>a</sub>	B <sub>1</sub>		dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
<b>GSH20-2RSR-B</b>	0,14	<b>20</b>	47	14	15	7,5	4	28	10 000	12 700	6 600	6204
<b>GSH25-2RSR-B</b>	0,17	<b>25</b>	52	15	15	7,5	3,9	28	8 000	13 600	7 800	6205
<b>GSH30-2RSR-B</b>	0,27	<b>30</b>	62	18	18	9	4,7	32	6 600	18 900	11 300	6206
<b>GSH35-2RSR-B</b>	0,43	<b>35</b>	72	19	19	9,5	5,8	34	5 700	24 900	15 300	6207
<b>GSH40-2RSR-B</b>	0,54	<b>40</b>	80	21	22	11	6,4	38	5 000	29 500	19 800	6208
<b>GSH50-2RSR-B</b>	0,64	<b>50</b>	90	22	22	11	6,5	40	4 000	33 000	19 900	6210

<sup>1)</sup> Mainly for shaft fits h6 to h9.

<sup>2)</sup> Reference bearings for determining the equivalent bearing load: see page 204.

# Radial insert ball bearings with drive slot

Non-locating bearings  
Spherical outer ring



GLE..-KRR-B

**Dimension table** - Dimensions in mm

Designation <sup>1)</sup>	Mass m ≈ kg	Dimensions											Basic load ratings		Reference bearing <sup>2)</sup>
		d	D <sub>sp</sub>	C	C <sub>2</sub>	B	S	d <sub>1</sub>	D <sub>1</sub>	C <sub>a</sub>	N	b	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
<b>GLE20-KRR-B</b>	0,15	<b>20</b>	47	14	16,6	34,1	15,6	27,6	37,4	4	7	7	12 800	6 600	6204
<b>GLE25-KRR-B</b>	0,19	<b>25</b>	52	15	16,7	34,9	14,7	33,8	42,5	3,9	8	7	14 000	7 800	6205
<b>GLE30-KRR-B</b>	0,3	<b>30</b>	62	18	20,7	36,5	14,5	40,2	52	4,7	8	7	19 500	11 300	6206
<b>GLE35-KRR-B</b>	0,43	<b>35</b>	72	19	22,5	37,7	15,7	46,8	60,3	5,6	8	7	25 500	15 300	6207
<b>GLE40-KRR-B</b>	0,57	<b>40</b>	80	21	23,5	42,9	15,9	52,3	68,3	6,4	9	7	32 500	19 800	6208
<b>GLE45-KRR-B</b>	0,66	<b>45</b>	85	22	26,4	42,9	17,4	57,9	72,3	6,4	9	7	32 500	20 400	6209
<b>GLE50-KRR-B</b>	0,76	<b>50</b>	90	22	26,4	49,2	19	62,8	77,3	6,9	10	7	35 000	23 200	6210
<b>GLE60-KRR-B</b>	1,46	<b>60</b>	110	24	29	61,9	24,6	76,5	95,9	7,2	12	9	52 000	36 000	6212
<b>GLE70-KRR-B</b>	1,9	<b>70</b>	125	28	32	68,2	27	85,2	109	8,9	12	9	62 000	44 000	6214

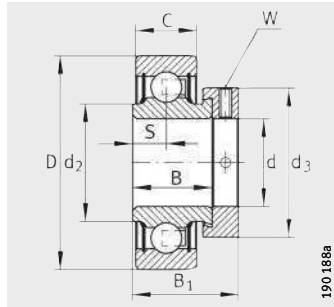
1) Permissible speeds of radial insert ball bearings: see page 1182.

2) Reference bearings for determining the equivalent bearing load: see page 204.

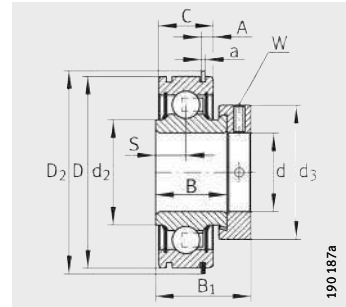


# Radial insert ball bearings with eccentric locking collar

Cylindrical outer ring



RAE...NPP, RALE...NPP



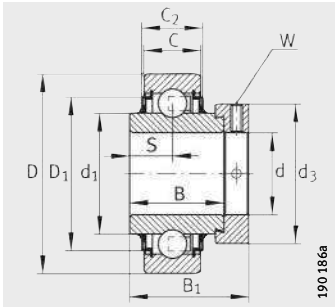
RAE...NPP-NR

Dimension table - Dimensions in mm

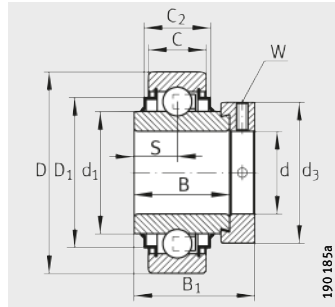
Designation <sup>1)</sup>	Mass m ≈kg	Dimensions						
		d	D	D <sub>2</sub>	C	C <sub>2</sub>	A	a
RAE12-NPP-FA106	0,13	12	40	–	12	–	–	–
RAE15-NPP-FA106	0,12	15	40	–	12	–	–	–
RAE17-NPP-FA106	0,11	17	40	–	12	–	–	–
RAE20-NPP-FA106	0,17	20	47	–	14	–	–	–
RAE20-NPP-NR	0,17	20	47	52,7	14	–	3,58 <sub>-0,25</sub>	1,12
RALE20-NPP-FA106	0,1	20	42	–	12	–	–	–
E20-KLL	0,2	20	47	–	14	16,6	–	–
E20-KRR	0,2	20	47	–	14	16,6	–	–
RAE25-NPP-FA106	0,2	25	52	–	15	–	–	–
RAE25-NPP-NR	0,2	25	52	57,9	15	–	3,58 <sub>-0,25</sub>	1,12
RALE25-NPP	0,13	25	47	–	12	–	–	–
E25-KLL	0,25	25	52	–	15	20,2	–	–
E25-KRR	0,25	25	52	–	15	16,7	–	–
RAE30-NPP-FA106	0,33	30	62	–	18	–	–	–
RAE30-NPP-NR	0,33	30	62	67,7	18	–	4,98 <sub>-0,3</sub>	1,7
RALE30-NPP-FA106	0,18	30	55	–	13	–	–	–
E30-KLL	0,39	30	62	–	18	20,6	–	–
E30-KRR	0,4	30	62	–	18	20,7	–	–
RAE35-NPP-FA106	0,49	35	72	–	19	–	–	–
RAE35-NPP-NR	0,48	35	72	78,6	19	–	4,98 <sub>-0,3</sub>	1,7
E35-KLL	0,56	35	72	–	19	25,4	–	–
E35-KRR	0,57	35	72	–	19	21,7	–	–
RAE40-NPP-FA106	0,64	40	80	–	21	–	–	–
RAE40-NPP-NR	0,64	40	80	86,6	21	–	4,98 <sub>-0,3</sub>	1,7
E40-KLL	0,76	40	80	–	21	28,1	–	–
E40-KRR	0,75	40	80	–	21	23,5	–	–
RAE45-NPP-FA106	0,72	45	85	–	22	–	–	–
E45-KLL	0,85	45	85	–	22	26,4	–	–
E45-KRR	0,85	45	85	–	22	26,4	–	–
RAE50-NPP-FA106	0,79	50	90	–	22	–	–	–
E50-KLL	1	50	90	–	22	26,4	–	–
E50-KRR	1	50	90	–	22	26,4	–	–
RAE60-NPP	1,43	60	110	–	24	–	–	–
E60-KRR	1,82	60	110	–	24	29	–	–
E70-KRR	2,45	70	125	–	28	32	–	–

<sup>1)</sup> Permissible speeds of radial insert ball bearings: see page 1182.

<sup>2)</sup> Reference bearings for determining the equivalent bearing load: see page 204.



E..-KLL



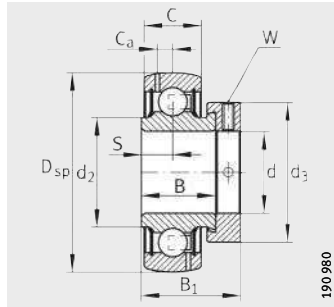
E..-KRR

B	S	d <sub>1</sub>	d <sub>2</sub>	D <sub>1</sub>	B <sub>1</sub>	d <sub>3</sub> max.	W	Basic load ratings		Reference bearing <sup>2)</sup>
								dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
19	6,5	–	23	–	28,6	28	3	9 800	4 750	6203
19	6,5	–	23	–	28,6	28	3	9 800	4 750	6203
19	6,5	–	23	–	28,6	28	3	9 800	4 750	6203
21,4	7,5	–	26,9	–	31	33	3	12 800	6 600	6204
21,4	7,5	–	26,9	–	31	33	3	12 800	6 600	6204
16,7	6	–	25,4	–	24,5	30	2,5	9 400	5 000	6004
34,1	17,1	27,6	–	37,4	43,7	33	3	12 800	6 600	6204
34,1	17,1	27,6	–	37,4	43,7	33	3	12 800	6 600	6204
21,4	7,5	–	30,5	–	31	37,5	3	14 000	7 800	6205
21,4	7,5	–	30,5	–	31	37,5	3	14 000	7 800	6205
17,5	6	–	30	–	25,5	36	2,5	10 100	5 900	6005
34,9	17,5	33,8	–	42,5	44,5	37,5	3	14 000	7 800	6205
34,9	17,5	33,8	–	42,5	44,5	37,5	3	14 000	7 800	6205
23,8	9	–	37,4	–	35,8	44	4	19 500	11 300	6206
23,8	9	–	37,4	–	35,8	44	4	19 500	11 300	6206
18,5	6,5	–	35,7	–	26,5	42,5	2,5	13 200	8 300	6006
36,5	18,3	40,2	–	52	48,5	44	4	19 500	11 300	6206
36,5	18,3	40,2	–	52	48,5	44	4	19 500	11 300	6206
25,4	9,5	–	44,6	–	39	51	5	25 500	15 300	6207
25,4	9,5	–	44,6	–	39	51	5	25 500	15 300	6207
37,7	18,8	46,8	–	60,3	51,3	51	5	25 500	15 300	6207
37,7	18,8	46,8	–	60,3	51,3	51	5	25 500	15 300	6207
30,2	11	–	49,4	–	43,8	58	5	32 500	19 800	6208
30,2	11	–	49,4	–	43,8	58	5	32 500	19 800	6208
42,9	21,4	52,3	–	68,3	56,5	58	5	32 500	19 800	6208
42,9	21,4	52,3	–	68,3	56,5	58	5	32 500	19 800	6208
30,2	11	–	54,5	–	43,8	63	5	32 500	20 400	6209
42,9	21,4	57,9	–	72,3	56,5	63	5	32 500	20 400	6209
42,9	21,4	57,9	–	72,3	56,5	63	5	32 500	20 400	6209
30,2	11	–	59,4	–	43,8	69	5	35 000	23 200	6210
49,2	24,6	62,8	–	77,3	62,8	69	5	35 000	23 200	6210
49,2	24,6	62,8	–	77,3	62,8	69	5	35 000	23 200	6210
37,1	13,5	–	72	–	53,1	84	5	52 000	36 000	6212
61,9	31	76,5	–	94,5	77,9	84	5	52 000	36 000	6212
48,5	21,5	85,2	–	109	66	96	6	62 000	44 000	6214

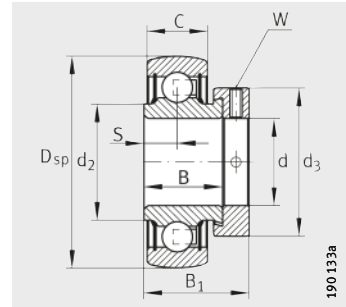


# Inch size radial insert ball bearings

Spherical or cylindrical outer ring



GRA...NPP-B-AS2/V



RA...NPP-B

**Dimension table** - Dimensions in mm

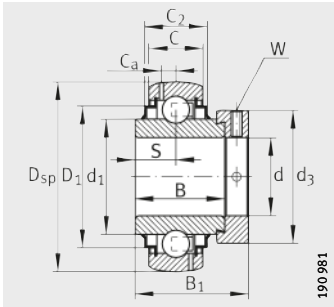
Shaft diameter d		Designation <sup>1)</sup>	Mass m ≈kg	Dimensions						
				D <sub>sp</sub>	D	B	B <sub>1</sub>	C	C <sub>a</sub>	C <sub>2</sub>
inch	mm									
5/8	15,8750	GRA010-NPP-B-AS2/V	0,12	40	–	19	28,6	12	3,4	–
		RA010-NPP	0,12	–	40	19	28,6	12	–	–
3/4	19,0500	GRA012-NPP-B-AS2/V	0,16	47	–	21,4	31	14	3,4	–
		GY1012-KRR-B-AS2/V	0,17	47	–	31	–	14	3,4	16,6
		RA012-NPP	0,09	–	42	16,7	24,6	12	–	–
		RA012-NPP	0,16	–	47	21,4	31	14	–	–
7/8	22,2250	GRA014-NPP-B-AS2/V	0,19	52	–	21,4	31	15	3,9	–
		RA014-NPP	0,19	–	52	21,4	31	15	–	–
15/16	23,8125	G1015-KRR-B-AS2/V	0,25	52	–	34,9	44,5	15	3,9	16,7
1	25,4000	GRA100-NPP-B-AS2/V	0,19	52	–	21,4	31	15	3,9	–
		G1100-KRR-B-AS2/V	0,25	52	–	34,9	44,5	15	3,9	16,7
		GY1100-KRR-B-AS2/V	0,2	52	–	34,1	–	15	3,9	16,7
		RA100-NPP	0,19	–	52	21,4	31	15	–	–
		RA100-NPP-B	0,19	52	–	21,4	31	15	–	–
11/16	26,9875	RA101-NPP	0,31	–	62	23,8	35,8	18	–	–
11/8	28,5750	GRA102-NPP-B-AS2/V	0,31	62	–	23,8	35,8	18	4,7	–
		G1102-KRR-B-AS2/V	0,38	62	–	36,5	48,5	18	4,7	20,7
		RA102-NPP	0,31	–	62	23,8	35,8	18	–	–
13/16	30,1625	GRA103-NPP-B-AS2/V	0,31	62	–	23,8	35,8	18	4,7	–
		G1103-KRR-B-AS2/V	0,38	62	–	36,5	48,5	18	4,7	20,7
		RA103-NPP	0,31	–	62	23,8	35,8	18	–	–
11/4	31,7500	GRA104-206-NPP-B-AS2/V	0,31	62	–	23,8	35,8	18	4,7	–
		G1104-206-KRR-B-AS2/V	0,38	62	–	36,5	48,5	18	4,7	20,7
		GY1104-206-KRR-B-AS2/V	0,33	62	–	38,1	–	18	4,7	20,7
		GRA104-NPP-B-AS2/V	0,48	72	–	25,4	39	19	5,6	–
		G1104-KRR-B-AS2/V	0,55	72	–	37,7	51,3	19	5,6	22,5
		GY1104-KRR-B-AS2/V	0,49	72	–	42,9	–	19	5,6	22,5
		RA104-NPP-B	0,48	72	–	25,4	39	19	–	–
		RA104-NPP	0,48	–	72	25,4	39	19	–	–
		RA104-206-NPP-B	0,31	62	–	23,8	35,8	18	–	–
RA104-206-NPP	0,31	–	62	23,8	35,8	18	–	9		

For further inch size bearings, see TPI 127, Radial insert ball bearings/housing units in inch sizes.

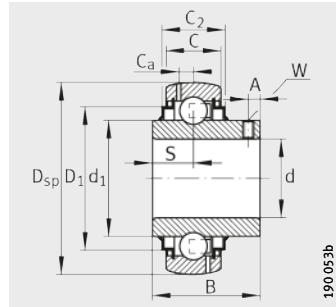
1) Permissible speeds of radial insert ball bearings: see page 1182.

2) Reference bearings for determining the equivalent bearing load: see page 204.

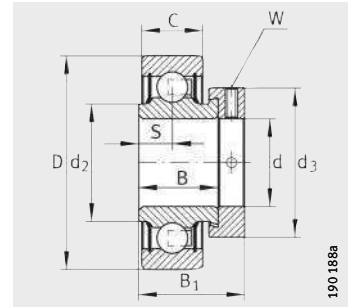




G...KRR-B-AS2/V



GY...KRR-B-AS2/V



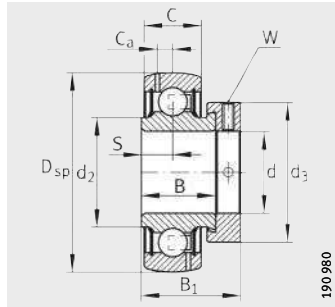
RA...NPP, RAL...NPP

							Basic load ratings		Reference bearing <sup>2)</sup>	Shaft diameter			
S	d <sub>1</sub>	d <sub>2</sub>	D <sub>1</sub>	d <sub>3</sub>	A	W	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N		inch	mm		
				max.		"							
6,5	-	23	-	28	-	1/8	9 800	4 750	6203	5/8	<b>15,8750</b>		
6,5	-	23	-	28	-	1/8	9 800	4 750	6203				
7,5	-	26,9	-	33	-	1/8	12 800	6 600	6204	3/4	<b>19,0500</b>		
12,7	27,6	-	37,4	-	4,5	3/32	12 800	6 600	6204				
6	-	25,4	-	30	-	1/8	9 400	5 000	6004				
7,5	-	26,9	-	33	-	1/8	12 800	6 600	6204				
7,5	-	30,5	-	37,5	-	1/8	14 000	7 800	6205	7/8	<b>22,2250</b>		
7,5	-	30,5	-	37,5	-	1/8	14 000	7 800	6205				
17,5	33,8	-	42,5	37,5	-	1/8	14 000	7 800	6205	15/16	<b>23,8125</b>		
7,5	-	30,5	-	37,5	-	1/8	14 000	7 800	6205	1	<b>25,4000</b>		
17,5	33,8	-	42,5	37,5	-	1/8	14 000	7 800	6205				
14,3	33,8	-	42,5	-	5	3/32	14 000	7 800	6205				
7,5	-	30,5	-	37,5	-	1/8	14 000	7 800	6205				
7,5	-	30,5	-	37,5	-	1/8	14 000	7 800	6205				
9	-	37,4	-	44	-	5/32	19 500	11 300	6206			11/16	<b>26,9875</b>
9	-	37,4	-	44	-	5/32	19 500	11 300	6206			11/8	<b>28,5750</b>
18,3	40,2	-	52	44	-	5/32	19 500	11 300	6206				
9	-	37,4	-	44	-	5/32	19 500	11 300	6206				
9	-	37,4	-	44	-	5/32	19 500	11 300	6206	13/16	<b>30,1625</b>		
18,3	40,2	-	52	44	-	5/32	19 500	11 300	6206				
9	-	37,4	-	44	-	5/32	19 500	11 300	6206				
9	-	37,4	-	44	-	5/32	19 500	11 300	6206	11/4	<b>31,7500</b>		
18,3	40,2	-	52	44	-	5/32	19 500	11 300	6206				
15,9	40,2	-	52	-	5	1/8	19 500	11 300	6206				
9,5	-	44,6	-	51	-	3/16	25 500	15 300	6207				
18,8	46,8	-	60,3	51	-	3/16	25 500	15 300	6207				
17,5	46,8	-	60,3	-	6	1/8	25 500	15 300	6207				
9,5	-	44,6	-	51	-	3/16	25 500	15 300	6207				
9,5	-	44,6	-	51	-	3/16	25 500	15 300	6207				
9	-	37,4	-	44	-	5/32	19 500	11 300	6206				
9	-	37,4	-	44	-	5/32	19 500	11 300	6206				

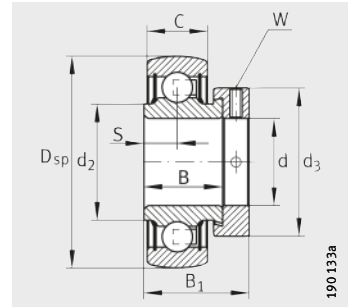


# Inch size radial insert ball bearings

Spherical or cylindrical outer ring



GRA...NPP-B-AS2/V



RA...NPP-B

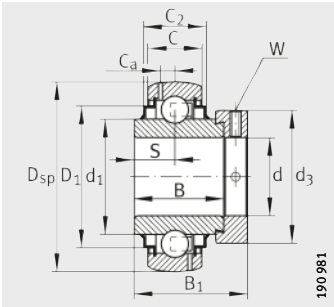
Dimension table (continued) · Dimensions in mm

Shaft diameter d		Designation <sup>1)</sup>	Mass m ≈ kg	Dimensions						
				D <sub>sp</sub>	D	B	B <sub>1</sub>	C	C <sub>a</sub>	C <sub>2</sub>
inch	mm									
1 <sup>3</sup> / <sub>8</sub>	34,9250	GRA106-NPP-B-AS2/V	0,48	72	–	25,4	39	19	5,6	–
		G1106-KRR-B-AS2/V	0,55	72	–	37,7	51,3	19	5,6	22,5
1 <sup>7</sup> / <sub>16</sub>	36,5125	GRA107-NPP-B-AS2/V	0,48	72	–	25,4	39	19	5,6	–
		G1107-KRR-B-AS2/V	0,55	72	–	37,7	51,3	19	5,6	22,5
		RA107-NPP	0,48	–	72	25,4	39	19	–	–
1 <sup>1</sup> / <sub>2</sub>	38,1000	GRA108-NPP-B-AS2/V	0,62	80	–	30,2	43,8	21	6,4	–
		G1108-KRR-B-AS2/V	0,74	80	–	42,9	56,5	21	6,4	23,5
		GY1108-KRR-B-AS2/V	0,65	80	–	49,2	–	21	6,4	23,5
		RA108-NPP-B	0,62	80	–	30,2	43,8	21	–	–
		RA108-NPP	0,62	–	80	30,2	43,8	21	–	–
1 <sup>5</sup> / <sub>8</sub>	41,2750	G1110-KRR-B-AS2/V	0,81	85	–	42,9	56,5	22	6,4	26,4
1 <sup>11</sup> / <sub>16</sub>	42,8625	G1111-KRR-B-AS2/V	0,81	85	–	42,9	56,5	22	6,4	26,4
1 <sup>3</sup> / <sub>4</sub>	44,4500	GRA112-NPP-B-AS2/V	0,69	85	–	30,2	43,8	22	6,4	–
		G1112-KRR-B-AS2/V	0,81	85	–	42,9	56,5	22	6,4	26,4
		GY1112-KRR-B-AS2/V	0,7	85	–	49,2	–	22	6,4	26,4
1 <sup>15</sup> / <sub>16</sub>	49,2125	G1115-KRR-B-AS2/V	1	90	–	49,2	62,8	22	6,9	26,4
2	50,8000	G1200-KRR-B-AS2/V	1,42	100	–	55,5	71,4	25	7	29
		GY1200-KRR-B-AS2/V	1,1	100	–	55,6	–	25	7	29
2 <sup>3</sup> / <sub>16</sub>	55,5625	G1203-KRR-B-AS2/V	1,42	100	–	55,5	71,4	25	7	29
2 <sup>7</sup> / <sub>16</sub>	61,9125	G1207-KRR-B-AS2/V	1,84	110	–	61,9	77,9	24	7,2	29
2 <sup>15</sup> / <sub>16</sub>	74,6125	G1215-KRR-B-AS2/V	2,65	130	–	49,5	67	28	8,5	30,5
		GY1215-KRR-B-AS2/V	1,97	130	–	77,8	–	28	8,5	31,5

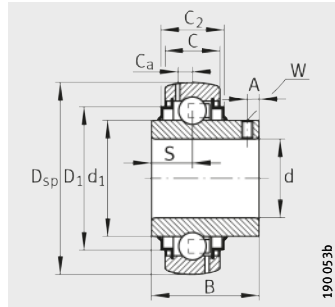
For further inch size bearings and bearing units, see TPI 127, Radial insert ball bearings/housing units in inch sizes.

<sup>1)</sup> Permissible speeds of radial insert ball bearings: see page 1182.

<sup>2)</sup> Reference bearings for determining the equivalent bearing load: see page 204.



G..-KRR-B-AS2/V



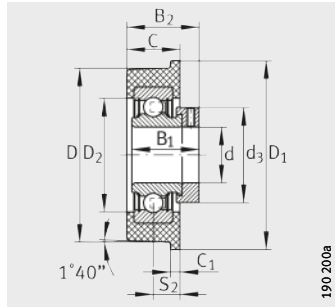
GY..-KRR-B-AS2/V

S	d <sub>1</sub>	d <sub>2</sub>	D <sub>1</sub>	d <sub>3</sub> max.	A	W "	Basic load ratings		Reference bearing <sup>2)</sup>	Shaft diameter d	
							dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N		inch	mm
							9,5	-		44,6	-
18,8	46,8	-	60,3	51	-	3/16	25 500	15 300	6207		
9,5	-	44,6	-	51	-	3/16	25 500	15 300	6207	1 7/16	<b>36,5125</b>
18,8	46,8	-	60,3	51	-	3/16	25 500	15 300	6207		
9,5	-	44,6	-	51	-	3/16	25 500	15 300	6207		
11	-	49,4	-	58	-	3/16	32 500	19 800	6208	1 1/2	<b>38,1000</b>
21,4	52,3	-	68,3	58	-	3/16	32 500	19 800	6208		
19	52,3	-	68,3	-	8	5/32	32 500	19 800	6208		
11	-	49,4	-	58	-	3/16	32 500	19 800	6208		
11	-	49,4	-	58	-	3/16	32 500	19 800	6208		
21,4	57,9	-	72,3	63	-	3/16	32 500	20 400	6209	1 5/8	<b>41,2750</b>
21,4	57,9	-	72,3	63	-	3/16	32 500	20 400	6209	1 11/16	<b>42,8625</b>
11	-	54,5	-	63	-	3/16	32 500	20 400	6209	1 3/4	<b>44,4500</b>
21,4	57,9	-	72,3	63	-	3/16	32 500	20 400	6209		
19	57,9	-	72,3	-	8	5/32	32 500	20 400	6209		
24,6	62,8	-	77,3	69	-	3/16	35 000	23 200	6210	1 15/16	<b>49,2125</b>
27,8	69,8	-	85,9	76	-	3/16	43 500	29 000	6211	2	<b>50,8000</b>
22,2	69,8	-	85,9	-	9	5/32	43 500	29 000	6211		
27,8	69,8	-	85,9	76	-	3/16	43 500	29 000	6211	2 3/16	<b>55,5625</b>
31	76,5	-	94,5	84	-	3/16	52 000	36 000	6212	2 7/16	<b>61,9125</b>
21,5	90	-	113	100	-	1/4	62 000	44 500	6215	2 15/16	<b>74,6125</b>
33,4	90	-	113	-	12,7	3/16	62 000	44 500	6215		

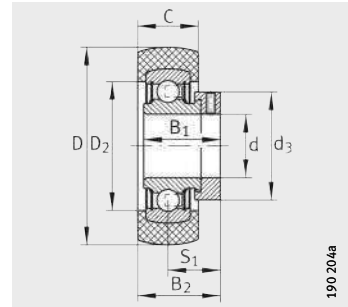


# Radial insert ball bearings with rubber interliner

Spherical or cylindrical outside surface of rubber interliner



CRB



RABRA, RABRB

**Dimension table** - Dimensions in mm

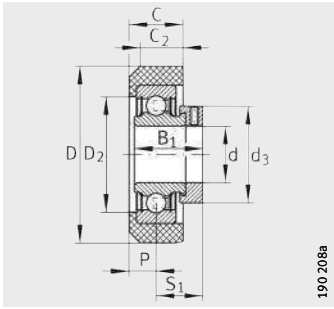
Designation		Mass m ≈kg	Dimensions					
Unit <sup>1)</sup>	Radial insert ball bearing <sup>2)</sup>		d	D	D <sub>1</sub>	C	C <sub>2</sub>	C <sub>1</sub>
	<b>RABRB12/47-FA106</b>	0,15	<b>12</b>	47,3	–	17,6	–	–
	<b>RCSMB15/65-FA106</b>	0,18	<b>15</b>	65,1	–	25,4	–	–
	<b>RABRB15/47-FA106</b>	0,15	<b>15</b>	47,3	–	18	–	–
	<b>RCSMB17/65-FA106</b>	0,18	<b>17</b>	65,1	–	25,4	–	–
	<b>CRB20/83</b>	0,3	<b>20</b>	83,6	87,4	25,4	–	4,8
	<b>CRB20/76</b>	0,3	<b>20</b>	77,5	80	25,4	–	5
	<b>RCSMB20/65-FA106</b>	0,22	<b>20</b>	65,1	–	25,4	–	–
	<b>RCRA20/46-FA106</b>	0,14	<b>20</b>	46	–	18,3	16	–
	<b>RABRB20/52-FA106</b>	0,2	<b>20</b>	52,3	–	17,6	–	–
	<b>CRB25/83</b>	0,32	<b>25</b>	83,6	87,4	25,4	–	4,8
	<b>CRB25/70</b>	0,32	<b>25</b>	71,5	76	25	–	5
	<b>CRB25/72</b>	0,32	<b>25</b>	73	80	25	–	5
	<b>RCSMB25/65-FA106</b>	0,24	<b>25</b>	65,1	–	25,4	–	–
	<b>RCRB25/57-FA106</b>	0,21	<b>25</b>	57,3	–	19,8	17,5	–
	<b>RABRB25/62-FA106</b>	0,24	<b>25</b>	62,2	–	20,8	–	–
	<b>CRB30/83</b>	0,41	<b>30</b>	83,6	87,4	28	–	4,8
	<b>CRB30/92</b>	0,41	<b>30</b>	93	98	28	–	5
	<b>RCSMA30/65-FA106</b>	0,32	<b>30</b>	65,1	–	25,4	–	–
	<b>RABRA30/62-FA106</b>	0,3	<b>30</b>	62,2	–	20,8	–	–
	<b>RABRB30/72-FA106</b>	0,38	<b>30</b>	72,2	–	23	–	–
	<b>CRB35/110</b>	0,56	<b>35</b>	112,3	120	30	–	5
	<b>RABRB35/80-FA106</b>	0,57	<b>35</b>	80,2	–	24	–	–
	<b>RABRB40/85-FA106</b>	0,73	<b>40</b>	85	–	27	–	–
	<b>RABRB50/100-FA106</b>	0,92	<b>50</b>	100,2	–	30	–	–

1) Operating temperature from –20 °C to +85 °C.

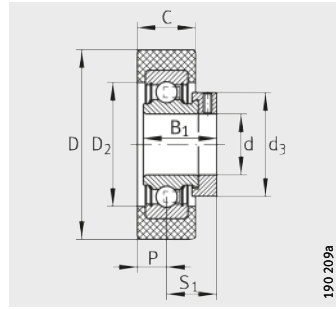
2) Permissible speeds of radial insert ball bearings: see page 1182.

3) Reference bearings for determining the equivalent bearing load: see page 204.

4) Also available by agreement in NBR80.



RCRA, RCRB

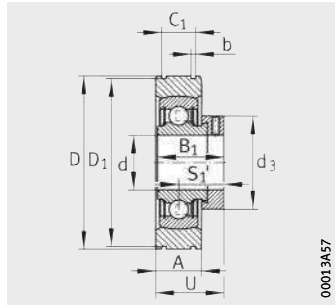


RCSMA, RCSMB

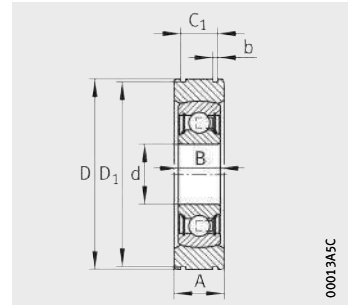
S <sub>1</sub>	D <sub>2</sub>	B <sub>1</sub>	P	d <sub>3</sub> max.	S <sub>2</sub>	B <sub>2</sub>	Rubber ring		Basic load ratings		Reference bearing <sup>3)</sup>
							Hardness Shore A °	Load carrying capacity C <sub>G</sub> N	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
22,1	33,5	28,6	–	28	–	30,9	70	840	9800	4750	6203
22,1	35	28,6	12,7	28	–	–	70	900	9800	4750	6203
22,1	33,5	28,6	–	28	–	31,1	70	840	9800	4750	6203
22,1	35	28,6	12,7	28	–	–	70	900	9800	4750	6203
–	40	31	–	33	12,7	36,2	80	750	12800	6600	6204
–	40	31	–	33	12,5	36	80	750	12800	6600	6204
23,5	40	31	12,7	33	–	–	70	1200	12800	6600	6204
18,6	35	24,5	10	30	–	–	70	900	9400	5000	6004
23,5	39	31	–	33	–	32,3	70	1160	12800	6600	6204
–	46	31	–	37,5	12,7	36,2	80	1000	14000	7800	6205
–	46	31	–	37,5	12,5	36	80	1000	14000	7800	6205
–	46	31	–	37,5	12,5	36	80	1000	14000	7800	6205
23,5	46	31	12,7	37,5	–	–	70	1400	14000	7800	6205
23,5	44,5	31	9,8	37,5	–	–	70	1400	14000	7800	6205
23,5	44,5	31	–	37,5	–	33,9	70 <sup>4)</sup>	1390	14000	7800	6205
–	56	35,8	–	44	14	40,7	80	1400	19500	11300	6206
–	56	35,8	–	44	14	40,7	80	1400	19500	11300	6206
20	47,6	26,5	15	42,5	–	–	70	1400	13200	8300	6006
20	47	26,5	–	42,5	–	30,4	70	1390	13200	8300	6006
26,7	54	35,8	–	44	–	38,2	70 <sup>4)</sup>	1980	19500	11300	6206
–	64	39	–	51	15	44,4	80	1500	25500	15300	6207
29,4	62	39	–	51	–	41,4	70	2700	25500	15300	6207
32,7	70	43,8	–	58	–	46,3	70 <sup>4)</sup>	3500	32500	19800	6208
32,7	80	43,8	–	69	–	47,7	70 <sup>4)</sup>	4100	35000	23200	6210



# Radial insert ball bearings with steel aligning ring



PE



BE

**Dimension table** - Dimensions in mm

Designation	Mass	Dimensions										Basic load ratings		Reference bearing <sup>5)</sup>		
		Unit	m	d	D <sup>3)</sup>	A	C <sub>1</sub> <sup>4)</sup>	b <sup>4)</sup>	D <sub>1</sub> <sup>4)</sup>	B	B <sub>1</sub>	S <sub>1</sub>	d <sub>3</sub>		U	dyn. C <sub>r</sub> N
	≈kg				+0,2	+0,3	-0,5					max.				
<b>PE20</b> <sup>1)</sup>	0,24	<b>20</b>	55	16	11,2	1,35	52,6	-	31	23,5	33	31,5	12 800	6 600	6204	
<b>BE20</b> <sup>2)</sup>	0,19	<b>20</b>	55	16	11,2	1,35	52,6	14	-	-	-	-	12 800	6 600	6204	
<b>PE25</b> <sup>1)</sup>	0,31	<b>25</b>	62	17	11,2	1,9	59,6	-	31	23,5	37,5	32	14 000	7 800	6205	
<b>BE25</b> <sup>2)</sup>	0,25	<b>25</b>	62	17	11,2	1,9	59,6	15	-	-	-	-	14 000	7 800	6205	
<b>PE30</b> <sup>1)</sup>	0,48	<b>30</b>	72	21	14,4	1,9	68,8	-	35,8	26,7	44	37,2	19 500	11 300	6206	
<b>BE30</b> <sup>2)</sup>	0,37	<b>30</b>	72	21	14,4	1,9	68,8	16	-	-	-	-	19 500	11 300	6206	
<b>PE35</b> <sup>1)</sup>	0,64	<b>35</b>	80	21	14,4	1,9	76,8	-	39	29,4	51	40	25 500	15 300	6207	
<b>BE35</b> <sup>2)</sup>	0,45	<b>35</b>	80	21	14,4	1,9	76,8	17	-	-	-	-	25 500	15 300	6207	
<b>PE40</b> <sup>1)</sup>	0,88	<b>40</b>	90	25	15,4	2,7	86,8	-	43,8	32,7	58	45,2	32 500	19 800	6208	
<b>BE40</b> <sup>2)</sup>	0,63	<b>40</b>	90	25	15,4	2,7	86,8	18	-	-	-	-	32 500	19 800	6208	

1) Permissible speeds of radial insert ball bearings RAE..NPP-B: see page 1182.

2) Permissible speeds of self-aligning deep groove ball bearings 2..NPP-B: see page 1210.

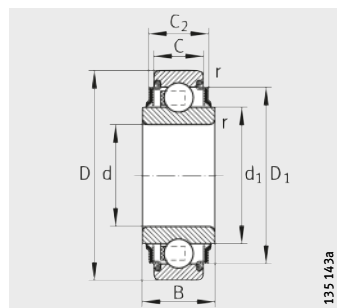
3) Before splitting, dimension D corresponds to tolerance class PN according to DIN 620-2.

4) Annular slot tolerances to DIN 616 (for snap rings to DIN 5 417).

5) Reference bearings for determining the equivalent bearing load: see page 204.

# Deep groove ball bearings with extended inner ring

Cylindrical outer ring



2..-KRR, 2..-KRR(-AH)

Dimension table · Dimensions in mm

Designation	Mass m ≈kg	Dimensions								Limiting speed $n_G$ grease $\text{min}^{-1}$	Basic load ratings		Reference bearing <sup>5)</sup>
		d	D	C	C <sub>2</sub>	d <sub>1</sub>	D <sub>1</sub>	B	r <sub>min</sub>		dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
<b>203-KRR-AH05</b> <sup>4)</sup>	0,09	<b>13</b> <sup>2)</sup>	40	12	12	24,2	30,6	18,3	0,6	13 000	9 800	4 750	6203
<b>202-KRR</b>	0,05	<b>15</b>	35	11	11	21,5	28,8	14,4	0,6	14 600	7 600	3 700	6202
<b>203-KRR-AH02</b>	0,07	<b>16,2</b> <sup>3)</sup>	40	12	12	24,2	32,6	18,3	0,6	13 000	9 800	4 750	6203
<b>203-KRR</b>	0,07	<b>17</b>	40	12	12	24,2	32,9	18,3	0,6	13 000	9 800	4 750	6203
<b>204-KRR</b>	0,12	<b>20</b>	47	14	14	28,7	38,7	17,7	1	11 000	12 800	6 600	6204
<b>205-KRR</b>	0,16	<b>25</b>	52	15	16,7	33,8	42,6	21	1	8 800	14 000	7 800	6205
<b>206-KRR</b>	0,24	<b>30</b>	62	16	19,6	40,2	52	24	1	7 300	19 500	11 300	6206
<b>207-KRR-AH03</b> <sup>1)</sup>	0,35	<b>35</b>	72	17	19,7	46,8	60,3	25	2	6 300	25 500	15 300	6207
<b>208-KRR-AH04</b> <sup>1)</sup>	0,48	<b>38,892</b>	80	21	21,2	52,3	68,2	27,5	1	5 500	32 500	19 800	6208
<b>208-KRR</b>	0,44	<b>40</b>	80	18	20,5	52,3	68,2	27	1,1	5 500	32 500	19 800	6208
<b>209-KRR</b>	0,53	<b>45</b>	85	19	26,4	57,9	72,3	30	1,1	4 900	32 500	20 400	6209
<b>210-KRR</b>	0,58	<b>50</b>	90	20	24	62,8	77,6	30	1,1	4 400	35 000	23 200	6210
<b>211-KRR</b>	0,85	<b>55</b>	100	21	27,5	69,8	85,9	36	1,5	4 000	43 500	29 000	6211
<b>212-KRR</b>	1,1	<b>60</b>	110	22	30	76,5	94,7	36	1,5	3 700	52 000	36 000	6212

1) With steel cage.

2)  $d^{+0,08}_{-0,05}$ .

3)  $d^{+0,1}$ . Bore diameter is designed for M16 screws.

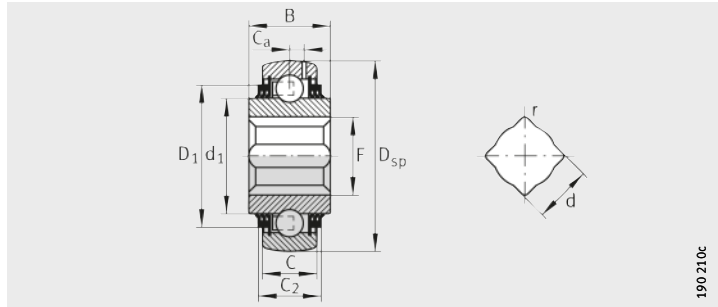
4) Greased with L114 (GA47).

5) Reference bearings for determining the equivalent bearing load: see page 204.



# Self-aligning deep groove ball bearings

Spherical outer ring  
Square or hexagonal bore



GVK...KTT-B(-AH..)-AS2/V, VK...KTT-B(-AH)

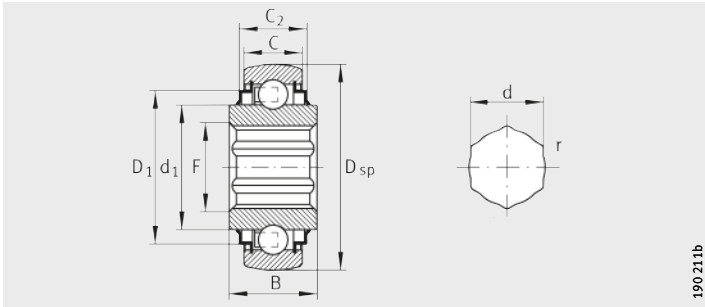
190 210c

**Dimension table** - Dimensions in mm

Width across flats of shaft d		Designation	Mass m ≈kg	Dimensions					
				d	d Deviation	D <sub>sp</sub>	C	C <sub>2</sub>	d <sub>1</sub>
inch	mm								
–	<b>17,0000</b>	<b>SKE17-204-KRR-B</b>	0,12	17,0000	+0,15 +0,05	47	14	–	28,7
7/8	<b>22,2250</b>	<b>SK014-205-KRR-B</b>	0,2	22,2250	+0,15 +0,05	52	15	16,7	33,8
1	<b>25,4000</b>	<b>GVK100-208-KTT-B-AS2/V</b>	0,74	25,4000	+0,9 +0,6	80	21	28,1	52,3
		<b>VK100-208-KTT-B-AH10</b>	0,72	25,4000	+0,9 +0,6	80	18	25,3	52,3
		<b>SK100-206-KRR-B-AH11</b>	0,32	25,4000	+0,15 +0,03	62	16	18,7	40,2
1 1/8	<b>28,5750</b>	<b>GVK102-208-KTT-B-AH10-AS2/V</b>	0,68	28,5750	+0,9 +0,6	80	18	25,3	52,3
		<b>SK102-207-KRR-B-AH10</b>	0,45	28,5750	+0,175 +0,03	72	17	20,5	46,8
1 1/4	<b>31,7500</b>	<b>GVK104-209-KTT-B-AS2/V</b>	0,71	31,7500	+0,9 +0,6	85	22	27,4	57,9
		<b>SK104-207-KRR-B-AH12</b>	0,45	31,7500	+0,2 +0,1	72	17	20,5	46,8
1 9/16	<b>39,6875</b>	<b>GVK109-211-KTT-B-AS2/V</b>	1,25	39,6875	+1,1 +0,8	100	25	29	69,8

1) Reference bearings for determining the equivalent bearing load: see page 204.





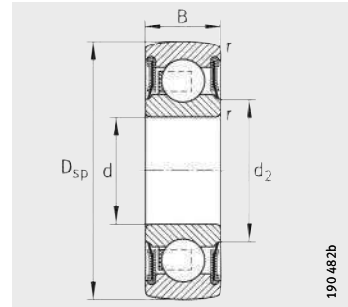
SK..-KRR-B(-AH)

F	D <sub>1</sub>	C <sub>a</sub>	B	r	Limiting speed n <sub>G grease</sub> min <sup>-1</sup>	Basic load ratings		Reference bearing <sup>1)</sup>	Width across flats of shaft	
						dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N		d	
									inch	mm
20,2	–	–	17,7	0,13	900	12 800	6 600	6204	–	<b>17,0000</b>
26,2	42,6	–	25,4	0,13	900	14 000	7 800	6205	<sup>7</sup> / <sub>8</sub>	<b>22,2250</b>
35,4	68,3	6,4	36,5	2,5	500	32 500	19 800	6208	1	<b>25,4000</b>
35,4	68,3	–	36,5	2,5	500	32 500	19 800	6208		
30,5	52	–	24	0,13	800	19 500	11 300	6206		
41,3	68,3	5,8	36,5	2,5	500	32 500	19 800	6208	1 <sup>1</sup> / <sub>8</sub>	<b>28,5750</b>
38	60,3	–	37,7	0,25	800	25 500	15 300	6207		
44,3	72,3	6,4	36,5	2,5	500	32 500	20 400	6209	1 <sup>1</sup> / <sub>4</sub>	<b>31,7500</b>
38	60,3	–	25	0,12	800	25 500	15 300	6207		
55,2	85,9	7,1	36	2,5	450	43 500	29 000	6214	1 <sup>9</sup> / <sub>16</sub>	<b>39,6875</b>



# Self-aligning deep groove ball bearings

Spherical outer ring  
Bore for fit



2..-NPP-B

**Dimension table** - Dimensions in mm

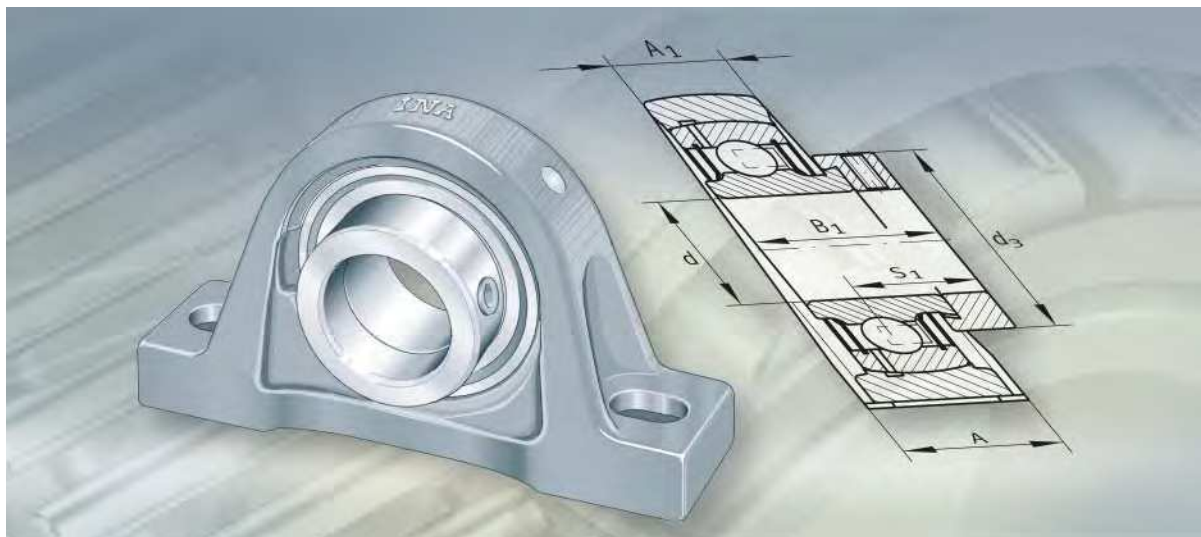
Designation	Mass m ≈kg	Dimensions					Limiting speed n <sub>G</sub> grease min <sup>-1</sup>	Basic load ratings		Reference bearing <sup>3)</sup>
		d	D <sub>sp</sub>	B	d <sub>2</sub>	r <sub>min</sub>		dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
<b>201-NPP-B<sup>1)</sup></b>	0,04	<b>12</b>	32	10	17,1	0,6	18 300	6 800	3 050	6201
<b>203-NPP-B<sup>2)</sup></b>	0,06	<b>17</b>	40	12	22,5	0,6	13 000	9 800	4 750	6203
<b>204-NPP-B<sup>2)</sup></b>	0,11	<b>20</b>	47	14	26,5	1	11 000	12 800	6 600	6204
<b>205-NPP-B<sup>2)</sup></b>	0,13	<b>25</b>	52	15	30,3	1	8 800	14 000	7 800	6205
<b>206-NPP-B<sup>1)</sup></b>	0,2	<b>30</b>	62	16	37,4	1	7 300	19 500	11 300	6206
<b>207-NPP-B<sup>1)</sup></b>	0,29	<b>35</b>	72	17	42,4	1	6 300	25 500	15 300	6207
<b>208-NPP-B<sup>1)</sup></b>	0,37	<b>40</b>	80	18	48,4	1,1	5 500	32 500	19 800	6208
<b>209-NPP-B<sup>1)</sup></b>	0,41	<b>45</b>	85	19	53,2	1,1	4 900	32 500	20 400	6209
<b>210-NPP-B<sup>2)</sup></b>	0,46	<b>50</b>	90	20	58,2	1,1	4 400	35 000	23 200	6210

1) One-piece seal with vulcanised seal lip.

2) Three-piece P seal.

3) Reference bearings for determining the equivalent bearing load: see page 204.





## Housing units

# Housing units

	Page
<b>Product overview</b>	Housing units ..... 1214
<b>Features</b>	Housing units with cast iron housing..... 1218
	Housing units with sheet steel housing..... 1221
	Possible combinations of insert bearings and housings ..... 1222
	Other products ..... 1222
	Suffixes..... 1222
	Possible combinations – radial insert ball bearings with cast iron housings ..... 1224
	Possible combinations – radial insert ball bearings with sheet steel housings ..... 1226
<b>Design and safety guidelines</b>	Compensation of misalignments..... 1228
	Load carrying capacity of housings ..... 1229
	Load carrying capacity and speed limits of radial insert ball bearings ..... 1230
	Design of adjacent construction..... 1230
	Bearing end caps..... 1231
<b>Fitting and dismantling</b>	Delivered condition ..... 1232
	Storage and storage period..... 1232
	Removal from packaging..... 1232
	Guidelines for fitting..... 1232
	Fitting of coated components..... 1232
	Fitting of cast iron units – plummer block and flanged housing units..... 1233
	Fitting of cast iron units – radial insert ball bearings with integral adapter sleeve ..... 1235
	Fitting of bearing end caps..... 1238
	Fitting of sheet steel units with eccentric locking collar and grub screws in the inner ring ..... 1239
<b>Accuracy</b>	Cast iron housings..... 1241
	Sheet steel housings ..... 1241
<b>Dimension tables</b>	Plummer block housing units (cast iron housings)..... 1242
	Flanged housing units (cast iron housings) ..... 1256
	Take-up housing units (cast iron housings, sheet steel housings) ..... 1288
	Plummer block housing units (sheet steel housings) ..... 1298
	Flanged housing units (sheet steel housings) ..... 1300



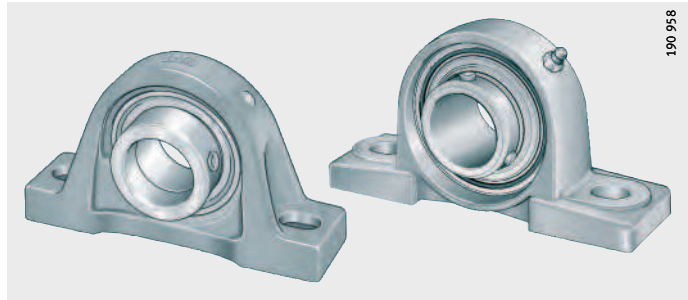
# Product overview Housing units

## Plummer block housing units

Cast iron housings with long base

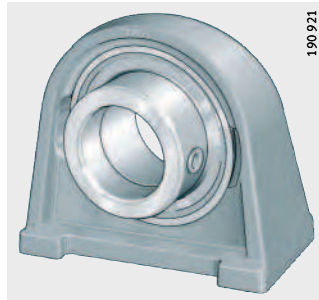
Combinations of bearings and housings, see page 1224

PASE, PASEY, RASE, RASEL, RASEA, RASEY, TASE, LASE, RSAO, RASEY..-JIS



Cast iron housings with short base

PSHE, PSHEY, RSHE, RSHEY, TSHE

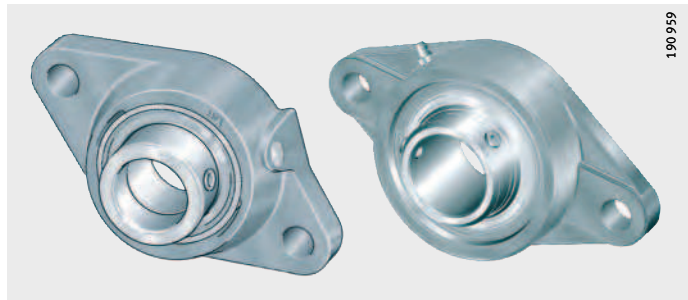


## Two-bolt flanged housing units

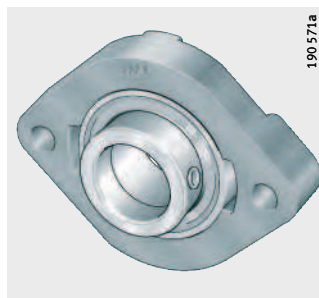
Cast iron housings

Combinations of bearings and housings, see page 1224

PCJT, PCJTY, RCJTZ, RCJT, RCJTA, RCJTY, PCFT, TCJT, LCJT, RCJTY..-JIS



FLCTE, FLCTEY, GLCTE

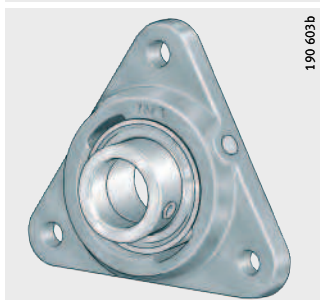


### Three-bolt flanged housing units

Cast iron housings

Combinations of bearings and housings, see page 1224

PCFTR

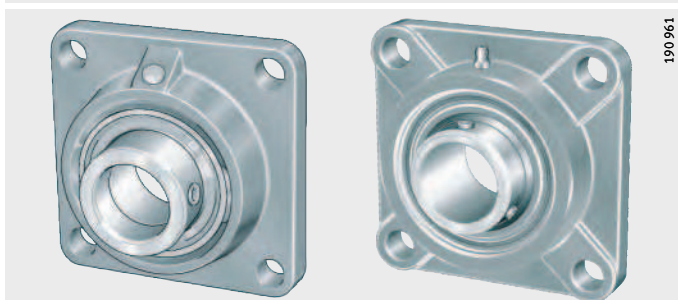


### Four-bolt flanged housing units

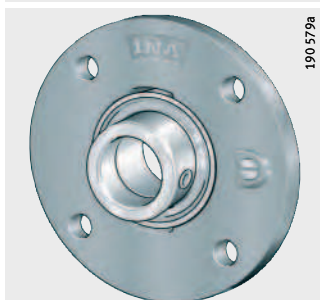
Cast iron housings

Combinations of bearings and housings, see page 1224

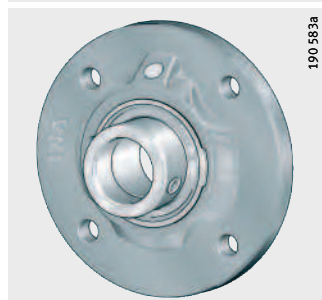
PCJ, PCJY, RCJ, RCJY, RCJL, RCJO, TCJ, PCF, RCJY..-JIS



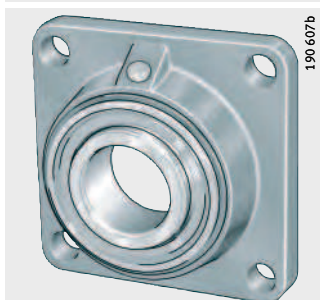
PME, PMEY, RME, RMEY, RMEO, TME



RFE, TFE



PCCJ

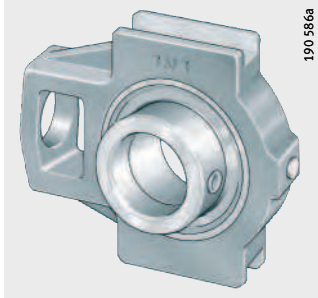


# Product overview Housing units

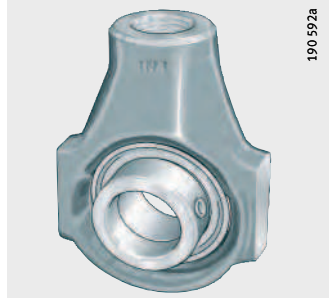
**Take-up housing units**  
Cast iron housings

Combinations of bearings  
and housings,  
see page 1225

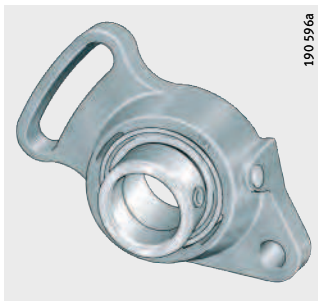
PTUE, PTUEY, RTUE, RTUEY,  
RTUEO, TTUE



PHE, PHEY, RHE, THE

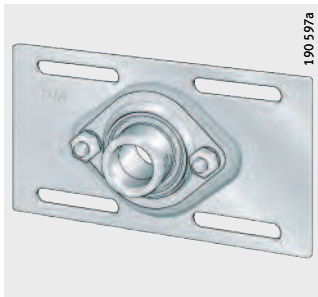


PSFT



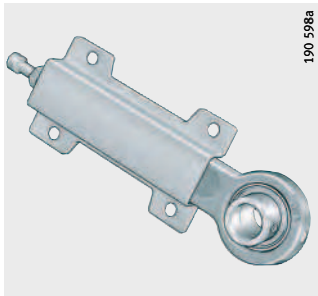
Sheet steel housings

MSTU



Cast iron housings,  
sheet steel housings

PHUSE



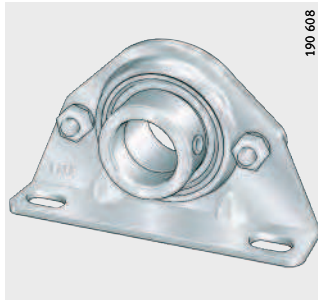


**Plummer block housing units**

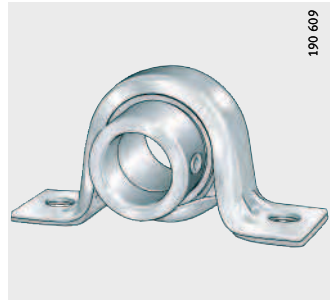
Sheet steel housings

Combinations of bearings and housings, see page 1226

PBS



PB, PBY, RPB

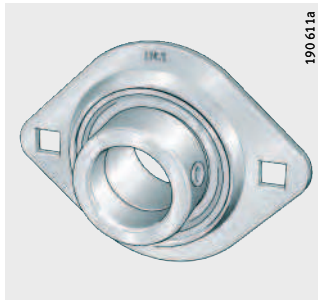


**Two-bolt and three-bolt flanged housing units**

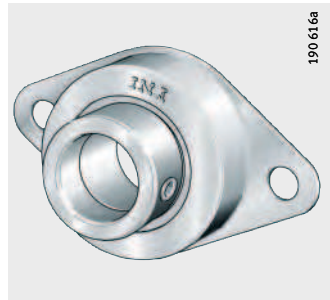
Sheet steel housings

Combinations of bearings and housings, see page 1226

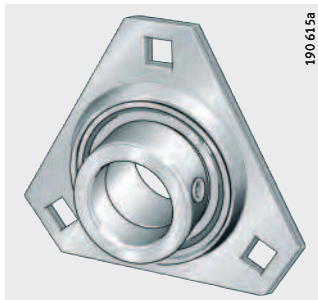
RAT, RATY, RALT, PCSLT



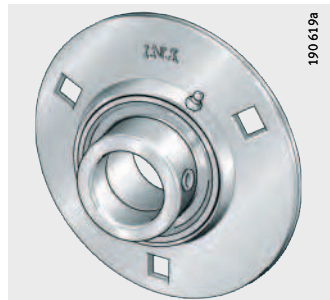
RCSMF



RATR, RALTR, RRTR, RATRY



RA, RAY, RRY, GRA, GRRY



# Housing units

## Features

INA housing units are available as plummer block, flanged and take-up housing units in numerous different designs. The units are ready-to-fit and comprise INA cast iron or sheet steel housings in which INA radial insert ball bearings are fitted. In order to ensure function and reliability under all operating conditions, the bearings and housings are matched to each other. Due to the spherical outside surface of the bearing outer ring and the concave housing bore, housing units can compensate for static angular misalignment of the shaft, see Compensation of misalignments, page 1228.

The units are used predominantly as locating bearings, but are also suitable as non-locating bearings under low loads and speeds.

The housings are screw mounted on the adjacent construction. Less stringent tolerances are sufficient for the screw mounting surfaces, see Design of adjacent construction, page 1230.

## Housing units with cast iron housing

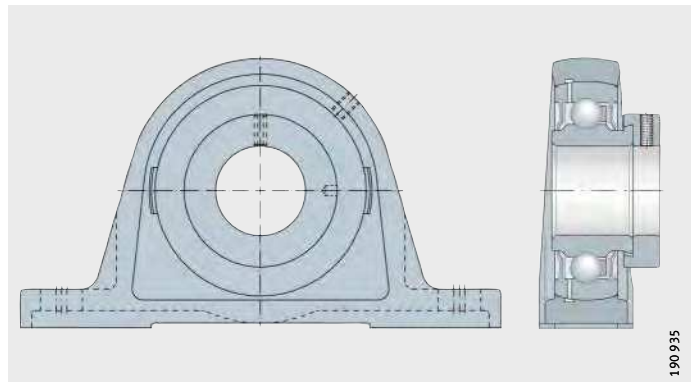
Cast iron housings are single-piece units with high load carrying capacity, see Load carrying capacity of housings, page 1229. For relubrication of radial insert ball bearings, the housing bore has a lubrication groove and the housing has a lubrication hole for conventional taper type lubrication nipples to DIN 71 412. In the delivered condition, the hole in the housing is closed off by a plastic plug. Cast iron units are available as plummer block and flanged housing units.

## Plummer block housing units

Plummer block housing units have a long or a short base, *Figure 1*. Housings with a long base are screw mounted to the adjacent construction by means of slots, housings with a short base by blind threaded holes.

PASE

*Figure 1*  
Plummer block housing unit,  
cast iron housing, with long base

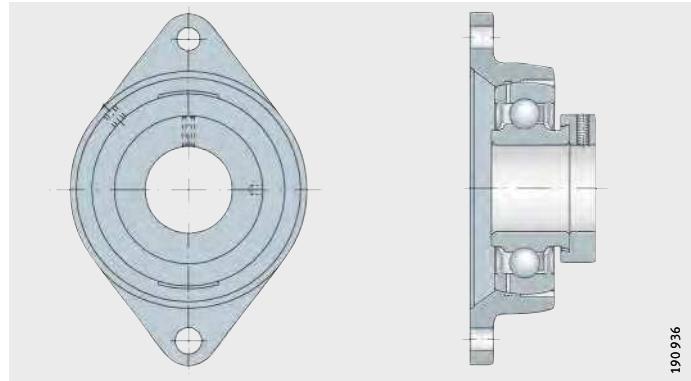


### Flanged housing units

Flanged housing units are available as two-bolt, three-bolt and four-bolt units, *Figure 2*. The housings are oval, triangular, square or round in shape. The housings have through holes for location purposes. Some series also have a centring spigot. The centring spigot is mounted in a turned recess in the machine structure. This gives concentric alignment of the housings and relieves the fixing screws of any radial forces.

PCJT

*Figure 2*  
Flanged housing unit –  
cast iron housing

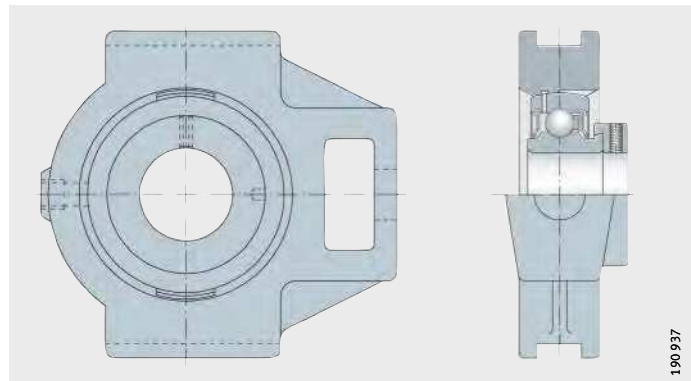


### Take-up housing units

Take-up housing units have facilities for sliding or swivel motion, *Figure 3*. They are used where shafts must undergo substantial displacement travel.

PTUE

*Figure 3*  
Take-up housing unit,  
cast iron housing



# Housing units

<b>Housing materials</b>	The material used for the cast iron housings is cast iron EN-GJL-200/250 to DIN EN 1 561. Housings are also available by agreement in spheroidal graphite cast iron EN-GJS-400/500 to DIN EN 1 563.
<b>Bearing end caps</b>	In order to cover the exposed ends of rotating shafts, cast iron housings with the suffix N can be fitted with bearing end caps.
<b>Corrosion-resistant units</b>	<p>Corrosion-resistant units are available as plummer block and flanged housing units. The housings and insert bearings are coated with Corrotect® and have the suffix FA125.</p> <p>The units are used if moisture, contaminated water, salt spray mist, weakly alkaline or weakly acidic cleaning agents are present.</p>
<b>Units for high and low temperatures</b>	<p>These units are available as plummer block and flanged housing units. The housings correspond to the cast iron housings described above. The high temperature variant FA164 includes a tapered lubrication nipple to DIN 71 412 screwed into the housing.</p> <p>Units for high temperatures have the suffix FA164 and units for the extended temperature range have the suffix FA101, see table, page 1222, and table, page 1178.</p>

## Housing units with sheet steel housing

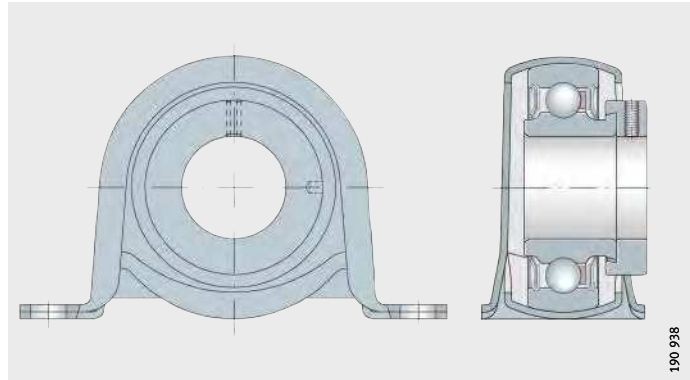
Sheet steel housings are two-piece units made from pressed deep drawn sheet steel and in some cases have a Corrotect® coating. The series GRA and GRRY can be relubricated via a lubrication nipple. The units are available as plummer block and flanged housing units, *Figure 4* and *Figure 5*.

Units with sheet steel housings are suitable for moderate loads and lightweight constructions.

## Plummer block and flanged housing units with rubber interliner

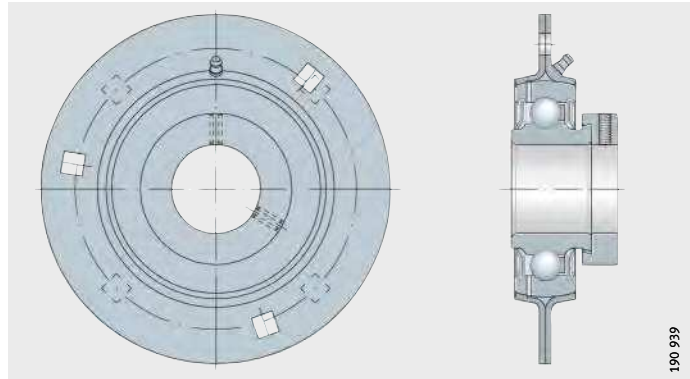
In addition to the normal plummer block and flanged housing units, there is also a design with a rubber interliner on the bearing outer ring. This interliner absorbs shocks and vibrations and thus gives damping of running noises.

PB



*Figure 4*  
Plummer block housing unit,  
sheet steel housing

GRA



*Figure 5*  
Flanged housing unit,  
sheet steel housing

## Corrosion-resistant units

The two-piece sheet steel flanged units have the suffix VA and are also available with a relubrication facility.

They are used if moisture, contaminated water, salt spray mist, weakly alkaline or weakly acidic cleaning agents are present.

# Housing units

## Possible combinations of insert bearings and housings

Possible combinations of radial insert ball bearings with cast iron housings and radial insert ball bearings with sheet steel housings, see table, page 1224 and table, page 1226.

## Other products

In addition to the comprehensive catalogue range, we also supply housing units for special applications.

Examples include:

- corrosion-resistant flanged housing units with two-piece housings
  - a polypropylene flanged element combined with a corrosion-resistant alloy steel flanged element
- units with plastic housings combined with radial insert ball bearings made from corrosion-resistant steel or with Corrotect®-coated bearings
- other designs are available with special greases, seals and inch dimensions, see also TPI 127, Radial insert ball bearings/housing units in inch sizes. Please contact us as necessary.

## Suffixes

Suffixes for the available housing unit designs: see table.

## Available designs


Suffix	Description	Design
2C	Radial insert ball bearing with flinger shields on both sides	Standard
FA101	High and low temperature design –40 °C to +180 °C	
FA106	Bearing subjected to special noise testing	
FA107	Bearing with lubrication holes on the locating side	
FA125	With Corrotect® coating	
FA164	High temperature design up to +250 °C	
N	Cast iron housing with undercut slot for end caps	
OSE	Bearing without clamping element	
JIS	Housing dimensions according to JIS B 1559	







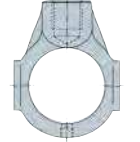


# Housing units

Possible combinations – radial insert ball bearings with cast iron housings		Housings				
		Plummer block housings		Two-bolt flanged housings		Three-bolt flanged housings
						
		GG.ASE	GG.SHE	GG.LCTE <sup>2)</sup>	GG.CJT	GG.CFTR
		GG.SAO <sup>1)</sup>		GG.GLCTE	GG.CFT	
				GG.CJTZ		
<b>RAE...-NPP-B</b> d = 12 to 50 mm				FLCTE <sup>2)</sup> page 1256		
<b>GRAE...-NPP-B</b> d = 12 to 60 mm		<b>PASE</b> page 1242	<b>PSHE</b> page 1252	<b>GLCTE</b> page 1256	<b>PCJT</b> page 1258 <b>PCFT</b> page 1258	<b>PCFTR</b> page 1268
<b>GE...-KRR-B</b> d = 17 to 120 mm		<b>RASE</b> page 1242	<b>RSHE</b> page 1252		<b>RCJT</b> page 1258 <b>RCJTZ</b> page 1266	Available by agreement only
<b>GE...-KTT-B</b> d = 20 to 80 mm		<b>TASE</b> page 1242	<b>TSHE</b> page 1252		<b>TCJT</b> page 1258	Available by agreement only
<b>GE...-KLL-B</b> d = 20 to 50 mm		<b>LASE</b> page 1242	Available by agreement only		<b>LCJT</b> page 1258	Available by agreement only
<b>GNE...-KRR-B<sup>1)</sup></b> d = 30 to 100 mm		<b>RSOA</b> page 1244				
<b>GLE...-KRR-B</b> d = 20 to 70 mm		<b>RASEL</b> page 1242	Available by agreement only		Available by agreement only	Available by agreement only
<b>GSH...-2RSR-B</b> d = 20 to 50 mm		<b>RASEA</b> page 1242	Available by agreement only		<b>RCJTA</b> page 1258	Available by agreement only
<b>AY...-NPP-B</b> d = 12 to 30 mm				FLCTEY <sup>2)</sup> page 1256		
<b>GAY...-NPP-B</b> d = 12 to 60 mm		<b>PASEY</b> page 1242	<b>PSHEY</b> page 1252	FLCTEY <sup>2)</sup> page 1256	<b>PCJTY</b> page 1258	Available by agreement only
<b>GYE...-KRR-B</b> d = 12 to 90 mm		<b>RASEY</b> page 1242	<b>RSHEY</b> page 1252		<b>RCJTY</b> page 1258	Available by agreement only

Catalogue range, for dimension tables see pages indicated. Other dimensions and combinations available by agreement.

 Combinations not possible or not advisable.




Four-bolt flanged housings		Take-up housings				
						
<b>GG.ME</b>	<b>GG.CJ</b>	<b>GG.TUE</b>	<b>GG.HUE</b> <b>GEH..-HUSE</b>	<b>GG.HE</b>	<b>GG.SFT</b>	<b>GEH..-MSTU</b>
<b>GG.MEO<sup>1)</sup></b>	<b>GG.CJO<sup>1)</sup></b>	<b>GG.TUEO<sup>1)</sup></b>				
<b>GG.FE</b>	<b>GG.CF</b>					
						<b>MSTU</b> page 1296
<b>PME</b> page 1278	<b>PCJ</b> page 1270 <b>PCF</b> page 1270	<b>PTUE</b> page 1288	<b>PHUSE</b> page 1294	<b>PHE</b> page 1292	<b>PSFT</b> page 1296	
<b>RME</b> page 1278 <b>RFE</b> page 1284	<b>RCJ</b> page 1270	<b>RTUE</b> page 1288	Available by agreement only	<b>RHE</b> page 1292	Available by agreement only	Available by agreement only
<b>TME</b> page 1278 <b>TFE</b> page 1284	<b>TCJ</b> page 1270	<b>TTUE</b> page 1288	Available by agreement only	<b>THE</b> page 1292	Available by agreement only	Available by agreement only
Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only
<b>RMEO</b> page 1278	<b>RCJO</b> page 1272	<b>RTUEO</b> page 1290				
Available by agreement only	<b>RCJL</b> page 1272	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only
Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only
						Available by agreement only
<b>PMEY</b> page 1278	<b>PCJY</b> page 1270	<b>PTUEY</b> page 1288	Available by agreement only	<b>PHEY</b> page 1292	Available by agreement only	
<b>RMEY</b> page 1278	<b>RCJY</b> page 1270	<b>RTUEY</b> page 1288	Available by agreement only	Available by agreement only	Available by agreement only	Available by agreement only

<sup>1)</sup> Heavy series.

<sup>2)</sup> Without lubrication hole.




# Housing units

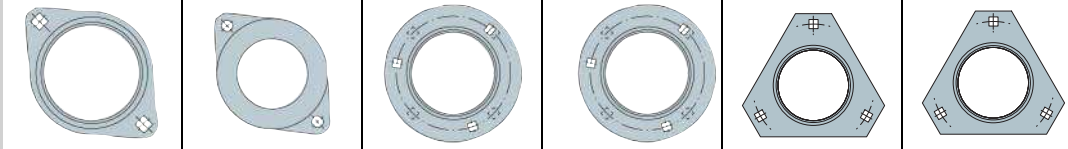
Possible combinations – radial insert ball bearings with sheet steel housings	Housings				
	Plummer block housings			Two-bolt flanged housings	
					
	GEH...-PBS	GEH...-BT	GEH...-BT GRG...-RABR	FLAN...-LST (2 pieces)	FLAN...-MST (2 pieces)
<b>RALE...-NPP(-B)</b> d = 20 to 30 mm 				<b>RPB</b> page 1298	<b>RALT</b> page 1300
<b>RAE...-NPP(-B)</b> d = 12 to 40 mm 	<b>PBS</b> page 1298	<b>PB</b> page 1298	<b>RPB</b> page 1298		<b>RAT</b> page 1300
<b>GRAE...-NPP-B</b> d = 20 to 60 mm 					
<b>GE...-KRR-B</b> d = 17 to 60 mm 	Housing and bearing to be ordered separately	Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		Housing and bearing to be ordered separately
<b>GE...-KTT-B</b> d = 20 to 60 mm 	Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately
<b>GE...-KLL-B</b> d = 20 to 50 mm 	Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately
<b>GLE...-KRR-B</b> d = 20 to 60 mm 	Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately
<b>GSH...-2RSR-B</b> d = 20 to 50 mm 	Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately
<b>(G)AY...-NPP-B</b> d = 12 to 60 mm 	Housing and bearing to be ordered separately	<b>PBY</b> page 1298			<b>RATY</b> page 1300
<b>GYE...-KRR-B</b> d = 12 to 60 mm 	Housing and bearing to be ordered separately	Housing and bearing to be ordered separately			Housing and bearing to be ordered separately

Catalogue range, for dimension tables see pages indicated.

Other dimensions and combinations available by agreement.

 Combinations not possible or not advisable.

**Three-bolt flanged housings**



<b>FLAN...CSLT</b> <b>FLAN...CST</b>	<b>FLAN...RCSMF</b> <b>GRG...RCSM</b>	<b>FLAN...MSB</b> (2 pieces)	<b>FLAN...MSA</b> <b>FLAN...MSB</b>	<b>FLAN...LSTR</b> (2 pieces)	<b>FLAN...MSTR</b> (2 pieces)
---	--	---------------------------------	--	----------------------------------	----------------------------------

<b>PCSLT</b> page 1300	<b>RCSMF</b> page 1302 d = 30 mm			<b>RALTR</b> page 1304	
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	<b>RCSMF</b> page 1302	<b>RA</b> page 1306			<b>RATR</b> page 1304
--	---------------------------	------------------------	--	--	--------------------------

		<b>RA</b> page 1306	<b>GRA</b> page 1306		
--	--	------------------------	-------------------------	--	--

		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		<b>RRTR</b> page 1304
--	--	--	--	--	--------------------------

		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		Housing and bearing to be ordered separately
--	--	--	--	--	--

		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		Housing and bearing to be ordered separately
--	--	--	--	--	--

		Housing and bearing to be ordered separately	Housing and bearing to be ordered separately		Housing and bearing to be ordered separately
--	--	--	--	--	--

		<b>RAY</b> page 1306			<b>RATRY</b> page 1304
--	--	-------------------------	--	--	---------------------------

		<b>RRY</b> page 1306	<b>GRRY</b> page 1306		Housing and bearing to be ordered separately
--	--	-------------------------	--------------------------	--	--



# Housing units

## Design and safety guidelines

INA radial insert ball bearings and INA housings are matched to each other and, as a unit, give particularly robust and economical bearing arrangements.

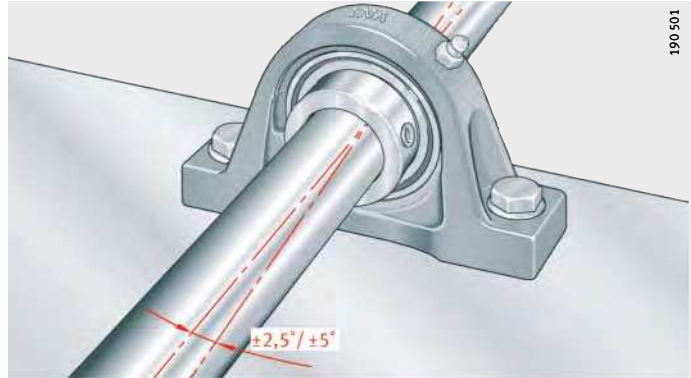
## Compensation of misalignments

Units with a spherical bearing outer ring and concave housing bore can compensate for static misalignment of the shaft, *Figure 6*:

- if relubrication is carried out, up to  $\pm 2,5^\circ$
- if relubrication is not carried out, up to  $\pm 5^\circ$ .



The units must not be used to support swivelling or tumbling motion.



*Figure 6*  
Compensation of static shaft misalignment

## Load carrying capacity of housings



Due to their versatile characteristics, INA housing units can be easily used in almost all industrial sectors.

If bearing arrangements are planned for equipment in which a malfunction could be hazardous to persons or an unplanned stoppage of the machine could cause major disruption, it is essential that you consult us before proceeding with the design.

### Cast iron housings, radial load carrying capacity

Cast iron housings can support the same radial loads as the insert bearings fitted. The static load carrying capacity of radial insert ball bearings  $C_{0r}$  is stated in the dimension tables.

For shock loads, appropriate safety factors must be applied. In this case, please contact us.



In the case of TUE and TUEO, the maximum radial tensile loading is only  $0,25 \times C_{0r}$  (higher loads by agreement only).

### Axial load carrying capacity

The axial load carrying capacity of cast iron housings is restricted to  $0,50 \times C_{0r}$ .

### Sheet steel housings, radial load carrying capacity

Sheet steel housings are suitable for moderate loads.

The permissible radial load carrying capacity  $C_{0rG}$  of sheet steel housings is given in the dimension tables.

### Axial load carrying capacity

Permissible axial load carrying capacity of sheet steel housings, see table.

### Permissible axial load carrying capacity

Units with sheet steel housings	Permissible axial load carrying capacity <sup>1)</sup>
MSTU	$0,20 \times C_{0rG}$
PHUSE	$0,25 \times C_{0rG}$
PB, PBY, RPB	$0,33 \times C_{0rG}$
PBS	$0,20 \times C_{0rG}$
RALTR, RATR, RATRY, RRTR	$0,50 \times C_{0rG}$
PCSLT, RAT, RATY, RALT	$0,50 \times C_{0rG}$
RCSMF	$0,33 \times C_{0rG}$
RA, RAY, GRA, RRY, GRRY	$0,50 \times C_{0rG}$

<sup>1)</sup>  $C_{0rG}$  is the permissible radial load carrying capacity of the sheet steel housing according to the dimension table.



# Housing units

## Load carrying capacity and speed limits of radial insert ball bearings



In the design of housing units, attention must be paid to the load carrying capacity and speed limits of the radial insert ball bearings fitted:

- axial load carrying capacity, see page 1181
- speed limits, see page 1182
- dimension table, see page 1242.

## Design of adjacent construction

The permissible shaft tolerance is dependent on the speed, load and the insert bearing fitted.

Shafts in the tolerance zone h6 up to h9 can be used. Conventional drawn shafts will suffice for most applications.

## Screw mounting surfaces

Recommendations for the screw mounting surfaces:

- roughness of the screw mounting surface max.  $R_a 12,5$  ( $R_z 63$ )
- geometrical tolerance 0,04/100 concave, spherical not permissible.

## Fixing screws

The screw connection should be designed according to VDI 2230; friction value  $\mu = 0,14$ . Screws of grade 8.8 or better can be used. For fixing, hexagonal socket head screws to DIN EN ISO 4 762 should be used. The screws should be secured by at least a washer to DIN EN ISO 7 089/7 090 or additionally with a lock washer to DIN 128 or a conical spring washer to DIN 6 796.

The screws are not included in the delivery.

## Bearing end caps

The ends of shafts can be covered using bearing end caps made from styrene-acrylnitrile copolymer (SAN), see table and *Figure 7*. The caps are suitable for temperatures from  $-20\text{ °C}$  to  $+80\text{ °C}$ . They guard against injury due to rotating shafts and also protect the bearings against contamination.

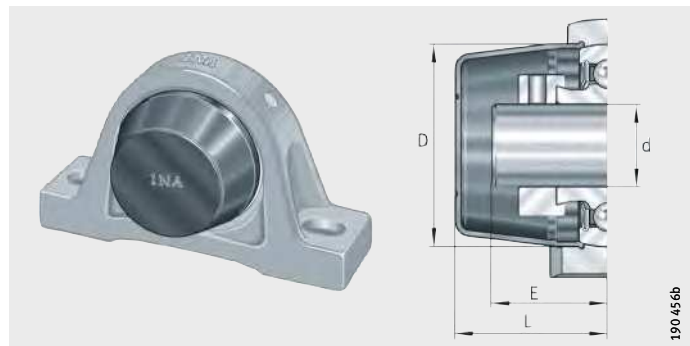
For location of the caps, housings with the suffix N have an annular slot on the side with the locating slot.

Fitting of the caps is described on page 1238.

The series for which end caps are supplied are indicated in the dimension tables. Bearing end caps are accessories and must always be ordered separately.

### End caps

Bearing end caps Designation	Dimensions			
	d	D	L	E max.
<b>KASK04</b>	20	48	36	30
<b>KASK05</b>	25	54	38	30
<b>KASK06</b>	30	63	44	35
<b>KASK07</b>	35	73	47	39
<b>KASK08</b>	40	82	51	42
<b>KASK10</b>	50	92	56	46
<b>KASK12</b>	60	112	65	55



*Figure 7*  
Housing unit with bearing end cap

# Housing units

## Fitting and dismantling

Radial insert ball bearings must be handled with care before and during assembly. Their trouble-free operation is also dependent on the care taken in fitting.

## Delivered condition

The housings have a coating of anthracite grey primer ( $\approx$ RAL 7016). The radial insert ball bearings are greased; for information on the grease used, see the Features section for the specific bearing, page 1178.

## Storage and storage period

The units should be stored:

- in dry, clean rooms with the temperature as constant as possible
- at a relative humidity of max. 65%.

The storage period of radial insert ball bearings is limited by the storage life of the grease, see section Lubrication, page 76.

## Removal from packaging

Perspiration causes corrosion. Hands must be kept clean and dry. Bearings should not be removed from their original packaging until immediately before assembly.

## Guidelines for fitting



If the cast iron housing and bearing are not supplied by INA as a ready-to-fit unit but are instead combined by the customer, the following guidelines should be followed:

- if the fit is too loose, grease can escape between the housing and bearing and will not therefore reach the bearing during relubrication
- if the fit is too tight, the bearing outer ring cannot align itself within the housing bore.

The assembly area should be as dry and clean as possible.

First, screw mount the housing on the adjacent construction, then locate the bearing inner ring on the shaft.

If this sequence is applied, the bearing aligns itself to the shaft in such a way that no stresses occur.

Provide the fitting tools and fixing screws.

Clean the shaft and remove any burrs.

Inspect the bearing seating surfaces on the shaft.

Keep bearing seating surfaces clean, dry and free of grease.



The specified tolerances must be observed.

Fitting forces must never be directed through the rolling elements.

Blows should never be applied directly to the bearing rings and seals.

## Fitting of coated components

Before fitting, the compatibility of Corrotect<sup>®</sup>-coated products with the media should be checked.

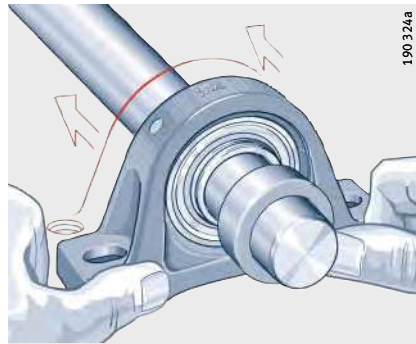
The tolerances are increased by the thickness of the coating.

In order to reduce the forces involved in pressing-in, the surface of the parts should be lightly greased or a mounting paste used.



**Fitting of cast iron units  
Plummer block and  
flanged housing units**

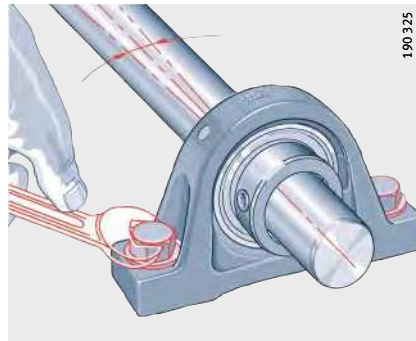
Push the housing unit onto the shaft and align it with the fixing holes in the adjacent construction, *Figure 8*.



*Figure 8*  
Pushing the unit onto the shaft

Screw the housing to the adjacent construction using the fixing screws, *Figure 9*.

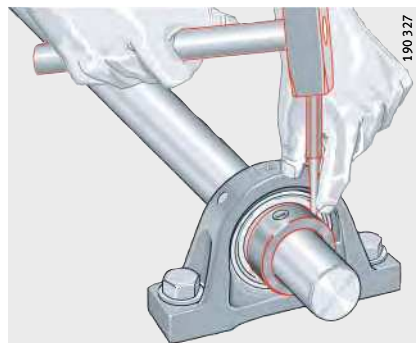
If the shaft is to be supported by several housing units, tighten the screws finger tight at first, align the shaft and then tighten the screws securely.



*Figure 9*  
Screw mounting  
the housing finger tight

Slide the eccentric locking collar onto the collar seat on the bearing inner ring and rotate by hand, preferably in the direction of shaft rotation, *Figure 10*.

Using a drift and hammer, tension the eccentric locking collar by means of one or two strong blows, *Figure 10*.



*Figure 10*  
Tensioning the eccentric  
locking collar



# Housing units

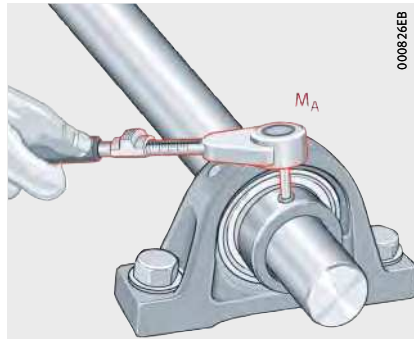
For location using a locking collar, tighten the grub screw by means of a torque wrench, *Figure 11*.

For location using grub screws in the inner ring, tighten both grub screws by means of a torque wrench.



Observe the tightening torque  $M_A$  according to the table.

Tightening torques for inch size grub screws: see TPI 127, Radial insert ball bearings/housing units in inch sizes.



*Figure 11*  
Tightening the grub screw in the eccentric locking collar or inner ring

## Dismantling

For bearings with an eccentric locking collar, undo the grub screw and rotate the locking collar in the opposite direction to the direction of shaft rotation.

For bearings with grub screws in the inner ring, undo both grub screws.

Unbolt the housing.

## Tightening torques for metric grub screws

Width across flats W mm	Thread	Tightening torques <sup>1)</sup> $M_A$ Nm
2,5	M5	3,6
3	M6×0,75	6
4	M8×1	14
5	M10×1,25	26
6	M12, M12×1,25 <sup>2)</sup>	42

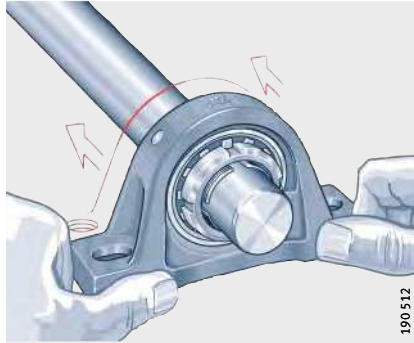
1) The tightening torques are valid for original INA grub screws only.

2) GYE90-KRR-B.

## Fitting of cast iron units Radial insert ball bearings with integral adapter sleeve

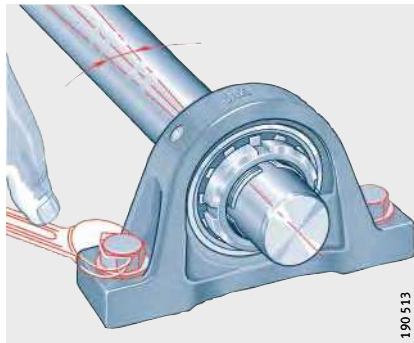
The bearing seats on the shaft and outside surface of the adapter must be dry and free of grease.

Push the housing unit onto the shaft and align it with the fixing holes in the adjacent construction, *Figure 12*.



*Figure 12*  
Pushing the unit onto the shaft

Screw the housing to the adjacent construction using the fixing screws, *Figure 13*. If the shaft is to be supported by several housing units, tighten the screws finger tight at first, align the shaft and then tighten the screws securely.



*Figure 13*  
Screw mounting  
the housing finger tight

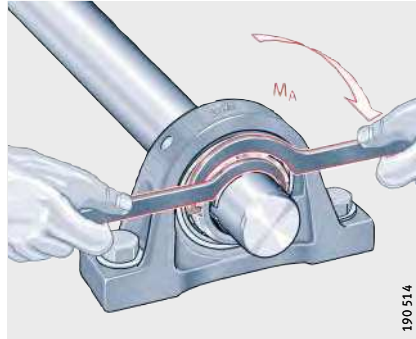


## Housing units

Tighten the locknut using 2 hook wrenches of type A to DIN 1810; during tightening, the adapter sleeve must be held in place using a second hook wrench, *Figure 14*. Wrenches for tightening and holding, see table.



Do not exceed the maximum tightening torque  $M_A$  given in the table, otherwise the operating clearance in the bearing will become too small. Driving the locknut up will slightly displace the bearing in an axial direction.



*Figure 14*  
Tightening of locknut

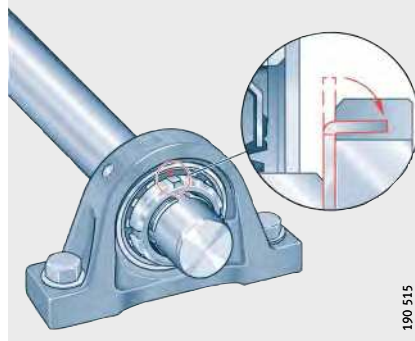
### Hook wrenches and tightening torques

Shaft diameter d mm	Hook wrench, type A, to DIN 1810		Tightening torque Locknut	
	For tightening locknut	For holding adapter sleeve	$M_{A \min}$ Nm	$M_{A \max}$ Nm
20	A 30–32 (HN 4)	A 25–28 (HN 2)	13	17
25	A 40–42 (HN 5)	A 30–32 (HN 3)	22	28
30	A 45–50 (HN 6)	A 34–36 (HN 4)	33	40
35	A 52–55 (HN 7)	A 40–42 (HN 5)	47	56
40	A 58–62 (HN 8)	A 45–50 (HN 6)	70	80
50	A 68–75 (HN 10)	A 52–55 (HN 7)	90	105

Bend the tab on the tab washer into a groove in the locknut to secure the nut against loosening, *Figure 15*.



Ensure that the seal in the bearing is not damaged when bending the locking tab over.



*Figure 15*  
Securing of locknut

**Dismantling**

Bend back the tab on the tab washer and undo the locknut by a few turns. Place the impact cap in front of the locknut and drive the adapter sleeve off the shaft seat using hammer blows. Unbolt the housing.



# Housing units

## Fitting of bearing end caps



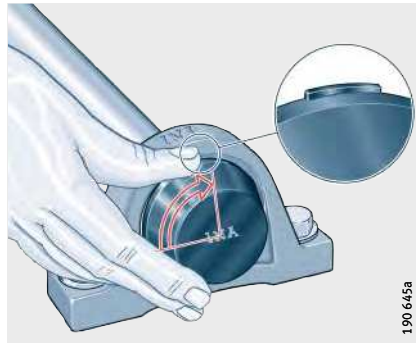
Description of bearing end caps: see Bearing end caps, page 1231. Bearing end caps should only be fitted or dismantled while the shaft is stationary. There is a serious danger of injury if the shaft is rotating.

Position the tabs of the end cap in the locating slots, observing the position of the INA logo, *Figure 16*.



*Figure 16*  
Positioning the cap

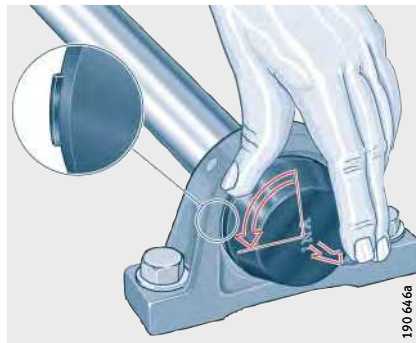
Rotate the end cap clockwise by 90°, observing the position of the INA logo, *Figure 17*. Check that the end cap is securely located in the housing.



*Figure 17*  
Locking the cap in place

## Dismantling

Loosen the end cap by rotating it anticlockwise (90°), observing the position of the INA logo, *Figure 18*.



*Figure 18*  
Removing the cap

## Fitting of sheet steel units with eccentric locking collar and grub screws in the inner ring



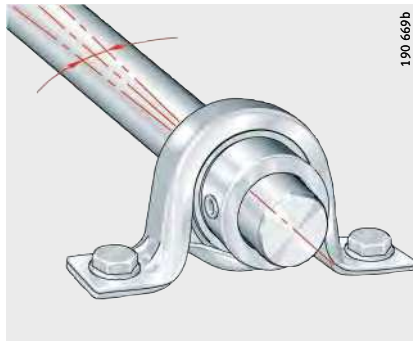
With two-piece housings, the housing and radial insert ball bearing should be assembled first.

Push the housing unit onto the shaft and align it with the fixing holes in the adjacent construction, *Figure 19*.



*Figure 19*  
Pushing the unit onto the shaft

Screw the housing to the adjacent construction using the fixing screws, *Figure 20*. If the shaft is to be supported by several housing units, tighten the screws finger tight at first, align the shaft and then tighten the screws securely.



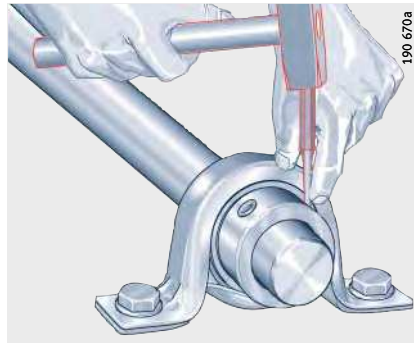
*Figure 20*  
Screw mounting  
the housing finger tight



## Housing units

Slide the eccentric locking collar onto the collar seat on the bearing inner ring and rotate by hand, preferably in the direction of shaft rotation.

Using a drift and hammer, tension the eccentric locking collar by means of one or two strong blows, *Figure 21*.



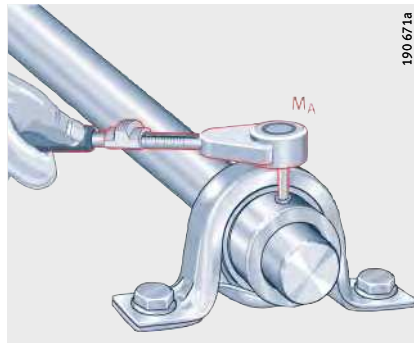
*Figure 21*  
Tensioning the eccentric locking collar

For location using a locking collar, tighten the grub screw by means of a torque wrench, *Figure 22*.

For location using grub screws in the inner ring, tighten both grub screws by means of a torque wrench.



Observe the tightening torque  $M_A$  according to the table, page 1234.



*Figure 22*  
Tightening the grub screw in the eccentric locking collar or inner ring

### Dismantling

For bearings with an eccentric locking collar, undo the grub screw and rotate the locking collar in the opposite direction to the direction of shaft rotation.

For bearings with grub screws in the inner ring, undo both grub screws.

Unbolt the housing.



**Accuracy** The cast iron and sheet steel housings correspond predominantly to DIN 626-2 and ISO 3 228, insofar as they are described therein.  
Cast iron housing series with the suffix -JIS are designed in accordance with the “Japanese Industry Standard” JIS B 1559.  
Accuracy of fitted radial insert ball bearings: see page 1183.

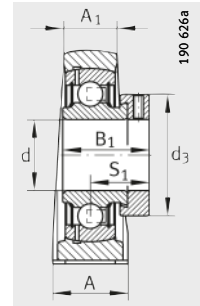
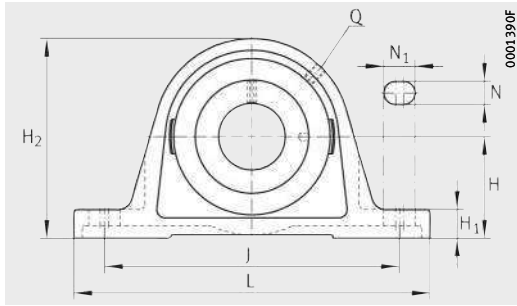
**Cast iron housings** The dimensional tolerances for the machined surfaces of the cast iron housings are  $\pm 0,25$  mm.  
The dimensional tolerances for unmachined as well as machined to unmachined cast surfaces correspond to GTB 14 DIN 1 680-2.  
For the JIS design, the dimensional tolerances correspond to ISO 8 062/CT10.

**Sheet steel housings** The dimensional tolerances for the sheet steel housings correspond to DIN 6930. For location of sheet steel housings with square bores, the use of mushroom head bolts with a square neck (DIN 603) or a short square neck (DIN 11 015) is recommended.



# Plummer block housing units

Cast iron housings  
With long base



PASE (-FA125), RASE (-FA125, -FA164), TASE, LASE, PASEY, RASEY (-JIS), RASEA, RASEL

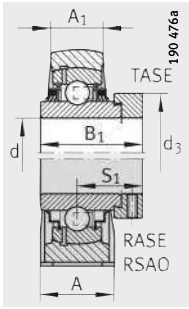
PASE

Dimension table - Dimensions in mm

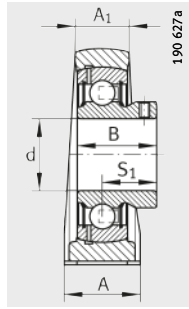
Designation			Mass m ≈kg	Dimensions					
Unit	Housing	Radial insert ball bearing		d	H	J	L	A	A <sub>1</sub>
PASE12	GG.ASE03	GRAE12-NPP-B	0,46	12	30,2	95	125	30	18
PASEY12	GG.ASE03	GAY12-NPP-B	0,44	12	30,2	95	125	30	18
RASEY12	GG.ASE03	GYE12-KRR-B	0,45	12	30,2	95	125	30	18
PASE15	GG.ASE03	GRAE15-NPP-B	0,46	15	30,2	95	125	30	18
PASEY15	GG.ASE03	GAY15-NPP-B	0,43	15	30,2	95	125	30	18
RASEY15	GG.ASE03	GYE15-KRR-B	0,45	15	30,2	95	125	30	18
RASEY16	GG.ASE03	GYE16-KRR-B	0,45	16	30,2	95	125	30	18
PASE17	GG.ASE03	GRAE17-NPP-B	0,46	17	30,2	95	125	30	18
RASE17	GG.ASE03	GE17-KRR-B	0,5	17	30,2	95	125	30	18
PASEY17	GG.ASE03	GAY17-NPP-B	0,42	17	30,2	95	125	30	18
RASEY17	GG.ASE03	GYE17-KRR-B	0,45	17	30,2	95	125	30	18
PASE20-N	GG.ASE04-E-N	GRAE20-NPP-B	0,6	20	33,3	97	130	32	19
PASE20-N-FA125	GG.ASE04-E-N-FA125.1	GRAE20-NPP-B-FA125.5	0,55	20	33,3	97	130	32	19
RASE20-N	GG.ASE04-E-N	GE20-KRR-B	0,63	20	33,3	97	130	32	19
RASE20-N-FA125	GG.ASE04-E-N-FA125.1	GE20-KRR-B-FA125.5	0,59	20	33,3	97	130	32	19
RASE20-FA164 <sup>1)</sup>	GG.ASE04-E-N	GE20-KRR-B-FA164	0,64	20	33,3	97	130	32	19
TASE20-N	GG.ASE04-E-N	GE20-KTT-B	0,63	20	33,3	97	130	32	19
LASE20-N	GG.ASE04-E-N	GE20-KLL-B	0,63	20	33,3	97	130	32	19
PASEY20-N	GG.ASE04-E-N	GAY20-NPP-B	0,56	20	33,3	97	130	32	19
RASEY20-N	GG.ASE04-E-N	GYE20-KRR-B	0,58	20	33,3	97	130	32	19
RASEY20-JIS	GG.P204	GYE20-KRR-B-FA107	0,63	20	33,3	95	127	38	22
RASEA20-N	GG.ASE04-E-N	GSH20-2RSR-B	0,51	20	33,3	97	130	32	19
RASEL20-N	GG.ASE04-E-N	GLE20-KRR-B	0,58	20	33,3	97	130	32	19
PASE25-N	GG.ASE05-N	GRAE25-NPP-B	0,7	25	36,5	103	130	36	21
PASE25-N-FA125	GG.ASE05-N-FA125.1	GRAE25-NPP-B-FA125.5	0,7	25	36,5	103	130	36	21
RASE25-N	GG.ASE05-N	GE25-KRR-B	0,75	25	36,5	103	130	36	21
RASE25-N-FA125	GG.ASE05-N-FA125.1	GE25-KRR-B-FA125.5	0,75	25	36,5	103	130	36	21
RASE25-FA164 <sup>1)</sup>	GG.ASE05-N	GE25-KRR-B-FA164	0,75	25	36,5	103	130	36	21
TASE25-N	GG.ASE05-N	GE25-KTT-B	0,75	25	36,5	103	130	36	21
LASE25-N	GG.ASE05-N	GE25-KLL-B	0,76	25	36,5	103	130	36	21
PASEY25-N	GG.ASE05-N	GAY25-NPP-B	0,61	25	36,5	103	130	36	21
RASEY25-N	GG.ASE05-N	GYE25-KRR-B	0,7	25	36,5	103	130	36	21
RASEY25-JIS	GG.P205	GYE25-KRR-B-FA107	0,79	25	36,5	105	140	38	23
RASEA25-N	GG.ASE05-N	GSH25-2RSR-B	0,6	25	36,5	103	130	36	21
RASEL25-N	GG.ASE05-N	GLE25-KRR-B	0,7	25	36,5	103	130	36	21

<sup>1)</sup> With lubrication nipple DIN 71412-AR 1/8.

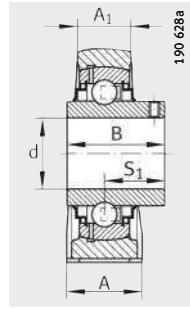
<sup>2)</sup> To be ordered separately.



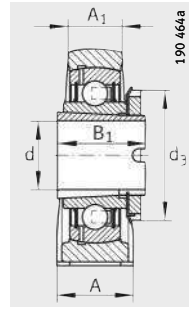
RASE, TASE, LASE



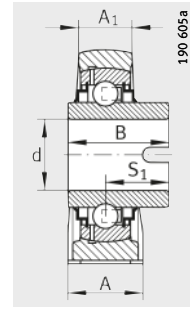
PASEY



RASEY (-JIS)



RASEA



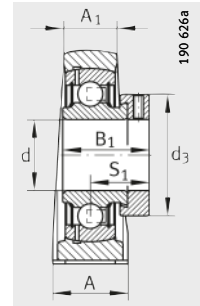
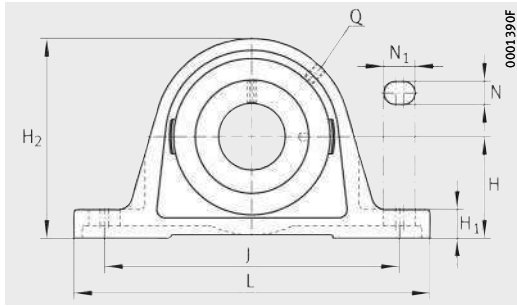
RASEL

H <sub>1</sub>	H <sub>2</sub>	N	N <sub>1</sub>	B	B <sub>1</sub>	S <sub>1</sub>	Q	d <sub>3</sub> max.	Basic load ratings		End cap <sup>2)</sup>
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
10	57	11	19	-	28,6	22,1	M6	28	9 800	4 750	-
10	57	11	19	22	-	16	M6	-	9 800	4 750	-
10	57	11	19	27,4	-	15,9	M6	-	9 800	4 750	-
10	57	11	19	-	28,6	22,1	M6	28	9 800	4 750	-
10	57	11	19	22	-	16	M6	-	9 800	4 750	-
10	57	11	19	27,4	-	15,9	M6	-	9 800	4 750	-
10	57	11	19	27,4	-	15,9	M6	-	9 800	4 750	-
10	57	11	19	-	28,6	22,1	M6	28	9 800	4 750	-
10	57	11	19	-	37,4	23,4	M6	28	9 800	4 750	-
10	57	11	19	22	-	16	M6	-	9 800	4 750	-
10	57	11	19	27,4	-	15,9	M6	-	9 800	4 750	-
14,5	64	11	19	-	31	23,5	R <sub>p</sub> 1/8	33	12 800	6 600	KASK04
14,5	64	11	19	-	31	23,5	R <sub>p</sub> 1/8	33	12 800	6 600	KASK04
14,5	64	11	19	-	43,7	26,6	R <sub>p</sub> 1/8	33	12 800	6 600	KASK04
14,5	64	11	19	-	43,7	26,6	R <sub>p</sub> 1/8	33	12 800	6 600	KASK04
14,5	64	11	19	-	43,7	26,6	R <sub>p</sub> 1/8	33	12 800	6 600	-
14,5	64	11	19	-	43,7	26,6	R <sub>p</sub> 1/8	33	12 800	6 600	KASK04
14,5	64	11	19	-	43,7	26,6	R <sub>p</sub> 1/8	33	12 800	6 600	KASK04
14,5	64	11	19	25	-	18	R <sub>p</sub> 1/8	33	12 800	6 600	KASK04
14,5	64	11	19	31	-	18,3	R <sub>p</sub> 1/8	-	12 800	6 600	KASK04
14	65	13	19	31	-	18,3	M6	-	12 800	6 600	-
14,5	64	11	19	-	28	-	R <sub>p</sub> 1/8	32	12 700	6 600	KASK04
14,5	64	11	19	34,1	-	18,5	R <sub>p</sub> 1/8	-	12 800	6 600	KASK04
14,5	70	11	19	-	31	23,5	R <sub>p</sub> 1/8	37,5	14 000	7 800	KASK05
14,5	70	11	19	-	31	23,5	R <sub>p</sub> 1/8	37,5	14 000	7 800	KASK05
14,5	70	11	19	-	44,5	27	R <sub>p</sub> 1/8	37,5	14 000	7 800	KASK05
14,5	70	11	19	-	44,5	27	R <sub>p</sub> 1/8	37,5	14 000	7 800	KASK05
14,5	70	11	19	-	44,5	27	R <sub>p</sub> 1/8	37,5	14 000	7 800	-
14,5	70	11	19	-	44,5	27	R <sub>p</sub> 1/8	37,5	14 000	7 800	KASK05
14,5	70	11	19	-	44,5	27	R <sub>p</sub> 1/8	37,5	14 000	7 800	KASK05
14,5	70	11	19	27	-	19,5	R <sub>p</sub> 1/8	-	14 000	7 800	KASK05
14,5	70	11	19	34,1	-	19,6	R <sub>p</sub> 1/8	-	14 000	7 800	KASK05
15	71	13	19	34,1	-	19,8	M6	-	14 000	7 800	-
14,5	70	11	19	-	28	-	R <sub>p</sub> 1/8	38	13 600	7 800	KASK05
14,5	70	11	19	34,9	-	20,2	R <sub>p</sub> 1/8	-	14 000	7 800	KASK05



# Plummer block housing units

Cast iron housings  
With long base



PASE (-FA125), RASE (-FA125, -FA164), TASE, LASE, RSAO, PASEY, RASEY (-JIS), RASEA, RASEL

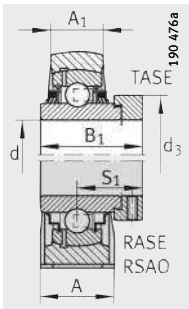
PASE

Dimension table (continued) · Dimensions in mm

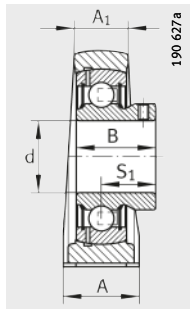
Designation			Mass m ≈kg	Dimensions					
Unit	Housing	Radial insert ball bearing		d	H	J	L	A	A <sub>1</sub>
PASE30-N	GG.ASE06-N	GRAE30-NPP-B	1,13	30	42,9	118	158	40	25
PASE30-N-FA125	GG.ASE06-N-FA125.1	GRAE30-NPP-B-FA125.5	1,11	30	42,9	118	158	40	25
RASE30-N	GG.ASE06-N	GE30-KRR-B	1,11	30	42,9	118	158	40	25
RASE30-N-FA125	GG.ASE06-N-FA125.1	GE30-KRR-B-FA125.5	1,18	30	42,9	118	158	40	25
RASE30-FA164 <sup>1)</sup>	GG.ASE06-N	GE30-KRR-B-FA164	1,21	30	42,9	118	158	40	25
TASE30-N	GG.ASE06-N	GE30-KTT-B	1,2	30	42,9	118	158	40	25
LASE30-N	GG.ASE06-N	GE30-KLL-B	1,2	30	42,9	118	158	40	25
RSAO30	GG.SAO06	GNE30-KRR-B	1,8	30	50	140	180	50	28
PASEY30-N	GG.ASE06-N	GAY30-NPP-B	1,07	30	42,9	118	158	40	25
RASEY30-N	GG.ASE06-N	GYE30-KRR-B	1,13	30	42,9	118	158	40	25
RASEY30-JIS	GG.P206	GYE30-KRR-B-FA107	1,3	30	42,9	121	165	48	26
RASEA30-N	GG.ASE06-N	GSH30-2RSR-B	1	30	42,9	118	158	40	25
RASEL30-N	GG.ASE06-N	GLE30-KRR-B	1,1	30	42,9	118	158	40	25
PASE35-N	GG.ASE06-N	GRAE35-NPP-B	1,57	35	47,6	126	163	45	27
PASE35-N-FA125	GG.ASE07-N-FA125.1	GRAE35-NPP-B-FA125.5	1,53	35	47,6	126	163	45	27
RASE35-N	GG.ASE07-N	GE35-KRR-B	1,65	35	47,6	126	163	45	27
RASE35-N-FA125	GG.ASE07-N-FA125.1	GE35-KRR-B-FA125.5	1,6	35	47,6	126	163	45	27
RASE35-FA164 <sup>1)</sup>	GG.ASE07-N	GE35-KRR-B-FA164	1,62	35	47,6	126	163	45	27
TASE35-N	GG.ASE07-N	GE35-KTT-B	1,65	35	47,6	126	163	45	27
LASE35-N	GG.ASE07-N	GE35-KLL-B	1,6	35	47,6	126	163	45	27
RSAO35	GG.SAO07	GNE35-KRR-B	2,75	35	56	160	210	56	30
PASEY35-N	GG.ASE07-N	GAY35-NPP-B	1,45	35	47,6	126	163	45	27
RASEY35-N	GG.ASE07-N	GYE35-KRR-B	1,55	35	47,6	126	163	45	27
RASEY35-JIS	GG.P207	GYE35-KRR-B-FA107	1,41	35	47,6	127	167	48	27
RASEA35-N	GG.ASE07-N	GSH35-2RSR-B	1,48	35	47,6	126	163	45	27

1) With lubrication nipple DIN 71412-AR 1/8.

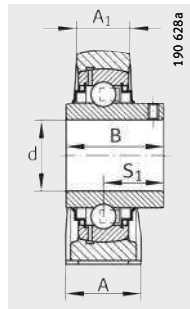
2) To be ordered separately.



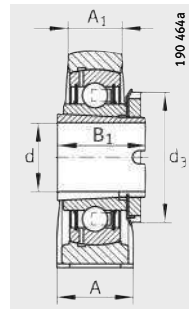
RASE, RSAO, TASE,  
LASE



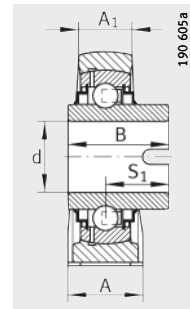
PASEY



RASEY (-JIS)



RASEA



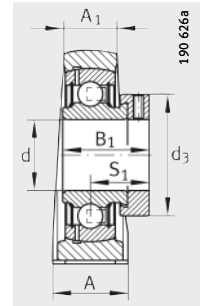
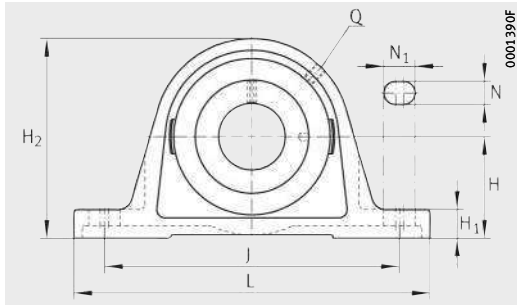
RASEL

H <sub>1</sub>	H <sub>2</sub>	N	N <sub>1</sub>	B	B <sub>1</sub>	S <sub>1</sub>	Q	d <sub>3</sub> max.	Basic load ratings		End cap <sup>2)</sup>
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
17	82	14	22	–	35,8	26,8	R <sub>p</sub> 1/8	44	19 500	11 300	KASK06
17	82	14	22	–	35,8	26,8	R <sub>p</sub> 1/8	44	19 500	11 300	KASK06
17	82	14	22	–	48,5	30,2	R <sub>p</sub> 1/8	44	19 500	11 300	KASK06
17	82	14	22	–	48,5	30,2	R <sub>p</sub> 1/8	44	19 500	11 300	KASK06
17	82	14	22	–	48,5	30,2	R <sub>p</sub> 1/8	44	19 500	11 300	–
17	82	14	22	–	48,5	30,2	R <sub>p</sub> 1/8	44	19 500	11 300	KASK06
17	82	14	22	–	48,5	30,2	R <sub>p</sub> 1/8	44	19 500	11 300	KASK06
18	95	17,5	20,5	–	50	32,5	R <sub>p</sub> 1/8	51	29 500	16 700	–
17	82	14	22	30	–	21	R <sub>p</sub> 1/8	–	19 500	11 300	KASK06
17	82	14	22	38,1	–	22,2	R <sub>p</sub> 1/8	–	19 500	11 300	KASK06
17	83	17	21	38,1	–	22,2	M6	–	19 500	11 300	–
17	82	14	22	–	32	–	R <sub>p</sub> 1/8	45	18 900	11 300	KASK06
17	82	14	22	36,5	–	22	R <sub>p</sub> 1/8	–	19 500	11 300	KASK06
19	93	14	21	–	39	29,5	R <sub>p</sub> 1/8	51	25 500	15 300	KASK07
19	93	14	21	–	39	29,5	R <sub>p</sub> 1/8	51	25 500	15 300	KASK07
19	93	14	21	–	51,3	32,5	R <sub>p</sub> 1/8	51	25 500	15 300	KASK07
19	93	14	21	–	51,3	32,5	R <sub>p</sub> 1/8	51	25 500	15 300	KASK07
19	93	14	21	–	51,3	32,5	R <sub>p</sub> 1/8	51	25 500	15 300	–
19	93	14	21	–	51,3	32,5	R <sub>p</sub> 1/8	51	25 500	15 300	KASK07
19	93	14	21	–	51,3	32,5	R <sub>p</sub> 1/8	51	25 500	15 300	KASK07
20	106	17,5	25,5	–	51,6	33,4	R <sub>p</sub> 1/8	55	36 500	20 900	–
19	93	14	21	34,95	–	25,45	R <sub>p</sub> 1/8	–	25 500	15 300	KASK07
19	93	14	21	42,9	–	25,4	R <sub>p</sub> 1/8	–	25 500	15 300	KASK07
18	93	17	21	42,9	–	25,4	M6	–	25 500	15 300	–
19	93	14	21	–	34	–	R <sub>p</sub> 1/8	52	24 900	15 300	KASK07



# Plummer block housing units

Cast iron housings  
With long base



PASE (-FA125), RASE (-FA125, -FA164), TASE, LASE,  
RSAO, PASEY, RASEY (-JIS), RASEA, RASEL

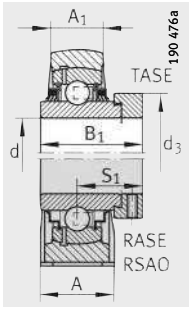
PASE

Dimension table (continued) · Dimensions in mm

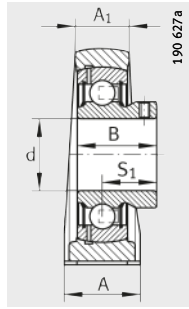
Designation			Mass m ≈kg	Dimensions					
Unit	Housing	Radial insert ball bearing		d	H	J	L	A	A <sub>1</sub>
<b>PASE40-N</b>	GG.ASE/AK08-N	GRAE40-NPP-B	1,84	<b>40</b>	49,2	138	179	48	30
<b>PASE40-N-FA125</b>	GG.ASE/AK08-N-FA125.1	GRAE40-NPP-B-FA125.5	1,84	<b>40</b>	49,2	138	179	48	30
<b>RASE40-N</b>	GG.ASE/AK08-N	GE40-KRR-B	1,95	<b>40</b>	49,2	138	179	48	30
<b>RASE40-N-FA125</b>	GG.ASE/AK08-N-FA125.1	GE40-KRR-B-FA125.5	1,95	<b>40</b>	49,2	138	179	48	30
<b>RASE40-FA164<sup>1)</sup></b>	GG.ASE/AK08-N	GE40-KRR-B-FA164	1,97	<b>40</b>	49,2	138	179	48	30
<b>TASE40-N</b>	GG.ASE/AK08-N	GE40-KTT-B	1,96	<b>40</b>	49,2	138	179	48	30
<b>LASE40-N</b>	GG.ASE/AK08-N	GE40-KLL-B	1,97	<b>40</b>	49,2	138	179	48	30
<b>RSAO40</b>	GG.SAO08	GNE40-KRR-B	3,18	<b>40</b>	60	170	220	60	31
<b>PASEY40-N</b>	GG.ASE/AK08-N	GAY40-NPP-B	1,75	<b>40</b>	49,2	138	179	48	30
<b>RASEY40-N</b>	GG.ASE/AK08-N	GYE40-KRR-B	1,84	<b>40</b>	49,2	138	179	48	30
<b>RASEY40-JIS</b>	GG.P208	GYE40-KRR-B-FA107	1,68	<b>40</b>	49,2	137	184	54	30
<b>RASEA40-N</b>	GG.ASE/AK08-N	GSH40-2RSR-B	1,71	<b>40</b>	49,2	138	179	48	30
<b>RASEL40-N</b>	GG.ASE/AK08-N	GLE40-KRR-B	1,79	<b>40</b>	49,2	138	179	48	30
<b>PASE45</b>	GG.ASE09	GRAE45-NPP-B	2,15	<b>45</b>	54	150	192	48	32
<b>PASE45-FA125</b>	GG.ASE09-FA125.1	GRAE45-NPP-B-FA125.5	2,12	<b>45</b>	54	150	192	48	32
<b>RASE45</b>	GG.ASE09	GE45-KRR-B	2,28	<b>45</b>	54	150	192	48	32
<b>RASE45-FA125</b>	GG.ASE09-FA125.1	GE45-KRR-B-FA125.5	2,21	<b>45</b>	54	150	192	48	32
<b>TASE45</b>	GG.ASE09	GE45-KTT-B	2,28	<b>45</b>	54	150	192	48	32
<b>LASE45</b>	GG.ASE09	GE45-KLL-B	2,3	<b>45</b>	54	150	192	48	32
<b>PASEY45</b>	GG.ASE09	GAY45-NPP-B	2,06	<b>45</b>	54	150	192	48	32
<b>RASEY45</b>	GG.ASE09	GYE45-KRR-B	2,16	<b>45</b>	54	150	192	48	32
<b>RASEY45-JIS</b>	GG.P209	GYE45-KRR-B-FA107	2,07	<b>45</b>	54	146	190	54	30
<b>RASEL45</b>	GG.ASE09	GLE45-KRR-B	2,1	<b>45</b>	54	150	192	48	32
<b>PASE50-N</b>	GG.ASE10-N	GRAE50-NPP-B	2,59	<b>50</b>	57,2	158	200	54	34
<b>PASE50-N-FA125</b>	GG.ASE10-N-FA125.1	GRAE50-NPP-B-FA125.5	2,47	<b>50</b>	57,2	158	200	54	34
<b>RASE50-N</b>	GG.ASE10-N	GE50-KRR-B	2,8	<b>50</b>	57,2	158	200	54	34
<b>RASE50-N-FA125</b>	GG.ASE10-N-FA125.1	GE50-KRR-B-FA125.5	2,7	<b>50</b>	57,2	158	200	54	34
<b>RASE50-FA164<sup>1)</sup></b>	GG.ASE10-N	GE50-KRR-B-FA164	2,82	<b>50</b>	57,2	158	200	54	34
<b>TASE50-N</b>	GG.ASE10-N	GE50-KTT-B	2,8	<b>50</b>	57,2	158	200	54	34
<b>LASE50-N</b>	GG.ASE10-N	GE50-KLL-B	2,82	<b>50</b>	57,2	158	200	54	34

<sup>1)</sup> With lubrication nipple DIN 71412-AR 1/8.

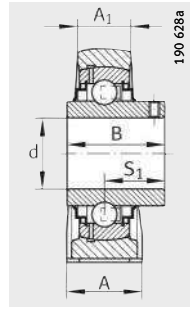
<sup>2)</sup> To be ordered separately.



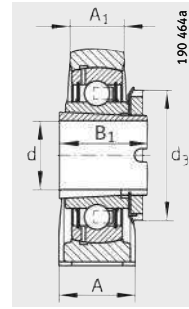
RASE, RSAO, TASE,  
LASE



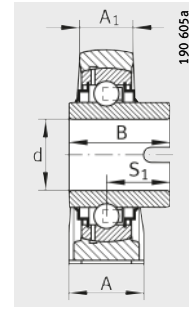
PASEY



RASEY (-JIS)



RASEA



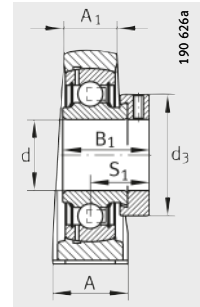
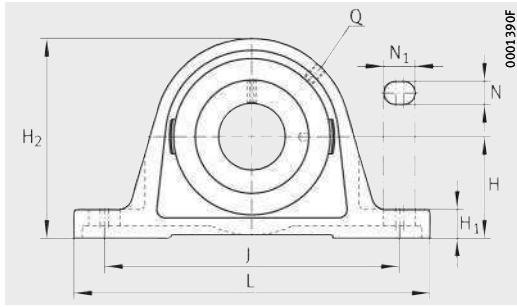
RASEL

H <sub>1</sub>	H <sub>2</sub>	N	N <sub>1</sub>	B	B <sub>1</sub>	S <sub>1</sub>	Q	d <sub>3</sub> max.	Basic load ratings		End cap <sup>2)</sup>
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
19	99	14	26	–	43,8	32,8	R <sub>p</sub> 1/8	58	32 500	19 800	KASK08
19	99	14	26	–	43,8	32,8	R <sub>p</sub> 1/8	58	32 500	19 800	KASK08
19	99	14	26	–	56,5	35,1	R <sub>p</sub> 1/8	58	32 500	19 800	KASK08
19	99	14	26	–	56,5	35,1	R <sub>p</sub> 1/8	58	32 500	19 800	KASK08
19	99	14	26	–	56,5	35,1	R <sub>p</sub> 1/8	58	32 500	19 800	–
19	99	14	26	–	56,5	35,1	R <sub>p</sub> 1/8	58	32 500	19 800	KASK08
19	99	14	26	–	56,5	35,1	R <sub>p</sub> 1/8	58	32 500	19 800	KASK08
22	116	17,5	27,5	–	54,6	36,6	R <sub>p</sub> 1/8	63	44 500	26 000	–
19	99	14	26	39,45	–	28,95	R <sub>p</sub> 1/8	–	32 500	19 800	KASK08
19	99	14	26	49,2	–	30,2	R <sub>p</sub> 1/8	–	32 500	19 800	KASK08
18	98	17	21	49,2	–	30,2	M6	–	32 500	19 800	–
19	99	14	26	–	38	–	R <sub>p</sub> 1/8	58	29 500	19 800	KASK08
19	99	14	26	42,9	–	27	R <sub>p</sub> 1/8	–	32 500	19 800	KASK08
21,5	107	14	29	–	43,8	32,8	R <sub>p</sub> 1/8	63	32 500	20 400	–
21,5	107	14	29	–	43,8	32,8	R <sub>p</sub> 1/8	63	32 500	20 400	–
21,5	107	14	29	–	56,5	35,1	R <sub>p</sub> 1/8	63	32 500	20 400	–
21,5	107	14	29	–	56,5	35,1	R <sub>p</sub> 1/8	63	32 500	20 400	–
21,5	107	14	29	–	56,5	35,1	R <sub>p</sub> 1/8	63	32 500	20 400	–
21,5	107	14	29	–	56,5	35,1	R <sub>p</sub> 1/8	63	32 500	20 400	–
21,5	107	14	29	41,5	–	30,5	R <sub>p</sub> 1/8	–	32 500	20 400	–
21,5	107	14	29	49,2	–	30,2	R <sub>p</sub> 1/8	–	32 500	20 400	–
20	106	17	21	49,2	–	30,2	M6	–	32 500	20 400	–
21,5	107	14	29	42,9	–	25,5	R <sub>p</sub> 1/8	–	32 500	20 400	–
21,5	115	18	23	–	43,8	32,8	R <sub>p</sub> 1/8	69	35 000	23 200	KASK10
21,5	115	18	23	–	43,8	32,8	R <sub>p</sub> 1/8	69	35 000	23 200	KASK10
21,5	115	18	23	–	62,8	38,2	R <sub>p</sub> 1/8	69	35 000	23 200	KASK10
21,5	115	18	23	–	62,8	38,2	R <sub>p</sub> 1/8	69	35 000	23 200	KASK10
21,5	115	18	23	–	62,8	38,2	R <sub>p</sub> 1/8	69	35 000	23 200	–
21,5	115	18	23	–	62,8	38,2	R <sub>p</sub> 1/8	69	35 000	23 200	KASK10
21,5	115	18	23	–	62,8	38,2	R <sub>p</sub> 1/8	69	35 000	23 200	KASK10



# Plummer block housing units

Cast iron housings  
With long base



PASE (-FA125), RASE (-FA164), TASE, RSAO, PASEY, RASEY (-JIS), RASEA, RASEL

PASE

Dimension table (continued) · Dimensions in mm

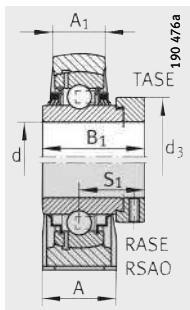
Designation			Mass m ≈kg	Dimensions					
Unit	Housing	Radial insert ball bearing		d	H	J	L	A	A <sub>1</sub>
<b>RSAO50</b>	GG.SAO10	GNE50-KRR-B	6,1	<b>50</b>	75	212	275	75	39
<b>PASEY50-N</b>	GG.ASE10-N	GAY50-NPP-B	2,49	<b>50</b>	57,2	158	200	54	34
<b>RASEY50-N</b>	GG.ASE10-N	GYE50-KRR-B	2,6	<b>50</b>	57,2	158	200	54	34
<b>RASEY50-JIS</b>	GG.P210	GYE50-KRR-B-FA107	2,57	<b>50</b>	57,2	159	206	60	32
<b>RASEA50-N</b>	GG.ASE10-N	GSH50-2RSR-B	2,09	<b>50</b>	57,2	158	200	54	34
<b>RASEL50-N</b>	GG.ASE10-N	GLE50-KRR-B	2,6	<b>50</b>	57,2	158	200	54	34
<b>PASE55</b>	GG.ASE11	GRAE55-NPP-B	2,79	<b>55</b>	63,5	176	222	60	35
<b>RASE55</b>	GG.ASE11	GE55-KRR-B	3,4	<b>55</b>	63,5	176	222	60	35
<b>TASE55</b>	GG.ASE11	GE55-KTT-B	3,51	<b>55</b>	63,5	176	222	60	35
<b>RASEY55-JIS</b>	GG.P211	GYE55-KRR-B-FA107	3,47	<b>55</b>	63,5	171	219	60	34
<b>RASEY55</b>	GG.ASE11	GYE55-KRR-B	3,22	<b>55</b>	63,5	176	222	60	35
<b>PASE60-N</b>	GG.ASE12-N	GRAE60-NPP-B	4,35	<b>60</b>	69,9	190	240	60	42
<b>PASE60-N-FA125</b>	GG.ASE12-N-FA125.1	GRAE60-NPP-B-FA125.5	4,35	<b>60</b>	69,9	190	240	60	42
<b>RASE60-N</b>	GG.ASE12-N	GE60-KRR-B	4,79	<b>60</b>	69,9	190	240	60	42
<b>RASE60-FA164<sup>1)</sup></b>	GG.ASE12-N	GE60-KRR-B-FA164	4,79	<b>60</b>	69,9	190	240	60	42
<b>TASE60-N</b>	GG.ASE12-N	GE60-KTT-B	4,77	<b>60</b>	69,9	190	240	60	42
<b>RSAO60</b>	GG.SAO12	GNE60-KRR-B	9	<b>60</b>	85	250	330	85	46
<b>PASEY60-N</b>	GG.ASE12-N	GAY60-NPP-B	4,15	<b>60</b>	69,9	190	240	60	42
<b>RASEY60-N</b>	GG.ASE12-N	GYE60-KRR-B	4,27	<b>60</b>	69,9	190	240	60	42
<b>RASEY60-JIS</b>	GG.P212	GYE60-KRR-B-FA107	4,53	<b>60</b>	69,8	184	241	70	36
<b>RASEL60-N</b>	GG.ASE12-N	GLE60-KRR-B	4,43	<b>60</b>	69,9	190	240	60	42
<b>RASE65-214<sup>3)</sup></b>	GG.ASE14	GE65-214-KRR-B	6,41	<b>65</b>	79,4	203	260	65	44
<b>TASE65-214<sup>3)</sup></b>	GG.ASE14	GE65-214-KTT-B	6,41	<b>65</b>	79,4	203	260	65	44
<b>RASEY65-214<sup>3)</sup></b>	GG.ASE14	GYE65-214-KRR-B	5,95	<b>65</b>	79,4	203	260	65	44
<b>RASE70</b>	GG.ASE14	GE70-KRR-B	6,15	<b>70</b>	79,4	203	260	65	44
<b>RASE70-FA164<sup>1)</sup></b>	GG.ASE14	GE70-KRR-B-FA164	6,15	<b>70</b>	79,4	203	260	65	44
<b>TASE70</b>	GG.ASE14	GE70-KTT-B	6,09	<b>70</b>	79,4	203	260	65	44
<b>RSAO70</b>	GG.ASE14	GNE70-KRR-B	11	<b>70</b>	95	282	360	90	54
<b>RASEY70</b>	GG.ASE14	GYE70-KRR-B	5,93	<b>70</b>	79,4	203	260	65	44
<b>RASEL70</b>	GG.ASE14	GLE70-KRR-B	5,87	<b>70</b>	79,4	203	260	65	44
<b>RASE75</b>	GG.ASE15	GE75-KRR-B	6,58	<b>75</b>	82,5	210	265	66	48
<b>RASE75-FA164<sup>1)</sup></b>	GG.ASE15	GE75-KRR-B-FA164	7,65	<b>75</b>	82,5	210	265	66	48
<b>TASE75</b>	GG.ASE15	GE75-KTT-B	7,65	<b>75</b>	82,5	210	265	66	48
<b>RASEY75</b>	GG.ASE15	GYE75-KRR-B	6,51	<b>75</b>	82,5	210	265	66	48

<sup>1)</sup> With lubrication nipple DIN 71412-AR 1/8.

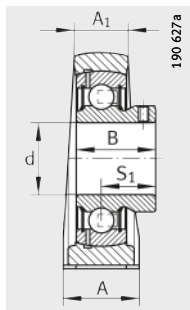
<sup>2)</sup> To be ordered separately.

<sup>3)</sup> Alternative ball set 6214.

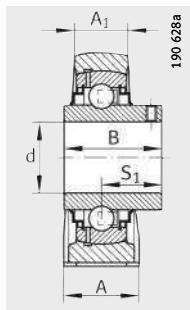




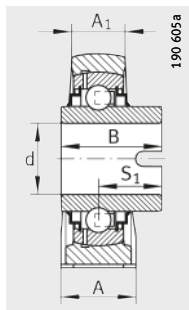
RASE, RSAO, TASE



PASEY



RASEY (-JIS)



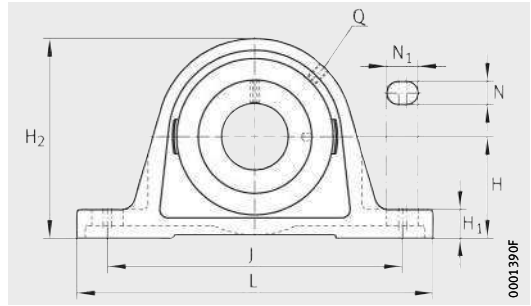
RASEL

H <sub>1</sub>	H <sub>2</sub>	N	N <sub>1</sub>	B	B <sub>1</sub>	S <sub>1</sub>	Q	d <sub>3</sub> max.	Basic load ratings		End cap <sup>2)</sup>
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
27	143	20	35	–	66,8	42,1	R <sub>p</sub> 1/8	75,8	62 000	38 000	–
21,5	115	18	23	43	–	32	R <sub>p</sub> 1/8	–	35 000	23 200	KASK10
21,5	115	18	23	51,6	–	32,6	R <sub>p</sub> 1/8	–	35 000	23 200	KASK10
21	114	20	25	51,6	–	32,6	M6	–	35 000	23 200	–
21,5	115	18	23	–	40	–	R <sub>p</sub> 1/8	70	33 000	19 900	KASK10
21,5	115	18	23	49,2	–	30,2	R <sub>p</sub> 1/8	–	35 000	23 200	KASK10
22,5	124,5	18	30	–	48,4	36,4	R <sub>p</sub> 1/8	76	43 500	29 000	–
22,5	124,5	18	30	–	71,4	43,6	R <sub>p</sub> 1/8	76	43 500	29 000	–
22,5	124,5	18	30	–	71,4	43,6	R <sub>p</sub> 1/8	76	43 500	29 000	–
23	126	20	25	55,6	–	33,4	M6	–	43 500	29 000	–
22,5	124,5	18	30	55,6	–	33,4	R <sub>p</sub> 1/8	–	43 500	29 000	–
25	140	18	28	–	53,1	39,6	R <sub>p</sub> 1/8	84	52 000	36 000	KASK12
25	140	18	28	–	53,1	39,6	R <sub>p</sub> 1/8	84	52 000	36 000	KASK12
25	140	18	28	–	77,9	46,8	R <sub>p</sub> 1/8	84	52 000	36 000	KASK12
25	140	18	28	–	77,9	46,8	R <sub>p</sub> 1/8	84	52 000	36 000	–
25	140	18	28	–	77,9	46,8	R <sub>p</sub> 1/8	84	52 000	36 000	KASK12
32	165	25	38	–	68,4	45,4	R <sub>p</sub> 1/8	89	82 000	52 000	–
25	140	18	28	47	–	34	R <sub>p</sub> 1/8	–	52 000	36 000	KASK12
25	140	18	28	65,1	–	39,7	R <sub>p</sub> 1/8	–	52 000	36 000	KASK12
25	138	20	25	65,1	–	39,7	M6	–	52 000	36 000	–
25	140	18	28	61,9	–	37,3	R <sub>p</sub> 1/8	–	52 000	36 000	KASK12
27,5	156	22	28	–	66	44,6	R <sub>p</sub> 1/8	96	62 000	44 000	–
27,5	156	22	28	–	66	44,6	R <sub>p</sub> 1/8	96	62 000	44 000	–
27,5	156	22	28	74,6	–	44,4	R <sub>p</sub> 1/8	–	62 000	44 000	–
27,5	156	22	28	–	66	44,6	R <sub>p</sub> 1/8	96	62 000	44 000	–
27,5	156	22	28	–	66	44,6	R <sub>p</sub> 1/8	96	62 000	44 000	–
27,5	156	22	28	–	66	44,6	R <sub>p</sub> 1/8	96	62 000	44 000	–
35	187	27	42	–	75,5	49,4	R <sub>p</sub> 1/8	102	104 000	68 000	–
27,5	156	22	28	74,6	–	44,4	R <sub>p</sub> 1/8	–	62 000	44 000	–
27,5	156	22	28	68,2	–	41,2	R <sub>p</sub> 1/8	–	62 000	44 000	–
27,5	164	22	30	–	67	45,6	R <sub>p</sub> 1/8	100	62 000	44 500	–
27,5	164	22	30	–	67	45,6	R <sub>p</sub> 1/8	100	62 000	44 500	–
27,5	164	22	30	–	67	45,6	R <sub>p</sub> 1/8	100	62 000	44 500	–
27,5	164	22	30	77,8	–	44,5	R <sub>p</sub> 1/8	–	62 000	44 500	–



# Plummer block housing units

Cast iron housings  
With long base

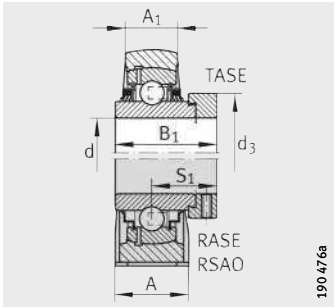


RASE (-FA164), TASE, RSAO, RASEY

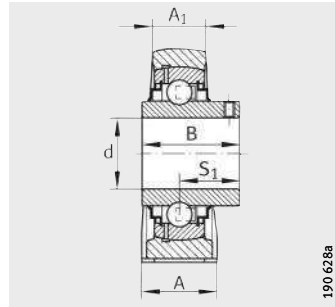
**Dimension table** (continued) · Dimensions in mm

Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	H	J	L
<b>RASE80</b>	GG.ASE16	GE80-KRR-B	8,65	<b>80</b>	89	232	290
<b>RASE80-AH01-FA164</b> <sup>1)</sup>	GG.ASE16	GE80-KRR-B-AH01-FA164	8,65	<b>80</b>	89	232	290
<b>TASE80</b>	GG.ASE16	GE80-KTT-B	8,49	<b>80</b>	89	232	290
<b>RSAO80</b>	GG.SAO16	GNE80-KRR-B	22,5	<b>80</b>	116	315	390
<b>RASEY80</b>	GG.ASE16	GYE80-KRR-B	8,41	<b>80</b>	89	232	290
<b>RASE90</b>	GG.ASE18	GE90-KRR-B	12,12	<b>90</b>	101,6	268	330
<b>RASE90-FA164</b> <sup>1)</sup>	GG.ASE18	GE90-KRR-B-FA164	12,12	<b>90</b>	101,6	268	330
<b>RSAO90</b>	GG.SAO18	GNE90-KRR-B	29,5	<b>90</b>	130	340	410
<b>RASEY90</b>	GG.ASE18	GYE90-KRR-B	12,6	<b>90</b>	101,6	268	330
<b>RASE100</b>	GG.ASE20	GE100-KRR-B	15,85	<b>100</b>	115	308	380
<b>RSAO100</b>	GG.SAO20	GNE100-KRR-B	41	<b>100</b>	145	375	440
<b>RASE120</b>	GG.ASE24	GE120-KRR-B	26,52	<b>120</b>	135	358	440

<sup>1)</sup> With lubrication nipple DIN 71412-AR 1/8.



RASE, RSAO, TASE



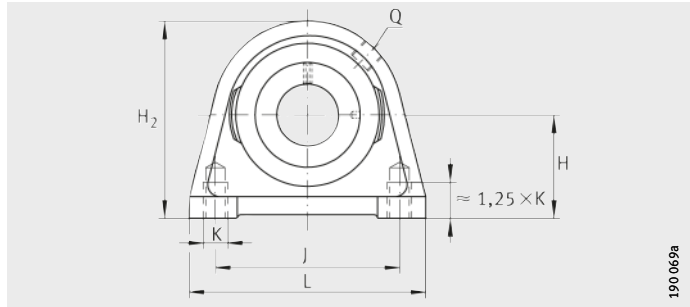
RASEY

											Basic load ratings	
A	A <sub>1</sub>	H <sub>1</sub>	H <sub>2</sub>	N	N <sub>1</sub>	B	B <sub>1</sub>	S <sub>1</sub>	Q	d <sub>3</sub>	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
										max.		
78	55	30	175	26	34	–	70,7	47,6	R <sub>p</sub> 1/8	108	72 000	54 000
78	55	30	175	26	34	–	70,7	47,6	R <sub>p</sub> 1/8	108	72 000	54 000
78	55	30	175	26	34	–	71	47,6	R <sub>p</sub> 1/8	108	72 000	54 000
110	76	50	226	25,5	44,5	–	93,6	59,7	R <sub>p</sub> 1/8	118	123 000	87 000
78	55	30	175	26	35	82,6	–	49,3	R <sub>p</sub> 1/8	–	72 000	54 000
85	55	35	200	27	35	–	69,6	46,6	R <sub>p</sub> 1/8	118	96 000	72 000
85	55	35	200	27	35	–	69,6	46,6	R <sub>p</sub> 1/8	118	96 000	72 000
120	84	57	250	28	54	–	101	65,5	R <sub>p</sub> 1/8	132	143 000	107 000
85	55	35	200	27	35	96	–	56,3	R <sub>p</sub> 1/8	–	96 000	72 000
95	62	40	225	30	38	–	75	49,5	R <sub>p</sub> 1/8	132	122 000	93 000
130	94	65	280	32	47	–	109,5	70	R <sub>p</sub> 1/8	145	174 000	140 000
105	70	45	265	33	41	–	81	52,5	R <sub>p</sub> 1/8	152	155 000	131 000



# Plummer block housing units

Cast iron housings  
With short base

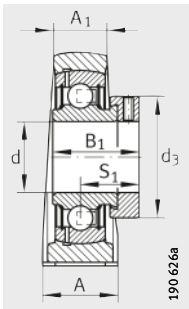


PSHE, RSHE, TSHE, PSHEY, RSHEY

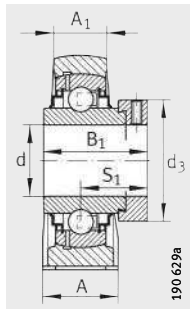
**Dimension table** - Dimensions in mm

Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	H	A	A <sub>1</sub>
<b>PSHE12</b>	GG.SHE03	GRAE12-NPP-B	0,44	<b>12</b>	30,2	30	18
<b>PSHEY12</b>	GG.SHE03	GAY12-NPP-B	0,42	<b>12</b>	30,2	30	18
<b>PSHE15</b>	GG.SHE03	GRAE15-NPP-B	0,44	<b>15</b>	30,2	30	18
<b>PSHEY15</b>	GG.SHE03	GAY15-NPP-B	0,41	<b>15</b>	30,2	30	18
<b>RSHEY15</b>	GG.SHE03	GYE15-KRR-B	0,42	<b>15</b>	30,2	30	18
<b>PSHE17</b>	GG.SHE03	GRAE17-NPP-B	0,44	<b>17</b>	30,2	30	18
<b>RSHE17</b>	GG.SHE03	GE17-KRR-B	0,48	<b>17</b>	30,2	30	18
<b>PSHEY17</b>	GG.SHE03	GAY17-NPP-B	0,4	<b>17</b>	30,2	30	18
<b>RSHEY17</b>	GG.SHE03	GYE17-KRR-B	0,41	<b>17</b>	30,2	30	18
<b>PSHE20-N</b>	GG.SHE04-N	GRAE20-NPP-B	0,46	<b>20</b>	33,3	32	19
<b>RSHE20-N</b>	GG.SHE04-N	GE20-KRR-B	0,49	<b>20</b>	33,3	32	19
<b>TSHE20-N</b>	GG.SHE04-N	GE20-KTT-B	0,49	<b>20</b>	33,3	32	19
<b>PSHEY20-N</b>	GG.SHE04-N	GAY20-NPP-B	0,42	<b>20</b>	33,3	32	19
<b>RSHEY20-N</b>	GG.SHE04-N	GYE20-KRR-B	0,43	<b>20</b>	33,3	32	19
<b>PSHE25-N</b>	GG.SHE05-E-N	GRAE25-NPP-B	0,54	<b>25</b>	36,5	36	21
<b>RSHE25-N</b>	GG.SHE05-E-N	GE25-KRR-B	0,6	<b>25</b>	36,5	36	21
<b>TSHE25-N</b>	GG.SHE05-E-N	GE25-KTT-B	0,66	<b>25</b>	36,5	36	21
<b>PSHEY25-N</b>	GG.SHE05-E-N	GAY25-NPP-B	0,57	<b>25</b>	36,5	36	21
<b>RSHEY25-N</b>	GG.SHE05-E-N	GYE25-KRR-B	0,54	<b>25</b>	36,5	36	21
<b>PSHE30-N</b>	GG.SHE06-E-N	GRAE30-NPP-B	0,94	<b>30</b>	42,9	40	25
<b>RSHE30-N</b>	GG.SHE06-E-N	GE30-KRR-B	1,01	<b>30</b>	42,9	40	25
<b>TSHE30-N</b>	GG.SHE06-E-N	GE30-KTT-B	1,01	<b>30</b>	42,9	40	25
<b>PSHEY30-N</b>	GG.SHE06-E-N	GAY30-NPP-B	0,88	<b>30</b>	42,9	40	25
<b>RSHEY30-N</b>	GG.SHE06-E-N	GYE30-KRR-B	0,94	<b>30</b>	42,9	40	25
<b>PSHE35-N</b>	GG.SHE07-E-N	GRAE35-NPP-B	1,26	<b>35</b>	47,6	45	27
<b>RSHE35-N</b>	GG.SHE07-E-N	GE35-KRR-B	1,34	<b>35</b>	47,6	45	27
<b>TSHE35-N</b>	GG.SHE07-E-N	GE35-KTT-B	1,34	<b>35</b>	47,6	45	27
<b>PSHEY35-N</b>	GG.SHE07-E-N	GAY35-NPP-B	1,19	<b>35</b>	47,6	45	27
<b>RSHEY35-N</b>	GG.SHE07-E-N	GYE35-KRR-B	1,25	<b>35</b>	47,6	45	27

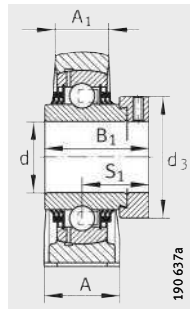
<sup>1)</sup> To be ordered separately.



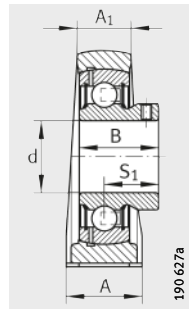
PSHE



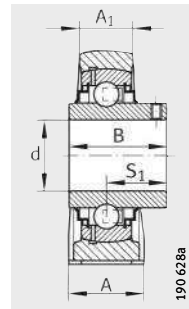
RSHE



TSHE



PSHEY



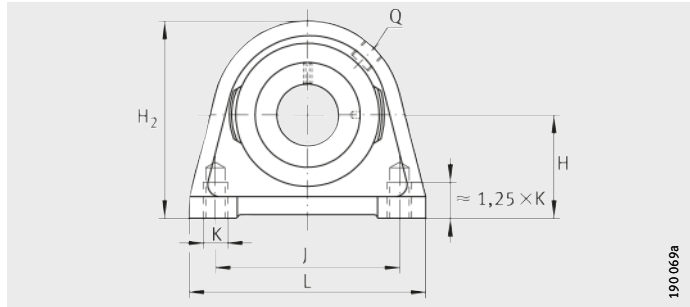
RSHEY

H <sub>2</sub>	K	B	B <sub>1</sub>	J	S <sub>1</sub>	Q	d <sub>3</sub>	L	Basic load ratings		End cap <sup>1)</sup>
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
57	M8	–	28,6	47	22,1	M6	28	63	9 800	4 750	–
57	M8	22	–	47	16	M6	–	63	9 800	4 750	–
57	M8	–	28,6	47	22,1	M6	28	63	9 800	4 750	–
57	M8	22	–	47	16	M6	–	63	9 800	4 750	–
57	M8	27,4	–	47	15,9	M6	–	63	9 800	4 750	–
57	M8	–	28,6	47	22,1	M6	28	63	9 800	4 750	–
57	M8	–	37,4	47	23,4	M6	28	63	9 800	4 750	–
57	M8	22	–	47	16	M6	–	63	9 800	4 750	–
57	M8	27,4	–	47	15,9	M6	–	63	9 800	4 750	–
64	M8	–	31	50,8	23,5	R <sub>p</sub> 1/8	33	65	12 800	6 600	KASK04
64	M8	–	43,7	50,8	26,6	R <sub>p</sub> 1/8	33	65	12 800	6 600	KASK04
64	M8	–	43,7	50,8	26,6	R <sub>p</sub> 1/8	33	65	12 800	6 600	KASK04
64	M8	25	–	50,8	18	R <sub>p</sub> 1/8	–	65	12 800	6 600	KASK04
64	M8	31	–	50,8	18,3	R <sub>p</sub> 1/8	–	65	12 800	6 600	KASK04
70	M10	–	31	50,8	23,5	R <sub>p</sub> 1/8	37,5	70	14 000	7 800	KASK05
70	M10	–	44,5	50,8	27	R <sub>p</sub> 1/8	37,5	70	14 000	7 800	KASK05
70	M10	–	44,5	50,8	27	R <sub>p</sub> 1/8	37,5	70	14 000	7 800	KASK05
70	M10	27	–	50,8	19,5	R <sub>p</sub> 1/8	–	70	14 000	7 800	KASK05
70	M10	34,1	–	50,8	19,8	R <sub>p</sub> 1/8	–	70	14 000	7 800	KASK05
82	M10	–	35,8	76,2	26,8	R <sub>p</sub> 1/8	44	98	19 500	11 300	KASK06
82	M10	–	48,5	76,2	30,2	R <sub>p</sub> 1/8	44	98	19 500	11 300	KASK06
82	M10	–	48,5	76,2	30,2	R <sub>p</sub> 1/8	44	98	19 500	11 300	KASK06
82	M10	30	–	76,2	21	R <sub>p</sub> 1/8	–	98	19 500	11 300	KASK06
82	M10	38,1	–	76,2	22,2	R <sub>p</sub> 1/8	–	98	19 500	11 300	KASK06
93	M10	–	39	82,6	29,5	R <sub>p</sub> 1/8	51	103	25 500	15 300	KASK07
93	M10	–	51,3	82,6	32,5	R <sub>p</sub> 1/8	51	103	25 500	15 300	KASK07
93	M10	–	51,3	82,6	32,5	R <sub>p</sub> 1/8	51	103	25 500	15 300	KASK07
93	M10	35	–	82,6	25,5	R <sub>p</sub> 1/8	–	103	25 500	15 300	KASK07
93	M10	42,9	–	82,6	25,4	R <sub>p</sub> 1/8	–	103	25 500	15 300	KASK07



# Plummer block housing units

Cast iron housings  
With short base

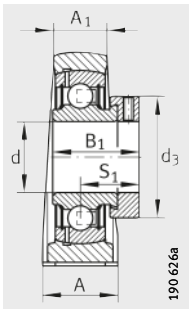


PSHE, RSHE, TSHE, PSHEY, RSHEY

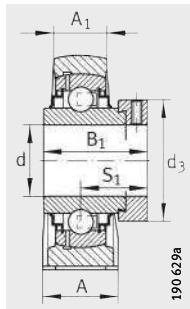
**Dimension table** (continued) · Dimensions in mm

Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	H	A	A <sub>1</sub>
<b>PSHE40-N</b>	GG.SHE08-E-N	GRAE40-NPP-B	1,84	<b>40</b>	49,2	48	30
<b>RSHE40-N</b>	GG.SHE08-E-N	GE40-KRR-B	1,96	<b>40</b>	49,2	48	30
<b>TSHE40-N</b>	GG.SHE08-E-N	GE40-KTT-B	1,66	<b>40</b>	49,2	48	30
<b>PSHEY40-N</b>	GG.SHE08-E-N	GAY40-NPP-B	1,73	<b>40</b>	49,2	48	30
<b>RSHEY40-N</b>	GG.SHE08-E-N	GYE40-KRR-B	1,53	<b>40</b>	49,2	48	30
<b>PSHE45</b>	GG.SHE09	GRAE45-NPP-B	2,14	<b>45</b>	54	48	32
<b>RSHE45</b>	GG.SHE09	GE45-KRR-B	2,26	<b>45</b>	54	48	32
<b>TSHE45</b>	GG.SHE09	GE45-KTT-B	2,31	<b>45</b>	54	48	32
<b>PSHEY45</b>	GG.SHE09	GAY45-NPP-B	1,91	<b>45</b>	54	48	32
<b>RSHEY45</b>	GG.SHE09	GYE45-KRR-B	2,15	<b>45</b>	54	48	32
<b>PSHE50-N</b>	GG.SHE10-E-N	GRAE50-NPP-B	2,79	<b>50</b>	57,2	54	34
<b>RSHE50-N</b>	GG.SHE10-E-N	GE50-KRR-B	3,02	<b>50</b>	57,2	54	34
<b>TSHE50-N</b>	GG.SHE10-E-N	GE50-KTT-B	2,47	<b>50</b>	57,2	54	34
<b>PSHEY50-N</b>	GG.SHE10-E-N	GAY50-NPP-B	2,64	<b>50</b>	57,2	54	34
<b>RSHEY50-N</b>	GG.SHE10-E-N	GYE50-KRR-B	2,82	<b>50</b>	57,2	54	34
<b>PSHE55</b>	GG.SHE11	GRAE55-NPP-B	2,91	<b>55</b>	64	60	35
<b>RSHE55</b>	GG.SHE11	GE55-KRR-B	3,52	<b>55</b>	64	60	35
<b>TSHE55</b>	GG.SHE11	GE55-KTT-B	3,59	<b>55</b>	64	60	35
<b>RSHEY55</b>	GG.SHE11	GYE55-KRR-B	3,29	<b>55</b>	64	60	35
<b>PSHE60-N</b>	GG.SHE12-N	GRAE60-NPP-B	4,1	<b>60</b>	69,9	60	42
<b>RSHE60-N</b>	GG.SHE12-N	GE60-KRR-B	4,54	<b>60</b>	69,9	60	42
<b>TSHE60-N</b>	GG.SHE12-N	GE60-KTT-B	4,22	<b>60</b>	69,9	60	42
<b>PSHEY60-N</b>	GG.SHE12-N	GAY60-NPP-B	3,6	<b>60</b>	69,9	60	42
<b>RSHEY60-N</b>	GG.SHE12-N	GYE60-KRR-B	3,9	<b>60</b>	69,9	60	42

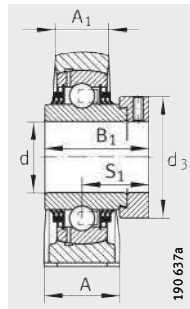
<sup>1)</sup> To be ordered separately.



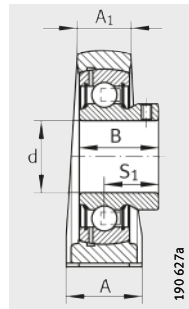
PSHE



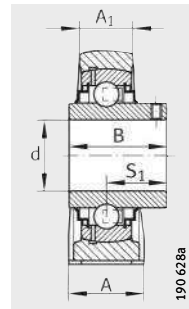
RSHE



TSHE



PSHEY



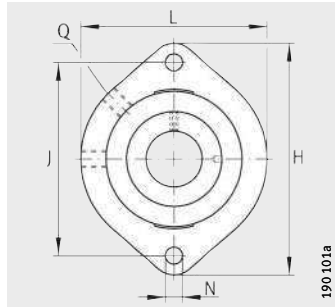
RSHEY

H <sub>2</sub>	K	B	B <sub>1</sub>	J	S <sub>1</sub>	Q	d <sub>3</sub> max.	L	Basic load ratings		End cap <sup>1)</sup>
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
99	M12	–	43,8	88,9	32,7	R <sub>p</sub> 1/8	58	116	32 500	19 800	KASK08
99	M12	–	56,5	88,9	35,1	R <sub>p</sub> 1/8	58	116	32 500	19 800	KASK08
99	M12	–	56,5	88,9	35,1	R <sub>p</sub> 1/8	58	116	32 500	19 800	KASK08
99	M12	39,5	–	88,9	29	R <sub>p</sub> 1/8	–	116	32 500	19 800	KASK08
99	M12	49,2	–	88,9	30,2	R <sub>p</sub> 1/8	–	116	32 500	19 800	KASK08
107	M12	–	43,8	95,3	32,7	R <sub>p</sub> 1/8	63	120	32 500	20 400	–
107	M12	–	56,5	95,3	34,9	R <sub>p</sub> 1/8	63	120	32 500	20 400	–
107	M12	–	56,5	95,3	34,9	R <sub>p</sub> 1/8	63	120	32 500	20 400	–
107	M12	41,5	–	95,3	30,5	R <sub>p</sub> 1/8	–	120	32 500	20 400	–
107	M12	49,2	–	95,3	30,5	R <sub>p</sub> 1/8	–	120	32 500	20 400	–
115	M16	–	43,8	101,6	32,7	R <sub>p</sub> 1/8	69	135	35 000	23 200	KASK10
115	M16	–	62,8	101,6	38,2	R <sub>p</sub> 1/8	69	135	35 000	23 200	KASK10
115	M16	–	62,8	101,6	38,2	R <sub>p</sub> 1/8	69	135	35 000	23 200	KASK10
115	M16	43	–	101,6	32	R <sub>p</sub> 1/8	–	135	35 000	23 200	KASK10
115	M16	51,6	–	101,6	32,6	R <sub>p</sub> 1/8	–	135	35 000	23 200	KASK10
125	M16	–	48,4	118	36,4	R <sub>p</sub> 1/8	76	150	43 500	29 000	–
125	M16	–	71,4	118	43,6	R <sub>p</sub> 1/8	76	150	43 500	29 000	–
125	M16	–	71,4	118	43,6	R <sub>p</sub> 1/8	76	150	43 500	29 000	–
125	M16	55,6	–	118	33,4	R <sub>p</sub> 1/8	–	150	43 500	29 000	–
140	M16	–	53,1	118	39,6	R <sub>p</sub> 1/8	84	150	52 000	36 000	KASK12
140	M16	–	77,9	118	46,9	R <sub>p</sub> 1/8	84	150	52 000	36 000	KASK12
140	M16	–	77,9	118	46,9	R <sub>p</sub> 1/8	84	150	52 000	36 000	KASK12
140	M16	47	–	118	34	R <sub>p</sub> 1/8	–	150	52 000	36 000	KASK12
140	M16	65,1	–	118	39,7	R <sub>p</sub> 1/8	–	150	52 000	36 000	KASK12

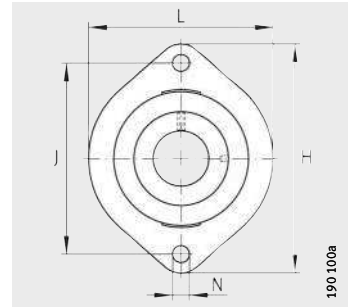


# Two-bolt flanged housing units

Cast iron housings



GLCTE



FLCTE, FLCTEY

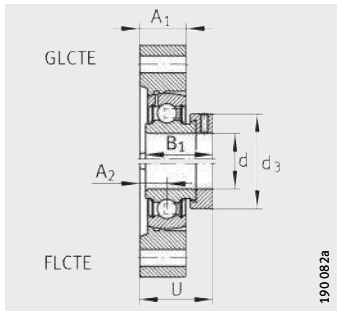
**Dimension table** - Dimensions in mm

Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	L	H	A <sub>1</sub>
<b>FLCTE12</b>	GG.LCTE03	RAE12-NPP-B	0,3	<b>12</b>	58,7	81	15
<b>GLCTE12</b> <sup>2)</sup>	GG.GLCTE03	GRAE12-NPP-B	0,3	<b>12</b>	58,7	81	15
<b>FLCTEY12</b>	GG.LCTE03	AY12-NPP-B	0,28	<b>12</b>	58,7	81	15
<b>FLCTE15</b>	GG.LCTE03	RAE15-NPP-B	0,3	<b>15</b>	58,7	81	15
<b>GLCTE15</b> <sup>2)</sup>	GG.GLCTE03	GRAE15-NPP-B	0,3	<b>15</b>	58,7	81	15
<b>FLCTEY15</b>	GG.LCTE03	AY15-NPP-B	0,27	<b>15</b>	58,7	81	15
<b>FLCTE17</b>	GG.LCTE03	RAE17-NPP-B	0,3	<b>17</b>	58,7	81	15
<b>GLCTE17</b> <sup>2)</sup>	GG.GLCTE03	GRAE17-NPP-B	0,3	<b>17</b>	58,7	81	15
<b>FLCTEY17</b>	GG.LCTE03	AY17-NPP-B	0,26	<b>17</b>	58,7	81	15
<b>FLCTE20</b>	GG.LCTE04-E	RAE20-NPP-B	0,39	<b>20</b>	66,5	90,5	17
<b>GLCTE20</b> <sup>1)</sup>	GG.GLCTE04-E	GRAE20-NPP-B	0,39	<b>20</b>	66,5	90,5	17
<b>FLCTEY20</b>	GG.LCTE04-E	AY20-NPP-B	0,36	<b>20</b>	66,5	90,5	17
<b>FLCTE25</b>	GG.LCTE05-E	RAE25-NPP-B	0,47	<b>25</b>	71	97	17,5
<b>GLCTE25</b> <sup>1)</sup>	GG.GLCTE05-E	GRAE25-NPP-B	0,47	<b>25</b>	71	97	17,5
<b>FLCTEY25</b>	GG.LCTE05-E	AY25-NPP-B	0,44	<b>25</b>	71	97	17,5
<b>FLCTE30</b>	GG.LCTE06-E	RAE30-NPP-B	0,76	<b>30</b>	84	112,5	20,5
<b>GLCTE30</b> <sup>1)</sup>	GG.GLCTE06-E	GRAE30-NPP-B	0,76	<b>30</b>	84	112,5	20,5
<b>FLCTEY30</b>	GG.LCTE06-E	AY30-NPP-B	0,7	<b>30</b>	84	112,5	20,5
<b>FLCTE35</b>	GG.LCTE07	RAE35-NPP-B	1,02	<b>35</b>	94	126	22
<b>GLCTE35</b> <sup>2)</sup>	GG.GLCTE07	GRAE35-NPP-B	1,02	<b>35</b>	94	126	22
<b>FLCTEY35</b>	GG.LCTE07	GAY35-NPP-B	0,93	<b>35</b>	94	126	22
<b>FLCTE40</b>	GG.LCTE08	RAE40-NPP-B	1,27	<b>40</b>	100	150	24
<b>GLCTE40</b> <sup>2)</sup>	GG.GLCTE08	GRAE40-NPP-B	1,27	<b>40</b>	100	150	24
<b>FLCTEY40</b>	GG.LCTE08	GAY40-NPP-B	1,18	<b>40</b>	100	150	24

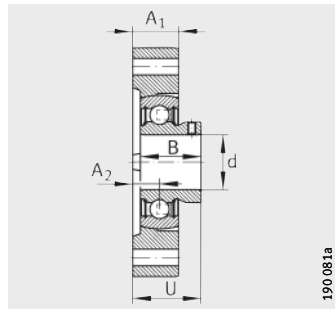
<sup>1)</sup> Lubrication hole 45°.

<sup>2)</sup> Lubrication hole 90°.





GLCTE, FLCTE



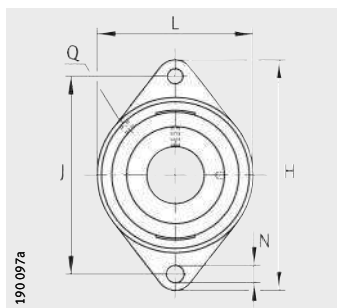
FLCTEY

								Basic load ratings	
N	B	B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub> max.	U	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>
								N	N
6,6	–	28,6	63,5	8,4	–	28	30,5	9 800	4 750
6,6	–	28,6	63,5	8,4	M6 <sup>2)</sup>	28	30,5	9 800	4 750
6,6	22	–	63,5	8,4	–	–	24,4	9 800	4 750
6,6	–	28,6	63,5	8,4	–	28	30,5	9 800	4 750
6,6	–	28,6	63,5	8,4	M6 <sup>2)</sup>	28	30,5	9 800	4 750
6,6	22	–	63,5	8,4	–	–	24,4	9 800	4 750
6,6	–	28,6	63,5	8,4	–	28	30,5	9 800	4 750
6,6	–	28,6	63,5	8,4	M6 <sup>2)</sup>	28	30,5	9 800	4 750
6,6	22	–	63,5	8,4	–	–	24,4	9 800	4 750
9	–	31	71,4	9,5	–	33	33	12 800	6 600
9	–	31	71,4	9,5	M6 <sup>1)</sup>	33	33	12 800	6 600
9	25	–	71,4	9,5	–	–	27	12 800	6 600
9	–	31	76,2	9,9	–	37,5	33,4	14 000	7 800
9	–	31	76,2	9,9	M6 <sup>1)</sup>	37,5	33,4	14 000	7 800
9	27	–	76,2	9,9	–	–	29,4	14 000	7 800
11,5	–	35,8	90,5	11,4	–	44	38,1	19 500	11 300
11,5	–	35,8	90,5	11,4	R <sub>p</sub> 1/8 <sup>1)</sup>	44	38,1	19 500	11 300
11,5	30	–	90,5	11,4	–	–	32,4	19 500	11 300
11,5	–	39	100	12,4	–	51	41,8	25 500	15 300
11,5	–	39	100	12,4	R <sub>p</sub> 1/8 <sup>2)</sup>	51	41,8	25 500	15 300
11,5	35	–	100	12,4	–	–	37,9	25 500	15 300
14	–	43,8	119	13,5	–	58	46,3	32 500	19 800
14	–	43,8	119	13,5	R <sub>p</sub> 1/8 <sup>2)</sup>	58	46,3	32 500	19 800
14	39,5	–	119	13,5	–	–	42,5	32 500	19 800

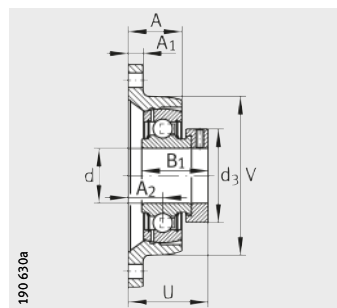


# Two-bolt flanged housing units

Cast iron housings



PCFT, PCJT (-FA125), PCJTY, RCJT (-FA125), TCJT, LCJT, RCJTA, RCJTY (-JIS)

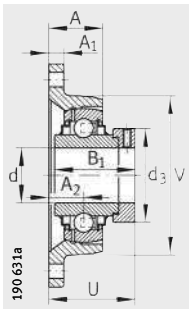


PCFT, PCJT

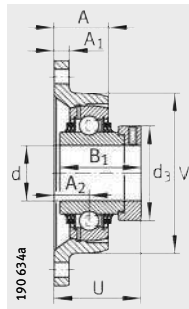
**Dimension table** - Dimensions in mm

Designation			Mass m ≈kg	Dimensions				
Unit	Housing	Radial insert ball bearing		d	L	H	A <sub>1</sub>	N
PCFT12	GG.CFT03	GRAE12-NPP-B	0,39	12	57	99	9,5	11,5
PCJT12	GG.CJT03	GRAE12-NPP-B	0,37	12	57	99	9,5	11,5
PCJTY12	GG.CJT03	GAY12-NPP-B	0,35	12	57	99	9,5	11,5
RCJTY12	GG.CJT03	GYE12-KRR-B	0,36	12	57	99	9,5	11,5
PCFT15	GG.CFT03	GRAE15-NPP-B	0,39	15	57	99	9,5	11,5
PCJT15	GG.CFT03	GRAE15-NPP-B	0,37	15	57	99	9,5	11,5
PCJTY15	GG.CFT03	GAY15-NPP-B	0,34	15	57	99	9,5	11,5
RCJTY15	GG.CFT03	GYE15-KRR-B	0,35	15	57	99	9,5	11,5
RCJTY16	GG.CJT03	GYE16-KRR-B	0,34	16	57	99	9,5	11,5
PCFT17	GG.CFT03	GRAE17-NPP-B	0,39	17	57	99	9,5	11,5
PCJT17	GG.CJT03	GRAE17-NPP-B	0,37	17	57	99	9,5	11,5
RCJT17	GG.CJT03	GE17-KRR-B	0,41	17	57	99	9,5	11,5
PCJTY17	GG.CJT03	GAY17-NPP-B	0,33	17	57	99	9,5	11,5
RCJTY17	GG.CJT03	GYE17-KRR-B	0,34	17	57	99	9,5	11,5
PCFT20	GG.CFT04	GRAE20-NPP-B	0,40	20	61	112	10	11,5
PCJT20-N	GG.CJT04-N	GRAE20-NPP-B	0,48	20	61	112	10	11,5
PCJT20-N-FA125	GG.CJT04-N-FA125.1	GRAE20-NPP-B-FA125.5	0,48	20	61	112	10	11,5
RCJT20-N	GG.CJT04-N	GE20-KRR-B	0,52	20	61	112	10	11,5
RCJT20-N-FA125	GG.CJT04-N-FA125.1	GE20-KRR-B-FA125.5	0,52	20	61	112	10	11,5
TCJT20-N	GG.CJT04-N	GE20-KTT-B	0,48	20	61	112	10	11,5
LCJT20-N	GG.CJT04-N	GE20-KLL-B	0,52	20	61	112	10	11,5
RCJTA20-N	GG.CJT04-N	GSH20-2RSR-B	0,52	20	61	112	10	11,5
PCJTY20-N	GG.CJT04-N	GAY20-NPP-B	0,41	20	61	112	10	11,5
RCJTY20-N	GG.CJT04-N	GYE20-KRR-B	0,42	20	61	112	10	11,5
RCJTY20-JIS	GG.FL204	GYE20-KRR-B-FA107	0,42	20	60	113	12	12
PCFT25	GG.CFT05	GRAE25-NPP-B	0,52	25	70	124	11	11,5
PCJT25-N	GG.CJT05-N	GRAE25-NPP-B	0,58	25	70	124	11	11,5
PCJT25-N-FA125	GG.CJT05-N-FA125.1	GRAE25-NPP-B-FA125.5	0,56	25	70	124	11	11,5
RCJT25-N	GG.CJT05-N	GE25-KRR-B	0,62	25	70	124	11	11,5
RCJT25-N-FA125	GG.CJT05-N-FA125.1	GE25-KRR-B-FA125.5	0,62	25	70	124	11	11,5
TCJT25-N	GG.CJT05-N	GE25-KTT-B	0,64	25	70	124	11	11,5
LCJT25-N	GG.CJT05-N	GE25-KLL-B	0,62	25	70	124	11	11,5
RCJTA25-N	GG.CJT05-N	GSH25-2RSR-B	0,54	25	70	124	11	11,5
PCJTY25-N	GG.CJT05-N	GAY25-NPP-B	0,48	25	70	124	11	11,5
RCJTY25-N	GG.CJT05-N	GYE25-KRR-B	0,57	25	70	124	11	11,5
RCJTY25-JIS	GG.FL205	GYE25-KRR-B-FA107	0,61	25	68	130	14	16

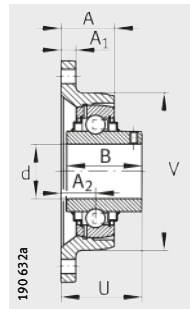
<sup>1)</sup> To be ordered separately.



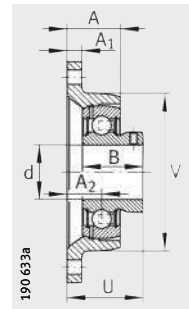
RCJT, LCJT



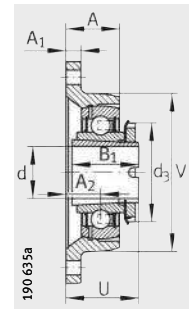
TCJT



RCJTJ



PCJTJ



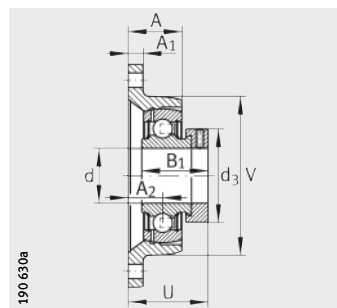
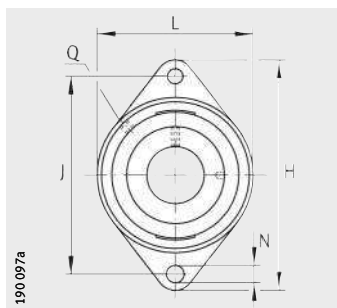
RCJTA

B	B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub> max.	A	U	V	Basic load ratings		End cap <sup>1)</sup>
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
-	28,6	76,5	10	M6	28	18	32,1	57	9 800	4 750	-
-	28,6	76,5	17	M6	28	25	39,1	57	9 800	4 750	-
22	-	76,5	17	M6	-	25	33	57	9 800	4 750	-
27,4	-	76,5	17	M6	-	25	32,9	57	9 800	4 750	-
-	28,6	76,5	10	M6	28	18	32,1	57	9 800	4 750	-
-	28,6	76,5	17	M6	28	25	39,1	57	9 800	4 750	-
22	-	76,5	17	M6	-	25	33	57	9 800	4 750	-
27,4	-	76,5	17	M6	-	25	32,9	57	9 800	4 750	-
27,4	-	76,5	17	M6	-	25	32,9	57	9 800	4 750	-
-	28,6	76,5	10	M6	28	18	32,1	57	9 800	4 750	-
-	28,6	76,5	17	M6	28	25	39,1	57	9 800	4 750	-
-	37,4	76,5	17	M6	28	25	40,4	57	9 800	4 750	-
22	-	76,5	17	M6	-	25	33	57	9 800	4 750	-
27,4	-	76,5	17	M6	-	25	32,9	57	9 800	4 750	-
-	31	90	10,5	R <sub>p</sub> 1/8	33	17,5	34	61	12 800	6 600	-
-	31	90	19	R <sub>p</sub> 1/8	33	28	42,5	61	12 800	6 600	KASK04
-	31	90	19	R <sub>p</sub> 1/8	33	28	42,5	61	12 800	6 600	KASK04
-	43,7	90	19	R <sub>p</sub> 1/8	33	28	45,6	61	12 800	6 600	KASK04
-	43,7	90	19	R <sub>p</sub> 1/8	33	28	45,6	61	12 800	6 600	KASK04
-	43,7	90	19	R <sub>p</sub> 1/8	33	28	45,6	61	12 800	6 600	KASK04
-	43,7	90	19	R <sub>p</sub> 1/8	33	28	45,6	61	12 800	6 600	KASK04
-	28	90	19	R <sub>p</sub> 1/8	32	28	42,5	61	12 700	6 600	KASK04
25	-	90	19	R <sub>p</sub> 1/8	-	28	37	61	12 800	6 600	KASK04
31	-	90	19	R <sub>p</sub> 1/8	-	28	37,3	61	12 800	6 600	KASK04
31	-	90	15	M6	-	25,5	33,3	-	12 800	6 600	-
-	31	99	12,5	R <sub>p</sub> 1/8	37,5	20	36	70	14 000	7 800	-
-	31	99	19	R <sub>p</sub> 1/8	37,5	26,5	42,5	70	14 000	7 800	KASK05
-	31	99	19	R <sub>p</sub> 1/8	37,5	26,5	42,5	70	14 000	7 800	KASK05
-	44,5	99	19	R <sub>p</sub> 1/8	37,5	26,5	46	70	14 000	7 800	KASK05
-	44,5	99	19	R <sub>p</sub> 1/8	37,5	26,5	46	70	14 000	7 800	KASK05
-	44,5	99	19	R <sub>p</sub> 1/8	37,5	26,5	46	70	14 000	7 800	KASK05
-	44,5	99	19	R <sub>p</sub> 1/8	37,5	26,5	46	70	14 000	7 800	KASK05
-	28	99	19	R <sub>p</sub> 1/8	38	26,5	42,5	70	13 600	7 800	KASK05
27	-	99	19	R <sub>p</sub> 1/8	-	26,5	38,5	70	14 000	7 800	KASK05
34,1	-	99	19	R <sub>p</sub> 1/8	-	26,5	38,8	70	14 000	7 800	KASK05
34,1	-	99	16	M6	-	27	35,8	-	14 000	7 800	-



# Two-bolt flanged housing units

Cast iron housings



PCFT, PCJT (-FA125), PCJTY,  
RCJT (-FA125, -FA164), TCJT, LCJT,  
RCJTA, RCJTY (-JIS)

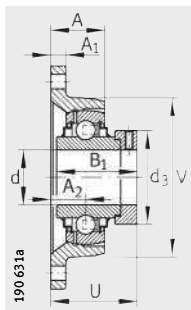
PCFT, PCJT

Dimension table (continued) · Dimensions in mm

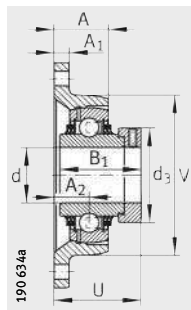
Designation			Mass m ≈kg	Dimensions				
Unit	Housing	Radial insert ball bearing		d	L	H	A <sub>1</sub>	N
<b>PCFT30</b>	GG.CFT06	GRAE30-NPP-B	0,77	<b>30</b>	80	142	12	11,5
<b>PCJT30-N</b>	GG.CJT06-N	GRAE30-NPP-B	0,81	<b>30</b>	80	142	12	11,5
<b>PCJT30-N-FA125</b>	GG.CJT06-N-FA125.1	GRAE30-NPP-B-FA125.5	0,81	<b>30</b>	80	142	12	11,5
<b>RCJT30-N</b>	GG.CJT06-N	GE30-KRR-B	0,88	<b>30</b>	80	142	12	11,5
<b>RCJT30-N-FA125</b>	GG.CJT06-N-FA125.1	GE30-KRR-B-FA125.5	0,88	<b>30</b>	80	142	12	11,5
<b>RCJT30-FA164<sup>2)</sup></b>	GG.CJT06-N	GE30-KRR-B-FA164	0,88	<b>30</b>	80	142	12	11,5
<b>TCJT30-N</b>	GG.CJT06-N	GE30-KTT-B	0,9	<b>30</b>	80	142	12	11,5
<b>LCJT30-N</b>	GG.CJT06-N	GE30-KLL-B	0,9	<b>30</b>	80	142	12	11,5
<b>RCJTA30-N</b>	GG.CJT06-N	GSH30-2RSR-B	0,77	<b>30</b>	80	142	12	11,5
<b>PCJTY30-N</b>	GG.CJT06-N	GAY30-NPP-B	0,77	<b>30</b>	80	142	12	11,5
<b>RCJTY30-N</b>	GG.CJT06-N	GYE30-KRR-B	0,88	<b>30</b>	80	142	12	11,5
<b>RCJTY30-JIS</b>	GG.FL206	GYE30-KRR-B-FA107	0,91	<b>30</b>	80	148	14	16
<b>PCFT35</b>	GG.CFT07	GRAE35-NPP-B	1,08	<b>35</b>	92	155	12,5	14
<b>PCJT35-N</b>	GG.CJT07-N	GRAE35-NPP-B	1,13	<b>35</b>	92	155	12,5	14
<b>PCJT35-N-FA125</b>	GG.CJT07-N-FA125.1	GRAE35-NPP-B-FA125.5	1,13	<b>35</b>	92	155	12,5	14
<b>RCJT35-N</b>	GG.CJT07-N	GE35-KRR-B	1,19	<b>35</b>	92	155	12,5	14
<b>RCJT35-N-FA125</b>	GG.CJT07-N-FA125.1	GE35-KRR-B-FA125.5	1,19	<b>35</b>	92	155	12,5	14
<b>RCJT35-FA164<sup>2)</sup></b>	GG.CJT07-N	GE35-KRR-B-FA164	1,19	<b>35</b>	92	155	12,5	14
<b>TCJT35-N</b>	GG.CJT07-N	GE35-KTT-B	1,21	<b>35</b>	92	155	12,5	14
<b>LCJT35-N</b>	GG.CJT07-N	GE35-KLL-B	1,22	<b>35</b>	92	155	12,5	14
<b>RCJTA35-N</b>	GG.CJT07-N	GSH35-2RSR-B	1,06	<b>35</b>	92	155	12,5	14
<b>PCJTY35-N</b>	GG.CJT07-N	GAY35-NPP-B	1,05	<b>35</b>	92	155	12,5	14
<b>RCJTY35-N</b>	GG.CJT07-N	GYE35-KRR-B	1,13	<b>35</b>	92	155	12,5	14
<b>RCJTY35-JIS</b>	GG.FL207	GYE35-KRR-B-FA107	1,19	<b>35</b>	90	161	16	16
<b>PCFT40</b>	GG.CFT08	GRAE40-NPP-B	1,42	<b>40</b>	105	172	13	14
<b>PCJT40-N</b>	GG.CJT08-N	GRAE40-NPP-B	1,54	<b>40</b>	105	172	13	14
<b>PCJT40-N-FA125</b>	GG.CJT08-N-FA125.1	GRAE40-NPP-B-FA125.5	1,54	<b>40</b>	105	172	13	14
<b>RCJT40-N</b>	GG.CJT08-N	GE40-KRR-B	1,66	<b>40</b>	105	172	13	14
<b>RCJT40-N-FA125</b>	GG.CJT08-N-FA125.1	GE40-KRR-B-FA125.5	1,66	<b>40</b>	105	172	13	14
<b>RCJT40-FA164<sup>2)</sup></b>	GG.CJT08-N	GE40-KRR-B-FA164	1,66	<b>40</b>	105	172	13	14

<sup>1)</sup> With lubrication nipple DIN 71412-AR 1/8.

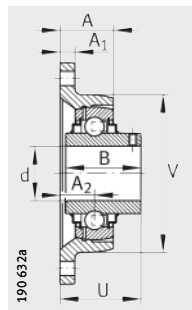
<sup>2)</sup> To be ordered separately.



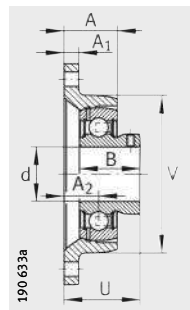
RCJT, LCJT



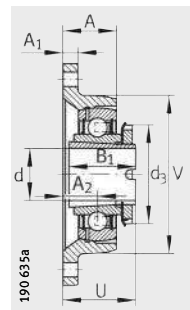
TCJT



RCJT (-JIS)



PCJT



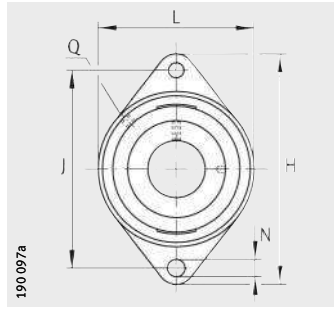
RCJTA

B	B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub> max.	A	U	V	Basic load ratings		End cap <sup>1)</sup>
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
-	35,8	116,5	13,3	R <sub>p</sub> 1/8	44	22,3	40	80	19 500	11 300	-
-	35,8	116,5	20	R <sub>p</sub> 1/8	44	29	46,7	80	19 500	11 300	KASK06
-	35,8	116,5	20	R <sub>p</sub> 1/8	44	29	46,7	80	19 500	11 300	KASK06
-	48,5	116,5	20	R <sub>p</sub> 1/8	44	29	50,2	80	19 500	11 300	KASK06
-	48,5	116,5	20	R <sub>p</sub> 1/8	44	29	50,2	80	19 500	11 300	KASK06
-	48,5	116,5	20	R <sub>p</sub> 1/8	44	29	50,2	80	19 500	11 300	-
-	48,5	116,5	20	R <sub>p</sub> 1/8	44	29	50,2	80	19 500	11 300	KASK06
-	48,5	116,5	20	R <sub>p</sub> 1/8	44	29	50,2	80	19 500	11 300	KASK06
-	32	116,5	20	R <sub>p</sub> 1/8	45	29	44	80	18 900	11 300	KASK06
30	-	116,5	20	R <sub>p</sub> 1/8	-	29	41	80	19 500	11 300	KASK06
38,1	-	116,5	20	R <sub>p</sub> 1/8	-	29	42,2	80	19 500	11 300	KASK06
38,1	-	117	18	M6	-	31	40,2	-	19 500	11 300	-
-	39	130	15,5	R <sub>p</sub> 1/8	51	25	44,9	92	25 500	15 300	-
-	39	130	21	R <sub>p</sub> 1/8	51	30,5	50,5	92	25 500	15 300	KASK07
-	39	130	21	R <sub>p</sub> 1/8	51	30,5	50,5	92	25 500	15 300	KASK07
-	51,3	130	21	R <sub>p</sub> 1/8	51	30,5	53,5	92	25 500	15 300	KASK07
-	51,3	130	21	R <sub>p</sub> 1/8	51	30,5	53,5	92	25 500	15 300	KASK07
-	51,3	130	21	R <sub>p</sub> 1/8	51	30,5	53,5	92	25 500	15 300	-
-	51,3	130	21	R <sub>p</sub> 1/8	51	30,5	53,5	92	25 500	15 300	KASK07
-	51,3	130	21	R <sub>p</sub> 1/8	51	30,5	53,5	92	25 500	15 300	KASK07
-	34	130	21	R <sub>p</sub> 1/8	52	30,5	46	92	24 900	15 300	KASK07
34,95	-	130	21	R <sub>p</sub> 1/8	-	30,5	46,45	92	25 500	15 300	KASK07
42,9	-	130	21	R <sub>p</sub> 1/8	-	30,5	46,4	92	25 500	15 300	KASK07
42,9	-	130	19	M6	-	34	44,4	-	25 500	15 300	-
-	43,8	143,5	18,3	R <sub>p</sub> 1/8	58	28,8	51	105	32 500	19 800	-
-	43,8	143,5	24	R <sub>p</sub> 1/8	58	34,5	56,7	105	32 500	19 800	KASK08
-	43,8	143,5	24	R <sub>p</sub> 1/8	58	34,5	56,7	105	32 500	19 800	KASK08
-	56,5	143,5	24	R <sub>p</sub> 1/8	58	34,5	59,1	105	32 500	19 800	KASK08
-	56,5	143,5	24	R <sub>p</sub> 1/8	58	34,5	59,1	105	32 500	19 800	KASK08
-	56,5	143,5	24	R <sub>p</sub> 1/8	58	34,5	59,1	105	32 500	19 800	-

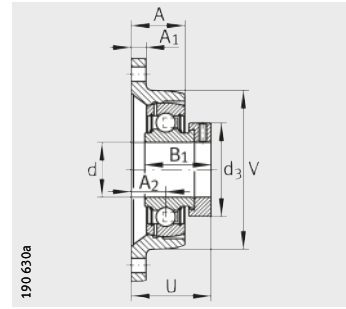


# Two-bolt flanged housing units

Cast iron housings



PCFT, PCJT (-FA125), PCJTY, RCJT (-FA125, -FA164), TCJT, LCJT, RCJTA, RCJTY (-JIS)



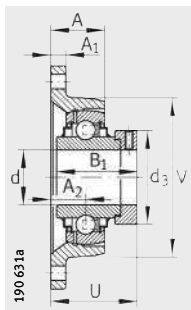
PCFT, PCJT

**Dimension table** (continued) · Dimensions in mm

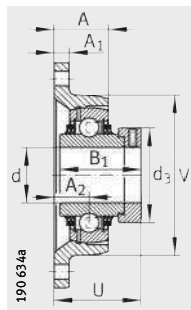
Designation			Mass m ≈kg	Dimensions				
Unit	Housing	Radial insert ball bearing		d	L	H	A <sub>1</sub>	N
<b>TCJT40-N</b>	GG.CJT08-N	GE40-KTT-B	1,7	<b>40</b>	105	172	13	14
<b>LCJT40-N</b>	GG.CJT08-N	GE40-KLL-B	1,66	<b>40</b>	105	172	13	14
<b>PCJTY40-N</b>	GG.CJT08-N	GAY40-NPP-B	1,48	<b>40</b>	105	172	13	14
<b>RCJTA40-N</b>	GG.CJT08-N	GSH40-2RSR-B	1,46	<b>40</b>	105	172	13	14
<b>RCJTY40-N</b>	GG.CJT08-N	GYE40-KRR-B	1,57	<b>40</b>	105	172	13	14
<b>RCJTY40-JIS</b>	GG.FL208	GYE40-KRR-B-FA107	1,51	<b>40</b>	100	175	16	16
<b>PCFT45</b>	GG.CFT09	GRAE45-NPP-B	1,59	<b>45</b>	111	180	13	14
<b>PCJT45</b>	GG.CJT09	GRAE45-NPP-B	1,69	<b>45</b>	111	180	13	14
<b>RCJT45</b>	GG.CJT09	GE45-KRR-B	1,81	<b>45</b>	111	180	13	14
<b>TCJT45</b>	GG.CJT09	GE45-KTT-B	1,92	<b>45</b>	111	180	13	14
<b>LCJT45</b>	GG.CJT09	GE45-KLL-B	1,81	<b>45</b>	111	180	13	14
<b>PCJTY45</b>	GG.CJT09	GAY45-NPP-B	1,69	<b>45</b>	111	180	13	14
<b>RCJTY45</b>	GG.CJT09	GYE45-KRR-B	1,7	<b>45</b>	111	180	13	14
<b>RCJTY45-JIS</b>	GG.FL209	GYE45-KRR-B-FA107	1,94	<b>45</b>	108	188	18	19
<b>PCFT50</b>	GG.CFT10	GRAE50-NPP-B	1,82	<b>50</b>	116	190	13	14
<b>PCJT50-N</b>	GG.CJT10-N	GRAE50-NPP-B	1,97	<b>50</b>	116	190	13	18
<b>PCJT50-N-FA125</b>	GG.CJT10-N-FA125.1	GRAE50-NPP-B-FA125.5	1,97	<b>50</b>	116	190	13	18
<b>RCJT50-N</b>	GG.CJT10-N	GE50-KRR-B	2,2	<b>50</b>	116	190	13	18
<b>RCJT50-N-FA125</b>	GG.CJT10-N-FA125.1	GE50-KRR-B-FA125.5	2,2	<b>50</b>	116	190	13	18
<b>RCJT50-FA164<sup>1)</sup></b>	GG.CJT10-N	GE50-KRR-B-FA164	2,2	<b>50</b>	116	190	13	18
<b>TCJT50-N</b>	GG.CJT10-N	GE50-KTT-B	2,19	<b>50</b>	116	190	13	18
<b>LCJT50-N</b>	GG.CJT10-N	GE50-KLL-B	2,21	<b>50</b>	116	190	13	18
<b>PCJTY50-N</b>	GG.CJT10-N	GAY50-NPP-B	1,82	<b>50</b>	116	190	13	18
<b>RCJTY50-N</b>	GG.CJT10-N	GYE50-KRR-B	2	<b>50</b>	116	190	13	18
<b>RCJTY50-JIS</b>	GG.FL210	GYE50-KRR-B-FA107	2,21	<b>50</b>	115	197	18	19
<b>PCJT55</b>	GG.CJT11	GRAE55-NPP-B	2,31	<b>55</b>	134	222	15	18
<b>RCJT55</b>	GG.CJT11	GE55-KRR-B	2,92	<b>55</b>	134	222	15	18
<b>TCJT55</b>	GG.CJT11	GE55-KTT-B	3,15	<b>55</b>	134	222	15	18
<b>RCJTY55</b>	GG.CJT11	GYE55-KRR-B	2,86	<b>55</b>	134	222	15	18
<b>RCJTY55-JIS</b>	GG.FL211	GYE55-KRR-B-FA107	2,83	<b>55</b>	130	224	20	19

<sup>1)</sup> With lubrication nipple DIN 71412-AR 1/8.

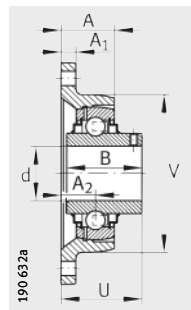
<sup>2)</sup> To be ordered separately.



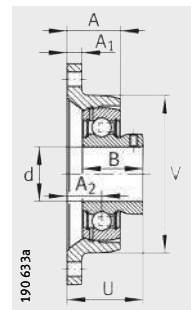
RCJT, LCJT



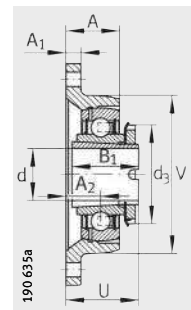
TCJT



RCJTJ (-JIS)



PCJTJ



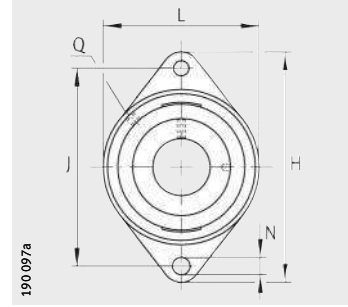
RCJTA

B	B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub>	A	U	V	Basic load ratings		End cap <sup>2)</sup>
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
–	56,5	143,5	24	R <sub>p</sub> 1/8	58	34,5	59,1	105	32 500	19 800	KASK08
–	56,5	143,5	24	R <sub>p</sub> 1/8	58	34,5	59,1	105	32 500	19 800	KASK08
39,45	–	143,5	24	R <sub>p</sub> 1/8	–	34,5	52,95	105	32 500	19 800	KASK08
–	38	143,5	24	R <sub>p</sub> 1/8	58	34,5	51	105	29 500	19 800	KASK08
49,2	–	143,5	24	R <sub>p</sub> 1/8	–	34,5	54,2	105	32 500	19 800	KASK08
49,2	–	144	21	M6	–	36	51,2	–	32 500	19 800	–
–	43,8	148,5	19,2	R <sub>p</sub> 1/8	63	30,2	51,9	111	32 500	20 400	–
–	43,8	148,5	24	R <sub>p</sub> 1/8	63	35	56,7	111	32 500	20 400	–
–	56,5	148,5	24	R <sub>p</sub> 1/8	63	35	59,1	111	32 500	20 400	–
–	56,5	148,5	24	R <sub>p</sub> 1/8	63	35	59,1	111	32 500	20 400	–
–	56,5	148,5	24	R <sub>p</sub> 1/8	63	35	59,1	111	32 500	20 400	–
41,5	–	148,5	24	R <sub>p</sub> 1/8	–	35	54,5	111	32 500	20 400	–
49,2	–	148,5	24	R <sub>p</sub> 1/8	–	35	54,2	111	32 500	20 400	–
49,2	–	148	22	M6	–	38	52,2	–	32 500	20 400	–
–	43,8	157	19,2	R <sub>p</sub> 1/8	69	30,2	51,9	116	35 000	23 200	–
–	43,8	157	28	R <sub>p</sub> 1/8	69	39	60,7	116	35 000	23 200	KASK10
–	43,8	157	28	R <sub>p</sub> 1/8	69	39	60,7	116	35 000	23 200	KASK10
–	62,8	157	28	R <sub>p</sub> 1/8	69	39	66,2	116	35 000	23 200	KASK10
–	62,8	157	28	R <sub>p</sub> 1/8	69	39	66,2	116	35 000	23 200	KASK10
–	62,8	157	28	R <sub>p</sub> 1/8	69	39	66,2	116	35 000	23 200	–
–	62,8	157	28	R <sub>p</sub> 1/8	69	39	66,2	116	35 000	23 200	KASK10
–	62,8	157	28	R <sub>p</sub> 1/8	69	39	66,2	116	35 000	23 200	KASK10
43	–	157	28	R <sub>p</sub> 1/8	–	39	60	116	35 000	23 200	KASK10
51,6	–	157	28	R <sub>p</sub> 1/8	–	39	60,6	116	35 000	23 200	KASK10
51,6	–	157	22	M6	–	40	54,6	–	35 000	23 200	–
–	48,4	184	31	R <sub>p</sub> 1/8	76	43,5	67,4	134	43 500	29 000	–
–	71,4	184	31	R <sub>p</sub> 1/8	76	43,5	74,6	134	43 500	29 000	–
–	71,4	184	31	R <sub>p</sub> 1/8	76	43,5	74,6	134	43 500	29 000	–
55,6	–	184	31	R <sub>p</sub> 1/8	–	43,5	64,4	134	43 500	29 000	–
55,6	–	184	25	M6	–	43	58,4	–	43 500	29 000	–



# Two-bolt flanged housing units

Cast iron housings



PCJT (-FA125), PCJTY, RCJT, TCJT, RCJTY (-JIS)

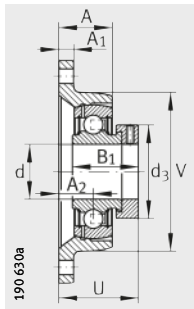
**Dimension table** (continued) · Dimensions in mm

Designation			Mass m ≈kg	Dimensions				
Unit	Housing	Radial insert ball bearing		d	L	H	A <sub>1</sub>	N
<b>PCJT60-N</b>	GG.CJT12-N	GRAE60-NPP-B	3,25	<b>60</b>	138	238	16	18
<b>PCJT60-N-FA125</b>	GG.CJT12-N-FA125.1	GRAE60-NPP-B-FA125.5	3,25	<b>60</b>	138	238	16	18
<b>RCJT60-N</b>	GG.CJT12-N	GE60-KRR-B	3,69	<b>60</b>	138	238	16	18
<b>PCJTY60-N</b>	GG.CJT12-N	GAY60-NPP-B	2,92	<b>60</b>	138	238	16	18
<b>RCJTY60-N</b>	GG.CJT12-N	GYE60-KRR-B	3,46	<b>60</b>	138	238	16	18
<b>RCJTY60-JIS</b>	GG.FL212	GYE60-KRR-B-FA107	3,88	<b>60</b>	140	250	20	23
<b>RCJT65-214<sup>2)</sup></b>	GG.CJT13/14	GE65-214-KRR-B	6,41	<b>65</b>	160	258	18	21
<b>TCJT65-214<sup>2)</sup></b>	GG.CJT13/14	GE65-214-KTT-B	6,41	<b>65</b>	160	258	18	21
<b>RCJTY65-214<sup>2)</sup></b>	GG.CJT13/14	GYE65-214-KRR-B	5,95	<b>65</b>	160	258	18	21
<b>RCJT70</b>	GG.CJT13/14	GE70-KRR-B	6,15	<b>70</b>	160	258	18	21
<b>RCJTY70</b>	GG.CJT13/14	GYE70-KRR-B	5,65	<b>70</b>	160	258	18	21
<b>RCJT75</b>	GG.CJT15	GE75-KRR-B	6	<b>75</b>	160	258	18	21
<b>TCJT75</b>	GG.CJT15	GE75-KTT-B	6	<b>75</b>	160	258	18	21
<b>RCJTY75</b>	GG.CJT15	GYE75-KRR-B	5,53	<b>75</b>	160	258	18	21

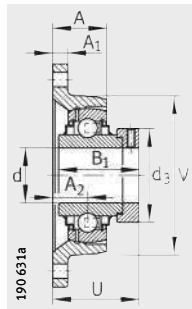
<sup>1)</sup> To be ordered separately.

<sup>2)</sup> Different ball set 6214.

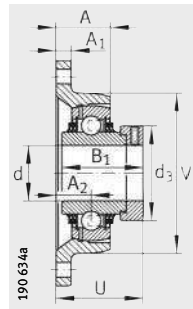




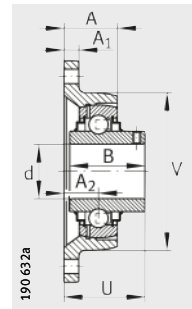
PCJT



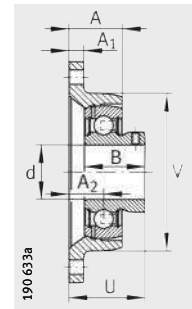
RCJT



TCJT



RCJTY



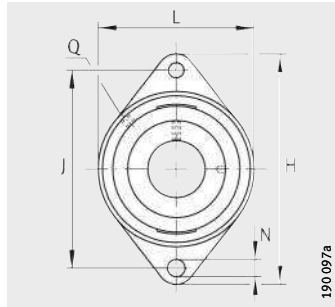
PCJTY

B	B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub> max.	A	U	V	Basic load ratings		End cap <sup>1)</sup>
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
-	53,1	202	34	R <sub>p</sub> 1/8	84	46	73,6	138	52 000	36 000	KASK12
-	53,1	202	34	R <sub>p</sub> 1/8	84	46	73,6	138	52 000	36 000	KASK12
-	77,9	202	34	R <sub>p</sub> 1/8	84	46	80,8	138	52 000	36 000	KASK12
47	-	202	34	R <sub>p</sub> 1/8	-	46	68	138	52 000	36 000	KASK12
65,1	-	202	34	R <sub>p</sub> 1/8	-	46	73,7	138	52 000	36 000	KASK12
65,1	-	202	29	M6	-	48	68,7	-	52 000	36 000	-
-	66	216	38	R <sub>p</sub> 1/8	96	57	82,6	160	62 000	44 000	-
-	66	216	38	R <sub>p</sub> 1/8	96	57	82,6	160	62 000	44 000	-
74,6	-	216	38	R <sub>p</sub> 1/8	-	57	82,4	160	62 000	44 000	-
-	66	216	38	R <sub>p</sub> 1/8	96	57	82,6	160	62 000	44 000	-
74,6	-	216	38	R <sub>p</sub> 1/8	-	57	82,4	160	62 000	44 000	-
-	67	216	38	R <sub>p</sub> 1/8	100	57	83,6	160	62 000	44 500	-
-	67	216	38	R <sub>p</sub> 1/8	100	57	83,6	160	62 000	44 500	-
77,8	-	216	38	R <sub>p</sub> 1/8	-	57	82,5	160	62 000	44 500	-

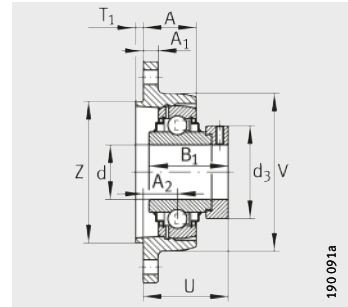


# Two-bolt flanged housing units with centring spigot

Cast iron housings



RCJ TZ



RCJ TZ

**Dimension table** - Dimensions in mm

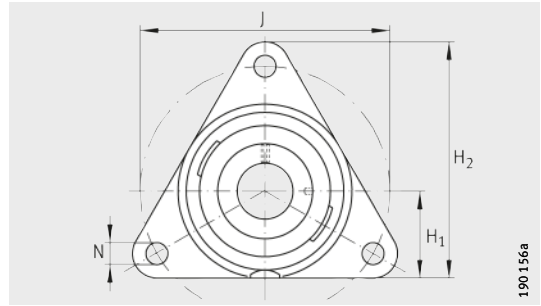
Designation			Mass m ≈ kg	Dimensions				
Unit	Housing	Radial insert ball bearing		d	L	H	A <sub>1</sub>	N
<b>RCJ TZ20</b>	GG.CJ TZ04	GE20-KRR-B	0,53	<b>20</b>	60,5	112,5	10	11,5
<b>RCJ TZ25</b>	GG.CJ TZ05	GE25-KRR-B	0,64	<b>25</b>	70	124	12	11,5
<b>RCJ TZ30</b>	GG.CJ TZ06	GE30-KRR-B	0,9	<b>30</b>	83	142	12	11,5
<b>RCJ TZ35</b>	GG.CJ TZ07	GE35-KRR-B	1,22	<b>35</b>	94	155	12,5	14
<b>RCJ TZ40</b>	GG.CJ TZ08	GE40-KRR-B	1,6	<b>40</b>	105	172	13	14
<b>RCJ TZ45</b>	GG.CJ TZ09	GE45-KRR-B	1,86	<b>45</b>	111	180	13	14
<b>RCJ TZ50</b>	GG.CJ TZ10	GE50-KRR-B	2,21	<b>50</b>	116	190	13	14
<b>RCJ TZ60</b>	GG.CJ TZ12	GE60-KRR-B	3,74	<b>60</b>	138	238	16	18

										Basic load ratings	
B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub> max.	A	T <sub>1</sub>	U	V	Z	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
43,7	90	19	R <sub>p</sub> 1/8	33	31,7	3,5	45,6	60,5	55	12 800	6 500
44,5	99	19	R <sub>p</sub> 1/8	37,5	26,5	3,5	45,9	70	60	14 000	7 800
48,5	116,5	17	R <sub>p</sub> 1/8	44	26	3	47,1	83	80	19 500	11 300
51,3	130	17	R <sub>p</sub> 1/8	51	26,5	4	49,3	94	90	25 500	15 300
56,5	143,5	20	R <sub>p</sub> 1/8	58	30,5	4	54,9	105	100	32 500	19 800
56,5	148,5	20	R <sub>p</sub> 1/8	63	31	4	54,9	111	105	32 500	20 400
62,8	157	24	R <sub>p</sub> 1/8	69	35	4	62,1	116	105	35 000	23 200
77,9	202	30	R <sub>p</sub> 1/8	84	42	4	76,8	138	130	52 000	36 000



# Three-bolt flanged housing units

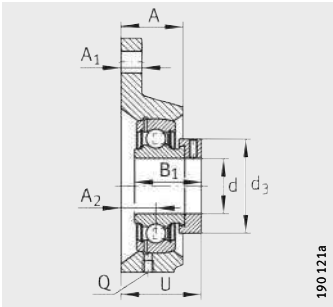
Cast iron housings



PCFTR

**Dimension table** - Dimensions in mm

Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	H <sub>2</sub>	H <sub>1</sub>	A <sub>1</sub>
PCFTR12	GG.CFTR03	GRAE12-NPP-B	0,4	12	81	31	11
PCFTR15	GG.CFTR03	GRAE15-NPP-B	0,4	15	81	31	11
PCFTR17	GG.CFTR03	GRAE17-NPP-B	0,4	17	81	31	11
PCFTR20	GG.CFTR04	GRAE20-NPP-B	0,56	20	92	35	11
PCFTR25	GG.CFTR05	GRAE25-NPP-B	0,71	25	97	36	12
PCFTR30	GG.CFTR06	GRAE30-NPP-B	0,99	30	117	44	12
PCFTR35	GG.CFTR07	GRAE35-NPP-B	1,34	35	128	48	14
PCFTR40	GG.CFTR08	GRAE40-NPP-B	1,83	40	137	51	16
PCFTR45	GG.CFTR09	GRAE45-NPP-B	2	45	150	55	16
PCFTR50	GG.CFTR10	GRAE50-NPP-B	2,15	50	150	55	16



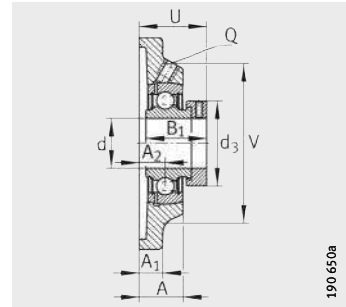
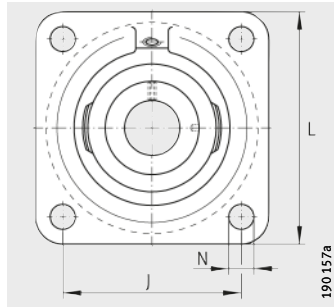
PCFTR

N	B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub> max.	A	U	Basic load ratings	
								dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
11,5	28,6	76,1	10	M6	28	20	32,1	9 800	4 750
11,5	28,6	76,1	10	M6	28	20	32,1	9 800	4 750
11,5	28,6	76,1	10	M6	28	20	32,1	9 800	4 750
11,5	31	89,5	10,5	R <sub>p</sub> 1/8	33	20	34	12 800	6 600
11,5	31	96	12,5	R <sub>p</sub> 1/8	37,5	22	36	14 000	7 800
11,5	35,8	116	13,3	R <sub>p</sub> 1/8	44	24	40	19 500	11 300
14	39	129,7	15,6	R <sub>p</sub> 1/8	51	27	45,1	25 500	15 300
14	43,8	140	18,3	R <sub>p</sub> 1/8	58	30	51	32 500	19 800
14	43,8	160	19,2	R <sub>p</sub> 1/8	63	33	51,9	32 500	20 400
14	43,8	160	19,2	R <sub>p</sub> 1/8	69	33	51,9	35 000	23 200



# Four-bolt flanged housing units

Cast iron housings



PCF, PCJ (-FA125),  
RCJ (-FA125, -FA164), TCJ, PCJY,  
RCJY, RCJY..-JIS

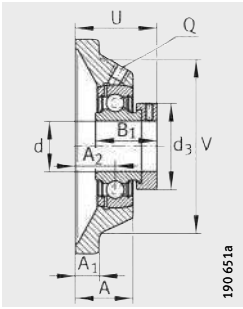
PCF

**Dimension table** - Dimensions in mm

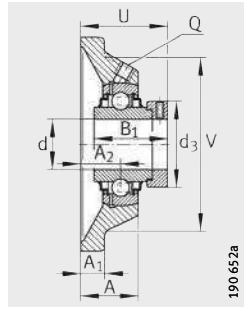
Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	L	A <sub>1</sub>	N
<b>PCJ12</b>	GG.CJ03	GRAE12-NPP-B	0,52	<b>12</b>	76	9,5	11,5
<b>PCJY12</b>	GG.CJ03	GAY12-NPP-B	0,5	<b>12</b>	76	9,5	11,5
<b>RCJY12</b>	GG.CJ03	GYE12-KRR-B	0,51	<b>12</b>	76	9,5	11,5
<b>PCJ15</b>	GG.CJ03	GRAE15-NPP-B	0,52	<b>15</b>	76	9,5	11,5
<b>PCJY15</b>	GG.CJ03	GAY15-NPP-B	0,49	<b>15</b>	76	9,5	11,5
<b>RCJY15</b>	GG.CJ03	GYE15-KRR-B	0,51	<b>15</b>	76	9,5	11,5
<b>RCJY16</b>	GG.CJ03	GYE16-KRR-B	0,51	<b>16</b>	76	9,5	11,5
<b>PCJ17</b>	GG.CJ03	GRAE17-NPP-B	0,52	<b>17</b>	76	9,5	11,5
<b>RCJ17</b>	GG.CJ03	GE17-KRR-B	0,56	<b>17</b>	76	9,5	11,5
<b>PCJY17</b>	GG.CJ03	GAY17-NPP-B	0,48	<b>17</b>	76	9,5	11,5
<b>RCJY17</b>	GG.CJ03	GYE17-KRR-B	0,51	<b>17</b>	76	9,5	11,5
<b>PCF20</b>	GG.CF04	GRAE20-NPP-B	0,55	<b>20</b>	86	10	11,5
<b>PCJ20-N</b>	GG.CJ04-N	GRAE20-NPP-B	0,6	<b>20</b>	86	10	11,5
<b>PCJ20-N-FA125</b>	GG.CJ04-N-FA125.1	GRAE20-NPP-B-FA125.5	0,6	<b>20</b>	86	10	11,5
<b>RCJ20-N</b>	GG.CJ04-N	GE20-KRR-B	0,65	<b>20</b>	86	10	11,5
<b>RCJ20-N-FA125</b>	GG.CJ04-N-FA125.1	GE20-KRR-B-FA125.5	0,65	<b>20</b>	86	10	11,5
<b>TCJ20-N</b>	GG.CJ04-N	GE20-KTT-B	0,65	<b>20</b>	86	10	11,5
<b>PCJY20-N</b>	GG.CJ04-N	GAY20-NPP-B	0,56	<b>20</b>	86	10	11,5
<b>RCJY20-N</b>	GG.CJ04-N	GYE20-KRR-B	0,62	<b>20</b>	86	10	11,5
<b>RCJY20-JIS</b>	GG.F204	GYE20-KRR-B-FA107	0,6	<b>20</b>	86	12	12
<b>PCF25</b>	GG.CF05	GRAE25-NPP-B	0,71	<b>25</b>	95	11	11,5
<b>PCJ25-N</b>	GG.CJ05-N	GRAE25-NPP-B	0,76	<b>25</b>	95	11	11,5
<b>PCJ25-N-FA125</b>	GG.CJ05-N-FA125.1	GRAE25-NPP-B-FA125.5	0,76	<b>25</b>	95	11	11,5
<b>RCJ25-N</b>	GG.CJ05-N	GE25-KRR-B	0,82	<b>25</b>	95	11	11,5
<b>RCJ25-N-FA125</b>	GG.CJ05-N-FA125.1	GE25-KRR-B-FA125.5	0,82	<b>25</b>	95	11	11,5
<b>RCJ25-FA164<sup>1)</sup></b>	GG.CJ05-N	GE25-KRR-B-FA164	0,82	<b>25</b>	95	11	11,5
<b>TCJ25-N</b>	GG.CJ05-N	GE25-KTT-B	0,81	<b>25</b>	95	11	11,5
<b>PCJY25-N</b>	GG.CJ05-N	GAY25-NPP-B	0,72	<b>25</b>	95	11	11,5
<b>RCJY25-N</b>	GG.CJ05-N	GYE25-KRR-B	0,77	<b>25</b>	95	11	11,5
<b>RCJY25-JIS</b>	GG.F205	GYE25-KRR-B-FA107	0,76	<b>25</b>	95	14	12

<sup>1)</sup> With lubrication nipple DIN 71412-AR 1/8.

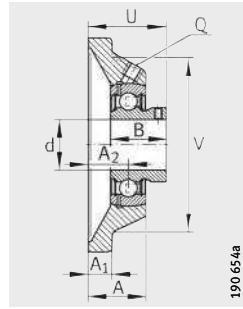
<sup>2)</sup> To be ordered separately.



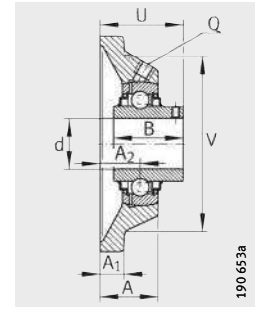
PCJ (-FA125)



RCJ (-FA125, -FA164),  
TCJ



PCJY



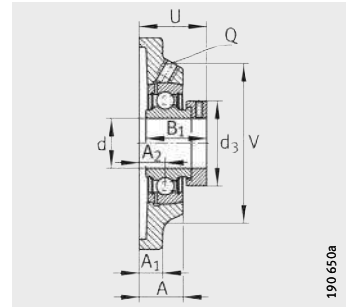
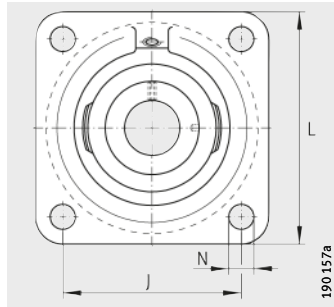
RCJY (-JIS)

B	B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub> max.	A	U	V	Basic load ratings		End cap <sup>2)</sup>
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
-	28,6	54	17	M6	28	27	39,1	58	9 800	4 750	-
22	-	54	17	M6	-	27	33	58	9 800	4 750	-
27,4	-	54	17	M6	-	27	32,9	58	9 800	4 750	-
-	28,6	54	17	M6	28	27	39,1	58	9 800	4 750	-
22	-	54	17	M6	-	27	33	58	9 800	4 750	-
27,4	-	54	17	M6	-	27	32,9	58	9 800	4 750	-
27,4	-	54	17	M6	-	27	32,9	58	9 800	4 750	-
-	28,6	54	17	M6	28	27	39,1	58	9 800	4 750	-
-	37,4	54	17	M6	28	27	40,4	58	9 800	4 750	-
22	-	54	17	M6	-	27	33	58	9 800	4 750	-
27,4	-	54	17	M6	-	27	32,9	58	9 800	4 750	-
-	31	63,5	10,5	R <sub>p</sub> 1/8	33	20	34	68	12 800	6 600	-
-	31	63,5	19	R <sub>p</sub> 1/8	33	29	42,5	68	12 800	6 600	KASK04
-	31	63,5	19	R <sub>p</sub> 1/8	33	29	42,5	68	12 800	6 600	KASK04
-	43,7	63,5	19	R <sub>p</sub> 1/8	33	29	45,6	68	12 800	6 600	KASK04
-	43,7	63,5	19	R <sub>p</sub> 1/8	33	29	45,6	68	12 800	6 600	KASK04
-	43,7	63,5	19	R <sub>p</sub> 1/8	33	29	45,6	68	12 800	6 600	KASK04
25	-	63,5	19	R <sub>p</sub> 1/8	-	29	37	68	12 800	6 600	KASK04
31	-	63,5	19	R <sub>p</sub> 1/8	-	29	37,3	68	12 800	6 600	KASK04
31	-	64	15	M6	-	25,5	33,3	-	12 800	6 600	-
-	31	70	12,5	R <sub>p</sub> 1/8	37,5	22	36	74	14 000	7 800	-
-	31	70	19	R <sub>p</sub> 1/8	37,5	29	42,5	74	14 000	7 800	KASK05
-	31	70	19	R <sub>p</sub> 1/8	37,5	29	42,5	74	14 000	7 800	KASK05
-	44,5	70	19	R <sub>p</sub> 1/8	37,5	29	46	74	14 000	7 800	KASK05
-	44,5	70	19	R <sub>p</sub> 1/8	37,5	29	46	74	14 000	7 800	KASK05
-	44,5	70	19	R <sub>p</sub> 1/8	37,5	29	46	74	14 000	7 800	-
-	44,5	70	19	R <sub>p</sub> 1/8	37,5	29	46	74	14 000	7 800	KASK05
27	-	70	19	R <sub>p</sub> 1/8	-	29	38,5	74	14 000	7 800	KASK05
34,1	-	70	19	R <sub>p</sub> 1/8	-	29	38,8	74	14 000	7 800	KASK05
34,1	-	70	16	M6	-	27	35,8	-	14 000	7 800	-



# Four-bolt flanged housing units

Cast iron housings



PCF, PCJ (-FA125),  
RCJ (-FA125, -FA164), RCJO,  
TCJ, PCJY, RCJY, RCJY (-JIS), RCJL

PCF

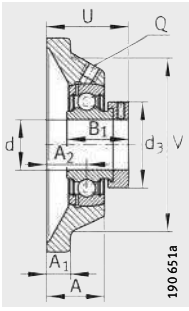
**Dimension table** (continued) · Dimensions in mm

Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	L	A <sub>1</sub>	N
<b>PCF30</b>	GG.CF06	GRAE30-NPP-B	1,01	<b>30</b>	108	12	11,5
<b>PCJ30-N</b>	GG.CJ06-N	GRAE30-NPP-B	1,11	<b>30</b>	108	12	11,5
<b>PCJ30-N-FA125</b>	GG.CJ06-N-FA125.1	GRAE30-NPP-B-FA125.5	1,11	<b>30</b>	108	12	11,5
<b>RCJ30-N</b>	GG.CJ06-N	GE30-KRR-B	1,16	<b>30</b>	108	12	11,5
<b>RCJ30-N-FA125</b>	GG.CJ06-N-FA125.1	GE30-KRR-B-FA125.5	1,17	<b>30</b>	108	12	11,5
<b>TCJ30-N</b>	GG.CJ06-N	GE30-KTT-B	1,17	<b>30</b>	108	12	11,5
<b>RCJL30-N</b>	GG.CJ06-N	GLE30-KRR-B	1,08	<b>30</b>	108	12	11,5
<b>RCJO30</b>	GG.CJO06	GNE30-KRR-B	1,75	<b>30</b>	125	15	14,5
<b>PCJY30-N</b>	GG.CJ06-N	GAY30-NPP-B	1,03	<b>30</b>	108	12	11,5
<b>RCJY30-N</b>	GG.CJ06-N	GYE30-KRR-B	1,1	<b>30</b>	108	12	11,5
<b>RCJY30-JIS</b>	GG.F206	GYE30-KRR-B-FA107	1,17	<b>30</b>	108	14	12
<b>PCF35</b>	GG.CF07	GRAE35-NPP-B	1,31	<b>35</b>	118	12,5	14
<b>PCJ35-N</b>	GG.CJ07-N	GRAE35-NPP-B	1,46	<b>35</b>	118	12,5	14
<b>PCJ35-N-FA125</b>	GG.CJ07-N-FA125.1	GRAE35-NPP-B-FA125.5	1,46	<b>35</b>	118	12,5	14
<b>RCJ35-N</b>	GG.CJ07-N	GE35-KRR-B	1,47	<b>35</b>	118	12,5	14
<b>RCJ35-N-FA125</b>	GG.CJ07-N-FA125.1	GE35-KRR-B-FA125.5	1,47	<b>35</b>	118	12,5	14
<b>RCJ35-FA164<sup>1)</sup></b>	GG.CJ07-N	GE35-KRR-B-FA164	1,47	<b>35</b>	118	12,5	14
<b>TCJ35-N</b>	GG.CJ07-N	GE35-KTT-B	1,54	<b>35</b>	118	12,5	14
<b>RCJL35-N</b>	GG.CJ07-N	GLE35-KRR-B	1,41	<b>35</b>	118	12,5	14
<b>RCJO35</b>	GG.CJO07	GNE35-KRR-B	2,55	<b>35</b>	135	16	19
<b>PCJY35-N</b>	GG.CJ07-N	GAY35-NPP-B	1,38	<b>35</b>	118	12,5	14
<b>RCJY35-N</b>	GG.CJ07-N	GYE35-KRR-B	1,44	<b>35</b>	118	12,5	14
<b>RCJY35-JIS</b>	GG.F207	GYE35-KRR-B-FA107	1,47	<b>35</b>	117	16	14
<b>PCF40</b>	GG.CF08	GRAE40-NPP-B	1,72	<b>40</b>	130	13	14
<b>PCJ40-N</b>	GG.CJ08-N	GRAE40-NPP-B	1,89	<b>40</b>	130	13	14
<b>PCJ40-N-FA125</b>	GG.CJ08-N-FA125.1	GRAE40-NPP-B-FA125.5	1,9	<b>40</b>	130	13	14
<b>RCJ40-N</b>	GG.CJ08-N	GE40-KRR-B	2,02	<b>40</b>	130	13	14
<b>RCJ40-N-FA125</b>	GG.CJ08-N-FA125.1	GE40-KRR-B-FA125.5	2,02	<b>40</b>	130	13	14
<b>RCJ40-FA164<sup>1)</sup></b>	GG.CJ08-N	GE40-KRR-B-FA164	2,02	<b>40</b>	130	13	14
<b>TCJ40-N</b>	GG.CJ08-N	GE40-KTT-B	2,02	<b>40</b>	130	13	14
<b>RCJL40-N</b>	GG.CJ08-N	GLE40-KRR-B	1,84	<b>40</b>	130	13	14
<b>RCJO40</b>	GG.CJO08	GNE40-KRR-B	3,1	<b>40</b>	150	17	19
<b>PCJY40-N</b>	GG.CJ08-N	GAY40-NPP-B	1,81	<b>40</b>	130	13	14
<b>RCJY40-N</b>	GG.CJ08-N	GYE40-KRR-B	1,93	<b>40</b>	130	13	14
<b>RCJY40-JIS</b>	GG.F208	GYE40-KRR-B-FA107	1,91	<b>40</b>	130	16	16

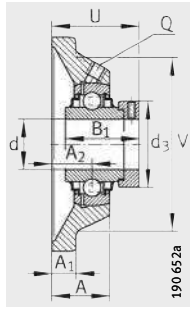
<sup>1)</sup> With lubrication nipple DIN 71412-AR 1/8.

<sup>2)</sup> To be ordered separately.

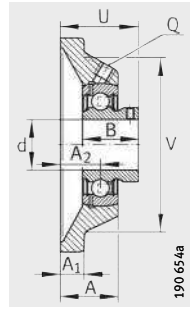




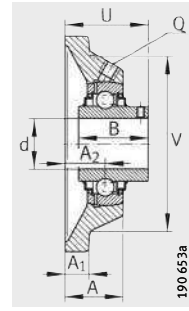
PCJ (-N-FA125)



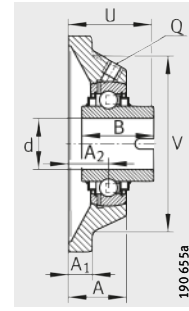
RCJ (-N-FA125,  
-FA164), RCJO, TCJ



PCJY



RCJY (-JIS)



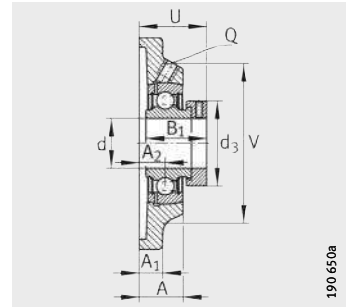
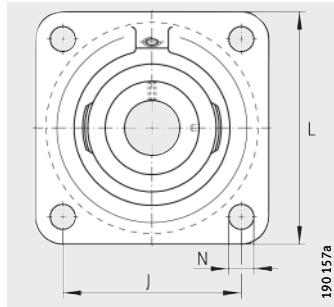
RCJL

B	B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub>	A	U	V	Basic load ratings		End cap <sup>2)</sup>
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
-	35,8	82,5	13,3	R <sub>p</sub> 1/8	44	22,3	40	85	19 500	11 300	-
-	35,8	82,5	20	R <sub>p</sub> 1/8	44	29	46,8	85	19 500	11 300	KASK06
-	35,8	82,5	20	R <sub>p</sub> 1/8	44	29	46,8	85	19 500	11 300	KASK06
-	48,5	82,5	20	R <sub>p</sub> 1/8	44	29	50,2	85	19 500	11 300	KASK06
-	48,5	82,5	20	R <sub>p</sub> 1/8	44	29	50,2	85	19 500	11 300	KASK06
-	48,5	82,5	20	R <sub>p</sub> 1/8	44	29	50,2	85	19 500	11 300	KASK06
36,5	-	82,5	20	R <sub>p</sub> 1/8	-	29	42	85	19 500	11 300	KASK06
-	50	95	20,6	R <sub>p</sub> 1/8	51	30,6	53,1	98	29 500	16 700	-
30	-	82,5	20	R <sub>p</sub> 1/8	-	29	41	85	19 500	11 300	KASK06
38,1	-	82,5	20	R <sub>p</sub> 1/8	-	29	42,2	85	19 500	11 300	KASK06
38,1	-	83	18	M6	-	31	40,2	-	19 500	11 300	-
-	39	92	15,5	R <sub>p</sub> 1/8	51	25	45	100	25 500	15 300	-
-	39	92	21	R <sub>p</sub> 1/8	51	30,5	50,5	100	25 500	15 300	KASK07
-	39	92	21	R <sub>p</sub> 1/8	51	30,5	50,5	100	25 500	15 300	KASK07
-	51,3	92	21	R <sub>p</sub> 1/8	51	30,5	53,5	100	25 500	15 300	KASK07
-	51,3	92	21	R <sub>p</sub> 1/8	51	30,5	53,5	100	25 500	15 300	KASK07
-	51,3	92	21	R <sub>p</sub> 1/8	51	30,5	53,5	100	25 500	15 300	-
-	51,3	92	21	R <sub>p</sub> 1/8	51	30,5	53,5	100	25 500	15 300	KASK07
37,7	-	92	21	R <sub>p</sub> 1/8	-	30,5	43	100	25 500	15 300	KASK07
-	51,6	100	20	R <sub>p</sub> 1/8	55	31	53,4	104	36 500	20 900	-
34,95	-	92	21	R <sub>p</sub> 1/8	-	30,5	46,45	100	25 500	15 300	KASK07
42,9	-	92	21	R <sub>p</sub> 1/8	-	30,5	46,4	100	25 500	15 300	KASK07
42,9	-	92	19	M6	-	34	44,4	-	25 500	15 300	-
-	43,8	101,5	18,3	R <sub>p</sub> 1/8	58	28,8	51	110	32 500	19 800	-
-	43,8	101,5	24	R <sub>p</sub> 1/8	58	34,5	56,8	110	32 500	19 800	KASK08
-	43,8	101,5	24	R <sub>p</sub> 1/8	58	34,5	56,8	110	32 500	19 800	KASK08
-	56,5	101,5	24	R <sub>p</sub> 1/8	58	34,5	59,1	110	32 500	19 800	KASK08
-	56,5	101,5	24	R <sub>p</sub> 1/8	58	34,5	59,1	110	32 500	19 800	KASK08
-	56,5	101,5	24	R <sub>p</sub> 1/8	58	34,5	59,1	110	32 500	19 800	-
-	56,5	101,5	24	R <sub>p</sub> 1/8	58	34,5	59,1	110	32 500	19 800	KASK08
42,9	-	101,5	24	R <sub>p</sub> 1/8	-	34,5	51	110	32 500	19 800	KASK08
-	54,6	112	23	R <sub>p</sub> 1/8	63	34,5	59,6	121	44 500	26 000	-
39,45	-	101,5	24	R <sub>p</sub> 1/8	-	34,5	52,95	110	32 500	19 800	KASK08
49,2	-	101,5	24	R <sub>p</sub> 1/8	-	34,5	54,2	110	32 500	19 800	KASK08
49,2	-	102	21	M6	-	36	51,2	-	32 500	19 800	-



# Four-bolt flanged housing units

Cast iron housings



PCF, PCJ (-N-FA125, -FA125),  
RCJ (-N-FA125, -FA125, -FA164),  
RCJO, TCJ, PCJY, RCJY (-JIS), RCJL

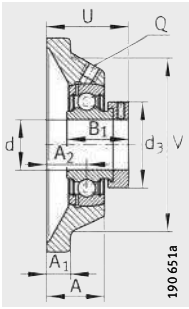
PCF

**Dimension table** (continued) · Dimensions in mm

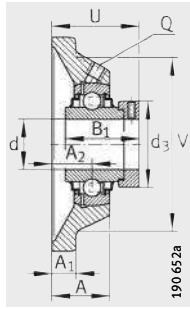
Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	L	A <sub>1</sub>	N
PCF45	GG.CF09	GRAE45-NPP-B	1,99	45	137	13	14
PCJ45	GG.CJ09	GRAE45-NPP-B	2,22	45	137	13	14
PCJ45-FA125	GG.CJ09-FA125.1	GRAE45-NPP-B-FA125.5	2,22	45	137	13	14
RCJ45	GG.CJ09	GE45-KRR-B	2,26	45	137	13	14
RCJ45-FA125	GG.CJ09-FA125.1	GE45-KRR-B-FA125.5	2,26	45	137	13	14
TCJ45	GG.CJ09	GE45-KTT-B	2,37	45	137	13	14
PCJY45	GG.CJ09	GAY45-NPP-B	2	45	137	13	14
RCJY45	GG.CJ09	GYE45-KRR-B	2,15	45	137	13	14
RCJY45-JIS	GG.F209	GYE45-KRR-B-FA107	2,28	45	137	18	16
PCF50	GG.CF10	GRAE50-NPP-B	2,2	50	143	13	14
PCJ50-N	GG.CJ10-N	GRAE50-NPP-B	2,3	50	143	13	18
PCJ50-N-FA125	GG.CJ10-N-FA125.1	GRAE50-NPP-B-FA125.5	2,3	50	143	13	18
RCJ50-N	GG.CJ10-N	GE50-KRR-B	2,53	50	143	13	18
RCJ50-N-FA125	GG.CJ10-N-FA125.1	GE50-KRR-B-FA125.5	2,53	50	143	13	18
RCJ50-FA164 <sup>1)</sup>	GG.CJ10-N	GE50-KRR-B-FA164	2,53	50	143	13	18
TCJ50-N	GG.CJ10-N	GE50-KTT-B	2,53	50	143	13	18
RCJL50-N	GG.CJ10-N	GLE50-KRR-B	2,29	50	143	13	18
RCJO50	GG.CJO10	GNE50-KRR-B	4,9	50	175	19	23
PCJY50-N	GG.CJ10-N	GAY50-NPP-B	2,2	50	143	13	18
RCJY50-N	GG.CJ10-N	GYE50-KRR-B	2,33	50	143	13	18
RCJY50-JIS	GG.F210	GYE50-KRR-B-FA107	2,54	50	143	18	16
PCJ55	GG.CJ11	GRAE55-NPP-B	2,91	55	162	15	18
TCJ55	GG.CJ11	GE55-KRR-B	3,52	55	162	15	18
RCJ55	GG.CJ11	GE55-KTT-B	3,57	55	162	15	18
RCJY55	GG.CJ11	GYE55-KRR-B	3,41	55	162	15	18
RCJY55-JIS	GG.F211	GYE55-KRR-B-FA107	3,3	55	162	20	19
PCJ60-N	GG.CJ12-N	GRAE60-NPP-B	4,1	60	175	16	18
RCJ60-N	GG.CJ12-N	GE60-KRR-B	4,21	60	175	16	18
RCJ60-FA164 <sup>1)</sup>	GG.CJ12-N	GE60-KRR-B-FA164	4,26	60	175	16	18
TCJ60-N	GG.CJ12-N	GE60-KTT-B	4,21	60	175	16	18
RCJL60-N	GG.CJ12-N	GLE60-KRR-B	4,22	60	175	16	18
RCJO60	GG.CJO12	GNE60-KRR-B	6,8	60	195	22	23
PCJY60-N	GG.CJ12-N	GAY60-NPP-B	3,59	60	175	16	18
RCJY60-N	GG.CJ12-N	GYE60-KRR-B	4,22	60	175	16	18
RCJY60-JIS	GG.F212	GYE60-KRR-B-FA107	4,22	60	175	20	19

<sup>1)</sup> With lubrication nipple DIN 71412-AR 1/8.

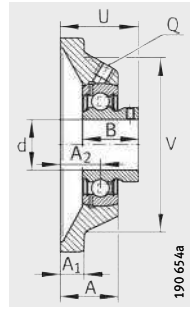
<sup>2)</sup> To be ordered separately.



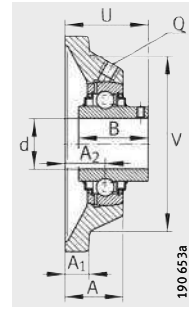
PCJ (-N-FA125, -FA125)



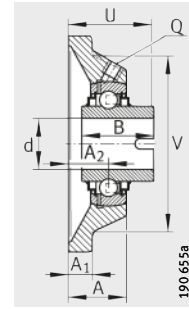
RCJ (-N-FA125, -FA125, -FA164), RCJO, TCJ)



PCJY



RCJY (-JIS)



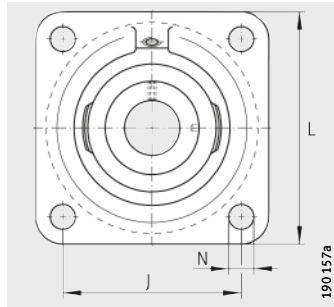
RCJL

B	B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub> max.	A	U	V	Basic load ratings		End cap <sup>2)</sup>
									dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
-	43,8	105	19,2	R <sub>p</sub> 1/8	63	30,2	51,9	116	32 500	20 400	-
-	43,8	105	24	R <sub>p</sub> 1/8	63	35	56,7	116	32 500	20 400	-
-	43,8	105	24	R <sub>p</sub> 1/8	63	35	56,7	116	32 500	20 400	-
-	56,5	105	24	R <sub>p</sub> 1/8	63	35	59,1	116	32 500	20 400	-
-	56,5	105	24	R <sub>p</sub> 1/8	63	35	59,1	116	32 500	20 400	-
-	56,5	105	24	R <sub>p</sub> 1/8	63	35	59,1	116	32 500	20 400	-
41,5	-	105	24	R <sub>p</sub> 1/8	-	35	54,5	116	32 500	20 400	-
49,2	-	105	24	R <sub>p</sub> 1/8	-	35	54,2	116	32 500	20 400	-
49,2	-	105	22	M6	-	38	52,2	-	32 500	20 400	-
-	43,8	111	19,2	R <sub>p</sub> 1/8	69	30,2	51,4	125	35 000	23 200	-
-	43,8	111	28	R <sub>p</sub> 1/8	69	39	60,8	125	35 000	23 200	KASK10
-	43,8	111	28	R <sub>p</sub> 1/8	69	39	60,8	125	35 000	23 200	KASK10
-	62,8	111	28	R <sub>p</sub> 1/8	69	39	66,1	125	35 000	23 200	KASK10
-	62,8	111	28	R <sub>p</sub> 1/8	69	39	66,1	125	35 000	23 200	KASK10
-	62,8	111	28	R <sub>p</sub> 1/8	69	39	66,1	125	35 000	23 200	-
-	62,8	111	28	R <sub>p</sub> 1/8	69	39	66,1	125	35 000	23 200	KASK10
49,2	-	111	28	R <sub>p</sub> 1/8	-	39	58,2	125	35 000	23 200	KASK10
-	66,8	132	28	R <sub>p</sub> 1/8	75,8	42,5	70,1	144	62 000	38 000	-
43	-	111	28	R <sub>p</sub> 1/8	-	39	60	125	35 000	23 200	KASK10
51,6	-	111	28	R <sub>p</sub> 1/8	-	39	60,6	125	35 000	23 200	KASK10
51,6	-	111	22	M6	-	40	54,6	-	35 000	23 200	-
-	48,4	130	31	R <sub>p</sub> 1/8	76	43,5	67,4	140	43 500	29 000	-
-	71,4	130	31	R <sub>p</sub> 1/8	76	43,5	74,6	140	43 500	29 000	-
-	71,4	130	31	R <sub>p</sub> 1/8	76	43,5	74,6	140	43 500	29 000	-
55,6	-	130	31	R <sub>p</sub> 1/8	-	43,5	64,4	140	43 500	29 000	-
55,6	-	130	25	M6	-	43	58,4	-	43 500	29 000	-
-	53,1	143	34	R <sub>p</sub> 1/8	84	46	73,6	150	52 000	36 000	KASK12
-	77,9	143	34	R <sub>p</sub> 1/8	84	46	80,9	150	52 000	36 000	KASK12
-	77,9	143	34	R <sub>p</sub> 1/8	84	46	80,9	150	52 000	36 000	-
-	77,9	143	34	R <sub>p</sub> 1/8	84	46	80,9	150	52 000	36 000	KASK12
61,9	-	143	34	R <sub>p</sub> 1/8	-	46	71,3	150	52 000	36 000	KASK12
-	68,4	150	33	R <sub>p</sub> 1/8	89	49,5	78,4	170	82 000	52 000	-
47	-	143	34	R <sub>p</sub> 1/8	-	46	68	150	52 000	36 000	KASK12
65,1	-	143	34	R <sub>p</sub> 1/8	-	46	73,7	150	52 000	36 000	KASK12
65,1	-	143	29	M6	-	48	68,7	-	52 000	36 000	-

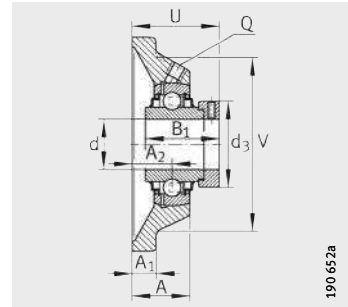


# Four-bolt flanged housing units

Cast iron housings



RCJ (-FA164), RCJO, TCJ, RCJL, RCJY



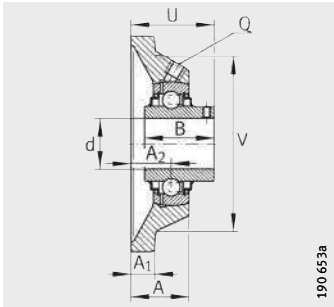
RCJ (-FA164), RCJO, TCJ

**Dimension table** (continued) · Dimensions in mm

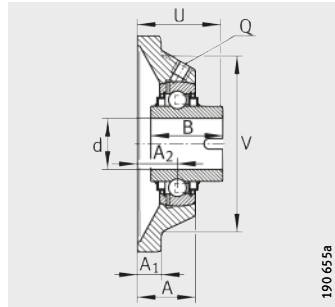
Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	L	A <sub>1</sub>	N
RCJ65-214 <sup>2)</sup>	GG.CJ14	GE65-214-KRR-B	6,11	65	188	18	18
RCJ65-214-FA164 <sup>1)2)</sup>	GG.CJ14	GE65-214-KRR-B-FA164	6,11	65	188	18	18
TCJ65-214 <sup>2)</sup>	GG.CJ14	GE65-214-KTT-B	6,11	65	188	18	18
RCJY65-214 <sup>2)</sup>	GG.CJ14	GYE65-214-KRR-B	5,65	65	188	18	18
RCJ70	GG.CJ14	GE70-KRR-B	5,85	70	188	18	18
TCJ70	GG.CJ14	GE70-KTT-B	5,85	70	188	18	18
RCJL70	GG.CJ14	GLE70-KRR-B	5,65	70	188	18	18
RCJO70	GG.CJO14	GNE70-KRR-B	10	70	226	25	25
RCJY70	GG.CJ14	GYE70-KRR-B	5,35	70	188	18	18
RCJ75	GG.CJ15	GE75-KRR-B	6,5	75	197	20	23
TCJ75	GG.CJ15	GE75-KTT-B	6,5	75	197	20	23
RCJY75	GG.CJ15	GYE75-KRR-B	6,04	75	197	20	23
RCJ80	GG.CJ16	GE80-KRR-B	6,85	80	197	20	23
TCJ80	GG.CJ16	GE80-KTT-B	6,85	80	197	20	23
RCJO80	GG.CJO16	GNE80-KRR-B	17,15	80	250	25	28
RCJY80	GG.CJ16	GYE80-KRR-B	6,82	80	197	20	23
RCJ90	GG.CJ18	GE90-KRR-B	9	90	235	22	23
RCJO90	GG.CJO18	GNE90-KRR-B	21,6	90	280	28,5	28
RCJY90	GG.CJ18	GYE90-KRR-B	9,48	90	235	22	23
RCJ100	GG.CJ20	GE100-KRR-B	12,25	100	265	25	27
RCJO100	GG.CJO20	GNE100-KRR-B	33,6	100	310	32	32
RCJ120	GG.CJ24	GE120-KRR-B	18	120	305	28	30

<sup>1)</sup> With lubrication nipple DIN 71412-AR 1/8.

<sup>2)</sup> Different ball set 6214.



RCJY



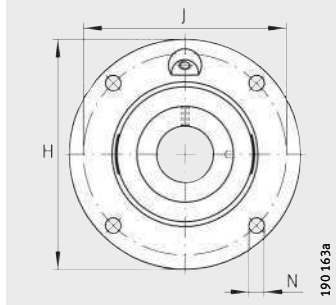
RCJL

									Basic load ratings	
B	B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub> max.	A	U	V	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
-	66	150	38	R <sub>p</sub> 1/8	96	52	82,6	165	62 000	44 000
-	66	150	38	R <sub>p</sub> 1/8	96	52	82,6	165	62 000	44 000
-	66	150	38	R <sub>p</sub> 1/8	96	52	82,6	165	62 000	44 000
74,6	-	150	38	R <sub>p</sub> 1/8	-	52	82,4	165	62 000	44 000
-	66	150	38	R <sub>p</sub> 1/8	96	52	82,6	165	62 000	44 000
-	66	150	38	R <sub>p</sub> 1/8	96	52	82,6	165	62 000	44 000
68,2	-	150	38	R <sub>p</sub> 1/8	-	52	79,2	165	62 000	44 000
-	75,4	178	36	R <sub>p</sub> 1/8	102	54,5	85,4	196	104 000	68 000
74,6	-	150	38	R <sub>p</sub> 1/8	-	52	82,4	165	62 000	44 000
-	67	153	41,3	R <sub>p</sub> 1/8	100	55,8	86,9	170	62 000	44 500
-	67	153	41,3	R <sub>p</sub> 1/8	100	55,8	86,9	170	62 000	44 500
77,8	-	153	41,3	R <sub>p</sub> 1/8	-	55,8	85,8	170	62 000	44 500
-	70,7	153	41,3	R <sub>p</sub> 1/8	108	55,8	88,9	180	72 000	54 000
-	70,7	153	41,3	R <sub>p</sub> 1/8	108	55,8	88,9	180	72 000	54 000
-	93,6	196	50	R <sub>p</sub> 1/8	118	80	109,7	210	123 000	87 000
82,6	-	153	41,3	R <sub>p</sub> 1/8	-	55,8	90,6	180	72 000	54 000
-	69,5	187	23,8	R <sub>p</sub> 1/8	118	39,8	70,3	200	96 000	72 000
-	101	216	48,5	R <sub>p</sub> 1/8	132	85	114	230	143 000	107 000
96	-	187	23,8	R <sub>p</sub> 1/8	-	39,8	80,1	200	96 000	72 000
-	75	210	28	R <sub>p</sub> 1/8	132	46	77,5	230	122 000	93 000
-	109,5	242	55	R <sub>p</sub> 1/8	145	97	125	268	174 000	140 000
-	81	240	31	R <sub>p</sub> 1/8	152	51	83	270	155 000	131 000

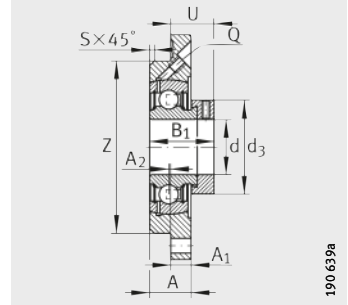


# Four-bolt flanged housing units with centring spigot

Cast iron housings



PME, RME, RME0, TME, PMEY, RMEY

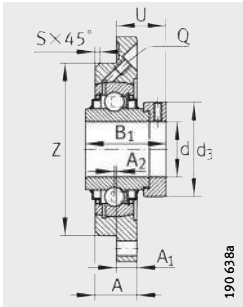


PME

**Dimension table** - Dimensions in mm

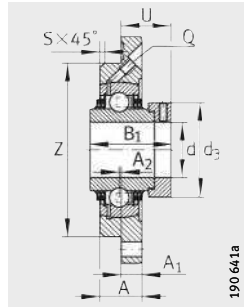
Designation			Mass m ≈kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	H	A <sub>1</sub>	N
<b>PME20-N</b>	GG.ME04-N	GRAE20-NPP-B	0,53	<b>20</b>	100	8	9
<b>RME20-N</b>	GG.ME04-N	GE20-KRR-B	0,57	<b>20</b>	100	8	9
<b>TME20-N</b>	GG.ME04-N	GE20-KTT-B	0,56	<b>20</b>	100	8	9
<b>PMEY20-N</b>	GG.ME04-N	GAY20-NPP-B	0,5	<b>20</b>	100	8	9
<b>RMEY20-N</b>	GG.ME04-N	GYE20-KRR-B	0,54	<b>20</b>	100	8	9
<b>PME25-N</b>	GG.ME05-N	GRAE25-NPP-B	0,73	<b>25</b>	115	9	9
<b>RME25-N</b>	GG.ME05-N	GE25-KRR-B	0,8	<b>25</b>	115	9	9
<b>TME25-N</b>	GG.ME05-N	GE25-KTT-B	0,8	<b>25</b>	115	9	9
<b>PMEY25-N</b>	GG.ME05-N	GAY25-NPP-B	0,7	<b>25</b>	115	9	9
<b>RMEY25-N</b>	GG.ME05-N	GYE25-KRR-B	0,75	<b>25</b>	115	9	9
<b>PME30-N</b>	GG.ME06-N	GRAE30-NPP-B	0,97	<b>30</b>	125	9,5	11,5
<b>RME30-N</b>	GG.ME06-N	GE30-KRR-B	1,04	<b>30</b>	125	9,5	11,5
<b>TME30-N</b>	GG.ME06-N	GE30-KTT-B	1,05	<b>30</b>	125	9,5	11,5
<b>PMEY30-N</b>	GG.ME06-N	GAY30-NPP-B	0,9	<b>30</b>	125	9,5	11,5
<b>RMEY30-N</b>	GG.ME06-N	GYE30-KRR-B	0,99	<b>30</b>	125	9,5	11,5
<b>PME35-N</b>	GG.ME07-N	GRAE35-NPP-B	1,22	<b>35</b>	135	10	11,5
<b>RME35-N</b>	GG.ME07-N	GE35-KRR-B	1,34	<b>35</b>	135	10	11,5
<b>TME35-N</b>	GG.ME07-N	GE35-KTT-B	1,35	<b>35</b>	135	10	11,5
<b>RME035</b>	GG.ME007	GNE35-KRR-B	2,4	<b>35</b>	174	16	19
<b>PMEY35-N</b>	GG.ME07-N	GAY35-NPP-B	1,15	<b>35</b>	135	10	11,5
<b>RMEY35-N</b>	GG.ME07-N	GYE35-KRR-B	1,28	<b>35</b>	135	10	11,5
<b>PME40-N</b>	GG.ME08-N	GRAE40-NPP-B	1,62	<b>40</b>	145	11,5	11,5
<b>RME40-N</b>	GG.ME08-N	GE40-KRR-B	1,74	<b>40</b>	145	11,5	11,5
<b>TME40-N</b>	GG.ME08-N	GE40-KTT-B	1,77	<b>40</b>	145	11,5	11,5
<b>RME040</b>	GG.ME008	GNE40-KRR-B	3,4	<b>40</b>	194	17	19
<b>PMEY40-N</b>	GG.ME08-N	GAY40-NPP-B	1,51	<b>40</b>	145	11,5	11,5
<b>RMEY40-N</b>	GG.ME08-N	GYE40-KRR-B	1,65	<b>40</b>	145	11,5	11,5
<b>PME45</b>	GG.ME09	GRAE45-NPP-B	1,93	<b>45</b>	155	12	14
<b>RME45</b>	GG.ME09	GE45-KRR-B	2,05	<b>45</b>	155	12	14
<b>TME45</b>	GG.ME09	GE45-KTT-B	2,1	<b>45</b>	155	12	14
<b>PMEY45</b>	GG.ME09	GAY45-NPP-B	1,77	<b>45</b>	155	12	14
<b>RMEY45</b>	GG.ME09	GYE45-KRR-B	1,94	<b>45</b>	155	12	14

<sup>1)</sup> To be ordered separately.



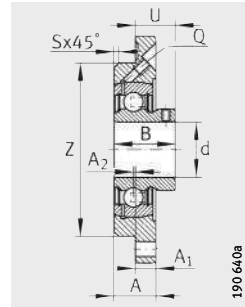
RME, RMEO

190 638a



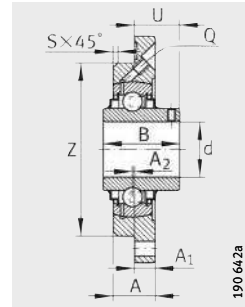
TME

190 641a



PMEY

190 640a



RMEY

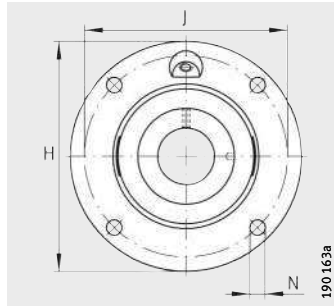
190 642a

B	B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub> max.	S	A	U	Z h8	Basic load ratings		End cap <sup>1)</sup>
										dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
-	31	78	2	M6	33	2	17	21,5	62	12 800	6 600	KASK04
-	43,7	78	2	M6	33	2	17	24,6	62	12 800	6 600	KASK04
-	43,7	78	2	M6	33	2	17	24,6	62	12 800	6 600	KASK04
25	-	78	2	M6	-	2	17	16	62	12 800	6 600	KASK04
31	-	78	2	M6	-	2	17	16,3	62	12 800	6 600	KASK04
-	31	90	2,5	M6	37,5	2	19	21	70	14 000	7 800	KASK05
-	44,5	90	2,5	M6	37,5	2	19	24,4	70	14 000	7 800	KASK05
-	44,5	90	2,5	M6	37,5	2	19	24,4	70	14 000	7 800	KASK05
27	-	90	2,5	M6	-	2	19	17	70	14 000	7 800	KASK05
34,1	-	90	2,5	M6	-	2	19	17,3	70	14 000	7 800	KASK05
-	35,8	100	2	M6	44	2	20,5	24,7	80	19 500	11 300	KASK06
-	48,5	100	2	M6	44	2	20,5	28,1	80	19 500	11 300	KASK06
-	48,5	100	2	M6	44	2	20,5	28,1	80	19 500	11 300	KASK06
30	-	100	2	M6	-	2	20,5	19	80	19 500	11 300	KASK06
38,1	-	100	2	M6	-	2	20,5	20,2	80	19 500	11 300	KASK06
-	39	110	1	M6	51	2	20,5	28,5	90	25 500	15 300	KASK07
-	51,3	110	1	M6	51	2	20,5	31,3	90	25 500	15 300	KASK07
-	51,3	110	1	M6	51	2	20,5	31,3	90	25 500	15 300	KASK07
-	51,6	141	-2	M6	55	2	25	25,4	100	36 500	20 900	-
34,95	-	110	1	M6	-	2	20,5	24,45	90	25 500	15 300	KASK07
42,9	-	110	1	M6	-	2	20,5	24,4	90	25 500	15 300	KASK07
-	43,8	120	1	M6	58	2	23	31,7	100	32 500	19 800	KASK08
-	56,5	120	1	M6	58	2	23	33,9	100	32 500	19 800	KASK08
-	56,5	120	1	M6	58	2	23	33,9	100	32 500	19 800	KASK08
-	54,6	158	-2,5	M6	63	2	27	39,1	115	44 500	26 000	-
39,5	-	120	1	M6	-	2	23	28	100	32 500	19 800	KASK08
49,2	-	120	1	M6	-	2	23	29,2	100	32 500	19 800	KASK08
-	43,8	130	2	M6	63	2	25	30,7	105	32 500	20 400	-
-	56,5	130	2	M6	63	2	25	32,9	105	32 500	20 400	-
-	56,5	130	2	M6	63	2	25	32,9	105	32 500	20 400	-
41,5	-	130	2	M6	-	2	25	28,5	105	32 500	20 400	-
49,2	-	130	2	M6	-	2	25	28,2	105	32 500	20 400	-

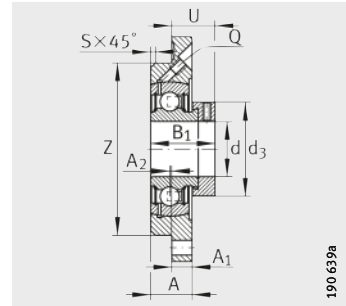


# Four-bolt flanged housing units with centring spigot

Cast iron housings



PME, RME, RME0, TME, PMEY, RMEY



PME

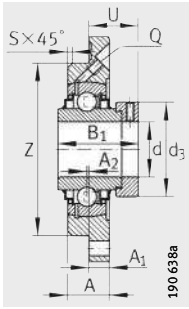
Dimension table (continued) · Dimensions in mm

Designation			Mass m ≈ kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	H	A <sub>1</sub>	N
<b>PME50-N</b>	GG.ME10-N	GRAE50-NPP-B	2,13	<b>50</b>	165	13	14
<b>RME50-N</b>	GG.ME10-N	GE50-KRR-B	2,53	<b>50</b>	165	13	14
<b>TME50-N</b>	GG.ME10-N	GE50-KTT-B	2,59	<b>50</b>	165	13	14
<b>RME050</b>	GG.MEO10	GNE50-KRR-B	4,6	<b>50</b>	230	19	23
<b>PMEY50-N</b>	GG.ME10-N	GAY50-NPP-B	2,03	<b>50</b>	165	13	14
<b>RMEY50-N</b>	GG.ME10-N	GYE50-KRR-B	2,16	<b>50</b>	165	13	14
<b>PME55</b>	GG.ME11	GRAE55-NPP-B	2,76	<b>55</b>	185	15	18
<b>RME55</b>	GG.ME11	GE55-KRR-B	3,37	<b>55</b>	185	15	18
<b>TME55</b>	GG.ME11	GE55-KTT-B	3,38	<b>55</b>	185	15	18
<b>RMEY55</b>	GG.ME11	GYE55-KRR-B	3,05	<b>55</b>	185	15	18
<b>PME60-N</b>	GG.ME12-N	GRAE60-NPP-B	3,65	<b>60</b>	195	16	18
<b>RME60-N</b>	GG.ME12-N	GE60-KRR-B	4,04	<b>60</b>	195	16	18
<b>TME60-N</b>	GG.ME12-N	GE60-KTT-B	4,04	<b>60</b>	195	16	18
<b>RME060</b>	GG.MEO12	GNE60-KRR-B	6	<b>60</b>	256	22	23
<b>PMEY60-N</b>	GG.ME12-N	GAY60-NPP-B	3,41	<b>60</b>	195	16	18
<b>RMEY60-N</b>	GG.ME12-N	GYE60-KRR-B	3,71	<b>60</b>	195	16	18
<b>RME65-214<sup>2)</sup></b>	GG.ME14	GE65-214-KRR-B	5,81	<b>65</b>	215	18	18
<b>TME65-214<sup>2)</sup></b>	GG.ME14	GE65-214-KTT-B	5,81	<b>65</b>	215	18	18
<b>RMEY65-214<sup>2)</sup></b>	GG.ME14	GYE65-214-KRR-B	5,35	<b>65</b>	215	18	18
<b>RME70</b>	GG.ME14	GE70-KRR-B	5,55	<b>70</b>	215	18	18
<b>TME70</b>	GG.ME14	GE70-KTT-B	5,03	<b>70</b>	215	18	18
<b>RME070</b>	GG.MEO14	GNE70-KRR-B	9	<b>70</b>	300	25	25
<b>RMEY70</b>	GG.ME14	GYE70-KRR-B	5,29	<b>70</b>	215	18	18
<b>RME75</b>	GG.ME15	GE75-KRR-B	5,65	<b>75</b>	220	18	18
<b>TME75</b>	GG.ME15	GE75-KTT-B	5,76	<b>75</b>	220	18	18
<b>RMEY75</b>	GG.ME15	GYE75-KRR-B	5,19	<b>75</b>	220	18	18
<b>RME80</b>	GG.ME16	GE80-KRR-B	5,75	<b>80</b>	220	18	18
<b>TME80</b>	GG.ME16	GE80-KTT-B	5,51	<b>80</b>	220	18	18
<b>RME080</b>	GG.MEO16	GNE80-KRR-B-FA107	12,7	<b>80</b>	275	22	22
<b>RMEY80</b>	GG.ME16	GYE80-KRR-B	5,43	<b>80</b>	220	18	18

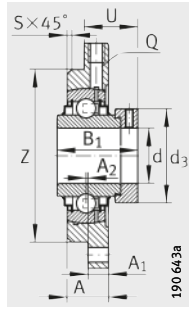
<sup>1)</sup> To be ordered separately.

<sup>2)</sup> Different ball set 6214.

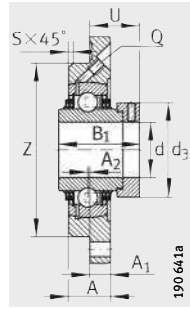




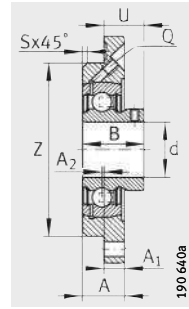
RME, RME0  
(up to d = 70 mm)



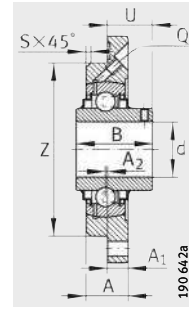
RME0  
(from d = 80 mm)



TME



PMEY



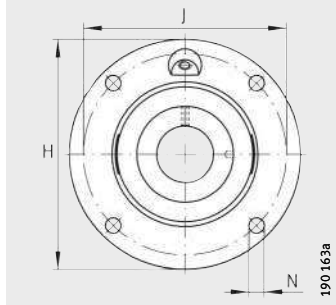
RMEY

B	B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub> max.	S	A	U	Z h8	Basic load ratings		End cap <sup>1)</sup>
										dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
-	43,8	135	1	M8X1	69	3	25	31,8	110	35 000	23 200	KASK10
-	62,8	135	1	M8X1	69	3	25	37,1	110	35 000	23 200	KASK10
-	62,8	135	1	M8X1	69	3	25	37,1	110	35 000	23 200	KASK10
-	66,8	187	-2,5	R <sub>p</sub> 1/8	75,8	2	31	44,6	140	62 000	38 000	-
43	-	135	1	M8X1	-	3	25	31	110	35 000	23 200	KASK10
51,6	-	135	1	M8X1	-	3	25	31,6	110	35 000	23 200	KASK10
-	48,4	150	-	M6	76	3	27,5	36,4	125	43 500	29 000	-
-	71,4	150	-	M6	76	3	27,5	43,6	125	43 500	29 000	-
-	71,4	150	-	M6	76	3	27,5	43,6	125	43 500	29 000	-
55,6	-	150	-	M6	-	3	27,5	33,4	125	43 500	29 000	-
-	53,1	160	1	R <sub>p</sub> 1/8	84	3	29	38,6	135	52 000	36 000	KASK12
-	77,9	160	1	R <sub>p</sub> 1/8	84	3	29	45,9	135	52 000	36 000	KASK12
-	77,9	160	1	R <sub>p</sub> 1/8	84	3	29	45,9	135	52 000	36 000	KASK12
-	68,4	212	-2,5	R <sub>p</sub> 1/8	89	3	36	47,9	160	82 000	52 000	-
47	-	160	1	R <sub>p</sub> 1/8	-	3	29	33	135	52 000	36 000	KASK12
65,1	-	160	1	R <sub>p</sub> 1/8	-	3	29	38,7	135	52 000	36 000	KASK12
-	66	177	-	R <sub>p</sub> 1/8	96	6	32	44,5	150	62 000	44 000	-
-	66	177	-	R <sub>p</sub> 1/8	96	6	32	44,5	150	62 000	44 000	-
74,6	-	177	-	R <sub>p</sub> 1/8	-	6	32	44,4	150	62 000	44 000	-
-	66	177	-	R <sub>p</sub> 1/8	96	6	32	44,5	150	62 000	44 000	-
-	66	177	-	R <sub>p</sub> 1/8	96	6	32	44,5	150	62 000	44 000	-
-	75,5	252	-0,5	R <sub>p</sub> 1/8	102	4	43	49,9	185	104 000	68 000	-
74,6	-	177	-	R <sub>p</sub> 1/8	-	6	32	44,4	150	62 000	44 000	-
-	67	184	-	R <sub>p</sub> 1/8	100	6	32	45,6	160	62 000	44 500	-
-	67	184	-	R <sub>p</sub> 1/8	100	6	32	45,6	160	62 000	44 500	-
77,8	-	184	-	R <sub>p</sub> 1/8	-	6	32	44,5	160	62 000	44 500	-
-	70,7	184	-2	R <sub>p</sub> 1/8	108	6	31	49,3	160	72 000	54 000	-
-	70,7	184	-2	R <sub>p</sub> 1/8	108	6	31	49,3	160	72 000	54 000	-
-	93,6	235	3	R <sub>p</sub> 1/8	118	6	50	56,7	200	123 000	87 000	-
82,6	-	184	-2	R <sub>p</sub> 1/8	-	6	31	51,3	160	72 000	54 000	-

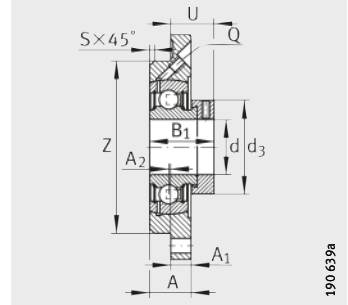


# Four-bolt flanged housing units with centring spigot

Cast iron housings



PME, RME, RME0, TME, PMEY, RMEY

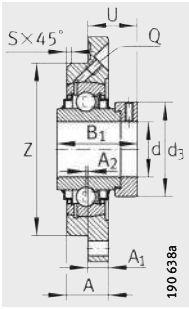


PME

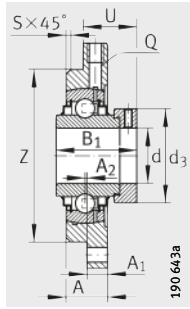
**Dimension table** (continued) · Dimensions in mm

Designation			Mass m ≈ kg	Dimensions			
Unit	Housing	Radial insert ball bearing		d	H	A <sub>1</sub>	N
<b>RME90</b>	GG.ME18	GE90-KRR-B	8,5	<b>90</b>	265	20	23
<b>RME090</b>	GG.ME018	GNE90-KRR-B-FA107	12,7	<b>90</b>	300	22	22
<b>RMEY90</b>	GG.ME18	GYE90-KRR-B	8,86	<b>90</b>	265	20	23
<b>RME100</b>	GG.ME20	GE100-KRR-B	11,45	<b>100</b>	295	22	23
<b>RME0100</b>	GG.ME020	GNE100-KRR-B-FA107	22,3	<b>100</b>	340	27	26
<b>RME120</b>	GG.ME24	GE120-KRR-B	17,43	<b>120</b>	350	24	27

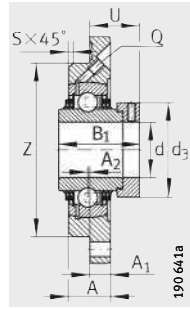
<sup>1)</sup> To be ordered separately.



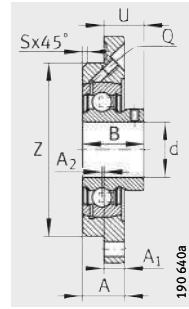
RME, RME0  
(up to d = 70 mm)



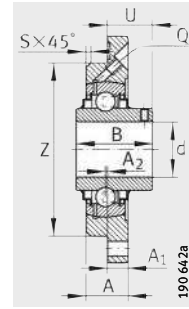
RME0  
(from d = 80 mm)



TME



PMEY



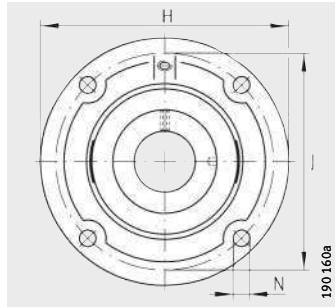
RMEY

B	B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub> max.	S	A	U	Z h8	Basic load ratings		End cap <sup>1)</sup>
										dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N	
–	69,5	220	–4	R <sub>p</sub> 1/8	118	3	32	50,5	190	96 000	72 000	–
–	101	260	3	R <sub>p</sub> 1/8	132	6	50	62,5	220	143 000	107 000	–
96	–	220	–4	R <sub>p</sub> 1/8	–	3	32	60,3	190	96 000	72 000	–
–	75	245	–4	R <sub>p</sub> 1/8	132	3	36	53,4	210	122 000	93 000	–
–	109,4	295	1,5	R <sub>p</sub> 1/8	145	8	57	68,5	250	174 000	140 000	–
–	81	295	–4	R <sub>p</sub> 1/8	152	3	40	56,5	250	155 000	131 000	–

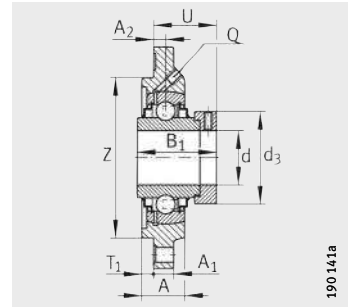


# Four-bolt flanged housing units with centring spigot

Cast iron housings



RFE, TFE

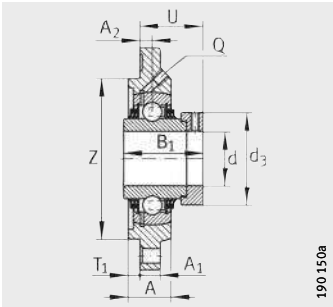


RFE

**Dimension table** - Dimensions in mm

Designation			Mass m ≈kg	Dimensions				
Unit	Housing	Radial insert ball bearing		d	H	A <sub>1</sub>	N	B <sub>1</sub>
<b>RFE25</b>	GG.FE05	GE25-KRR-B	0,8	<b>25</b>	115	9	9	44,5
<b>TFE25</b>	GG.FE05	GE25-KTT-B	0,8	<b>25</b>	115	9	9	44,5
<b>RFE30</b>	GG.FE06	GE30-KRR-B	1,08	<b>30</b>	127	9,5	9	48,5
<b>TFE30</b>	GG.FE06	GE30-KTT-B	1,08	<b>30</b>	127	9,5	9	48,5
<b>RFE35</b>	GG.FE07	GE35-KRR-B	1,3	<b>35</b>	135	10	11,5	51,3
<b>TFE35</b>	GG.FE07	GE35-KTT-B	1,3	<b>35</b>	135	10	11,5	51,3
<b>RFE40</b>	GG.FE08	GE40-KRR-B	1,72	<b>40</b>	145	11,5	11,5	56,5
<b>TFE40</b>	GG.FE08	GE40-KTT-B	1,72	<b>40</b>	145	11,5	11,5	56,5
<b>RFE45</b>	GG.FE09	GE45-KRR-B	2,06	<b>45</b>	155	12	14	56,5
<b>RFE50-N<sup>1)</sup></b>	GG.FE10-N	GE50-KRR-B	2,48	<b>50</b>	165	13	14	62,8
<b>TFE50-N<sup>1)</sup></b>	GG.FE10-N	GE50-KTT-B	2,48	<b>50</b>	165	13	14	62,8
<b>RFE60</b>	GG.FE12	GE60-KRR-B	3,99	<b>60</b>	195	16	14	77,9
<b>TFE60</b>	GG.FE12	GE60-KTT-B	3,99	<b>60</b>	195	16	14	77,9

<sup>1)</sup> End cap KASK10 to be ordered separately.



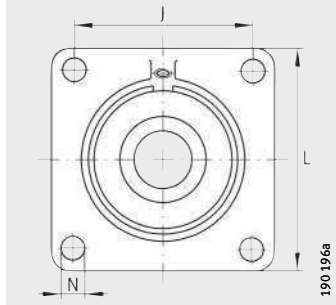
TFE

J	A <sub>2</sub>	Q	d <sub>3</sub> max.	A	T <sub>1</sub>	U	Z h8	Basic load ratings	
								dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
92	9,5	R <sub>p</sub> 1/8	37,5	22	3	36,4	75	14 000	7 800
92	9,5	R <sub>p</sub> 1/8	37,5	22	3	36,4	75	14 000	7 800
105	10,5	R <sub>p</sub> 1/8	44	22,5	3	40,6	85	19 500	11 300
105	10,5	R <sub>p</sub> 1/8	44	22,5	3	40,6	85	19 500	11 300
110	9	R <sub>p</sub> 1/8	51	22,5	4	41,3	90	25 500	15 300
110	9	R <sub>p</sub> 1/8	51	22,5	4	41,3	90	25 500	15 300
120	11,5	R <sub>p</sub> 1/8	58	26	4	46,4	100	32 500	19 800
120	11,5	R <sub>p</sub> 1/8	58	26	4	46,4	100	32 500	19 800
130	11,5	R <sub>p</sub> 1/8	63	26,5	4	46,4	105	32 500	20 400
136	12,5	R <sub>p</sub> 1/8	69	27,5	4	50,6	115	35 000	23 200
136	12,5	R <sub>p</sub> 1/8	69	27,5	4	50,6	115	35 000	23 200
165	17	R <sub>p</sub> 1/8	84	33	4	63,8	140	52 000	36 000
165	17	R <sub>p</sub> 1/8	84	33	4	63,8	140	52 000	36 000

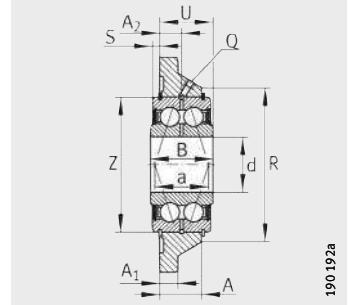


# Four-bolt flanged housing units

Cast iron housings  
With double row angular contact ball bearing



PCCJ



PCCJ

**Dimension table** - Dimensions in mm

Designation			Mass m ≈kg	Dimensions					
Unit	Housing	Double row angular contact ball bearing <sup>2)</sup>		d	L	A <sub>1</sub>	N	B	J
<b>PCCJ25</b>	GG.CCJ05	G5205-2RS-N	0,79	<b>25</b>	95	12	11,5	30	70
<b>PCCJ30</b>	GG.CCJ06	G5206-2RS-N	1,12	<b>30</b>	108	12	11,5	34	82,5
<b>PCCJ35</b>	GG.CCJ07	G5207-2RS-N	1,48	<b>35</b>	118	14	14	36	92
<b>PCCJ40</b>	GG.CCJ08	G5208-2RS-N	1,8	<b>40</b>	130	14	14	38	101,5

1) Tolerance PN of bearing outside diameter to DIN 620-2.

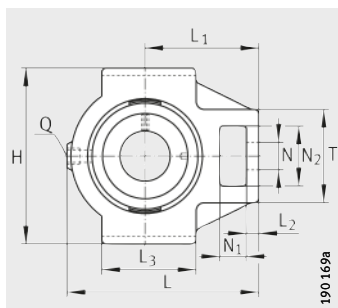
2) For general guidelines on double row angular contact ball bearings, see page 280.

								Basic load ratings	
A <sub>2</sub>	Q	R max.	S	A	U	Z <sup>1)</sup> h5	a	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
11,7	M6	64	2,4	22,1	26,7	52	24	21 600	14 900
13	M6	76	3,2	24	29,7	62	28,9	30 000	21 400
14	M6	88	3	26	31,7	72	33,8	39 500	29 000
15	M6	98	3,2	28	33,7	80	38,8	50 000	38 000

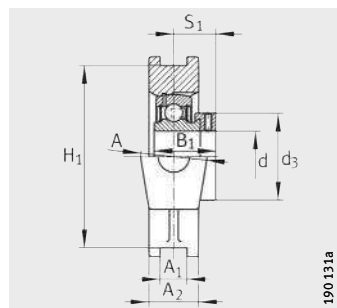


# Take-up housing units

Cast iron housings



PTUE, RTUE, TTUE, PTUEY, RTUEY

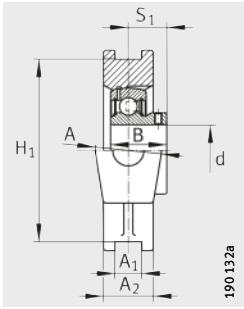


PTUE

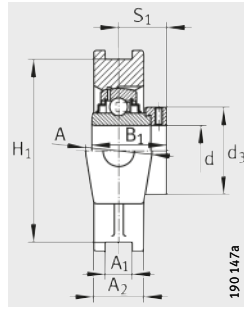
Dimension table - Dimensions in mm

Designation			Mass m ≈kg	Dimensions						
Unit	Housing	Radial insert ball bearing		d	A	A <sub>1</sub> H13	A <sub>2</sub>	L	L <sub>1</sub>	L <sub>2</sub>
PTUE20	GG.TUE04	GRAE20-NPP-B	0,83	20	37	12	25	94,5	60	9
RTUE20	GG.TUE04	GE20-KRR-B	0,9	20	37	12	25	94,5	60	9
PTUEY20	GG.TUE04	GAY20-NPP-B	0,8	20	37	12	25	94,5	60	9
RTUEY20	GG.TUE04	GYE20-KRR-B	0,84	20	37	12	25	94,5	60	9
PTUE25	GG.TUE05	GRAE25-NPP-B	0,85	25	37	12	25	98,5	62	10
RTUE25	GG.TUE05	GE25-KRR-B	0,91	25	37	12	25	98,5	62	10
TTUE25	GG.TUE05	GE25-KTT-B	0,91	25	37	12	25	98,5	62	10
PTUEY25	GG.TUE05	GAY25-NPP-B	0,82	25	37	12	25	98,5	62	10
RTUEY25	GG.TUE05	GYE25-KRR-B	0,86	25	37	12	25	98,5	62	10
PTUE30	GG.TUE06	GRAE30-NPP-B	1,19	30	37	12	25	114,5	70	10
RTUE30	GG.TUE06	GE30-KRR-B	1,24	30	37	12	25	114,5	70	10
TTUE30	GG.TUE06	GE30-KTT-B	1,25	30	37	12	25	114,5	70	10
PTUEY30	GG.TUE06	GAY30-NPP-B	1,11	30	37	12	25	114,5	70	10
RTUEY30	GG.TUE06	GYE30-KRR-B	1,19	30	37	12	25	114,5	70	10
PTUE35	GG.TUE07	GRAE35-NPP-B	1,65	35	40	12	30	131,5	80	13
RTUE35	GG.TUE07	GE35-KRR-B	1,8	35	40	12	30	131,5	80	13
TTUE35	GG.TUE07	GE35-KTT-B	1,73	35	40	12	30	131,5	80	13
PTUEY35	GG.TUE07	GAY35-NPP-B	1,64	35	40	12	30	131,5	80	13
RTUEY35	GG.TUE07	GYE35-KRR-B	1,74	35	40	12	30	131,5	80	13
PTUE40	GG.TUE08	GRAE40-NPP-B	2,43	40	50	16	35	141	88	16
RTUE40	GG.TUE08	GE40-KRR-B	2,52	40	50	16	35	141	88	16
TTUE40	GG.TUE08	GE40-KTT-B	2,55	40	50	16	35	141	88	16
RTUEY40	GG.TUE08	GYE40-KRR-B	2,43	40	50	16	35	141	88	16
PTUE45	GG.TUE09	GRAE45-NPP-B	2,32	45	50	16	35	141	88	16
RTUE45	GG.TUE09	GE45-KRR-B	2,61	45	50	16	35	141	88	16
TTUE45	GG.TUE09	GE45-KTT-B	2,45	45	50	16	35	141	88	16
PTUE50	GG.TUE10	GRAE50-NPP-B	2,42	50	50	16	35	148	90	16
RTUE50	GG.TUE10	GE50-KRR-B	2,57	50	50	16	35	148	90	16
TTUE50	GG.TUE10	GE50-KTT-B	2,56	50	50	16	35	148	90	16
PTUEY50	GG.TUE10	GAY50-NPP-B	2,25	50	50	16	35	148	90	16
RTUEY50	GG.TUE10	GYE50-KRR-B	2,38	50	50	16	35	148	90	16
PTUE55	GG.TUE11	GRAE55-NPP-B	3,99	55	60	22	42	169	104	17
RTUE55	GG.TUE11	GE55-KRR-B	4,6	55	60	22	42	169	104	17
TTUE55	GG.TUE11	GE55-KTT-B	4,72	55	60	22	42	169	104	17

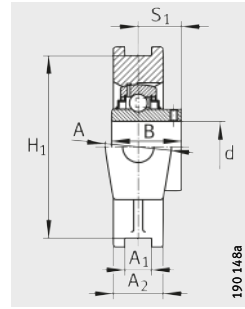




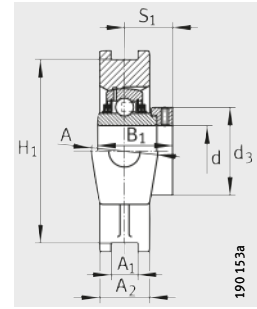
PTUEY



RTUE



RTUEY



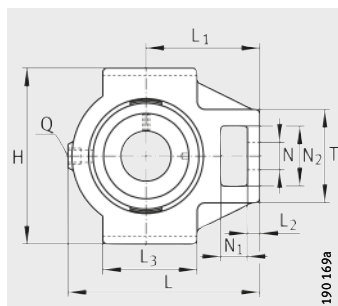
TTUE

												Basic load ratings	
N	N <sub>1</sub>	N <sub>2</sub>	B	B <sub>1</sub>	H	H <sub>1</sub>	S <sub>1</sub>	Q	T	L <sub>3</sub>	d <sub>3</sub>	dyn. C <sub>r</sub>	stat. C <sub>0r</sub>
						±0,15					max.	N	N
19	18	32	-	31	90	76	23,5	R <sub>p</sub> 1/8	51	50	33	12 800	6 600
19	18	32	-	43,7	90	76	26,6	R <sub>p</sub> 1/8	51	50	33	12 800	6 600
19	18	32	25	-	90	76	18	R <sub>p</sub> 1/8	51	50	-	12 800	6 600
19	18	32	31	-	90	76	18,3	R <sub>p</sub> 1/8	51	50	-	12 800	6 600
19	18	32	-	31	90	76	23,5	R <sub>p</sub> 1/8	51	50	37,5	14 000	7 800
19	18	32	-	44,5	90	76	27	R <sub>p</sub> 1/8	51	50	37,5	14 000	7 800
19	18	32	-	44,5	90	76	27	R <sub>p</sub> 1/8	51	50	37,5	14 000	7 800
19	18	32	27	-	90	76	19,5	R <sub>p</sub> 1/8	51	50	-	14 000	7 800
19	18	32	34,1	-	90	76	19,8	R <sub>p</sub> 1/8	51	50	-	14 000	7 800
22	18	36,5	-	35,8	102	89	26,7	R <sub>p</sub> 1/8	56	57	44	19 500	11 300
22	18	36,5	-	48,5	102	89	30,2	R <sub>p</sub> 1/8	56	57	44	19 500	11 300
22	18	36,5	-	48,5	102	89	30,2	R <sub>p</sub> 1/8	56	57	44	19 500	11 300
22	18	36,5	30	-	102	89	21	R <sub>p</sub> 1/8	56	57	-	19 500	11 300
22	18	36,5	38,1	-	102	89	22,2	R <sub>p</sub> 1/8	56	57	-	19 500	11 300
22	18	36,5	-	39	102	89	29,4	R <sub>p</sub> 1/8	64	63	51	25 500	15 300
22	18	36,5	-	51,3	102	89	32,5	R <sub>p</sub> 1/8	64	63	51	25 500	15 300
22	18	36,5	-	51,3	102	89	32,5	R <sub>p</sub> 1/8	64	63	51	25 500	15 300
22	18	36,5	35	-	102	89	25,5	R <sub>p</sub> 1/8	64	63	-	25 500	15 300
22	18	36,5	42,9	-	102	89	25,4	R <sub>p</sub> 1/8	64	63	-	25 500	15 300
29	20	49	-	43,8	115	102	32,8	R <sub>p</sub> 1/8	82	82	58	32 500	19 800
29	20	49	-	56,5	115	102	35,1	R <sub>p</sub> 1/8	82	82	58	32 500	19 800
29	20	49	-	56,5	115	102	35,1	R <sub>p</sub> 1/8	82	82	58	32 500	19 800
29	20	49	49,2	-	115	102	30,2	R <sub>p</sub> 1/8	82	82	-	32 500	19 800
29	20	49	-	43,8	115	102	32,8	R <sub>p</sub> 1/8	82	82	63	32 500	20 400
29	20	49	-	56,5	115	102	35,1	R <sub>p</sub> 1/8	82	82	63	32 500	20 400
29	20	49	-	56,5	115	102	35,1	R <sub>p</sub> 1/8	82	82	63	32 500	20 400
29	20	49	-	43,8	115	102	32,7	R <sub>p</sub> 1/8	83	85	69	35 000	23 200
29	20	49	-	62,8	115	102	38,2	R <sub>p</sub> 1/8	83	85	69	35 000	23 200
29	20	49	-	62,8	115	102	38,2	R <sub>p</sub> 1/8	83	85	69	35 000	23 200
29	20	49	43	-	115	102	32	R <sub>p</sub> 1/8	83	85	-	35 000	23 200
29	20	49	51,6	-	115	102	32,6	R <sub>p</sub> 1/8	83	85	-	35 000	23 200
35	26	63,5	-	48,4	145	130	36,4	R <sub>p</sub> 1/8	102	95	76	43 500	29 000
35	26	63,5	-	71,4	145	130	43,6	R <sub>p</sub> 1/8	102	95	76	43 500	29 000
35	26	63,5	-	71,4	145	130	43,6	R <sub>p</sub> 1/8	102	95	76	43 500	29 000

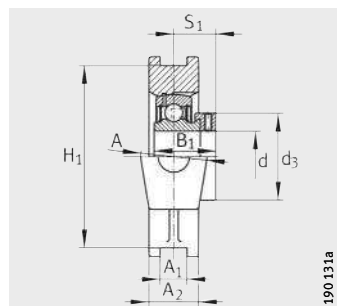


# Take-up housing units

## Cast iron housings



PTUE, RTUE, TTUE, RTUEO, PTUEY, RTUEY



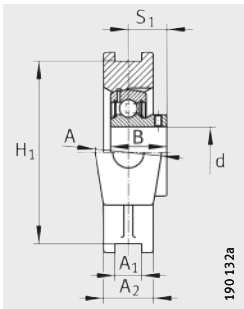
PTUE

**Dimension table (continued) · Dimensions in mm**

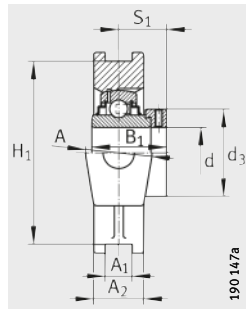
Designation			Mass m ≈ kg	Dimensions						
Unit	Housing	Radial insert ball bearing		d	A	A <sub>1</sub> H13	A <sub>2</sub>	L	L <sub>1</sub>	L <sub>2</sub>
PTUE60	GG.TUE12	GRAE60-NPP-B	4,21	60	60	22	44	186	118	19
RTUE60	GG.TUE12	GE60-KRR-B	4,77	60	60	22	44	186	118	19
TTUE60	GG.TUE12	GE60-KTT-B	4,76	60	60	22	44	186	118	19
PTUEY60	GG.TUE12	GAY60-NPP-B	4,14	60	60	22	44	186	118	19
RTUEY60	GG.TUE12	GYE60-KRR-B	4,44	60	60	22	44	186	118	19
RTUE65-214 <sup>2)</sup>	GG.TUE13/14	GE65-214-KRR-B	7,46	65	70	25	50	214	135	20
RTUEY65-214 <sup>2)</sup>	GG.TUE13/14	GYE65-214-KRR-B	7	65	70	25	50	214	135	20
RTUE70	GG.TUE13/14	GE70-KRR-B	6,82	70	70	25	50	214	135	20
TTUE70	GG.TUE13/14	GE70-KTT-B	6,85	70	70	25	50	214	135	20
RTUEY70	GG.TUE13/14	GYE70-KRR-B	6,69	70	70	25	50	214	135	20
RTUE75	GG.TUE15	GE75-KRR-B	6,44	75	70	25	50	214	135	20
TTUE75	GG.TUE15	GE75-KTT-B	7,13	75	70	25	50	214	135	20
RTUEY75	GG.TUE15	GYE75-KRR-B	6,38	75	70	25	50	214	135	20
RTUE80	GG.TUE16	GE80-KRR-B	8,4	80	70	28	50	230	140	20
TTUE80	GG.TUE16	GE80-KTT-B	7,7	80	70	28	50	230	140	20
RTUEO80	GG.TUEO16	GNE80-KRR-B	17,25	80	102	30	60	282	174	28
RTUEY80	GG.TUE16	GYE80-KRR-B	7,63	80	70	28	50	230	140	20
RTUE90	GG.TUE18	GE90-KRR-B	11,87	90	80	28	55	275	170	30
RTUEO90	GG.TUEO18	GNE90-KRR-B	22,9	90	110	32	66	312	192	30
RTUE100	GG.TUE20	GE100-KRR-B	14,55	100	90	28	60	295	180	30
RTUE120	GG.TUE24	GE120-KRR-B	23,89	120	100	32	70	345	210	35

1) Tolerance  $\begin{smallmatrix} 0 \\ -0,6 \end{smallmatrix}$ .

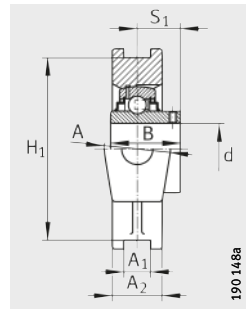
2) Different ball set 6214.



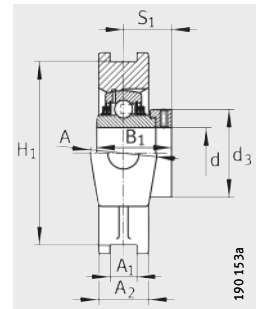
PTUEY



RTUE, RTUEO



RTUEY



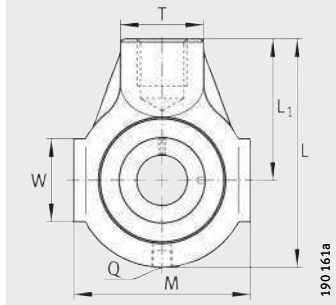
TTUE

N	N <sub>1</sub>	N <sub>2</sub>	B	B <sub>1</sub>	H	H <sub>1</sub>	S <sub>1</sub>	Q	T	L <sub>3</sub>	d <sub>3</sub> max.	Basic load ratings	
												dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
35	32	63,5	-	53,1	146	130±0,15	39,6	R <sub>p</sub> 1/8	102	100	84	52 000	36 000
35	32	63,5	-	77,9	146	130±0,15	46,9	R <sub>p</sub> 1/8	102	100	84	52 000	36 000
35	32	63,5	-	77,9	146	130±0,15	46,9	R <sub>p</sub> 1/8	102	100	84	52 000	36 000
35	32	63,5	47	-	146	130±0,15	34	R <sub>p</sub> 1/8	102	100	-	52 000	36 000
35	32	63,5	65,1	-	146	130±0,15	39,7	R <sub>p</sub> 1/8	102	100	-	52 000	36 000
41	35	70	-	66	166	151±0,25	44,5	R <sub>p</sub> 1/8	110	120	96	62 000	44 000
41	35	70	74,6	-	166	151±0,25	44,4	R <sub>p</sub> 1/8	110	120	-	62 000	44 000
41	35	70	-	66	166	151±0,25	44,5	R <sub>p</sub> 1/8	110	120	96	62 000	44 000
41	35	70	-	66	166	151±0,25	44,5	R <sub>p</sub> 1/8	110	120	96	62 000	44 000
41	35	70	74,6	-	166	151±0,25	44,4	R <sub>p</sub> 1/8	110	120	-	62 000	44 000
41	35	70	-	67	166	151±0,25	45,5	R <sub>p</sub> 1/8	110	120	100	62 000	44 500
41	35	70	-	67	166	151±0,25	45,5	R <sub>p</sub> 1/8	110	120	100	62 000	44 500
41	35	70	77,8	-	166	151±0,25	44,5	R <sub>p</sub> 1/8	110	120	-	62 000	44 500
41	35	70	-	70,7	184	165±0,25	47,6	R <sub>p</sub> 1/8	110	120	108	72 000	54 000
41	35	70	-	70,7	184	165±0,25	47,6	R <sub>p</sub> 1/8	110	120	108	72 000	54 000
53	42	98	-	93,7	230	204 <sup>1)</sup>	59,7	R <sub>p</sub> 1/8	150	150	118	123 000	87 000
41	35	70	82,6	-	184	165±0,25	49,3	R <sub>p</sub> 1/8	110	120	-	72 000	54 000
47	40	80	-	69,5	215	190±0,25	46,5	R <sub>p</sub> 1/8	130	140	118	96 000	72 000
57	46	106	-	101	255	228 <sup>1)</sup>	65,5	R <sub>p</sub> 1/8	160	165	132	143 000	107 000
47	40	80	-	75	240	215±0,25	49,5	R <sub>p</sub> 1/8	130	160	132	122 000	93 000
55	45	95	-	81	285	255±0,25	52,5	R <sub>p</sub> 1/8	150	190	152	155 000	131 000

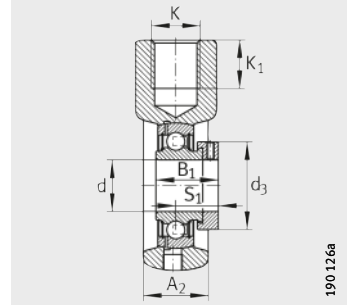


# Take-up housing units

Cast iron housings



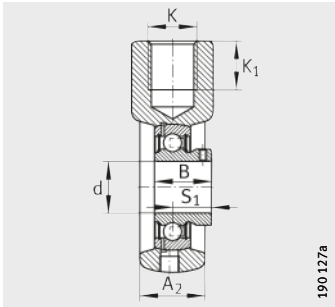
PHE, PHEY, RHE, THE



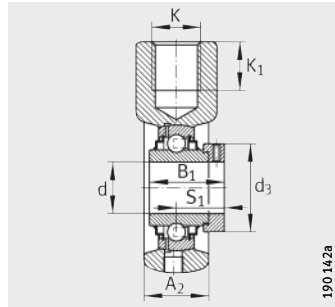
PHE

**Dimension table** - Dimensions in mm

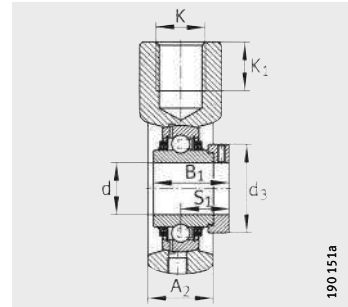
Designation			Mass m ≈kg	Dimensions					
Unit	Housing	Radial insert ball bearing		d	L	A <sub>2</sub>	L <sub>1</sub>	K	K <sub>1</sub>
<b>PHE20</b>	GG.HE04	GRAE20-NPP-B	0,54	<b>20</b>	91	25	58	M16	21
<b>PHEY20</b>	GG.HE04	GAY20-NPP-B	0,51	<b>20</b>	91	25	58	M16	21
<b>RHE20</b>	GG.HE04	GE20-KRR-B	0,58	<b>20</b>	91	25	58	M16	21
<b>PHE25</b>	GG.HE05	GRAE25-NPP-B	0,71	<b>25</b>	99	28	64	M20	22
<b>PHEY25</b>	GG.HE05	GAY25-NPP-B	0,68	<b>25</b>	99	28	64	M20	22
<b>RHE25</b>	GG.HE05	GE25-KRR-B	0,77	<b>25</b>	99	28	64	M20	22
<b>THE25</b>	GG.HE05	GE25-KTT-B	0,75	<b>25</b>	99	28	64	M20	22
<b>PHE30</b>	GG.HE06	GRAE30-NPP-B	1,09	<b>30</b>	114	32	72	M24	24
<b>PHEY30</b>	GG.HE06	GAY30-NPP-B	1,03	<b>30</b>	114	32	72	M24	24
<b>RHE30</b>	GG.HE06	GE30-KRR-B	1,16	<b>30</b>	114	32	72	M24	24
<b>THE30</b>	GG.HE06	GE30-KTT-B	1,17	<b>30</b>	114	32	72	M24	24
<b>PHE35</b>	GG.HE07	GRAE35-NPP-B	1,32	<b>35</b>	122	32	76	M24	24
<b>PHEY35</b>	GG.HE07	GAY35-NPP-B	1,23	<b>35</b>	122	32	76	M24	24
<b>RHE35</b>	GG.HE07	GE35-KRR-B	1,39	<b>35</b>	122	32	76	M24	24
<b>THE35</b>	GG.HE07	GE35-KTT-B	1,35	<b>35</b>	122	32	76	M24	24
<b>PHE40</b>	GG.HE08	GRAE40-NPP-B	1,65	<b>40</b>	135	36	85	M24	24
<b>PHEY40</b>	GG.HE08	GAY40-NPP-B	1,5	<b>40</b>	135	36	85	M24	24
<b>RHE40</b>	GG.HE08	GE40-KRR-B	1,77	<b>40</b>	135	36	85	M24	24
<b>THE40</b>	GG.HE08	GE40-KTT-B	1,8	<b>40</b>	135	36	85	M24	24
<b>PHE45</b>	GG.HE09	GRAE45-NPP-B	1,89	<b>45</b>	145	40	90	M24	24
<b>PHEY45</b>	GG.HE09	GAY45-NPP-B	1,91	<b>45</b>	145	40	90	M24	24
<b>RHE45</b>	GG.HE09	GE45-KRR-B	2,01	<b>45</b>	145	40	90	M24	24
<b>THE45</b>	GG.HE09	GE45-KTT-B	2,13	<b>45</b>	145	40	90	M24	24
<b>PHE50</b>	GG.HE10	GRAE50-NPP-B	1,92	<b>50</b>	145	40	90	M24	24
<b>RHE50</b>	GG.HE10	GE50-KRR-B	2,15	<b>50</b>	145	40	90	M24	24
<b>THE50</b>	GG.HE10	GE50-KTT-B	2,08	<b>50</b>	145	40	90	M24	24



PHEY



RHE



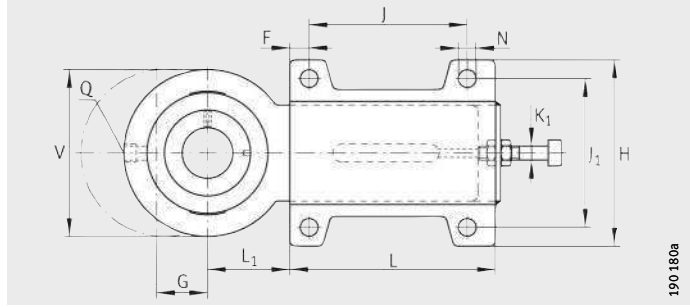
THE

								Basic load ratings	
B	B <sub>1</sub>	M	S <sub>1</sub>	Q	d <sub>3</sub> max.	T	W	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
-	31	65	23,5	R <sub>p</sub> 1/8	33	30	38	12 800	6 600
25	-	65	18	R <sub>p</sub> 1/8	-	30	38	12 800	6 600
-	43,7	65	26,6	R <sub>p</sub> 1/8	33	30	38	12 800	6 600
-	31	70	23,5	R <sub>p</sub> 1/8	37,5	35	38	14 000	7 800
27	-	70	19,5	R <sub>p</sub> 1/8	-	35	38	14 000	7 800
-	44,5	70	27	R <sub>p</sub> 1/8	37,5	35	38	14 000	7 800
-	44,5	70	27	R <sub>p</sub> 1/8	37,5	35	38	14 000	7 800
-	35,8	85	26,7	R <sub>p</sub> 1/8	44	40	40	19 500	11 300
30	-	85	21	R <sub>p</sub> 1/8	-	40	40	19 500	11 300
-	48,5	85	30,2	R <sub>p</sub> 1/8	44	40	40	19 500	11 300
-	48,5	85	30,2	R <sub>p</sub> 1/8	44	40	40	19 500	11 300
-	39	90	29,4	R <sub>p</sub> 1/8	51	40	49	25 500	15 300
35	-	90	25,5	R <sub>p</sub> 1/8	-	40	49	25 500	15 300
-	51,3	90	32,5	R <sub>p</sub> 1/8	51	40	49	25 500	15 300
-	51,3	90	32,5	R <sub>p</sub> 1/8	51	40	49	25 500	15 300
-	43,8	100	32,7	R <sub>p</sub> 1/8	58	40	45	32 500	19 800
39,5	-	100	29	R <sub>p</sub> 1/8	-	40	45	32 500	19 800
-	56,5	100	35,1	R <sub>p</sub> 1/8	58	40	45	32 500	19 800
-	56,5	100	35,1	R <sub>p</sub> 1/8	58	40	45	32 500	19 800
-	43,7	110	32,7	R <sub>p</sub> 1/8	63	40	45	32 500	20 400
41,5	-	110	30,5	R <sub>p</sub> 1/8	-	40	45	32 500	20 400
-	56,5	110	35,1	R <sub>p</sub> 1/8	63	40	45	32 500	20 400
-	56,5	110	35,1	R <sub>p</sub> 1/8	63	40	45	32 500	20 400
-	43,8	110	32,7	R <sub>p</sub> 1/8	69	40	46	35 000	23 200
-	62,8	110	38,2	R <sub>p</sub> 1/8	69	40	46	35 000	23 200
-	62,8	110	38,2	R <sub>p</sub> 1/8	69	40	46	35 000	23 200



# Take-up housing units

Cast iron housings

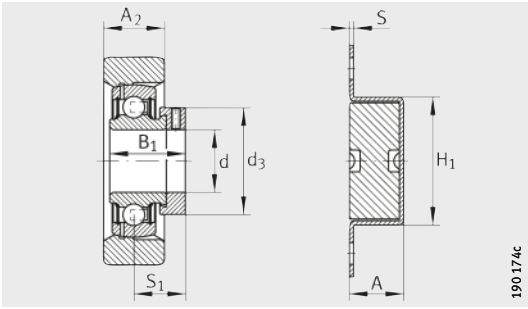


PHUSE

**Dimension table** - Dimensions in mm

Designation		Mass m ≈kg	Dimensions								
Unit	Radial insert ball bearing		d	L	A <sub>2</sub>	S	F	G	L <sub>1</sub>	N	K <sub>1</sub>
<b>PHUSE25</b>	GRAE25-NPP-B	2,07	<b>25</b>	187	22	4	20	65	50	11,5	M12
<b>PHUSE30</b>	GRAE30-NPP-B	2,22	<b>30</b>	187	22	4	20	65	50	11,5	M12
<b>PHUSE35</b>	GRAE35-NPP-B	2,46	<b>35</b>	187	22	4	20	65	50	11,5	M12
<b>PHUSE40</b>	GRAE40-NPP-B	4,89	<b>40</b>	256	30	4	20	80	60	14	M16
<b>PHUSE50-N<sup>1)</sup></b>	GRAE50-NPP-B	5,25	<b>50</b>	256	30	4	20	80	60	14	M16

<sup>1)</sup> End cap KASK10 to be ordered separately.



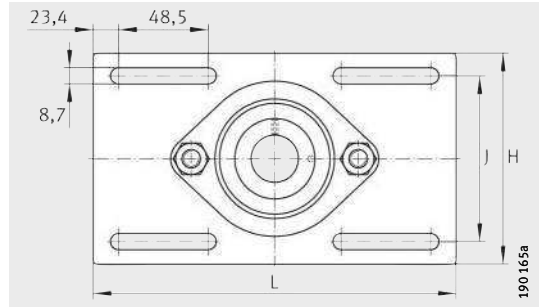
PHUSE

										Load carrying capacity of housing $C_{0rG}$ N	Basic load ratings	
$B_1$	J	$J_1$	$S_1$	Q	$d_3$ max.	A	V	H	$H_1$		dyn. $C_r$ N	stat. $C_{0r}$ N
31	140	80	23,5	$R_p 1/8$	37,5	28	78	103	52	7 800	14 000	7 800
35,8	140	80	26,7	$R_p 1/8$	44	28	88	103	52	11 300	19 500	11 300
39	140	80	29,4	$R_p 1/8$	51	28	98	103	52	15 300	25 500	15 300
43,8	180	100	32,7	$R_p 1/8$	58	36	108	130	60	19 800	32 500	19 800
43,8	180	100	32,7	$R_p 1/8$	69	36	120	130	60	23 200	35 000	23 200



# Take-up housing units

Cast iron housings  
Sheet steel housings

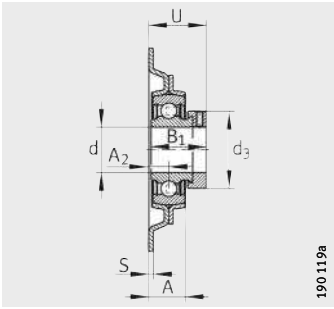


MSTU

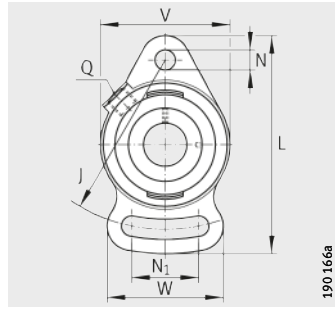
**Dimension table** - Dimensions in mm

Designation			Mass m ≈kg	Dimensions						
Unit	Housing	Radial insert ball bearing		d	H	A <sub>1</sub>	L	S	N	N <sub>1</sub>
<b>PSFT20</b>	GG.SFT04	GRAE20-NPP-B	0,41	<b>20</b>	-	10	112	-	11,5	30
<b>MSTU25</b>	GEH52-MSTU	RAE25-NPP-B	0,58	<b>25</b>	104,8	-	203,2	2	-	-
<b>PSFT25</b>	GG.SFT05	GRAE25-NPP-B	0,52	<b>25</b>	-	11	124	-	11,5	37,5
<b>MSTU30</b>	GEH62-MSTU	RAE30-NPP-B	0,84	<b>30</b>	114,3	-	203,2	2,5	-	-
<b>PSFT30</b>	GG.SFT06	GRAE30-NPP-B	0,77	<b>30</b>	-	12	142	-	11,5	40
<b>PSFT35</b>	GG.SFT07	GRAE35-NPP-B	1,1	<b>35</b>	-	12,5	155	-	14	45

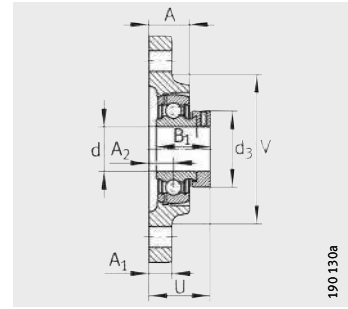




MSTU



PSFT



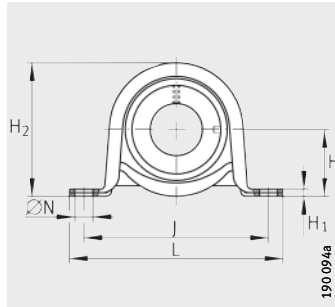
PSFT

B <sub>1</sub>	J	A <sub>2</sub>	Q	d <sub>3</sub> max.	A	U	V	W	Load carrying capacity of housing C <sub>0rG</sub> N	Basic load ratings	
										dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
31	90	10,5	R <sub>p</sub> 1/8	33	18	34	61	52	–	12 800	6 600
31	80,2	10,3	–	37,5	19	33,8	–	–	3 900	14 000	7 800
31	99	12,5	R <sub>p</sub> 1/8	37,5	20	36	70	63	–	14 000	7 800
35,8	89,2	12,1	–	44	21,1	37,8	–	–	3 900	19 500	11 300
35,8	117	13	R <sub>p</sub> 1/8	44	22	39,7	80	65	–	19 500	11 300
39	128	15	R <sub>p</sub> 1/8	51	25	44,5	90	75	–	25 500	15 300

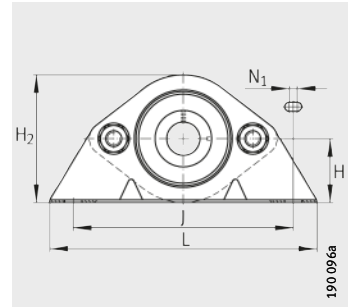


# Plummer block housing units

Sheet steel housings



PB, PBY, RPB

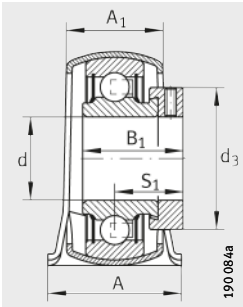


PBS

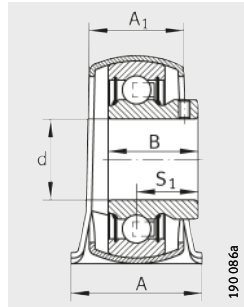
**Dimension table** - Dimensions in mm

Unit	Housing <sup>1)</sup>	Rubber interliner	Radial insert ball bearing	Mass m ≈kg	Dimensions					
					d	H	A	A <sub>1</sub>	H <sub>1</sub>	H <sub>2</sub>
<b>PB12</b>	GEH40-BT	–	RAE12-NPP-B	0,17	<b>12</b>	22,2	25,4	18,4	2,6	43,2
<b>PBY12</b>	GEH40-BT	–	AY12-NPP-B	0,15	<b>12</b>	22,2	25,4	18,4	2,6	43,2
<b>RPB12</b>	GEH47-BT	GRG.RABR40/47	RAE12-NPP-B	0,23	<b>12</b>	25,4	31,8	22,3	3,3	50,1
<b>PBS12</b>	GEH40-PBS	–	RAE12-NPP-B	0,32	<b>12</b>	30,2	32,5	14,2	2,6	59,6
<b>PB15</b>	GEH40-BT	–	RAE15-NPP-B	0,17	<b>15</b>	22,2	25,4	18,4	2,6	43,2
<b>PBY15</b>	GEH40-BT	–	AY15-NPP-B	0,15	<b>15</b>	22,2	25,4	18,4	2,6	43,2
<b>RPB15</b>	GEH47-BT	GRG.RABR40/47	RAE15-NPP-B	0,23	<b>15</b>	25,4	31,8	22,3	3,3	50,1
<b>PBS15</b>	GEH40-PBS	–	RAE15-NPP-B	0,32	<b>15</b>	30,2	32,5	14,2	2,6	59,6
<b>PB17</b>	GEH40-BT	–	RAE17-NPP-B	0,17	<b>17</b>	22,2	25,4	18,4	2,6	43,2
<b>PBY17</b>	GEH40-BT	–	AY17-NPP-B	0,15	<b>17</b>	22,2	25,4	18,4	2,6	43,2
<b>RPB17</b>	GEH47-BT	GRG.RABR40/47	RAE17-NPP-B	0,23	<b>17</b>	25,4	31,8	22,3	3,3	50,1
<b>PBS17</b>	GEH40-PBS	–	RAE17-NPP-B	0,32	<b>17</b>	30,2	32,5	14,2	2,6	59,6
<b>PB20</b>	GEH47-BT	–	RAE20-NPP-B	0,27	<b>20</b>	25,4	31,8	22,3	3,3	50,1
<b>PBY20</b>	GEH47-BT	–	AY20-NPP-B	0,22	<b>20</b>	25,4	31,8	22,3	3,3	50,1
<b>RPB20</b>	GEH52-BT	GRG.RABR47/52-AH01	RAE20-NPP-B	0,28	<b>20</b>	28,6	31,8	23,5	4	56,5
<b>PBS20</b>	GEH47-PBS	–	RAE20-NPP-B	0,45	<b>20</b>	33,6	33	15,8	3	66,8
<b>PB25</b>	GEH52-BT	–	RAE25-NPP-B	0,3	<b>25</b>	28,6	31,8	23,5	4	56,5
<b>PBY25</b>	GEH52-BT	–	AY25-NPP-B	0,26	<b>25</b>	28,6	31,8	23,5	4	56,5
<b>RPB25</b>	GEH62-BT	GRG.RABR52/62-AH01	RAE25-NPP-B	0,38	<b>25</b>	33,3	38	26,5	4	66,1
<b>PBS25</b>	GEH52-BT	–	RAE25-NPP-B	0,49	<b>25</b>	36,5	34,1	17,4	3,4	72
<b>PB30</b>	GEH62-BT	–	RAE30-NPP-B	0,5	<b>30</b>	33,3	38	26,5	4	66,1
<b>PBY30</b>	GEH62-BT	–	AY30-NPP-B	0,4	<b>30</b>	33,3	38	26,5	4	66,1
<b>RPB30</b>	GEH62-BT	GRG.RABR55/62	RAE30-NPP-B	0,45	<b>30</b>	33,3	38	26,5	4	66,1
<b>PBS30</b>	GEH62-PBS	–	RAE30-NPP-B	0,79	<b>30</b>	42,9	38,9	17,4	3,4	85
<b>PBS35</b>	GEH72-PBS	–	RAE35-NPP-B	1,05	<b>35</b>	47,6	46,1	22,2	4	94,4
<b>PBS40</b>	GEH80-PBS	–	RAE40-NPP-B	1,33	<b>40</b>	55	53,5	23	4	106

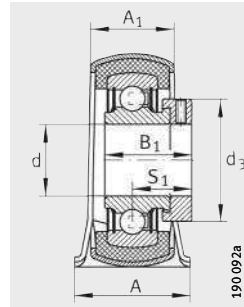
<sup>1)</sup> Housing with Corrotect® coating.



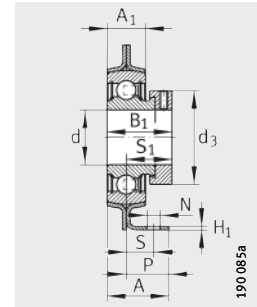
PB



PBY



RPB



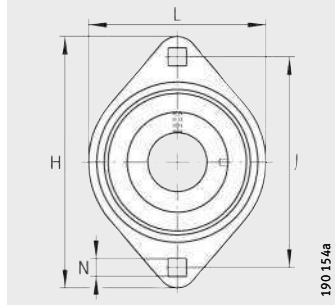
PBS

										Load carrying capacity of housing	Basic load ratings	
N	N <sub>1</sub>	B	B <sub>1</sub>	J	S <sub>1</sub>	P	S	d <sub>3</sub>	L		C <sub>0rG</sub>	dyn. C <sub>r</sub>
								max.		N	N	N
9,5	-	-	28,6	68	22,1	-	-	28	85,7	1 350	9 800	4 750
9,5	-	22	-	68	16	-	-	-	85,7	1 350	9 800	4 750
9,5	-	-	28,6	76	22,1	-	-	28	98,7	900	9 800	4 750
10,5	5,6	-	28,6	92	22,1	25,4	15	28	123,8	2 700	9 800	4 750
9,5	-	-	28,6	68	22,1	-	-	28	85,7	1 350	9 800	4 750
9,5	-	22	-	68	16	-	-	-	85,7	1 350	9 800	4 750
9,5	-	-	28,6	76	22,1	-	-	28	98,4	900	9 800	4 750
10,5	5,6	-	28,6	92	22,1	25,4	15	28	123,8	2 700	9 800	4 750
9,5	-	-	28,6	68	22,1	-	-	28	85,7	1 350	9 800	4 750
9,5	-	22	-	68	16	-	-	-	85,7	1 350	9 800	4 750
9,5	-	-	28,6	76	22,1	-	-	28	98,4	900	9 800	4 750
10,5	5,6	-	28,6	92	22,1	25,4	15	28	123,8	2 700	9 800	4 750
9,5	-	-	31	76	23,5	-	-	33	98,4	1 600	12 800	6 600
9,5	-	25	-	76	18	-	-	-	98,4	1 600	12 800	6 600
11,5	-	-	31	86	23,5	-	-	33	108	1 100	12 800	6 600
10,5	5,6	-	31	97	23,5	25,4	15	33	127	3 200	12 800	6 600
11,5	-	-	31	86	23,5	-	-	37,5	108	1 800	14 000	7 800
11,5	-	27	-	86	19,5	-	-	-	108	1 800	14 000	7 800
11,5	-	-	31	95	23,5	-	-	37,5	117,5	1 400	14 000	7 800
10,5	9,5	-	31	95,5	23,5	25,4	14,3	37,5	133,5	3 600	14 000	7 800
11,5	-	-	35,8	95	26,7	-	-	44	117,5	2 700	19 500	11 300
11,5	-	30	-	95	21	-	-	-	117,5	2 700	19 500	11 300
11,5	-	-	26,5	95	20	-	-	42,5	117,5	1 400	13 200	8 300
13,5	8	-	35,8	119	26,7	30,2	16	44	159	3 600	19 500	11 300
13,5	8	-	39	127	29,4	35	20,7	51	165	4 100	25 500	15 300
13,5	8	-	43,8	136,5	32,7	40	25	58	180	4 500	32 500	19 800

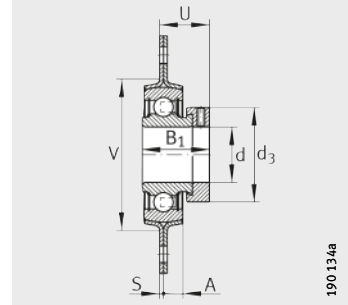


# Two-bolt flanged housing units

Sheet steel housings



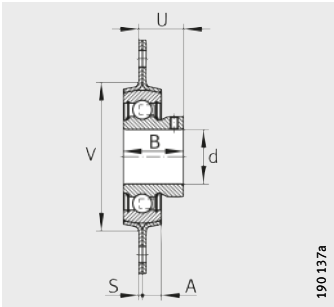
RAT, RATY, RALT, PCSLT



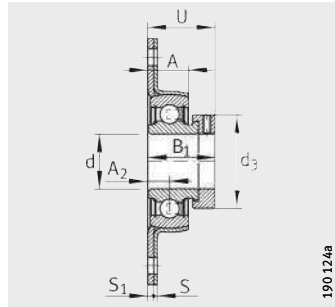
RAT, RALT

**Dimension table** - Dimensions in mm

Designation			Mass m ≈kg	Dimensions		
Unit	Housing	Radial insert ball bearing		d	L	H
<b>RAT12</b>	FLAN40-MST (2 pieces)	RAE12-NPP-B	0,19	<b>12</b>	58,7	81
<b>RATY12</b>	FLAN40-MST (2 pieces)	AY12-NPP-B	0,14	<b>12</b>	58,7	81
<b>RAT15</b>	FLAN40-MST (2 pieces)	RAE15-NPP-B	0,19	<b>15</b>	58,7	81
<b>RATY15</b>	FLAN40-MST (2 pieces)	AY15-NPP-B	0,13	<b>15</b>	58,7	81
<b>RAT17</b>	FLAN40-MST (2 pieces)	RAE17-NPP-B	0,19	<b>17</b>	58,7	81
<b>RATY17</b>	FLAN40-MST (2 pieces)	AY17-NPP-B	0,12	<b>17</b>	58,7	81
<b>RALT20-FA125.8</b>	FLAN42-LST-FA125 (2 pieces)	RAE20-NPP-B	0,21	<b>20</b>	58,7	81
<b>PCSLT20</b>	FLAN42-CSLT-FA125/FLAN42-CST-FA125 (1 piece each)	RAE20-NPP-B	0,22	<b>20</b>	66	90,5
<b>RAT20</b>	FLAN47-MST (2 pieces)	RAE20-NPP-B	0,27	<b>20</b>	66	90,5
<b>RATY20</b>	FLAN47-MST (2 pieces)	AY20-NPP-B	0,22	<b>20</b>	66	90,5
<b>RALT25</b>	FLAN47-LST (2 pieces)	RAE25-NPP-B	0,22	<b>25</b>	71	95,2
<b>PCSLT25</b>	FLAN47-CSLT-FA125/FLAN47-CST-FA125 (1 piece each)	RAE25-NPP-B	0,25	<b>25</b>	71	95,2
<b>RAT25</b>	FLAN52-MST (2 pieces)	RAE25-NPP-B	0,34	<b>25</b>	71	95,2
<b>RATY25</b>	FLAN52-MST (2 pieces)	AY25-NPP-B	0,26	<b>25</b>	71	95,2
<b>PCSLT30</b>	FLAN55-CSLT-FA125/FLAN55-CST-FA125 (1 piece each)	RAE30-NPP-B	0,3	<b>30</b>	84	112,5
<b>RAT30</b>	FLAN62-MST (2 pieces)	RAE30-NPP-B	0,49	<b>30</b>	84	112,7
<b>RATY30</b>	FLAN62-MST (2 pieces)	AY30-NPP-B	0,41	<b>30</b>	84	112,7
<b>RAT35</b>	FLAN72-MST (2 pieces)	RAE35-NPP-B	0,72	<b>35</b>	93,7	123
<b>RATY35</b>	FLAN72-MST (2 pieces)	GAY35-NPP-B	0,56	<b>35</b>	93,7	123
<b>RAT40</b>	FLAN80-MST (2 pieces)	RAE40-NPP-B	0,98	<b>40</b>	100	151
<b>RATY40</b>	FLAN80-MST (2 pieces)	GAY40-NPP-B	0,85	<b>40</b>	100	151



RATY



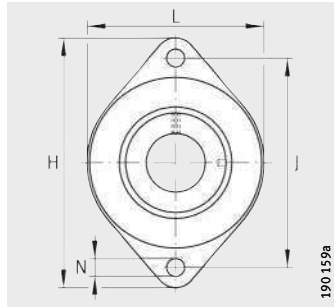
PCSLT

S	S <sub>1</sub>	N	B	B <sub>1</sub>	J	A <sub>2</sub>	d <sub>3</sub> max.	A	U	V	Load carrying capacity of housing	Basic load ratings	
											C <sub>0rG</sub> N	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
2	-	7,1	-	28,6	63,5	-	28	7	24	48	2 700	9 800	4 750
2	-	7,1	22	-	63,5	-	-	7	18	48	2 700	9 800	4 750
2	-	7,1	-	28,6	63,5	-	28	7	24	48	2 700	9 800	4 750
2	-	7,1	22	-	63,5	-	-	7	18	48	2 700	9 800	4 750
2	-	7,1	-	28,6	63,5	-	28	7	24	48	2 700	9 800	4 750
2	-	7,1	22	-	63,5	-	-	7	18	48	2 700	9 800	4 750
2	-	7,1	-	24,6	63,5	-	30	7	20,6	48	2 700	9 400	5 000
2	3	8,7	-	24,6	71,4	7,5	30	14	26,1	-	4 200	9 400	5 000
2	-	8,7	-	31	71,5	-	33	8	25,5	55	3 200	12 800	6 600
2	-	8,7	25	-	71,5	-	-	8	20	55	3 200	12 800	6 600
2	-	8,7	-	25,4	76	-	36	7,1	21,4	55	3 000	10 100	5 900
2	3	8,7	-	25,4	76,2	8,5	36	16	28	-	4 500	10 100	5 900
2	-	8,7	-	31	76,2	-	37,5	8,7	25,5	60	3 650	14 000	7 800
2	-	8,7	27	-	76,2	-	-	8,7	21,5	60	3 650	14 000	7 800
2,5	3,5	11,5	-	26,5	90,5	9	42,5	16	29	-	6 000	13 200	8 300
2,5	-	10,5	-	35,7	90,5	-	44	8,7	29,2	71	5 000	19 500	11 300
2,5	-	10,5	30	-	90,5	-	-	8,7	23,5	71	5 000	19 500	11 300
2,5	-	10,5	-	38,9	100	-	51	10,5	31,5	81	6 300	25 500	15 300
2,5	-	10,5	35	-	100	-	-	10,5	28	81	6 300	25 500	15 300
3,5	-	13,5	-	43,8	119	-	58	11,5	36,2	90	7 000	32 500	19 800
3,5	-	13,5	39,5	-	119	-	-	11,5	32,5	90	7 000	32 500	19 800

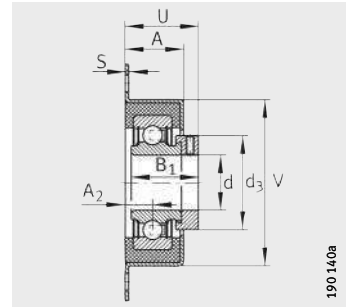


# Two-bolt flanged housing units

Sheet steel housings with rubber interliner



RCSMF



RCSMF

**Dimension table** - Dimensions in mm

Designation				Mass m ≈kg	Dimensions				
Unit	Housing <sup>1)</sup>	Rubber interliner	Radial insert ball bearing		d	L	H	S	N
<b>RCSMF12</b>	FLAN65-RCSMF-FA125	GRG.RCSM40/65	RAE12-NPP-FA106	0,27	<b>12</b>	70	114	1,5	10,5
<b>RCSMF15</b>	FLAN65-RCSMF-FA125	GRG.RCSM40/65	RAE15-NPP-FA106	0,27	<b>15</b>	70	114	1,5	10,5
<b>RCSMF17</b>	FLAN65-RCSMF-FA125	GRG.RCSM40/65	RAE17-NPP-FA106	0,27	<b>17</b>	70	114	1,5	10,5
<b>RCSMF20</b>	FLAN65-RCSMF-FA125	GRG.RCSM47/65	RAE20-NPP-FA106	0,32	<b>20</b>	70	114	1,5	10,5
<b>RCSMF25</b>	FLAN65-RCSMF-FA125	GRG.RCSM52/65	RAE25-NPP-FA106	0,33	<b>25</b>	70	114	1,5	10,5
<b>RCSMF30</b>	FLAN65-RCSMF-FA125	GRG.RCSM55/65	RAE30-NPP-FA106	0,32	<b>30</b>	70	114	1,5	10,5

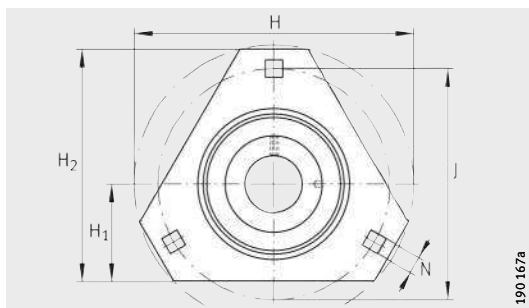
<sup>1)</sup> Housing with Corrotect® coating.

							Load carrying capacity of housing	Basic load ratings	
B <sub>1</sub>	J	A <sub>2</sub>	d <sub>3</sub> max.	A	U	V		C <sub>0rG</sub> N	dyn. C <sub>r</sub> N
28,6	92	12,7	28	27	34,8	68	900	9 800	4 750
28,6	92	12,7	28	27	34,8	68	900	9 800	4 750
28,6	92	12,7	28	27	34,8	68	900	9 800	4 750
31	92	12,7	33	27	36,2	68	1 100	12 800	6 600
31	92	12,7	37,5	27	36,2	68	1 400	14 000	7 800
26,5	92	15	42,5	27	35	68	1 400	13 200	8 300



# Three-bolt flanged housing units

Sheet steel housings



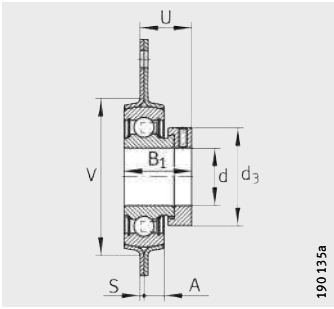
RATR, RALTR, RRTR, RATRY

**Dimension table** - Dimensions in mm

Designation			Mass m ≈kg	Dimensions				
Unit	Housing	Radial insert ball bearing		d	H <sub>2</sub>	H	H <sub>1</sub>	S <sub>1</sub>
<b>RALTR20</b>	FLAN42-LSTR (2 pieces)	RALE20-NPP-B	0,21	<b>20</b>	76,2	90,5	33,3	2
<b>RATR20</b>	FLAN47-MSTR (2 pieces)	RAE20-NPP-B	0,28	<b>20</b>	76,2	90,5	33,3	2
<b>RRTR20</b>	FLAN47-MSTR (2 pieces)	GE20-KRR-B	0,32	<b>20</b>	76,2	90,5	33,3	2
RALTR25 <sup>1)</sup>	<b>FLAN47-LSTR</b> (2 pieces)	<b>RALE25-NPP-B</b>	0,23	<b>25</b>	80,5	95,3	34,9	2
<b>RATR25</b>	FLAN52-MSTR (2 pieces)	RAE25-NPP-B	0,32	<b>25</b>	80,5	95,3	34,9	2
RRTR25 <sup>1)</sup>	<b>FLAN52-MSTR</b> (2 pieces)	<b>E25-KRR-B</b>	0,37	<b>25</b>	80,5	95,3	34,9	2
<b>RATR30</b>	FLAN62-MSTR (2 pieces)	RAE30-NPP-B	0,43	<b>30</b>	93	112,7	38,1	2,5
<b>RATRY30</b>	FLAN62-MSTR (2 pieces)	AY30-NPP-B	0,41	<b>30</b>	93	112,7	38,1	2,5
RRTR30 <sup>1)</sup>	<b>FLAN62-MSTR</b> (2 pieces)	<b>E30-KRR-B</b>	0,5	<b>30</b>	93	112,7	38,1	2,5
<b>RATR35</b>	FLAN72-MSTR (2 pieces)	RAE35-NPP-B	0,56	<b>35</b>	105,6	122	44,5	2,5
<b>RATRY35</b>	FLAN72-MSTR (2 pieces)	GAY35-NPP-B	0,47	<b>35</b>	105,6	122	44,5	2,5
<b>RRTR35</b>	FLAN72-MSTR (2 pieces)	E35-KRR-B	0,63	<b>35</b>	105,6	122	44,5	2,5

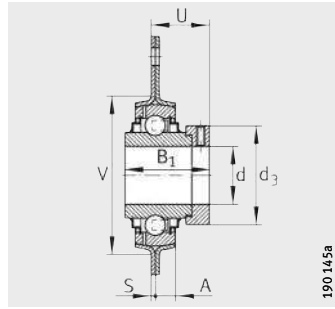
<sup>1)</sup> Housing and radial insert ball bearing must be ordered separately.





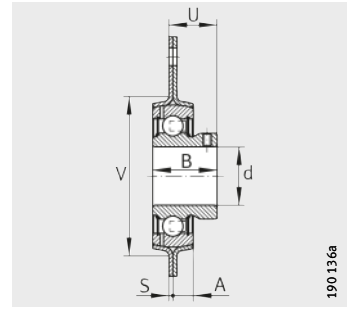
RATR, RALTR

190 135a



RRTR

190 145a



RATRY

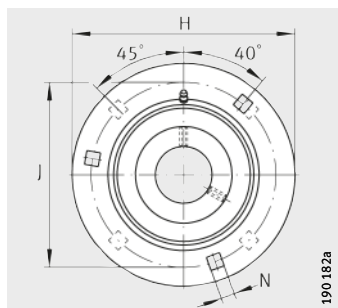
190 136a

N	B	B <sub>1</sub>	J	d <sub>3</sub> max.	A	U	V	Load carrying capacity of housing	Basic load ratings	
								C <sub>0rG</sub> N	dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
8,7	–	24,5	71,5	30	7,2	20,6	49	2 600	9 400	5 000
8,7	–	31	71,5	33	8	25,5	55	3 200	12 800	6 600
8,7	–	43,7	71,5	33	8	28,6	55	3 200	12 800	6 600
8,7	–	25,5	76	36	7,2	21,4	54	3 000	10 100	5 900
8,7	–	31	76	37,5	8,7	25,5	60	3 650	14 000	7 800
8,7	–	44,5	76	37,5	8,7	28,9	60	3 650	14 000	7 800
10,5	–	35,7	90,5	44	8,7	29,2	71	5 000	19 500	11 300
10,5	30	–	90,5	–	8,7	23,5	71	5 000	19 500	11 300
10,5	–	48,5	90,5	44	8,7	32,6	71	5 000	19 500	11 300
10,5	–	39	100	51	9,5	31,9	81	6 400	25 500	15 300
10,5	35	–	100	–	9,5	28	81	6 400	25 500	15 300
10,5	–	51,3	100	51	9,5	34,8	81	6 400	25 500	15 300

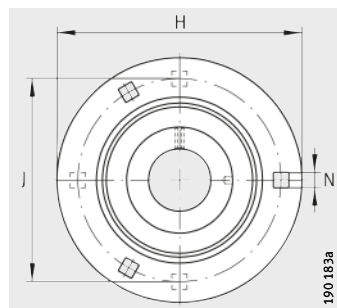


# Three-bolt and four-bolt flanged housing units

Sheet steel housings



GRA, GRRY..-VA



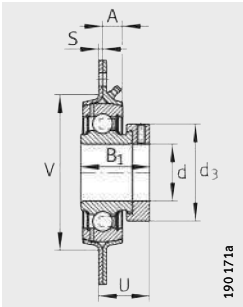
RA, RAY, RRY..-VA

**Dimension table** - Dimensions in mm

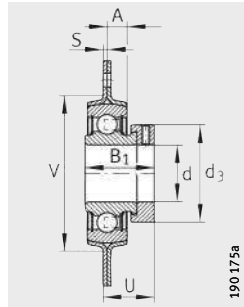
Designation			Mass m ≈kg	Dimensions	
Unit	Housing	Radial insert ball bearing		d	H
RA12 <sup>1)</sup>	<b>FLAN40-MSB</b> (2 pieces)	<b>RAE12-NPP-B</b>	0,23	<b>12</b>	81
RAY12 <sup>1)</sup>	<b>FLAN40-MSB</b> (2 pieces)	<b>AY12-NPP-B</b>	0,17	<b>12</b>	81
RRY12-VA <sup>1)</sup>	<b>FLAN40-MSB-VA</b> (2 pieces)	<b>GYE12-KRR-B-VA</b>	0,21	<b>12</b>	81
<b>RA15</b>	FLAN40-MSB (2 pieces)	RAE15-NPP-B	0,23	<b>15</b>	81
<b>RAY15</b>	FLAN40-MSB (2 pieces)	AY15-NPP-B	0,16	<b>15</b>	81
RRY15-VA <sup>1)</sup>	<b>FLAN40-MSB-VA</b> (2 pieces)	<b>GYE15-KRR-B-VA</b>	0,2	<b>15</b>	81
<b>RA17</b>	FLAN40-MSB (2 pieces)	RAE17-NPP-B	0,23	<b>17</b>	81
RAY17 <sup>1)</sup>	<b>FLAN40-MSB</b> (2 pieces)	<b>AY17-NPP-B</b>	0,15	<b>17</b>	81
RRY17-VA <sup>1)</sup>	<b>FLAN40-MSB-VA</b> (2 pieces)	<b>GYE17-KRR-B-VA</b>	0,19	<b>17</b>	81
<b>RA20</b>	FLAN47-MSB (2 pieces)	RAE20-NPP-B	0,32	<b>20</b>	90,5
<b>RAY20</b>	FLAN47-MSB (2 pieces)	AY20-NPP-B	0,3	<b>20</b>	90,5
<b>GRA20<sup>2)</sup></b>	FLAN47-MSB/FLAN47-MSA (1 piece each)	GRAE20-NPP-B	0,32	<b>20</b>	90,5
<b>GRRY20-VA<sup>2)</sup></b>	FLAN47-MSB-VA/FLAN47-MSA-VA (1 piece each)	GYE20-KRR-B-VA	0,34	<b>20</b>	90,5
<b>RRY20-VA</b>	FLAN47-MSB-VA (2 pieces)	GYE20-KRR-B-VA	0,34	<b>20</b>	90,5
<b>RA25</b>	FLAN52-MSB (2 pieces)	RAE25-NPP-B	0,37	<b>25</b>	95
<b>RAY25</b>	FLAN52-MSB (2 pieces)	AY25-NPP-B	0,34	<b>25</b>	95
<b>GRA25<sup>2)</sup></b>	FLAN52-MSB/FLAN52-MSA (1 piece each)	GRAE25-NPP-B	0,37	<b>25</b>	95
<b>GRRY25-VA<sup>2)</sup></b>	FLAN52-MSB-VA/FLAN52-MSA-VA (1 piece each)	GYE25-KRR-B-VA	0,38	<b>25</b>	95
<b>RRY25-VA</b>	FLAN52-MSB-VA (2 pieces)	GYE25-KRR-B-VA	0,38	<b>25</b>	95
<b>RA30</b>	FLAN62-MSB (2 pieces)	RAE30-NPP-B	0,61	<b>30</b>	112,7
<b>RAY30</b>	FLAN62-MSB (2 pieces)	AY30-NPP-B	0,45	<b>30</b>	112,7
<b>GRA30<sup>2)</sup></b>	FLAN62-MSB/FLAN62-MSA (1 piece each)	GRAE30-NPP-B	0,61	<b>30</b>	112,7
<b>GRRY30-VA<sup>2)</sup></b>	FLAN62-MSB-VA/FLAN62-MSA-VA (1 piece each)	GYE30-KRR-B-VA	0,63	<b>30</b>	112,7
<b>RRY30-VA</b>	FLAN62-MSB-VA (2 pieces)	GYE30-KRR-B-VA	0,63	<b>30</b>	112,7
<b>RA35</b>	FLAN72-MSB (2 pieces)	RAE35-NPP-B	0,82	<b>35</b>	122
<b>RAY35</b>	FLAN72-MSB (2 pieces)	GAY35-NPP-B	0,78	<b>35</b>	122
<b>GRA35<sup>2)</sup></b>	FLAN72-MSB/FLAN72-MSA (1 piece each)	GRAE35-NPP-B	0,82	<b>35</b>	122

<sup>1)</sup> Housing and radial insert ball bearing must be ordered separately.

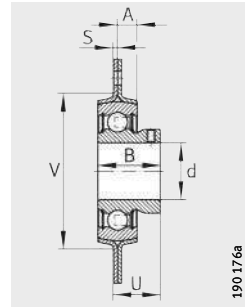
<sup>2)</sup> Units with relubrication facility.



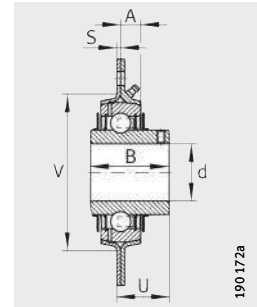
GRA



RA



RAY



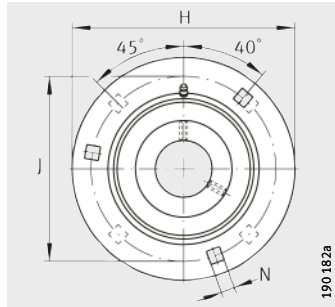
GRRY..-VA, RRY..-VA

S	N	B	B <sub>1</sub>	J	d <sub>3</sub> max.	A	U	V	Number of screw mounting holes n	Load carrying capacity of housing C <sub>0rG</sub> N	Basic load ratings	
											dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
2	7,1	-	28,6	63,5	28	7	24	48	3	2700	9800	4750
2	7,1	22	-	63,5	-	7	18	48	3	2700	9800	4750
2	7,1	25	-	63,5	-	7	17,4	48	3	2700	9800	4750
2	7,1	-	28,6	63,5	28	7	24	48	3	2700	9800	4750
2	7,1	22	-	63,5	-	7	18	48	3	2700	9800	4750
2	7,1	25	-	63,5	-	7	17,4	48	3	2700	9800	4750
2	7,1	-	28,6	63,5	28	7	24	48	3	2700	9800	4750
2	7,1	22	-	63,5	-	7	18	48	3	2700	9800	4750
2	7,1	25	-	63,5	-	7	17,4	48	3	2700	9800	4750
2	8,7	-	31	71,5	33	8	25,5	55	3	3200	12800	6600
2	8,7	25	-	71,5	-	8	20	55	3	3200	12800	6600
2	8,7	-	31	71,5	33	8	25,5	55	3	3200	12800	6600
2	8,7	31	-	71,5	-	8	20,3	55	3	3200	12800	6600
2	8,7	31	-	71,5	-	8	20,3	55	3	3200	12800	6600
2	8,7	-	31	76	37,5	8,7	25,5	60	3	3650	14000	7800
2	8,7	27	-	76	-	8,7	21,5	60	3	3650	14000	7800
2	8,7	-	31	76	37,5	8,7	25,5	60	3	3650	14000	7800
2	8,7	34	-	76	-	8,7	21,7	60	3	3650	14000	7800
2	8,7	34	-	76	-	8,7	21,7	60	3	3650	14000	7800
2,5	10,5	-	35,8	90,5	44	8,7	29,2	71	3	5000	19500	11300
2,5	10,5	30	-	90,5	-	8,7	23,5	71	3	5000	19500	11300
2,5	10,5	-	35,8	90,5	44	8,7	29,2	71	3	5000	19500	11300
2,5	10,5	38,1	-	90,5	-	9	24,7	71	3	5000	19500	11300
2,5	10,5	38,1	-	90,5	-	9	24,7	71	3	5000	19500	11300
2,5	10,5	-	39	100	51	9,5	31,9	81	3	6400	25500	15300
2,5	10,5	35	-	100	-	9,5	28	81	3	6400	25500	15300
2,5	10,5	-	39	100	51	9,5	32	81	3	6400	25500	15300

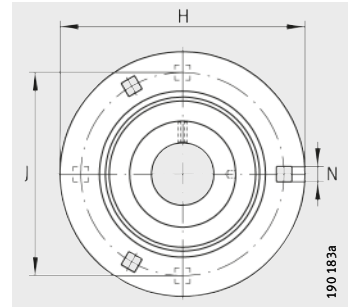


# Three-bolt and four-bolt flanged housing units

Sheet steel housings



GRA

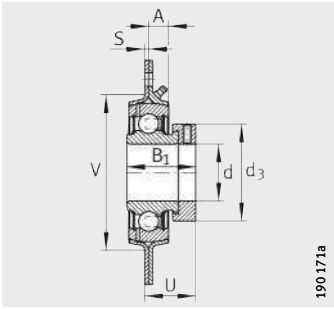


RA, RAY

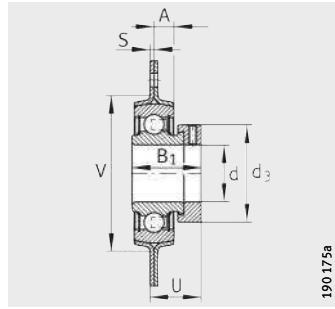
**Dimension table** (continued) · Dimensions in mm

Designation			Mass m ≈kg	Dimensions	
Unit	Housing	Radial insert ball bearing		d	H
<b>RA40</b>	FLAN80-MSB (2 pieces)	RAE40-NPP-B	1,36	<b>40</b>	147,5
RAY40 <sup>1)</sup>	<b>FLAN80-MSB</b> (2 pieces)	<b>GAY40-NPP-B</b>	1,25	<b>40</b>	147,5
<b>GRA40</b>	FLAN80-MSB/FLAN80-MSA (1 piece each)	GRAE40-NPP-B	1,36	<b>40</b>	147,5
<b>RA45</b>	FLAN85-MSB (2 pieces)	GRAE45-NPP-B	1,41	<b>45</b>	149,2
<b>GRA45</b>	FLAN85-MSB/FLAN85-MSA (1 piece each)	GRAE45-NPP-B	1,41	<b>45</b>	149,2
<b>RA50</b>	FLAN90-MSB (2 pieces)	GRAE50-NPP-B	1,68	<b>50</b>	155,5
RAY50 <sup>1)</sup>	<b>FLAN90-MSB</b> (2 pieces)	<b>GAY50-NPP-B</b>	1,68	<b>50</b>	155,5
<b>GRA50</b>	FLAN90-MSB/FLAN90-MSA (1 piece each)	GRAE50-NPP-B	1,68	<b>50</b>	155,5
RA55 <sup>1)</sup>	<b>FLAN100-MSB</b> (2 pieces)	<b>GRAE55-NPP-B</b>	1,39	<b>55</b>	167
RA60 <sup>1)</sup>	<b>FLAN110-MSB</b> (2 pieces)	<b>GRAE60-NPP-B</b>	2,54	<b>60</b>	176
RAY60 <sup>1)</sup>	<b>FLAN110-MSB</b> (2 pieces)	<b>GAY60-NPP-B</b>	2,13	<b>60</b>	176

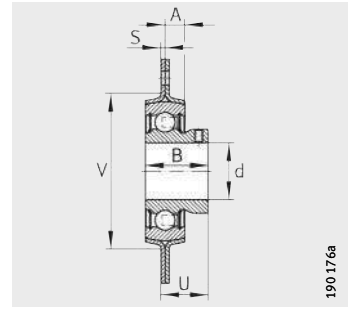
<sup>1)</sup> Housing and radial insert ball bearing must be ordered separately.



GRA



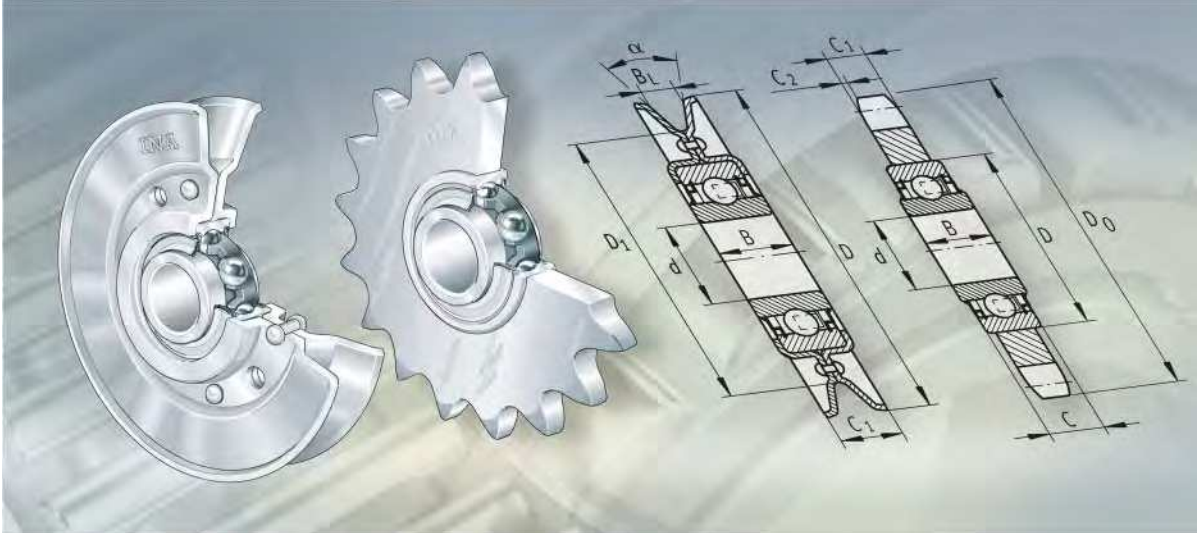
RA



RAY

S	N	B	B <sub>1</sub>	J	d <sub>3</sub> max.	A	U	V	Number of screw mounting holes n	Load carrying capacity of housing C <sub>0rG</sub> N	Basic load ratings	
											dyn. C <sub>r</sub> N	stat. C <sub>0r</sub> N
3,5	13,5	–	43,8	119	58	10,3	36,2	90	4	7 700	32 500	19 800
3,5	13,5	39,5	–	119	–	10,3	32,5	90	4	7 700	32 500	19 800
3,5	13,5	–	43,8	119	58	10,3	36,2	90	4	7 700	32 500	19 800
3,5	13,5	–	43,8	120,5	63	11,1	36,2	95	4	7 700	32 500	20 400
3,5	13,5	–	43,8	120,5	63	11,1	36,2	95	4	7 700	32 500	20 400
4	13,5	–	43,8	127	69	11,1	36,7	100	4	8 600	35 000	23 200
4	13,5	43	–	127	–	11,1	36	100	4	8 600	35 000	23 200
4	13,5	–	43,8	127	69	11,1	36,7	100	4	8 600	35 000	23 200
4	13,5	–	48,4	138	76	12,5	40,4	110	4	9 500	43 500	29 000
4	13,5	–	53,1	148	84	12	43,6	120	4	11 200	52 000	36 000
4	13,5	47	–	148	–	12	38	120	4	11 200	52 000	36 000





## Roller chain idler sprocket units Idler pulley units

# Roller chain idler sprocket units

## Idler pulley units

	Page
<b>Product overview</b>	Roller chain idler sprocket units, idler pulley units ..... 1312
<b>Features</b>	Roller chain idler sprocket units ..... 1313
	Idler pulley units..... 1313
	Operating temperature ..... 1313
<b>Design and safety guidelines</b>	Roller chain idler sprocket units ..... 1314
	Material codes..... 1314
	Idler pulley units..... 1315
<b>Accuracy</b>	..... 1315
<b>Dimension tables</b>	Roller chain idler sprocket units..... 1316
	Idler pulley units..... 1318



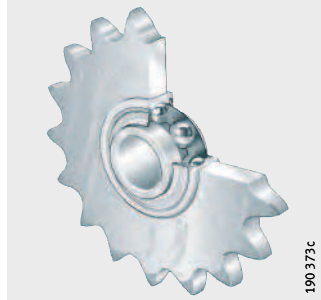
## Product overview

## Roller chain idler sprocket units Idler pulley units

### Roller chain idler sprocket units

Sprocket made from steel or sintered iron

KSR...-L0

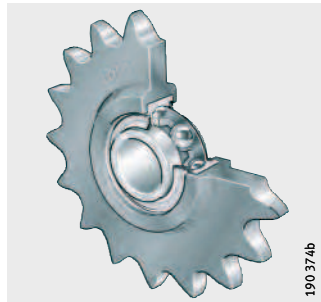


KSR...-B0



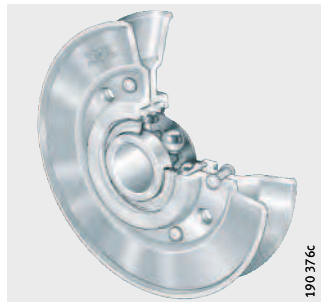
Sprocket made from plastic

KSR...-L0...-22

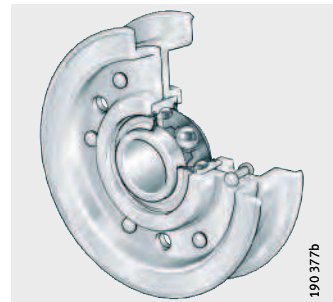


### Idler pulley units

RSRA...-L0, RSRA...-K0



RSRB...-L0



RSRD...-L0





# Roller chain idler sprocket units

## Idler pulley units

### Features

#### Roller chain idler sprocket units

INA roller chain idler sprocket units are guidance and return units for roller bush chains and roller chains. They can compensate for chain stretch resulting from operation and give smoother system running under high loads and speeds.

The ready-to-fit units comprise sprockets and deep groove ball bearings or radial insert ball bearings. The sprockets are made from high strength steel, sintered iron or plastic (polyamide). Sprockets made from plastic give particularly smooth running and generate very little noise. Since the inner ring of the deep groove ball bearing is extended on both sides, no additional spacer rings are required.

In series KSR...-B0, the inner ring is located on the shaft by means of a locking collar. The bearing bore of this series has a plus tolerance. As a result, unmachined shafts up to ISO tolerance h9 can be used under moderate loads and speeds.

#### Sealing

The deep groove ball bearings are sealed on both sides.

#### Lubrication

They are greased using a lithium soap grease to GA13 and are maintenance-free.

#### Idler pulley units

Idler pulley units are tensioning systems for belt drives and idler units. They:

- increase the wrap angle in belt drives and can therefore support higher power levels or allow smaller units to be used
- compensate for belt stretch resulting from operation
- allow shorter centre distances
- reduce the wear on the belt drive.

The ready-to-fit units comprise deep drawn, profiled sheet steel pulley halves riveted together and deep groove ball bearings. Pulleys of larger diameters are additionally welded together. A lead chamfer on the pulley profile prevents damage to the belt. Due to the sheet steel construction, the additional rotating masses and the out of balance masses generated are low.

Type A is suitable for vee belts, type B for flat, vee and round belts, type D for round belts, steel cables and hemp ropes.

#### Sealing

The deep groove ball bearings are sealed on both sides.

#### Lubrication

They are greased using a lithium soap grease to GA13 and are maintenance-free.

#### Operating temperature

Roller chain idler sprocket units with steel or sintered iron sprockets are suitable for operating temperatures from  $-20\text{ }^{\circ}\text{C}$  to  $+120\text{ }^{\circ}\text{C}$ .

Roller chain idler sprocket units with plastic sprockets are suitable for operating temperatures from  $-20\text{ }^{\circ}\text{C}$  to  $+80\text{ }^{\circ}\text{C}$ .

Idler pulley units are suitable for operating temperatures from  $-20\text{ }^{\circ}\text{C}$  to  $+120\text{ }^{\circ}\text{C}$ , limited by the grease and seal material.



# Roller chain idler sprocket units Idler pulley units

## Design and safety guidelines Roller chain idler sprocket units

Roller chain idler sprocket units should always be mounted on the slack side of the chain, *Figure 1*.

The wrap angle on the idler sprocket unit should be selected such that at least three teeth are engaged simultaneously.

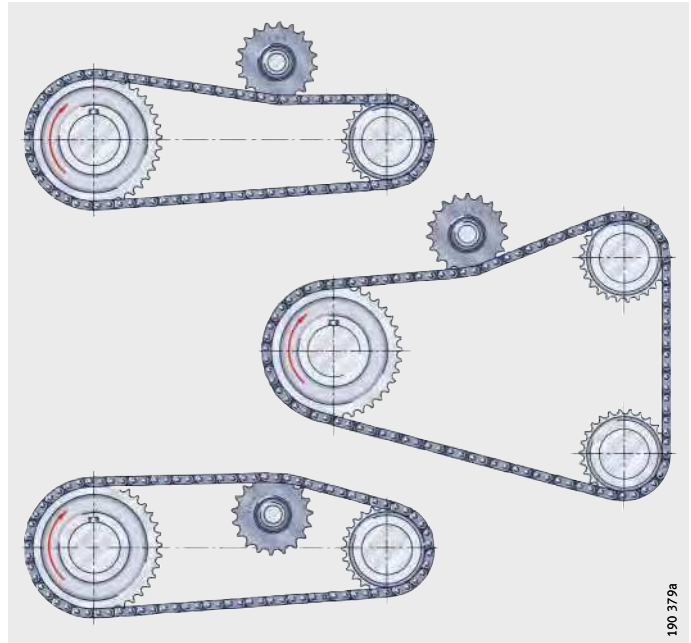
For grease lubrication, a grease with good adhesion characteristics should be used.

Roller chain idler sprocket units of bore  $d = 16$  mm are tolerated so that they can be fitted using fixing screws M16.



The minimum press-out force of the deep groove ball bearings is 700 N. This value must not be exceeded during operation.

The preload on the slack side should not be less than 1% of the tractive force on the taut side.



*Figure 1*  
Arrangement on slack side  
of chain drive

## Material codes

The materials used for the sprockets are classified by means of material codes, see table.

### Classification of materials

Code	Material	Hardness
08	Sintered iron C 10	HB $50 \pm 10$
09	Sintered iron D 39	HB $105 \pm 15$
15	Steel St 52	–
16	Steel C 45	HRC $50 \pm 5$ Tooth flanks hardened
22	Plastic PA	–

## Idler pulley units

Idler pulley units should only be positioned on the slack side of the drive, *Figure 2*.

For normal loads, a light fit for the inner ring combined with axial clamping is sufficient.

If idler pulley units with a flat profile are to be used for tensioning via the back of a vee belt, check the suitability of the vee belt for this arrangement.



The permissible belt speed of 40 m/s must not be exceeded. Check the permissible belt tension and operating life of the ball bearing for each individual application.

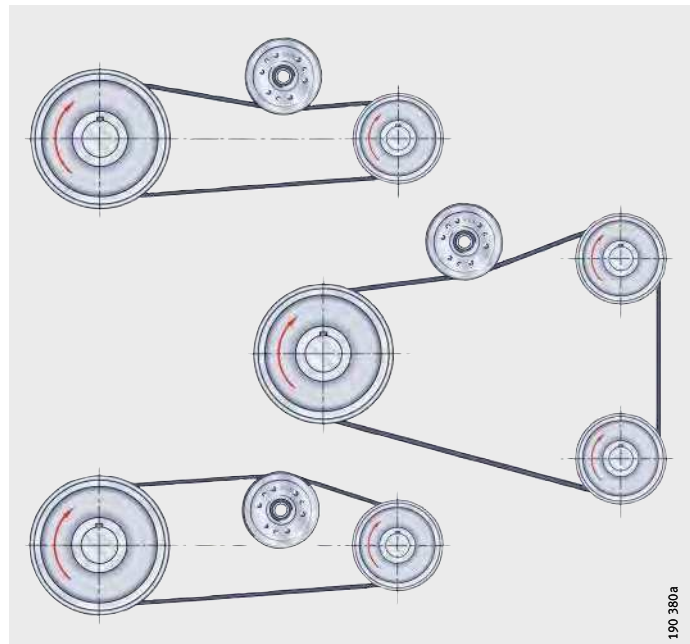
## Preload force

The following is an approximate guide value for the preload force  $S_v$  between the shafts:

- for flat belts  
 $S_v = 2 \text{ to } 3 \times F_u$  (circumferential force)
- for vee belts  
 $S_v = 1,7 \text{ to } 2,5 \times F_u$  (circumferential force).

## Checking belt tension

Measure the speed ratio without load at low speed. Then measure the speed ratio at operating speed and under operating load. If the difference in speed due to slippage is  $> 2\%$ , retension the belt.

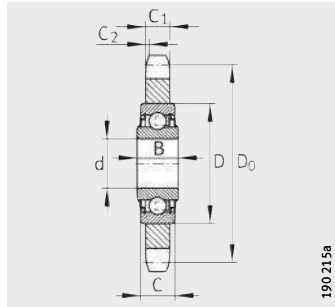


*Figure 2*  
Arrangement on slack side  
of belt drive

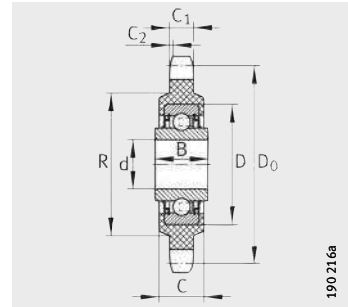
## Accuracy

In the case of idler pulley units for vee belts, the groove angles are slightly larger due to the small wrap than recommended according to DIN 2 211 and DIN 2 217.

# Roller chain idler sprocket units



KSR...-L0



KSR...-L0...-22

**Dimension table** - Dimensions in mm

Tooth set		Designation <sup>3)5)</sup>	Mass m ≈kg	Dimensions									For chain to	
p <sup>1)</sup> "	z <sup>2)</sup>			d <sup>4)</sup>	C <sub>1</sub>	D <sub>0</sub>	D <sub>k</sub>	C <sub>2 min</sub>	D	B	C	R	DIN 8187	DIN 8188
<sup>3</sup> / <sub>8</sub>	20	KSR16-L0-06-10-20-08	0,14	16,2	5,2	60,9	65	0,8	40	18,3	12	-	*	-
<sup>1</sup> / <sub>2</sub>	16	KSR16-L0-08-10-16-08	0,16	16,2	7	65,1	70,5	1,1	40	18,3	12	-	*	-
		KSR16-L0-08-10-16-15	0,14	16,2	7	65,1	70,5	1,1	40	18,3	12	-	*	*
		KSR16-L0-08-10-16-22	0,1	16,2	7	65,1	70,5	1,1	40	18,3	18,1	48	*	*
	18	KSR16-L0-08-10-18-08	0,21	16,2	7	73,1	78,6	1,1	40	18,3	12	-	*	-
		KSR16-L0-08-10-18-09	0,21	16,2	7	73,1	78,6	1,1	40	18,3	12	-	*	*
		KSR16-L0-08-10-18-16	0,21	16,2	7	73,1	78,6	1,1	40	18,3	12	-	*	*
<sup>5</sup> / <sub>8</sub>	14	KSR16-L0-10-10-14-08	0,21	16,2	8,7	71,3	78	1,3	40	18,3	12	-	*	*
		KSR16-L0-10-10-17-08	0,32	16,2	8,7	86,4	93,1	1,3	40	18,3	12	-	*	*
	17	KSR16-L0-10-10-17-09	0,32	16,2	8,7	86,4	93,1	1,3	40	18,3	12	-	*	*
		KSR16-L0-10-10-17-22	0,26	16,2	8,7	86,4	93,1	1,3	40	18,3	18	48	*	*
<sup>3</sup> / <sub>4</sub>	13	KSR16-L0-12-10-13-08	0,33	16,2	10,5	79,6	87	1,5	40	18,3	12	-	*	*
		KSR16-L0-12-10-13-16	0,33	16,2	10,5	79,6	87	1,5	40	18,3	12	-	*	*
	15	KSR16-L0-12-10-15-08	0,42	16,2	10,5	91,6	99,2	1,5	40	18,3	12	-	*	*
		KSR16-L0-12-10-15-09	0,42	16,2	10,5	91,6	99,2	1,5	40	18,3	12	-	*	-
		KSR16-L0-12-10-15-22	0,36	16,2	10,5	91,6	99,2	1,5	40	18,3	18	48	*	*
	17	KSR16-L0-12-10-17-15	0,58	16,2	10,5	103,7	111,4	1,5	40	18,3	12	-	*	*
		KSR16-L0-12-10-17-16	0,58	16,2	10,5	103,7	111,4	1,5	40	18,3	12	-	*	*
	1	12	KSR20-L0-16-10-12-15	0,7	20	15,3	98,1	107,6	2	47	17,7	14	-	*
KSR20-L0-16-10-12-16			0,7	20	15,3	98,1	107,6	2	47	17,7	14	-	*	-
1 <sup>1</sup> / <sub>4</sub>	9	KSR25-L0-20-10-09-16	0,8	25	17,6	92,8	103	2,5	52	21	15	-	*	*
		KSR25-L0-20-10-13-15	1,6	25	17,6	132,7	144	2,5	52	21	15	-	*	*

1) p = pitch.

2) z = number of teeth.

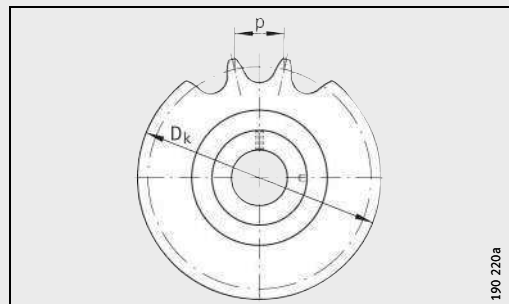
3) Material codes, see section Material codes, page 1314.

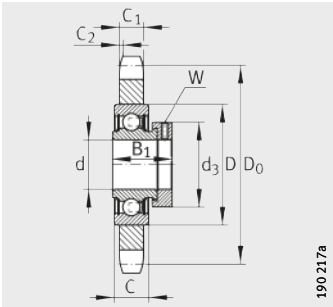
4) Tolerance of bore d: see table.

5) Composition of designation: see example, page 1317, footnote<sup>4)</sup>.

### Bore tolerance

Series	Bore d mm	Tolerance mm
KSR...-L0	16,2	0 +0,1
	20 - 25	0 -0,01





190 217a

KSR...-B0

**Dimension table** · Dimensions in mm

Tooth set	Designation <sup>3)4)</sup>	Mass	Dimensions										W	For chain to	
			m	d	C <sub>1</sub>	D <sub>0</sub>	D <sub>k</sub>	C <sub>2 min</sub>	D	B <sub>1</sub>	C	d <sub>3 max.</sub>		DIN 8187	DIN 8188
p <sup>1)</sup>	z <sup>2)</sup>	≈ kg	$d_{0+0,018}$												
<sup>3</sup> / <sub>8</sub>	20	<b>KSR15-B0-06-10-20-08</b>	0,18	15	5,2	60,9	65	0,8	40	28,6	12	28	3	*	–
<sup>1</sup> / <sub>2</sub>	16	<b>KSR15-B0-08-10-16-08</b>	0,21	15	7	65,1	70,5	1,1	40	28,6	12	28	3	*	–
	18	<b>KSR20-B0-08-10-18-08</b>	0,32	20	7	73,1	78,6	1,1	47	31	14	33	3	*	*
		<b>KSR20-B0-08-10-18-15</b>	0,32	20	7	73,1	78,6	1,1	47	31	14	33	3	*	*
	19	<b>KSR25-B0-08-10-19-08</b>	0,29	25	7	77,1	82,5	1,1	52	31	15	37,3	3	*	*
<sup>5</sup> / <sub>8</sub>	14	<b>KSR15-B0-10-10-14-08</b>	0,26	15	8,7	71,3	78	1,3	40	28,3	12	28	3	*	*
	17	<b>KSR20-B0-10-10-17-15</b>	0,41	20	8,7	86,3	93,1	1,3	47	31	14	33	3	*	*
<sup>3</sup> / <sub>4</sub>	13	<b>KSR15-B0-12-10-13-08</b>	0,4	15	10,5	79,6	87	1,5	40	28,6	12	28	3	*	*
	15	<b>KSR20-B0-12-10-15-16</b>	0,47	20	10,5	91,6	99,2	1,5	47	31	14	33	3	*	*
1	10	<b>KSR20-B0-16-10-10-15</b>	0,5	20	15,3	82,3	89,4	2	47	31	14	33	3	*	–
	15	<b>KSR30-B0-16-10-15-15</b>	1,34	30	15,3	122,2	131	2	62	35,7	18	44	4	*	–

1) p = pitch.

2) z = number of teeth.

3) Material codes: see page 1314.

4) Composition of designation taking example of **roller chain idler sprocket unit KSR15-B0-06-10-20-08**

KSR Roller chain idler sprocket unit

15 Bearing bore diameter

B0 Radial insert ball bearing with eccentric locking collar, series RAE...-NPP

06 Sprocket pitch in 1/16", code

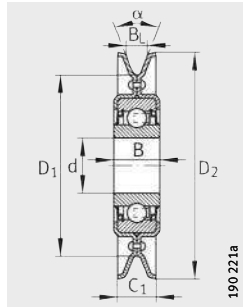
10 Chain code (width index or relevant standard)

20 Number of teeth

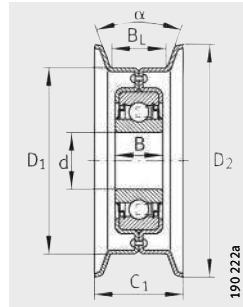
08 Material code (sintered iron).



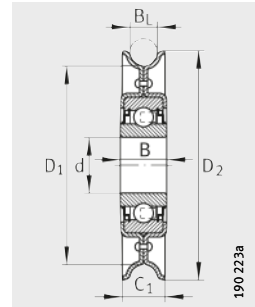
# Idler pulley units



RSRA...-L0, RSRA...-K0  
Type A



RSRB...-L0  
Type B



RSRD...-L0  
Type D

**Dimension table** - Dimensions in mm

Type	Designation	Mass m ≈kg	Dimensions						Angle α °	Vee belt size to DIN 2 215 (ISO 1 081, ISO 4 183, ISO 4 184) and DIN 7 753, Part 1 (ISO 4 184)	Basic load ratings <sup>2)</sup>	
			d <sup>1)</sup>	D <sub>1</sub>	D <sub>2</sub>	B	C <sub>1</sub>	B <sub>L</sub>			dyn. C <sub>r</sub>	stat. C <sub>0r</sub>
<b>A</b>	<b>RSRA15-90-L0</b>	0,24	<b>15</b>	61,6	90	14,4	20	12,4	32	8, 10, (12,5)	7 600	3 700
	<b>RSRA17-102-K0-AH01</b>	0,42	<b>17</b>	70,8	102	12	22,2	12,7	34	8, 10, (12,5)	9 800	4 750
	<b>RSRA13-129-L0-L114<sup>3)</sup></b>	0,56	<b>13</b>	73,7	129	18,3	32	22,1	32	13, 17, 20, 22	9 800	4 750
	<b>RSRA16-129-L0</b>	0,54	<b>16</b>	73,7	129	18,3	32	22,1	32	13, 17, 20, 22	9 800	4 750
	<b>RSRA16-186-L0</b>	1,11	<b>16</b>	130,8	186	18,3	32	22,1	32	13, 17, 20, 22	9 800	4 750
<b>B</b>	<b>RSRB15-92-L0</b>	0,31	<b>15</b>	76,2	92	14,4	31	22,2	10	–	7 600	3 700
	<b>RSRB13-117-L0</b>	0,5	<b>13</b>	101	117	18,3	36	25,4	10	–	9 800	4 750
	<b>RSRB16-117-L0</b>	0,48	<b>16</b>	101	117	18,3	36	25,4	10	–	9 800	4 750
	<b>RSRB13-159-L0</b>	0,8	<b>13</b>	139,7	159	18,3	36,5	25,4	10	–	9 800	4 750
	<b>RSRB16-159-L0</b>	0,78	<b>16</b>	139,7	159	18,3	36,5	25,4	10	–	9 800	4 750
	<b>RSRB16-222-L0</b>	1,45	<b>16</b>	203	222	18,3	50	38	10	–	9 800	4 750
<b>D</b>	<b>RSRD25-150-L0</b>	0,83	<b>25</b>	133	154	21	24	17	–	–	14 000	7 800

1) Tolerance of bore d: see table.

2) Basic load rating of bearing.

3) The bearing is greased with L114 (GA47).

## Bore tolerance

Bore d mm	Tolerance mm
13	+0,08 –0,05
15	0 –0,08
16	+0,26 +0,13
17	0 –0,008
25	0 –0,01





# Bearing housings



# Bearing housings

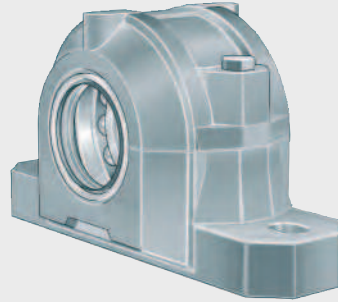
	Page
<b>Product overview</b>	Bearing housings ..... 1322
<b>Features</b>	Housing materials and outer surfaces ..... 1324
	Locating and non-locating bearings ..... 1324
	Sealing..... 1324
<b>Split and unsplit plummer block housings</b>	Split plummer block housings SNV ..... 1326
	Split plummer block housings S30..... 1334
	Split plummer block housings SD31 ..... 1337
	Split plummer block housings LOE for oil lubrication ..... 1340
	Unsplit plummer block housings VR3 ..... 1342
	Unsplit plummer block housings BND ..... 1345
<b>Flanged housings</b>	Flanged housings F112 ..... 1351
	Flanged housings F5 ..... 1352
<b>Design and safety guidelines</b>	Load carrying capacity of split plummer block housings ..... 1354
	Load carrying capacity of unsplit plummer block housings .... 1358
	Tightening torques ..... 1360
<b>Accessories</b>	Grease valves, locating rings ..... 1361
	Seals..... 1362
	Covers..... 1363
<b>Dimension tables</b>	Plummer block housings, SNV, split, for bearings with tapered bore and adapter sleeve ..... 1364
	cylindrical bore ..... 1400
	Plummer block housings, S30, split, for spherical roller bearings with tapered bore and adapter sleeve ..... 1412
	Plummer block housings, SD31, split, for spherical roller bearings with tapered bore and adapter sleeve ..... 1418
	Plummer block housings, LOE, split, for spherical roller bearings with cylindrical bore ..... 1422
	tapered bore and adapter sleeve ..... 1426
	Plummer block units, VRE3, unsplit, with bearings and shaft..... 1430
	Plummer block housings, BND, unsplit, for spherical roller bearings ..... 1438
	Flanged housings, F112, unsplit, for self-aligning ball bearings with extended inner ring..... 1444
	Flanged housings, F5, unsplit, for bearings with tapered bore and adapter sleeve ..... 1446



# Product overview Bearing housings

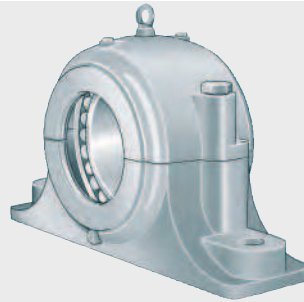
## Plummer block housings Split

SNV



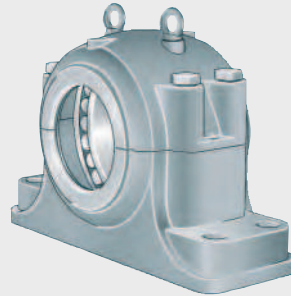
214 017a

S30



214 018a

SD31



214 019a

## For oil lubrication

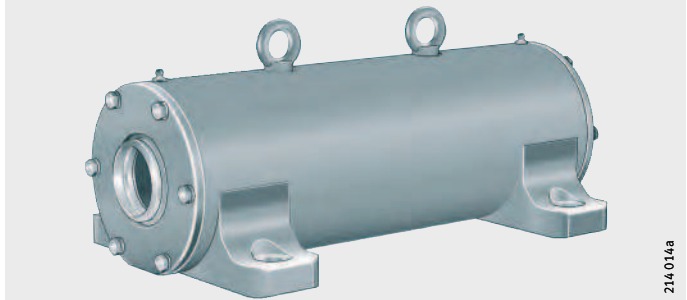
LOE



214 016b

**Plummer block housings**  
Unsplit

VR3

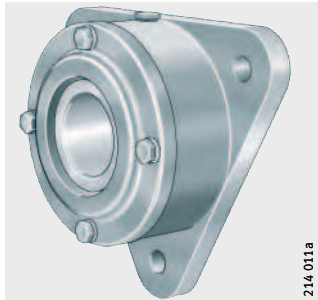


BND

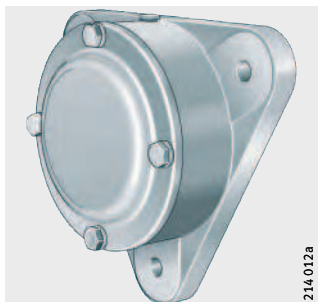


**Flanged housings**

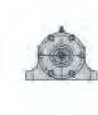
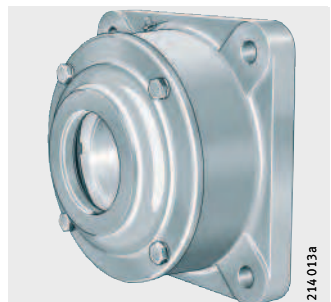
F112



F5 (F505 to F513)



F5 (F515 to F522)



# Bearing housings

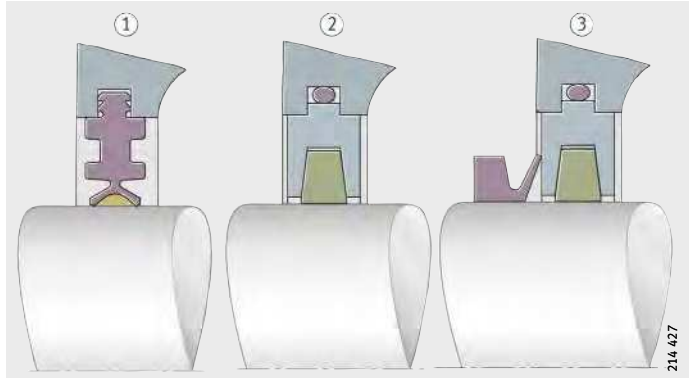
**Features** FAG housings and the associated bearings form bearing units that have proven successful in machinery, plant and equipment. It is only possible, however, to show here a small selection of the numerous sizes and designs (for an overview of the FAG series housings, see publication TI WL 90-30). For other housings or housing designs, please consult Schaeffler Group Industrial.

**Housing materials and outer surfaces** The bearing housings are predominantly made from flake graphite cast iron. We can supply housings made from cast steel or spheroidal graphite cast iron by agreement. Since the bearings are generally lubricated with grease and the initial grease filling lasts for a long period, most housings do not have relubrication holes. However, there are cast-on bosses or marks present so that lubrication holes can be made if necessary. If relubrication is carried out, it must be ensured that excess grease is allowed to escape. All outer surfaces of the housings and housing parts not machined by chip-forming methods have a universal paint coating (colour RAL 7031, bluish grey). The coating can be finished using all synthetic resin, polyurethane, acrylic, epoxy resin, chlorinated rubber, nitrocellulose and acid-hardening hammer tone finishes. The anti-corrosion protection on the inner and outer surfaces machined by chip-forming methods can be easily removed.

**Locating and non-locating bearings** The bearing seats in the housing are generally machined such that the bearings are movable and can thus function as non-locating bearings. Locating bearing arrangements can be achieved by the insertion of locating rings if these are listed in the tables. Locating rings must be ordered separately. Housings without locating rings are supplied in a non-locating or locating bearing design.

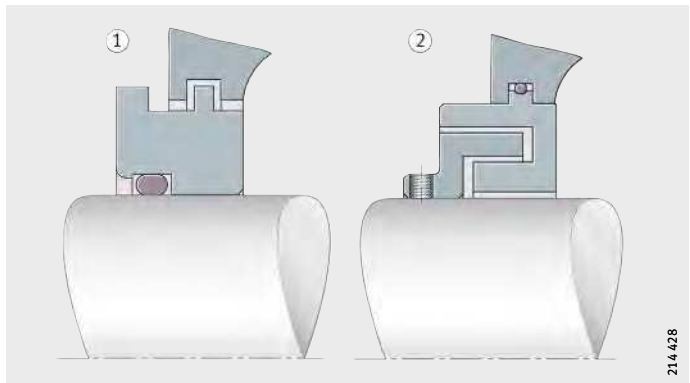
**Sealing** Bearing housings can be sealed, depending on the operating conditions, by the use of contact seals, non-contact seals or combinations thereof, *Figure 1 to Figure 3*, page 1325.

- ① Double lip seal
- ② Felt seal
- ③ Felt seal and V ring



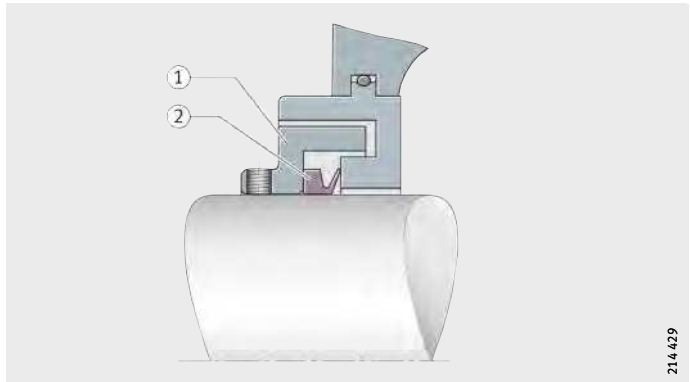
*Figure 1*  
Examples of contact seals

- ① Radial labyrinth
- ② Axial labyrinth



*Figure 2*  
Examples of non-contact seals

- Taconite seal, comprising
- ① Labyrinth
  - ② V ring



*Figure 3*  
Example of combined seals

# Bearing housings

## Split and unsplit plummer block housings

Split and unsplit plummer block housings are generally intended for bearing arrangements with self-aligning ball bearings, barrel roller bearings and spherical roller bearings.

In split plummer block housings, the removable upper section of the housing is centred on the lower section by dowel pins, allowing easier fitting and maintenance. The upper sections must not be interchanged with each other.

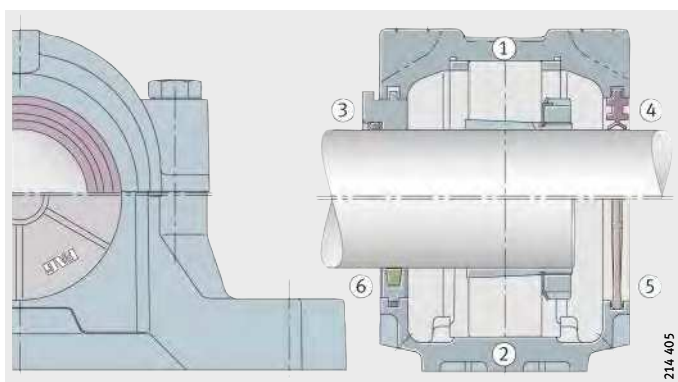
In the case of split housings, the tolerance data for bearing seats are only valid for the delivered condition, i.e. before the screws connecting the upper and lower sections are loosened.

## Split plummer block housings SNV

Housings SNV are designed in accordance with a modular concept. This allows the fitting of rolling bearings of various diameter and width series.

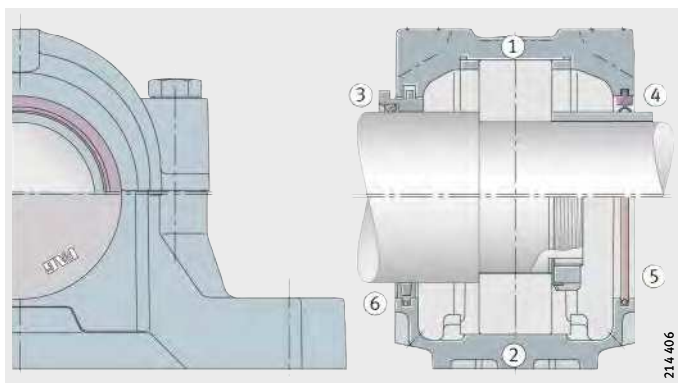
- ① Locating bearing
- ② Non-locating bearing
- ③ TSV, ④ DH, ⑤ DKV, ⑥ FSV

*Figure 4*  
Housing SNV for bearings with tapered bore and adapter sleeve



- ① Locating bearing
- ② Non-locating bearing
- ③ TSV, ④ DH, ⑤ DKVT, ⑥ FSV

*Figure 5*  
Housing SNV for bearings with cylindrical bore



The housing SNV160 can accommodate three different self-aligning bearing types from 20 bearing series, namely self-aligning ball bearings, barrel roller bearings and spherical roller bearings if the named bearings have an outside diameter of 160 mm. Housings SNV can also accommodate deep groove ball bearings and split spherical roller bearings.

Bearings from different diameter series with the same outside diameter have different bore diameters.

The method of locating the bearing on the shaft is also significant:

- direct seating or location using an adapter sleeve results in different shaft diameters.

In housings SNV, this gives different sizes of gap between the shaft and housing bore, depending on the bearing fitted. This gap is taken up by the seal.

The dimension tables indicate the suitable seals and covers for the bearings listed. If the housing bore allows a different bearing to be used, the seals must be selected as appropriate.

In size SNV215 and larger, the housings have an eye bolt that must not be subjected to a load greater than the mass of the housing including the bearing.

The essential advantages of housings SNV are as follows:

- Simplified stockholding due to the modular concept, with one housing size suitable for various shaft diameters
- High load carrying capacity, see table, page 1355
- Depending on the operating conditions, double lip seals, V ring seals, labyrinth seals, felt seals or combined seals may be used. Special seals are available by agreement
- Locating bearings are located centrally by means of two locating rings of identical width
- Flat end faces on the housing base allow abutment against stops if high forces do not act on the mounting face in a purely vertical direction
- Holes can be made at marked points on the housing for: lubrication and monitoring systems, fixing screws, parallel or tapered pins.



#### **Dimensions, material**

The dimensions of housings SNV correspond to ISO 113/II and, with the exception of the width, also to DIN 736 to DIN 739. The housings are interchangeable with the existing housings SN(E). The housings SNV listed in the tables are made from flake graphite cast iron (suffix L). Housings made from spheroidal graphite cast iron (suffix D) are available by agreement.

#### **Bearing seat and fitting of bearings**

The bearing seat in the housing SNV is machined to H7. The bearings can be displaced and thus function as non-locating bearings. Locating bearing arrangements are achieved by inserting one locating ring (FRM) on each side of the bearing; the bearing is thus seated in the centre of the housing.

Housings SNV can accommodate rolling bearings that are seated directly on a stepped shaft or on an adapter sleeve.

# Bearing housings

<b>Seals and covers</b>	<p>Seals and covers can be accommodated in the rectangular-section annular slots on both sides of housings SNV. The seals must be ordered separately. They are principally suitable for grease lubrication.</p> <p>The standard seal for housings SNV is the double lip seal DH. Other types available upon request are V ring seals DHV, labyrinth seals TSV, felt seals FSV, combined seals TCV and special seals.</p>
Double lip seal DH	<p>The double lip seal DH made from nitrile butadiene rubber (NBR) is suitable for circumferential speeds up to 13 m/s. For continuous operation, a maximum circumferential speed of 6 m/s is recommended. The two-part seal can be easily inserted in the annular slots in the housing (pay attention to the position of the joint). The seal lips slide on the rotating shaft. The outer seal lip prevents ingress of contamination into the bearing arrangement. This effect is supported by the grease fed into the space between the seal lips at assembly. The inner lip prevents the egress of lubricant from the housing. The double lip seal allows shaft misalignment of up to 0,5° in both directions. It is suitable for temperatures from -40 °C to +100 °C. The contact area on the shaft for the seal lips should have a roughness to class N8 (DIN ISO 1302).</p>
V ring seal DHV	<p>In V ring seals DHV made from NBR, the seal lip is in axial contact with the sliding surface. The seal allows misalignment of up to 0,5° in both directions and is suitable, if grease lubrication is used, for a circumferential speed up to 12 m/s (at &gt; 8 m/s, axial location is necessary).</p>
Labyrinth rings TSV	<p>Labyrinth rings of series TSV are suitable for higher circumferential speeds since they are of a non-contact type. The O ring pressed between the labyrinth ring and the shaft ensures that the labyrinth ring does not slip despite the loose fit. The O ring made from fluoro rubber (Viton®) is suitable for temperatures up to +200 °C. The labyrinth seal allows shaft misalignment of up to 0,5° in both directions. If necessary, the labyrinth can be relubricated.</p>
Felt seals FSV	<p>FAG felt seals FSV are suitable for grease lubrication and temperatures up to +100 °C (by agreement, aramid packing is available for high temperatures). The adapter holding the inserted, oil-impregnated felt strip is secured against rotation by an O ring in the housing slot. Felt seals are suitable for circumferential speeds up to 5 m/s and, after running-in, up to 15 m/s. The permissible shaft misalignment is 0,5° in both directions.</p>
Covers DKV	<p>If housings SNV are to be closed off on one side, the covers DKV must be ordered specially. The plastic covers are suitable for long term operating temperatures up to +120 °C. Covers DKVT for higher temperatures are available by agreement.</p>



## Grease lubrication

In many applications, bearings can be operated with lifetime lubrication, i. e. the grease quantity introduced at assembly is sufficient for the entire bearing rating life when contact seals are used (for example DH, FSV). The bearings are filled completely with grease while the housing cavities are filled to 60%. Grease quantity for initial filling, see table, page 1330.

For bearing operating temperatures  $< +100\text{ }^{\circ}\text{C}$ , bearing loads  $P/C < 0,3$  and a bearing-specific speed parameter  $k_a \cdot n \cdot d_M < 700\,000\text{ min}^{-1} \cdot \text{mm}$ , the most suitable rolling bearing grease is Arcanol MULTITOP, a lithium soap grease to NLGI class 2 with particularly effective EP additives, see also TPI 168, Arcanol rolling bearing greases.

For a speed parameter  $n \cdot d_M < 50\,000\text{ min}^{-1} \cdot \text{mm}$  and a non-contact seal (e.g. TSV), where the grease should also perform a sealing function, the housing and seal cavities should be filled to approx. 100%.

If the achievable fatigue limit life of the bearing is significantly longer than the grease operating life, the existing grease must be removed and replaced by fresh grease.

If the grease change intervals for particular applications are too short, relubrication is recommended. The lubricant can be introduced into the housing from the side or, in the case of bearings with a lubrication slot and lubrication holes, through the centre.

If relubrication is carried out from the side, the housing cavities on the side with the lubrication nipple should be filled to approx. 100% with grease so that the relubrication grease can act immediately on the bearing. Depending on the seal selected and the application, the housing can be fitted at marked locations with devices for the inlet and outlet of lubricant.

Housings ordered using the suffix G944A\* have a lubrication nipple and grease outlet hole. Position and dimensions of the holes and the lubrication nipple, *Figure 6*, page 1331.

In housings with a grease outlet hole or non-contact seal, the bearing cannot be overlubricated. If the temperature reaches a higher level during relubrication due to the churning energy of the grease, it will return to its initial value after several hours of running once the excess grease has escaped. In the interests of the environment, controlled metering of lubricant is recommended.

Due to their favourable flow behaviour, greases of consistency class 2, e.g. Arcanol MULTITOP and MULTI2, are more suitable for relubrication than greases of higher consistency classes.



# Bearing housings

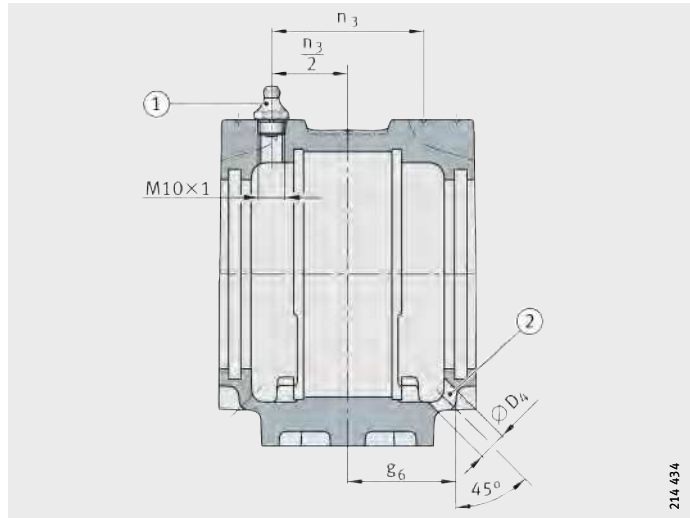
The quantities stated are valid for the initial filling of SNV housings. The bearings are thus filled completely with grease while the housing cavities are filled to 60%.

## Recommended grease quantity

Housing	Grease quantity Initial filling ≈g
SNV052	30
SNV062	45
SNV072	65
SNV080	80
SNV085	105
SNV090	130
SNV100	180
SNV110	210
SNV120	270
SNV125	290
SNV130	330
SNV140	440
SNV150	500
SNV160	650
SNV170	700
SNV180	900
SNV190	950
SNV200	1 200
SNV215	1 400
SNV230	1 600
SNV240	1 700
SNV250	2 000
SNV260	2 000
SNV270	2 500
SNV280	2 600
SNV290	3 000
SNV300	3 100
SNV320	3 700
SNV340	4 500

- ① Lubrication nipple (example)
- ② Outlet hole

**Figure 6**  
Recommended dimensions for lubrication nipple connector hole and grease outlet hole



**Recommended dimensions for lubrication nipple connector hole and grease outlet hole**

Housing	Connector for lubrication nipple $\frac{n_3}{2}$ mm	Grease outlet hole	
		$D_4$ mm	$g_6$ mm
SNV052	19	10	27,5
SNV062	21	10	30
SNV072	23	10	33
SNV080	26	10	36
SNV085	23,5	10	34,5
SNV090	29	10	41,5
SNV100	31	15	44
SNV110	33,5	15	46
SNV120	35,5	15	49
SNV125	28,5	10	41
SNV130	38	15	51,5
SNV140	40,5	15	57,5
SNV150	42,5	15	60
SNV160	45	15	62,5
SNV170	46,5	20	64
SNV180	49,5	20	69
SNV190	49,5	20	68,5
SNV200	55,5	20	77,5
SNV215	58,5	20	80
SNV230	61	20	83
SNV240	60	20	81,5
SNV250	65,5	20	89
SNV260	62,5	20	84
SNV270	71,5	20	96,5
SNV280	68	20	92,5
SNV290	76	20	102,5
SNV300	73	20	99,5
SNV320	77	20	104,5
SNV340	81	20	109,5



# Bearing housings

Housings SNV for grease relubrication (suffix G944A\*, available by agreement) have a lubrication nipple and an outlet hole of the dimensions given in the table, see table, page 1331.

Example: design G944AA with tapered lubrication nipple to DIN 71412-A M10×1.

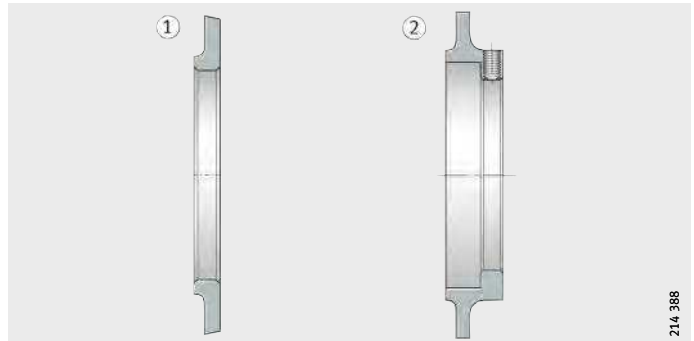
## Grease valves RSV

For operation at high speeds, for example in fan bearing arrangements, we can by agreement supply grease valves RSV, *Figure 7* and *Figure 8*.

The grease valves for housings SNV of design G944A\* must be ordered separately. For bearings located by means of adapter sleeves, grease valves RSV5 or RSV6 should be used, for bearings with a cylindrical bore, RSV2 or RSV3 should be used.

- ① RSV2, RSV3
- ② RSV5, RSV6

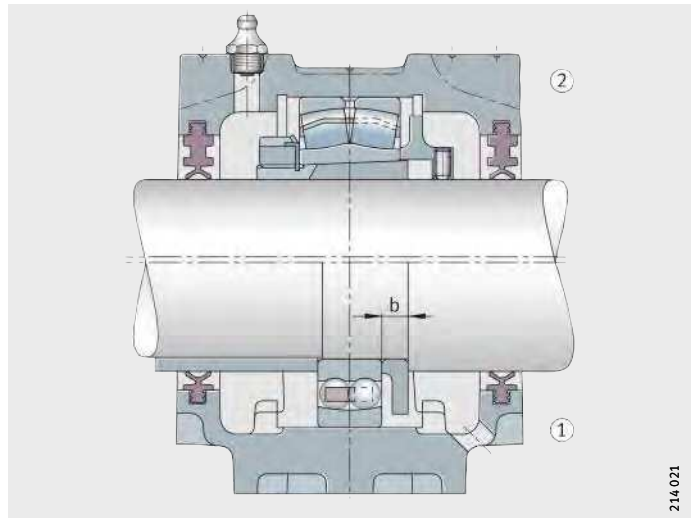
*Figure 7*  
Grease valves RSV



214 388

- ① RSV2, RSV3
  - ② RSV5, RSV6
- b = valve width

*Figure 8*  
Grease valves RSV,  
mounting position



214 021

### Dimensions of grease valves RSV

Grease valve	Width b mm
RSV205 to RSV211	8
RSV212 to RSV218	10
RSV219 to RSV222	13
RSV224 to RSV232	15
RSV305 to RSV308	8
RSV309 to RSV313	10
RSV314 to RSV316	13
RSV317 to RSV322	15
RSV324 to RSV332	16

### Oil lubrication

Housings SNV are designed such that they are suitable for both oil bath and recirculating oil lubrication. The housings have a large internal cavity with oil collector pockets in the lower section as well as connector facilities for oil inlet, oil outlet, oil level sensors and temperature sensors. When using oil bath lubrication, a minimum oil level must be ensured. If the FAG double lip seal is used, a certain amount of oil leakage must be expected, which is unavoidable with seals that are split and not spring-loaded. In order to limit oil leakage to a small quantity, the shaft in the double lip contact areas should be as follows: hardness min. 55 HRC, ground free from spiral marks with  $R_a = 0,2 \mu\text{m}$  up to max.  $0,5 \mu\text{m}$ .

The parting line between the upper and lower sections of the housing must be sealed with a thin layer of a commercial sealant (with permanent elasticity).



Please note that the housing must be ventilated if oil bath lubrication is used (for example, the inlet hole can be closed off using a ventilation plug).



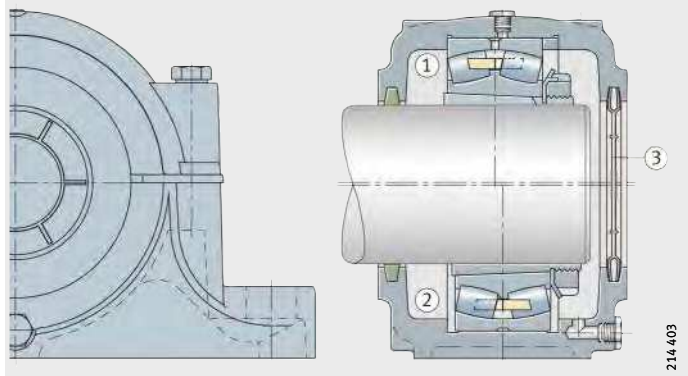
# Bearing housings

## Split plummer block housings S30

Split plummer block housings for spherical roller bearings 230...-K with tapered bore and adapter sleeve, *Figure 9 to Figure 12*, page 1335.

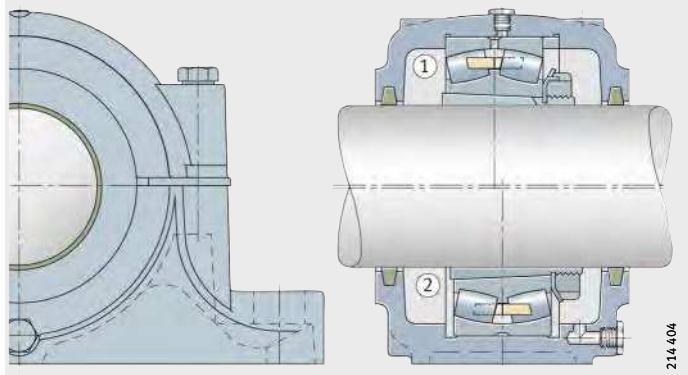
- ① Locating bearing
- ② Non-locating bearing
- ③ Cover DK

*Figure 9*  
Plummer block housing S30  
up to and including size S3040  
with cover DK



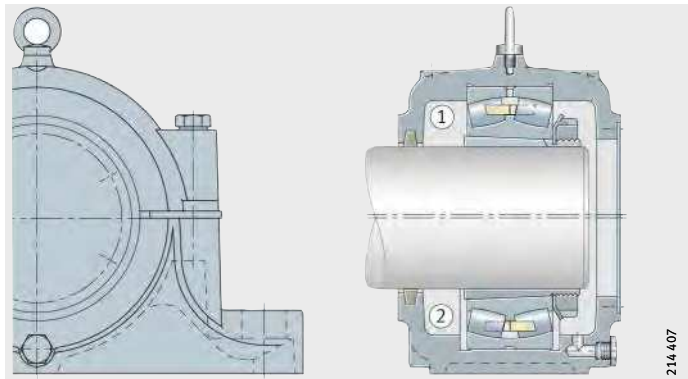
- ① Locating bearing
- ② Non-locating bearing

*Figure 10*  
Plummer block housing S30  
up to and including size S3040  
without cover DK



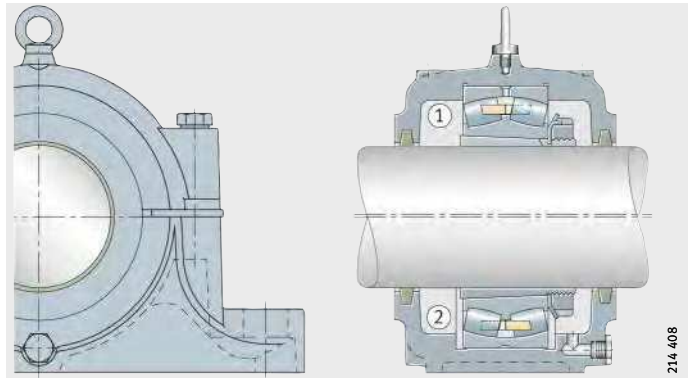
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 11*  
Plummer block housing S30  
from size S3044,  
design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

*Figure 12*  
Plummer block housing S30  
from size S3044,  
design B



**Plummer block housings of series S30 for spherical roller bearings of series 230..-K with tapered bore and adapter sleeve**

The smaller housings including S3040 are non-locating bearing housings; locating bearing arrangements can be achieved by inserting a locating ring. Locating rings must be ordered separately. Housings closed on one side up to size S3040 have a polyamide cover inserted in the slot instead of the felt strip. This cover must be ordered separately.

The larger housings from S3044 are produced as non-locating bearing housings or as locating bearing housings. When ordering housings closed on one side, design A must be indicated in the order. The cover is made from steel. Housings of design B are intended for continuous shafts.

The housings are sealed using felt strips. Felt seals allow shaft misalignment of up to 0,5° in both directions.

Housings of series S30 can be relubricated via a lubrication connector in the centre of the housing. In size S3034 and larger, the housings have an eye bolt that must not be subjected to a load greater than the mass of the housing including the bearing.

The housing material is flake graphite cast iron (suffix L). Housings made from spheroidal graphite cast iron (suffix D) are available by agreement.

Load carrying capacity: see also Load carrying capacity of split plummer block housings, page 1356.



The maximum axial load carrying capacity is 35% of  $F_{180^\circ}$ .



# Bearing housings

The quantities stated are valid for the initial filling of S30 housings. The bearings are thus filled completely with grease while the housing cavities are filled to 60%.

## Recommended grease quantity

Housing	Grease quantity Initial filling ≈g
S3024	390
S3026	560
S3028	630
S3030	730
S3032	970
S3034	1 100
S3036	1 300
S3038	1 300
S3040	2 000
S3044	2 700
S3048	2 700
S3052	3 700
S3056	4 200
S3060	5 200
S3064	5 500
S3068	6 800
S3072	7 200
S3076	8 600
S3080	10 400
S3084	12 000
S3088	13 200
S3092	14 600
S3096	15 100

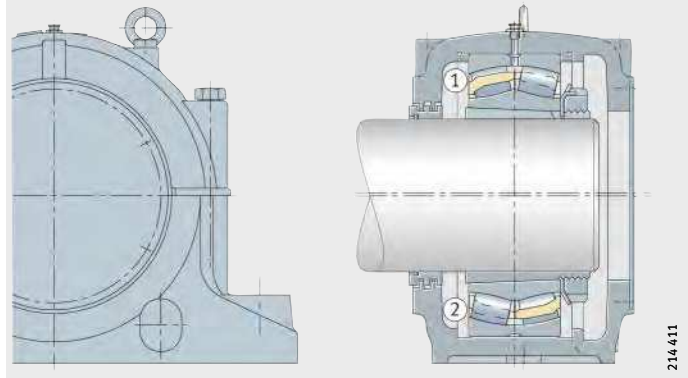


## Split plummer block housings SD31

Split plummer block housings for spherical roller bearings 231...-K with tapered bore and adapter sleeve, *Figure 13* to *Figure 16*, page 1338.

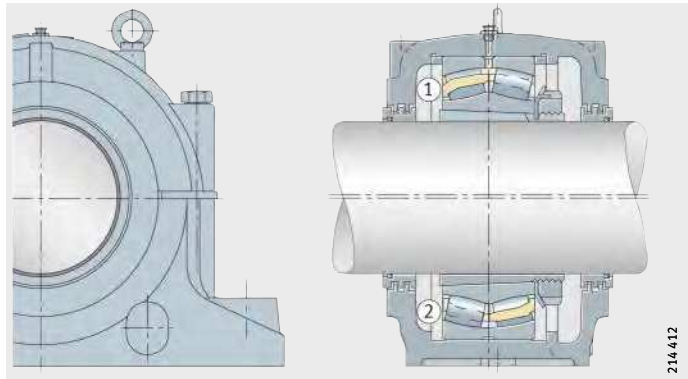
- ① Locating bearing
- ② Non-locating bearing

*Figure 13*  
Plummer block housing SD31  
up to and including size SD3140,  
design A



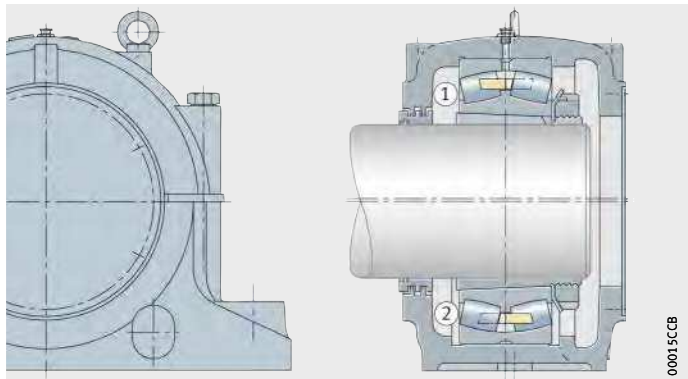
- ① Locating bearing
- ② Non-locating bearing

*Figure 14*  
Plummer block housing SD31  
up to and including size SD3140,  
design B



- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

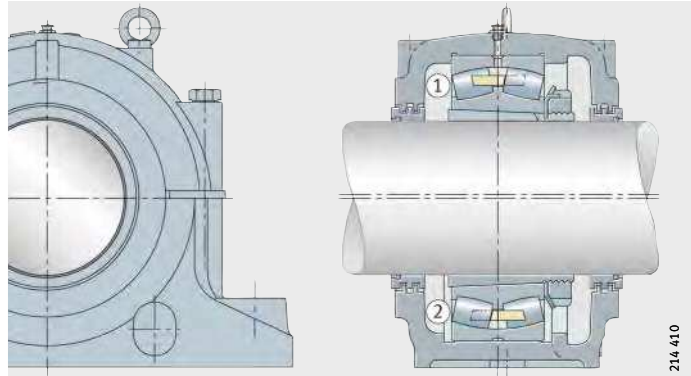
*Figure 15*  
Plummer block housing SD31  
from size S3144,  
design A



## Bearing housings

- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

*Figure 16*  
Plummer block housing SD31  
from size SD3144,  
design B



**Plummer block housings of series SD31 for spherical roller bearings of series 231..-K with tapered bore and adapter sleeve**

These housings are intended for bearing arrangements subjected to heavy loads. The bearings are located on the shaft by means of adapter sleeves.

From SD3144, the housings are supplied as a locating bearing design or non-locating bearing design. Smaller housings initially give non-locating bearing arrangements. Locating bearing arrangements can be achieved by the insertion of locating rings on both sides of the bearing. Locating rings must be ordered separately.

The housings are intended for grease lubrication and can be relubricated via a lubrication nipple.

For the holes required for oil lubrication, the upper and lower section of the housings have cast-on bosses.

The seal is a three-section labyrinth. Labyrinth seals allow shaft misalignment of up to 0,25° in both directions. Housings closed on one side (design A) are supplied with a steel cover.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

The housing material is flake graphite cast iron (suffix L). Housings made from spheroidal graphite cast iron (suffix D) are available by agreement.

See also Load carrying capacity of split plummer block housings and table, page 1357.

The maximum axial load carrying capacity is  $\frac{2}{3}$  of  $F_{180^\circ}$ .



The quantities stated are valid for the initial filling of SD31 housings. The bearings are thus filled completely with grease while the housing cavities are filled to 60%.

**Recommended grease quantity**

Housing	Grease quantity Initial filling ≈ g
SD3134	1 700
SD3136	2 100
SD3138	2 800
SD3140	3 600
SD3144	4 200
SD3148	5 200
SD3152	6 700
SD3156	7 000
SD3160	10 000
SD3164	12 000
SD3168	18 000
SD3172	18 000
SD3176	23 000
SD3180	23 000
SD3184	32 000
SD3188	32 000
SD3192	40 000
SD3196	40 000



# Bearing housings

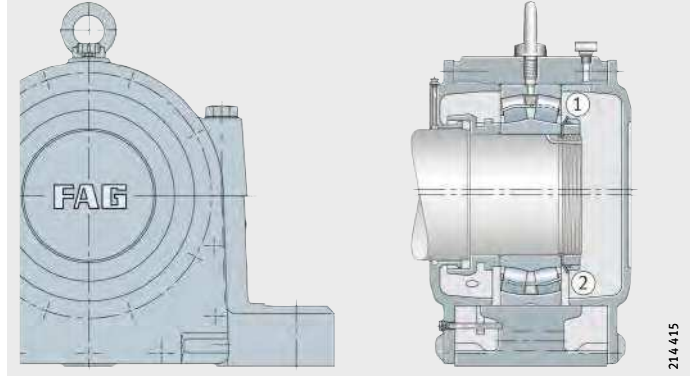
## Split plummer block housings LOE for oil lubrication

Split plummer block housings LOE are designed for oil lubrication. Plummer block housings LOE2 and LOE3 are fitted with spherical roller bearings with a cylindrical bore of series 222 and 223, *Figure 17* and *Figure 18*.

The bearings are located on the shaft using an interference fit and axially secured by means of a locknut.

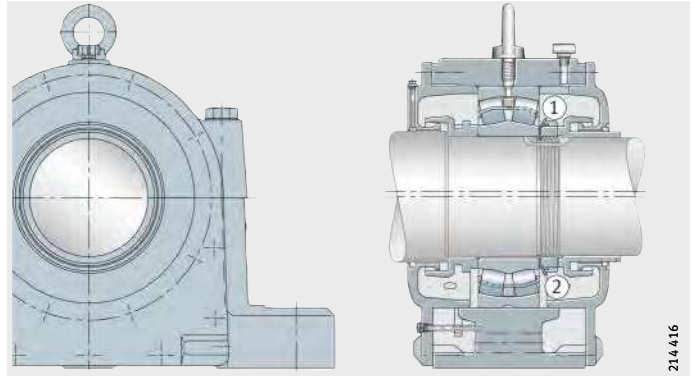
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 17*  
Plummer block housings  
LOE2, LOE3, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

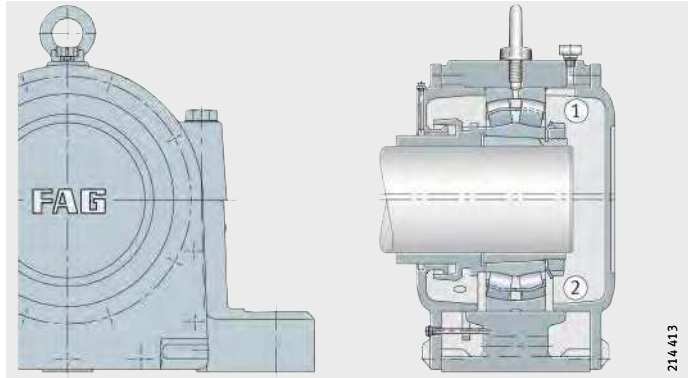
*Figure 18*  
Plummer block housings  
LOE2, LOE3, design B



LOE plummer block housings LOE5 and LOE6 are intended for spherical roller bearings with tapered bore and adapter sleeve location, *Figure 19* and *Figure 20*.

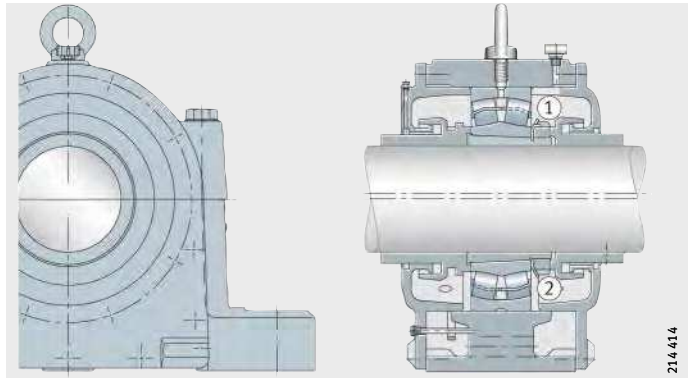
- ① Locating bearing (AF)
- ② Non-locating bearing (AL)

*Figure 19*  
Plummer block housings  
LOE5, LOE6, design A



- ① Locating bearing (BF)
- ② Non-locating bearing (BL)

*Figure 20*  
Plummer block housings  
LOE5, LOE6, design B



The housing is split, the labyrinth covers are unsplit.  
The seal comprises two labyrinth rings. Labyrinth seals allow shaft misalignment of up to  $0,25^\circ$  in both directions.  
The grease chamber in the cover labyrinth can be relubricated.  
The housing base has four extended slots.

Plummer block housings of series LOE are suitable for high-speed bearing arrangements and are designed for oil lubrication. The oil is supplied to the rolling bearing from the oil sump in the lower section of the housing by a ring oiler. An angled oil level indicator is screwed to one cover.

Housings of series LOU for recirculating oil lubrication are available by agreement.

The eye bolt in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

The housing material is flake graphite cast iron (suffix L).

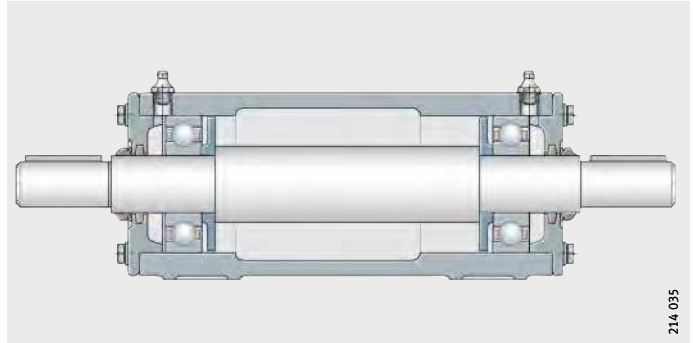


# Bearing housings

## Unsplit plummer block housings VR3

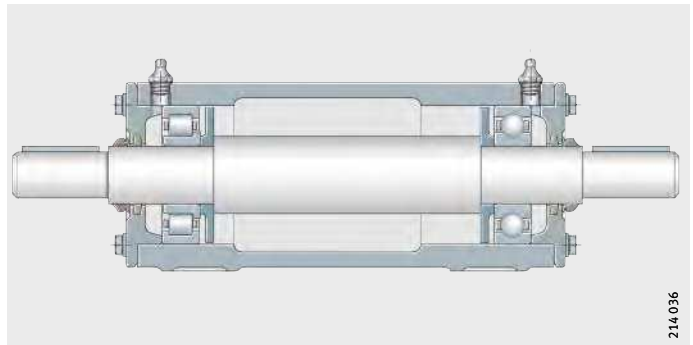
Plummer block housings VR3 are fitted with rolling bearings with a cylindrical bore, *Figure 21 to Figure 26*, page 1343. The variants of these housings are available completely assembled and greased as bearing units VRE3.

Housing VR3..-A  
2 deep groove ball bearings  
in floating arrangement  
Shaft VRW3..-A



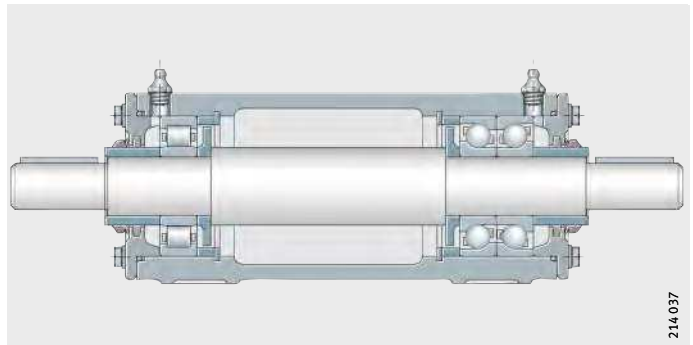
*Figure 21*  
Unit VRE3..-A

Housing VR3..-A  
1 deep groove ball bearing and  
1 cylindrical roller bearing NJ  
in floating arrangement  
Shaft VRW3..-A



*Figure 22*  
Unit VRE3..-B

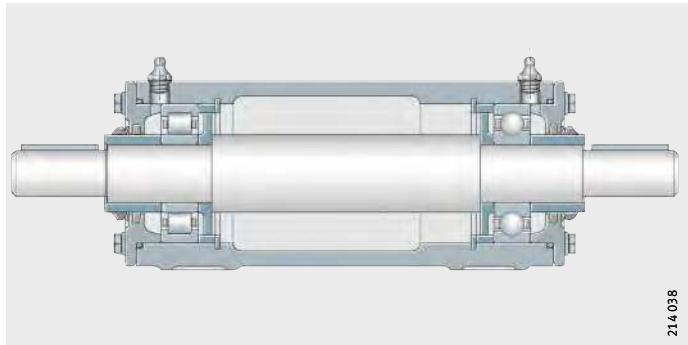
Housing VR3..-C  
Locating/non-locating bearing  
arrangement with  
1 cylindrical roller bearing NU and  
2 angular contact ball bearings  
in O arrangement  
Shaft VRW3..-C



*Figure 23*  
Unit VRE3..-C

In size VR(E)310 and larger, the housings have two eye bolts that must not be subjected to a load greater than the mass of the housing including the bearing and shaft. After mounting, the eye bolts can be replaced by the hexagon head bolts with seals included in the packaging.

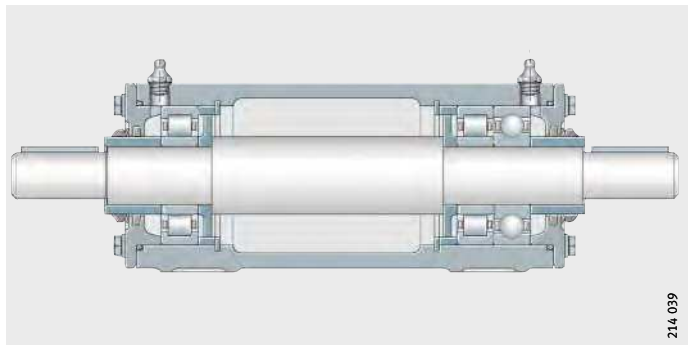
Housing VR3..-D  
 Locating/non-locating bearing  
 arrangement with  
 1 cylindrical roller bearing NU and  
 1 deep groove ball bearing  
 Shaft VRW3..-D



*Figure 24*  
 Unit VRE3..-D

214 038

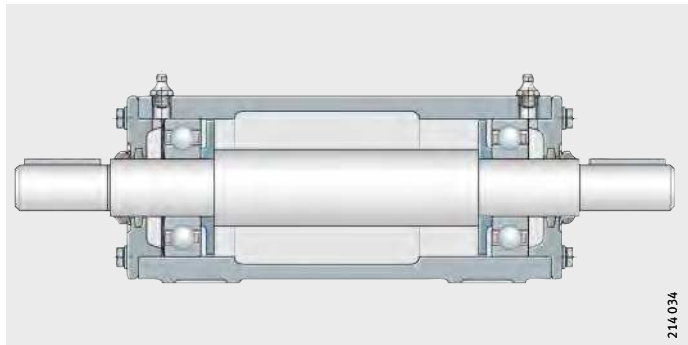
Housing VR3..-E  
 Locating/non-locating bearing  
 arrangement with  
 1 cylindrical roller bearing NU,  
 1 cylindrical roller bearing NU and  
 1 deep groove ball bearing  
 Shaft VRW3..-C



*Figure 25*  
 Unit VRE3..-E

214 039

Housing VR3..-F  
 2 deep groove ball bearings  
 in floating arrangement,  
 axially adjusted by spring between  
 outer ring and housing cover  
 Shaft VRW3..-F



*Figure 26*  
 Unit VRE3..-F

214 034



These unsplit housings, developed for fan applications, contain two bearing positions. They are used where a precise and easy-to-fit bearing arrangement is required, for example in:

- conveying equipment
- test rigs
- materials processing machinery
- belt drives
- laboratory equipment
- textile machinery
- feeder mechanisms.

# Bearing housings

All variants of housings VR3 are available completely assembled and greased as bearing units VRE3. They can be integrated directly in existing machinery without substantial preparation.

The shaft diameter range extends from 25 mm to 120 mm.

Advantages of bearing units VRE3:

- Easy to fit
- Low maintenance requirements
- Effective, low-friction sealing against dust and moisture (max. permissible operating temperature +100 °C)
- Bearing arrangement contained in single-piece housing, therefore requiring no time-consuming alignment work
- High tilting moments supported by two bearings with optimum spacing
- Six designs allow matching to different load conditions.

In addition to complete bearing units VRE3, the following are also available:

- housings VR3 with covers, grease valves, lubrication nipples, seals, locating elements and, if necessary, a spring washer
- shafts VRW with fasteners
- rolling bearings.

## Areas of application of designs

Design A is suitable for predominantly radial load and high speed. It can support axial loads in both directions (not alternating).

Design B is suitable for high radial load on one side. It can only support axial forces in one direction.

Design C is suitable for high radial load on one side. It can support high axial forces in both directions.

Design D is suitable for axial loads in both directions.

Design E is suitable for high radial loads on both sides and axial loads in both directions.

Design F is suitable for predominantly radial load and high speed. It can support axial load in one direction (facing away from the spring).

## Marking

A cast-on boss on the housing body indicates:

- in design B, the position of the cylindrical roller bearing
- in designs C, D and E, the position of the non-locating bearing
- in design F, the position of the ondular washer.

On the shaft VRW3...-F, the position of the ondular washer is also marked.

The housing is made from flake graphite cast iron, the shaft is made from steel.

## Further information

Further information on lubrication and sealing, fitting and maintenance of VRE units is given in publication WL 90121, FAG Bearing Units for Fans, Series VRE3.

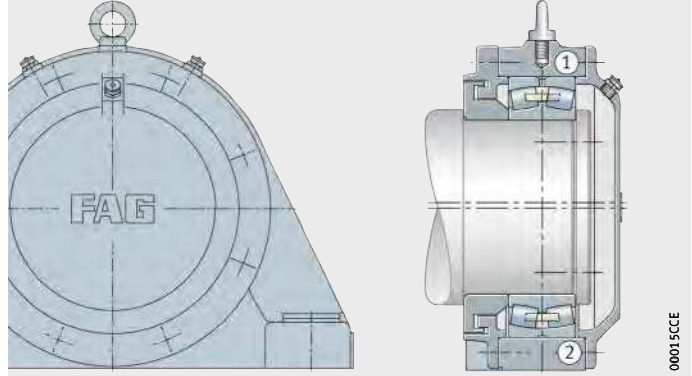


## Unsplit plummer block housings BND

Unsplit FAG housings of series BND are combined with FAG spherical roller bearings, seals and grease filling to form bearing units for very high demands, *Figure 27 to Figure 38*, page 1348.

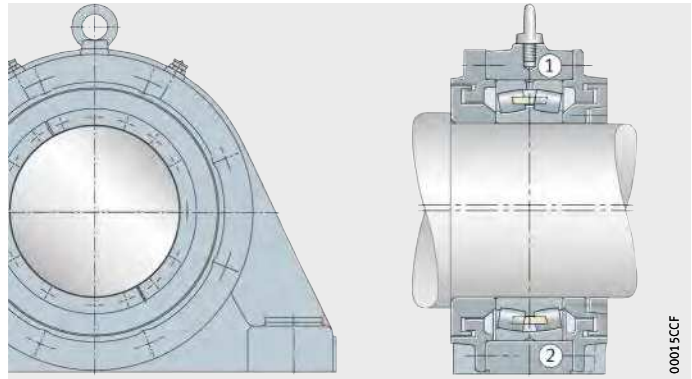
- ① Locating bearing BND...Z-Y-AF-S
- ② Non-locating bearing BND...Z-Y-AL-S

*Figure 27*  
Plummer block housing BND for bearings with cylindrical bore (labyrinth seal), design A



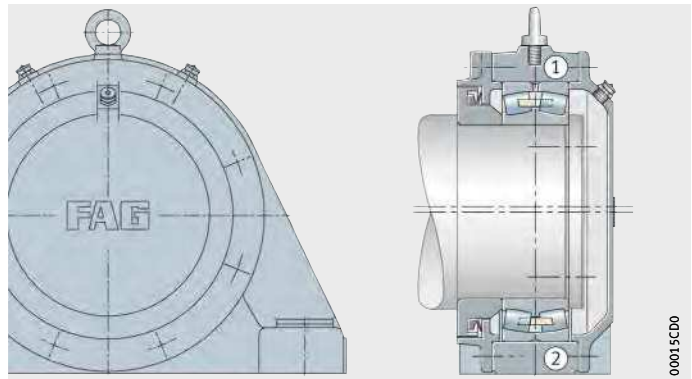
- ① Locating bearing BND...Z-Y-BF-S
- ② Non-locating bearing BND...Z-Y-BL-S

*Figure 28*  
Plummer block housing BND for bearings with cylindrical bore (labyrinth seal), design B



- ① Locating bearing BND...Z-T-AF-S
- ② Non-locating bearing BND...Z-T-AL-S

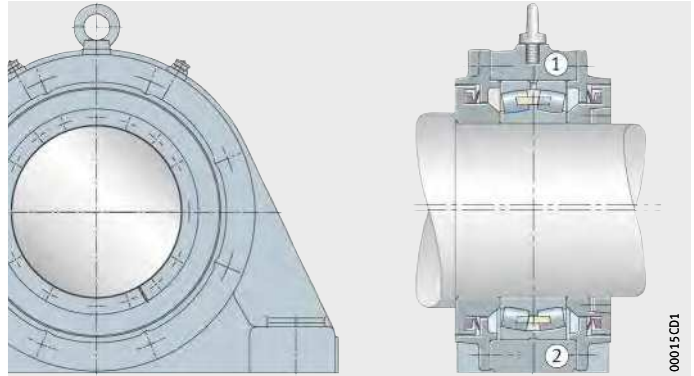
*Figure 29*  
Plummer block housing BND for bearings with cylindrical bore (Taconite seal), design A



# Bearing housings

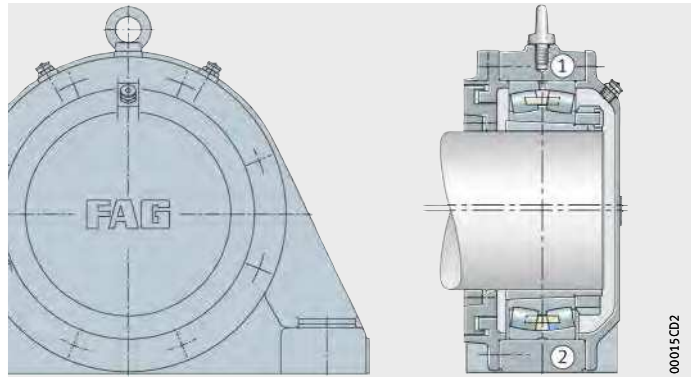
- ① Locating bearing BND...Z-T-BF-S
- ② Non-locating bearing BND...Z-T-BL-S

*Figure 30*  
Plummer block housing BND for bearings with cylindrical bore (Taconite seal), design B



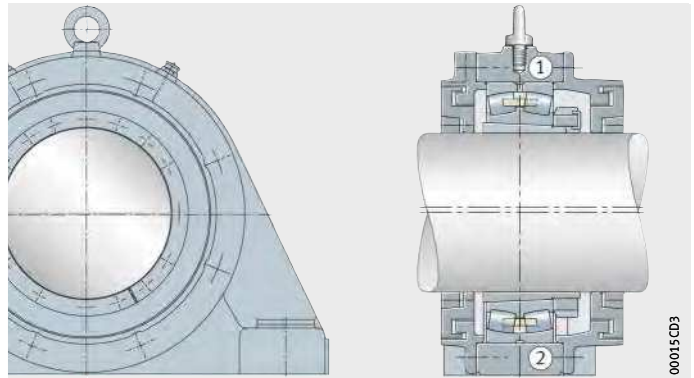
- ① Locating bearing BND...H-W-Y-AF-S
- ② Non-locating bearing BND...H-W-Y-AL-S

*Figure 31*  
Plummer block housing BND for bearings with tapered bore and adapter sleeve (labyrinth seal), design A



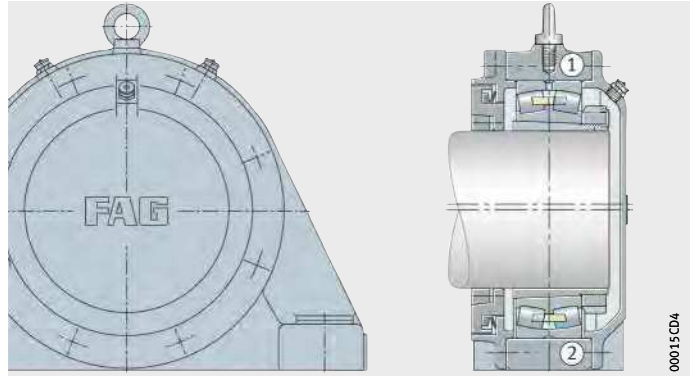
- ① Locating bearing BND...H-W-Y-BF-S
- ② Non-locating bearing BND...H-W-Y-BL-S

*Figure 32*  
Plummer block housing BND for bearings with tapered bore and adapter sleeve (labyrinth seal), design B



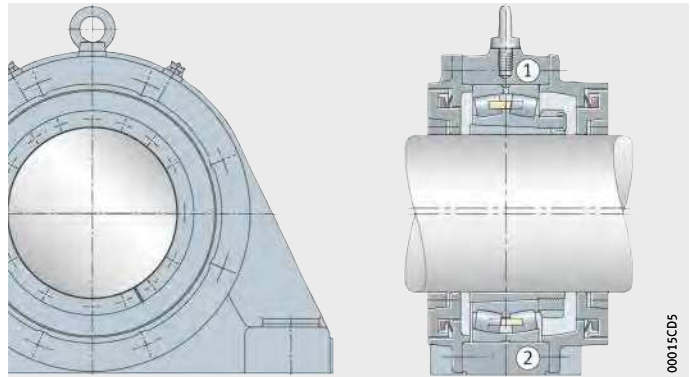
- ① Locating bearing BND...-H-W-T-AF-S
- ② Non-locating bearing BND...-H-W-T-AL-S

*Figure 33*  
Plummer block housing BND for bearings with tapered bore and adapter sleeve (Taconite seal), design A



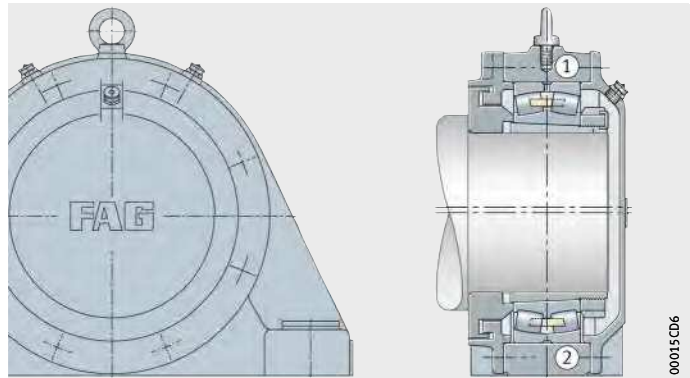
- ① Locating bearing BND...-H-W-T-BF-S
- ② Non-locating bearing BND...-H-W-T-BL-S

*Figure 34*  
Plummer block housing BND for bearings with tapered bore and adapter sleeve (Taconite seal), design B



- ① Locating bearing BND...-H-C-Y-AF-S
- ② Non-locating bearing BND...-H-C-Y-AL-S

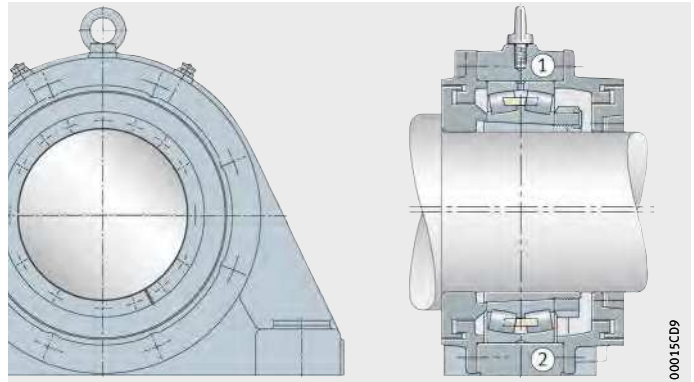
*Figure 35*  
Plummer block housing BND for bearings with tapered bore and adapter sleeve and for shaft with abutment shoulder (labyrinth seal), design A



# Bearing housings

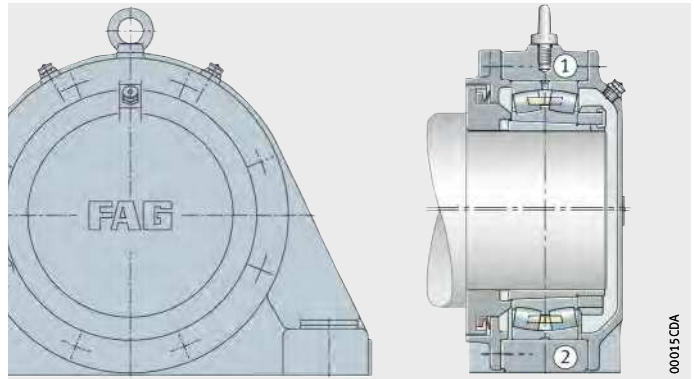
- ① Locating bearing BND...-H-C-Y-BF-S
- ② Non-locating bearing BND...-H-C-Y-BL-S

*Figure 36*  
Plummer block housing BND for bearings with tapered bore and adapter sleeve and for shaft with abutment shoulder (labyrinth seal), design B



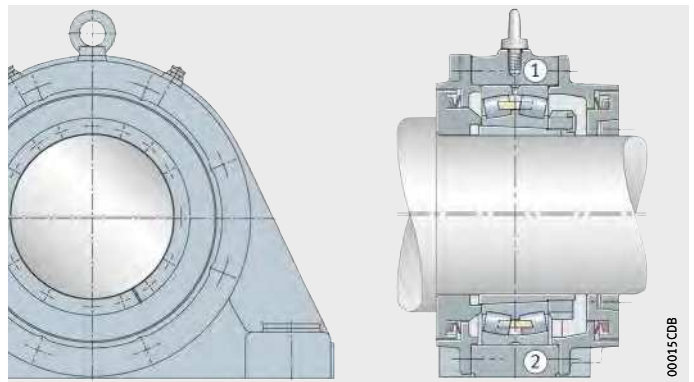
- ① Locating bearing BND...-H-C-T-AF-S
- ② Non-locating bearing BND...-H-C-T-AL-S

*Figure 37*  
Plummer block housing BND for bearings with tapered bore and adapter sleeve and for shaft with abutment shoulder (Taconite seal), design A



- ① Locating bearing BND...-H-C-T-BF-S
- ② Non-locating bearing BND...-H-C-T-BL-S

*Figure 38*  
Plummer block housing BND for bearings with tapered bore and adapter sleeve and for shaft with abutment shoulder (Taconite seal), design B



Unsplit housings of series BND, originally developed for belt conveyors, can also be used advantageously in materials processing, for example in hard crushers, sugar cane mill drives and rotor shafts in wind turbines.

The dimensions of housings BND are matched to spherical roller bearings of series 222, 230, 231 and 232.

In housings BND of design A for the bearing arrangements of shaft ends, one side is closed by a cover.

Design B is intended for continuous shafts.

The housing body, labyrinth rings and cover are unsplit.

The labyrinth rings are located by means of split tapered rings made from laminated fabric material. The labyrinth gaps are dimensioned so that the shafts can undergo deflection of approx.  $0,5^\circ$  in both directions without the labyrinths touching the bore.

**Material** The standard material for the housing bodies is cast steel (suffix S). If required, housing bodies made from spheroidal graphite cast iron (suffix D) are available.

**Bearing seat and fitting of bearings** The bearing seat in the housing is machined to H7. The housings are supplied as a locating bearing design or non-locating bearing design. In the locating bearing, the bearing is clamped between the housing covers. In the non-locating bearing, the bearing can align itself axially, since the covers have shorter centring collars. Housings BND can accommodate rolling bearings with a cylindrical bore that are seated directly on a stepped shaft. For these bearings, we recommend machining the shaft to m6. Shaft seats for bearings with a tapered bore seated on adapter sleeves should be machined to h8.

**Seals** Plummer block housings BND are sealed on one side (design A) or on both sides (design B) by labyrinths (suffix Y). If required, Taconite seals (suffix T) are available with a V ring integrated in the labyrinth (these must be provided with a separate relubrication facility).

**Load carrying capacity** Guide values for the rupture load of housings BND: see table, page 1358. When determining the permissible load, a safety factor 6 should be applied to the housing rupture load.



Housings BND should not be subjected to an axial load greater than 20% of the housing rupture load  $F_{180^\circ}$ . For load directions between  $55^\circ$  and  $120^\circ$  and axial load, we recommend that the housings should be secured in the load direction by means of stops or dowels.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.



# Bearing housings

**Lubrication** Housings BND are designed for grease lubrication. Suitable lubricants are lithium soap greases of consistency 2 and 3, for example the rolling bearing grease MULTI3 for low loads and MULTITOP and LOAD400 for high and very high loads. The housings have button head lubrication nipples with a head diameter standardised to DIN 3 404 of 22 mm. The grease is fed uniformly to both rows of rollers via the circumferential slot and three lubrication holes in the outer ring of the spherical roller bearings.

In initial lubrication, the cavities in the bearing, the housing and the labyrinths are completely filled with grease.

Recommended grease quantities, see table.

The relubrication intervals should be matched to the environmental conditions. The bearings should be relubricated after an interval of no more than four weeks.

For relubrication, we recommend approx. 10% of the grease used for initial filling. For machinery operating in highly contaminated environments, relubrication should be carried out daily with small quantities.

The quantities stated are valid for the initial filling of BND housings. The bearings and housing cavities are thus filled completely.

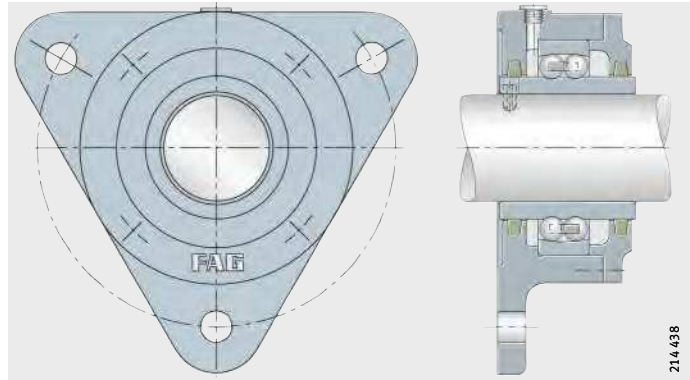
## Recommended grease quantity

Bearing bore mm	Grease quantity for initial filling	
	BND31, BND22, BND32 ≈g	BND30 ≈g
65	700	–
75	800	–
90	900	–
100	950	–
110	1 000	–
120	1 100	500
130	1 250	600
140	1 400	700
150	1 700	800
160	1 900	900
170	2 200	1 000
180	2 500	1 200
190	3 000	1 300
200	3 600	1 600
220	4 200	1 900
240	5 000	2 100
260	6 000	2 500
280	7 000	3 000
300	8 000	3 500
320	9 000	4 100
340	10 500	4 800
360	12 000	5 500
380	13 000	6 200
400	14 500	7 000
420	16 000	8 000

## Flanged housings

### Flanged housings F112

These housings are fitted with self-aligning ball bearings with an extended inner ring of series 112, *Figure 39*.



*Figure 39*  
Flanged housing  
for self-aligning ball bearings  
with extended inner ring

The flanged housings have covers made from flake graphite cast iron and felt seals. Felt seals allow shaft misalignment of up to  $0,5^\circ$  in both directions.

All flanged housings have a threaded hole  $M10 \times 1$  that is closed off by a plastic plug until relubrication is to be carried out.

The housing material is flake graphite cast iron.





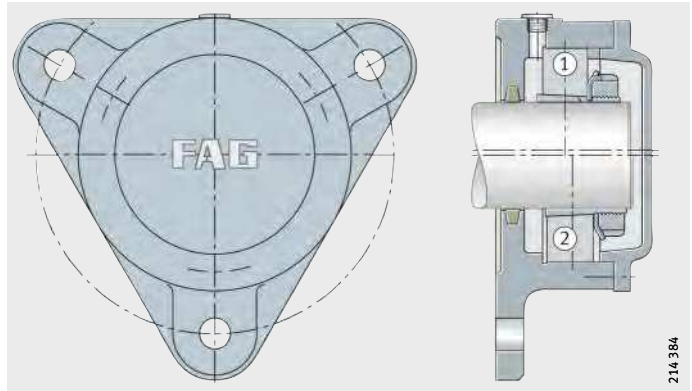
# Bearing housings

## Flanged housings F5

Flanged housings for bearings with a tapered bore and adapter sleeve, *Figure 40 to Figure 43*, page 1353.

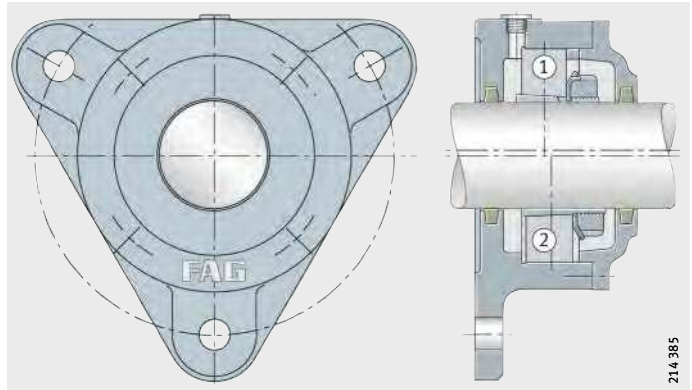
- ① Locating bearing (A, WA)
- ② Non-locating bearing (A, WA)

*Figure 40*  
Flanged housing  
for bearings with tapered bore and  
adapter sleeve F505, F506, F508,  
design A



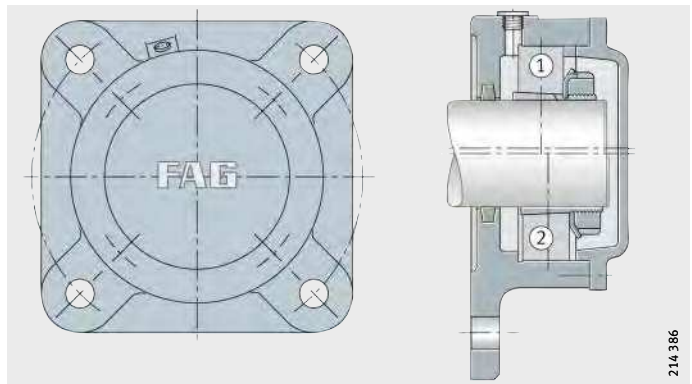
- ① Locating bearing (B, WB)
- ② Non-locating bearing (B, WB)

*Figure 41*  
Flanged housing  
for bearings with tapered bore and  
adapter sleeve F507, F509 to F513,  
design B



- ① Locating bearing (A, WA)
- ② Non-locating bearing (A, WA)

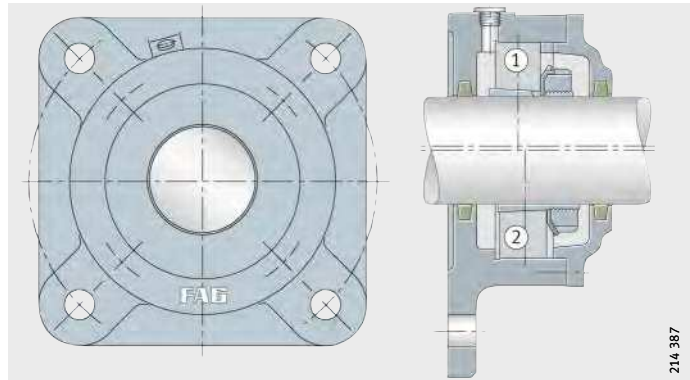
*Figure 42*  
Flanged housing  
for bearings with tapered bore and  
adapter sleeve F515 to F522,  
design A





- ① Locating bearing (B, WB)
- ② Non-locating bearing (B, WB)

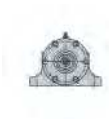
*Figure 43*  
 Flanged housing  
 for bearings with tapered bore and  
 adapter sleeve F515 to F522,  
 design B



These flanged housings are suitable for self-aligning ball bearings, barrel roller bearings and spherical roller bearings with a tapered bore that are located on the shaft using adapter sleeves. The housings are available with one side closed off (design A) or – for continuous shafts – open on both sides (design B). Felt strips are used for sealing. Felt seals allow shaft misalignment of up to 0,5° in both directions.

The housings are designed as non-locating bearing housings. Locating bearing arrangements can be achieved by the insertion of locating rings. The number of rings required is indicated in the tables. Two rings are inserted on both sides of the bearing, a single ring is inserted on the side with the adapter sleeve nut. Locating rings must be ordered separately.

The housing material is flake graphite cast iron (suffix L).



# Bearing housings

## Design and safety guidelines

### Load carrying capacity of split plummer block housings

The permissible load on the housing is dependent on the strength of the housing and connecting screws, the load carrying capacity of the bearing and on the load direction. Guide values for the rupture load of the housings and the maximum load carrying capacity of the screws connecting the upper and lower sections of the housing are given on the following pages.

When determining the permissible load, safety factors must be applied. For general machine building, a safety factor 6 relative to the housing rupture load is normally applied.

The values in the tables apply if the mounting surface of the mating parts is in accordance with DIN ISO 2 768-H. A precondition for supporting loads is that the housing base surface is completely and rigidly supported.



Housings SNV and SD31 must not be subjected to more than  $\frac{2}{3}$  of the housing rupture load  $F_{180^\circ}$ , housings S30 must not be subjected to more than 35% of  $F_{180^\circ}$ . For load directions between  $55^\circ$  and  $120^\circ$  and axial load, we recommend that the housings should be secured in the load direction by means of stops or dowels.

The eye bolts in the upper section of the housing must not be subjected to a load greater than the mass of the housing including the bearing.

## Housings SNV

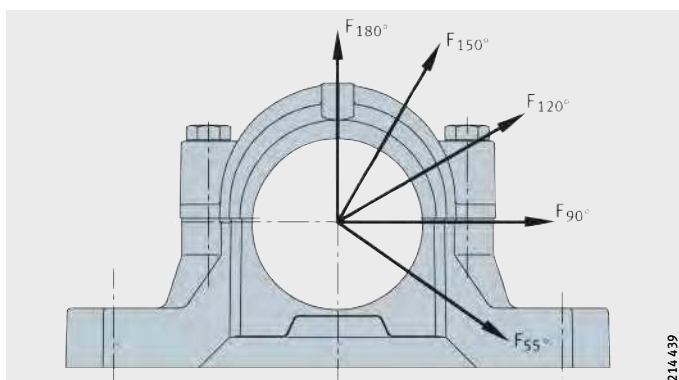


Figure 44

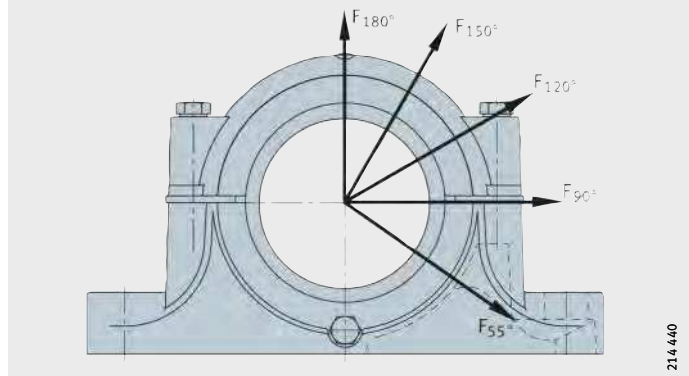
Guide values for the rupture load of housings SNV and the maximum load carrying capacity of the connecting screws (for tightening torques, see also page 1360)

Housing Designation	Housing rupture load in load direction F Housing made from flake graphite cast iron					Connecting screws			
						Thread to DIN 13	Maximum load carrying capacity of both screws with contact between parting surfaces in load direction		
	55° kN	90°	120°	150°	180°	Grade 8.8	120° kN	150°	180°
SNV052	160	95	70	60	80	M10	60	35	30
SNV062	170	100	80	65	85	M10	60	35	30
SNV072	190	110	85	80	95	M10	60	35	30
SNV080	210	130	95	85	105	M10	60	35	30
SNV085	225	140	100	90	120	M10	60	35	30
SNV090	265	160	120	105	130	M10	60	35	30
SNV100	280	170	125	120	140	M12	80	45	40
SNV110	300	180	130	125	150	M12	80	45	40
SNV120	335	200	150	130	170	M12	80	45	40
SNV125	335	200	150	130	170	M12	80	45	40
SNV130	400	250	180	150	200	M12	80	45	40
SNV140	425	265	190	170	210	M12	80	45	40
SNV150	475	280	200	180	235	M12	80	45	40
SNV160	530	335	250	210	265	M16	180	100	90
SNV170	560	355	265	225	280	M16	180	100	90
SNV180	630	375	280	250	300	M20	260	150	130
SNV190	630	375	280	250	300	M20	260	150	130
SNV200	670	400	315	280	335	M20	260	150	130
SNV215	800	450	355	315	400	M20	260	150	130
SNV230	900	530	400	355	450	M24	360	210	180
SNV240	1 000	600	450	400	500	M24	360	210	180
SNV250	1 060	630	475	425	530	M24	360	210	180
SNV260	1 180	710	530	475	600	M24	360	210	180
SNV270	1 180	710	530	475	600	M24	360	210	180
SNV280	1 320	750	600	530	630	M24	360	210	180
SNV290	1 400	850	630	560	710	M24	360	210	180
SNV300	1 500	900	670	600	750	M24	360	210	180
SNV320	1 700	1 000	750	670	850	M24	360	210	180
SNV340	1 900	1 120	850	750	950	M30	640	370	320

Housings made from spheroidal graphite cast iron (suffix D) have a housing rupture load 1,6 times higher than that of housings made from flake graphite cast iron.

# Bearing housings

## Housings S30

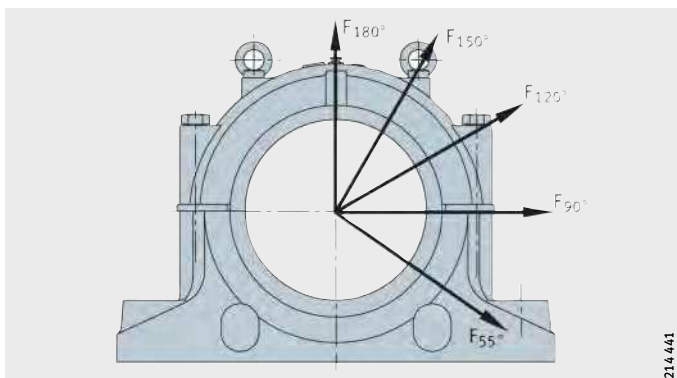


**Figure 45**  
Guide values for the rupture load of housings S30 and the maximum load carrying capacity of the connecting screws (for tightening torques, see also page 1360)

Housing Designation	Housing rupture load in load direction F Housing made from flake graphite cast iron					Connecting screws			
						Thread to DIN 13	Maximum load carrying capacity of both screws with contact between parting surfaces in load direction		
	55° kN	90°	120°	150°	180°	Grade 8.8	120° kN	150°	180°
S3024	540	320	245	215	270	M20	260	150	130
S3026	620	370	280	250	310	M20	260	150	130
S3028	700	420	315	280	350	M20	260	150	130
S3030	780	470	350	310	390	M20	260	150	130
S3032	860	520	390	345	430	M20	260	150	130
S3034	1 000	600	450	400	500	M24	360	210	180
S3036	1 160	700	520	465	580	M24	360	210	180
S3038	1 300	780	585	520	650	M24	360	210	180
S3040	1 500	890	665	590	740	M24	360	210	180
S3044	1 700	1 020	765	680	850	M30	640	370	320
S3048	1 900	1 130	845	750	940	M30	640	370	320
S3052	2 200	1 320	990	880	1 100	M36	800	460	400
S3056	2 500	1 500	1 120	1 000	1 300	M36	800	460	400
S3060	2 700	1 620	1 215	1 080	1 350	M36	800	460	400
S3064	2 900	1 740	1 305	1 160	1 450	M36	800	460	400
S3068	3 200	1 920	1 440	1 280	1 600	M36	800	460	400
S3072	3 500	2 100	1 575	1 400	1 750	M36	800	460	400
S3076	3 900	2 340	1 755	1 560	1 950	M36	800	460	400
S3080	4 300	2 580	1 935	1 720	2 150	M36	800	460	400
S3084	4 900	2 940	2 205	1 960	2 450	M36	800	460	400
S3088	5 300	3 180	2 385	2 120	2 650	M36	800	460	400
S3092	6 100	3 660	2 745	2 440	3 050	M48	1 340	770	670
S3096	7 000	4 200	3 150	2 800	3 500	M48	1 340	770	670

Housings made from spheroidal graphite cast iron (suffix D) have a housing rupture load 1,6 times higher than that of housings made from flake graphite cast iron.

## Housings SD31



214.441

**Figure 46**  
Guide values for the rupture load of housings SD31 and the maximum load carrying capacity of the connecting screws (for tightening torques, see also page 1360)

Housing Designation	Housing rupture load in load direction F Housing made from flake graphite cast iron					Connecting screws			
						Thread to DIN 13	Maximum load carrying capacity of the four screws with contact between parting surfaces in load direction		
	55° kN	90°	120°	150°	180°	Grade 8.8	120° kN	150°	180°
SD3134	2 600	1 100	1 000	940	1 050	M20	520	300	260
SD3136	2 750	1 200	1 050	1 000	1 100	M20	520	300	260
SD3138	3 000	1 350	1 150	1 100	1 200	M20	520	300	260
SD3140	4 000	1 700	1 450	1 400	1 600	M24	720	420	360
SD3144	4 250	1 900	1 600	1 500	1 700	M24	720	420	360
SD3148	4 600	2 300	1 800	1 600	1 850	M24	720	420	360
SD3152	5 500	2 550	2 150	2 050	2 200	M30	1 280	740	640
SD3156	6 600	3 100	2 400	2 250	2 650	M30	1 280	740	640
SD3160	7 750	3 400	2 900	2 800	3 100	M30	1 280	740	640
SD3164	8 100	3 650	3 100	3 000	3 250	M30	1 280	740	640
SD3168	8 850	4 000	3 200	3 100	3 550	M30	1 280	740	640
SD3172	9 750	4 500	3 350	3 250	3 900	M30	1 280	740	640
SD3176	10 300	4 800	3 400	3 300	4 150	M30	1 280	740	640
SD3180	10 700	5 000	3 500	3 400	4 300	M36	1 600	920	800
SD3184	12 000	5 800	4 000	3 750	4 800	M36	1 600	920	800
SD3188	12 400	5 950	4 450	3 950	4 950	M36	1 600	920	800
SD3192	13 300	6 350	4 750	4 250	5 300	M36	1 600	920	800
SD3196	14 300	6 850	5 150	4 550	5 700	M42	2 060	1 180	1 030

Housings made from spheroidal graphite cast iron (suffix D) have a housing rupture load 1,6 times higher than that of housings made from flake graphite cast iron.



# Bearing housings

## Load carrying capacity of unsplit plummer block housings

The permissible load on the housing is dependent on the strength of the housing, the load carrying capacity of the bearing and on the load direction. Guide values for the rupture load of housings, see table.

When determining the permissible load, safety factors must be applied. For general machine building, a safety factor 6 relative to the housing rupture load is normally applied.

The values in the table apply if the mounting surface of the mating parts is in accordance with DIN ISO 2 768-H.

A precondition for supporting loads is that the housing base surface is completely and rigidly supported.

### Housings BND

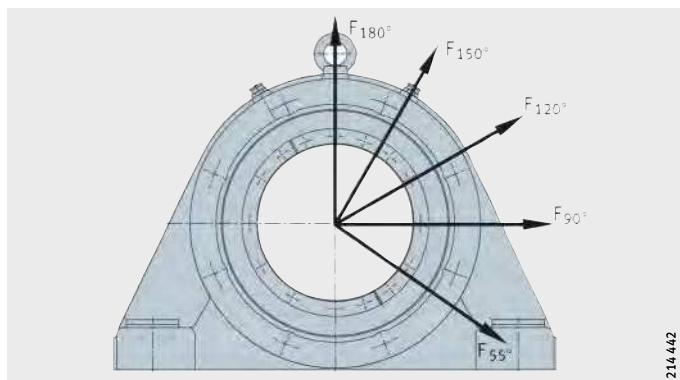


Figure 47  
Guide values for the rupture load of housings BND made from cast steel and spheroidal graphite cast iron

Housing Designation				Housing rupture load in load direction F				
				55°	90°	120°	150°	180°
BND2213	–	–	–	665	530	440	350	440
BND2215	–	–	–	880	705	580	465	580
BND2218	–	–	–	1 125	900	745	595	745
BND2220	BND3024	–	–	1 325	1 070	1 020	815	1 020
–	–	BND3122	–	1 900	1 530	1 685	1 345	1 685
BND2222	BND3026	–	–	1 580	1 275	1 120	920	1 120
–	–	BND3124	BND3222	1 875	1 500	1 685	1 345	1 685
BND2224	BND3028	–	–	1 785	1 430	1 225	1 020	1 225
–	–	BND3126	BND3224	2 020	1 610	1 735	1 385	1 735
BND2226	BND3030	–	–	2 040	1 630	2 140	1 735	2 140
–	BND3032	–	–	2 295	1 835	2 245	1 835	2 245
–	–	BND3128	BND3226	2 295	1 835	1 735	1 385	1 735
BND2228	BND3034	–	–	2 755	2 195	2 245	1 835	2 245
–	–	BND3130	BND3228	2 755	2 195	1 785	1 430	1 785
BND2230	BND3036	–	–	3 060	2 450	2 245	1 835	2 245
–	–	BND3132	BND3230	3 110	2 500	1 835	1 470	1 835
BND2232	BND3038	–	–	3 365	2 705	2 450	1 940	2 450
–	–	BND3134	BND3232	3 570	2 855	1 940	1 550	1 940
BND2234	BND3040	–	–	3 925	3 110	3 060	2 450	3 060
–	–	BND3136	BND3234	4 285	3 415	2 040	1 630	2 040
BND2236	–	–	–	4 435	3 570	3 470	2 755	3 470

Housing Designation				Housing rupture load in load direction F				
				55° kN	90°	120°	150°	180°
BND2238	BND3044	–	–	4 435	3 570	3 470	2 755	3 470
–	–	BND3138	BND3236	4 590	3 725	2 140	1 715	2 140
–	–	BND3140	BND3238	5 610	4 540	2 295	1 835	2 295
BND2240	BND3048	–	–	5 050	4 030	4 895	3 875	4 895
–	–	BND3144	BND3240	6 120	4 935	2 550	2 040	2 550
BND2244	BND3052	–	–	5 660	4 540	5 000	3 980	5 000
–	BND3056	–	–	6 580	5 255	6 120	4 895	6 120
–	–	BND3148	BND3244	6 835	5 510	3 060	2 450	3 060
BND2248	BND3060	–	–	7 295	5 815	6 325	5 100	6 325
–	–	BND3152	BND3248	7 650	6 170	3 570	2 855	3 570
BND2252	BND3064	–	–	8 000	6 425	6 835	5 400	6 835
–	–	BND3156	BND3252	9 385	7 550	4 180	3 365	4 180
BND2256	BND3068	–	–	8 825	7 040	6 835	5 400	6 835
–	–	BND3160	BND3256	10 200	8 260	4 490	3 570	4 490
BND2260	BND3072	–	–	9 640	7 700	8 160	6 530	8 160
–	BND3076	–	–	10 810	8 670	8 365	8 770	8 365
–	–	BND3164	BND3260	11 935	9 535	5 100	4 080	5 100
BND2264	BND3080	–	–	12 035	9 690	9 080	7 240	9 080
–	–	BND3168	BND3264	14 280	11 375	5 815	4 590	5 815
BND2268	BND3084	–	–	13 360	10 760	9 280	7 345	9 280
–	–	BND3172	–	14 485	11 630	6 630	5 300	6 630
BND2272	–	–	–	15 700	12 570	10 370	8 325	10 370
–	–	BND3176	BND3268	16 320	13 055	6 630	5 300	6 630
BND2276	–	–	–	16 600	13 280	10 960	8 800	10 960
–	–	BND3180	BND3272	17 850	14 280	7 345	5 815	7 345
BND2280	–	–	–	19 750	15 800	13 030	10 470	13 030
–	–	–	BND3276	18 870	15 050	8 160	6 530	8 160
–	–	BND3184	–	19 380	15 600	8 160	6 530	8 160
BND2284	–	–	–	21 540	17 240	14 220	11 420	14 220
–	–	–	BND3280	22 440	17 950	9 280	7 445	9 280
–	–	–	BND3284	24 480	19 380	10 710	8 570	10 710



# Bearing housings

## Tightening torques

The tightening torques in the following table are maximum values for metric coarse-pitch threads to DIN 13-13 and head contact dimensions to DIN 912, 931, 933, 934, 6 912, 7 984 and 7 990.

They are valid with 90% utilisation of the yield stress of the screw material 8.8 and a friction factor of 0,14. We recommend that the screws should be tightened to 70% of these values.

Housings are not supplied together with screws for the housing base.

### Maximum tightening torques for screws with metric thread to DIN 13-13

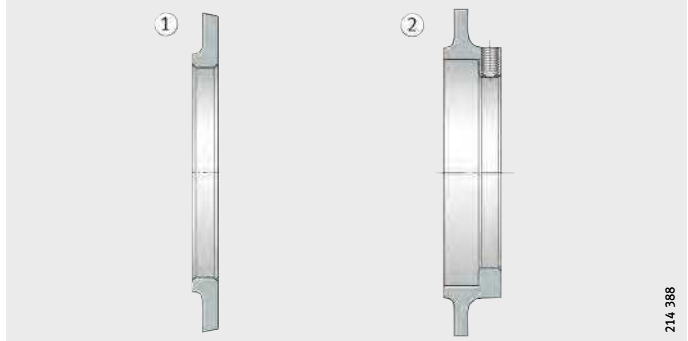
Nominal screw size	Tightening torque Nm
M6	10,4
M8	25
M10	51
M12	87
M16	215
M20	430
M24	740
M30	1 450
M36	2 600
M42	4 000
M45	4 950
M48	6 000
M56	9 650
M64	14 400



**Accessories**  
**Grease valves**

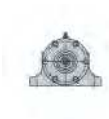
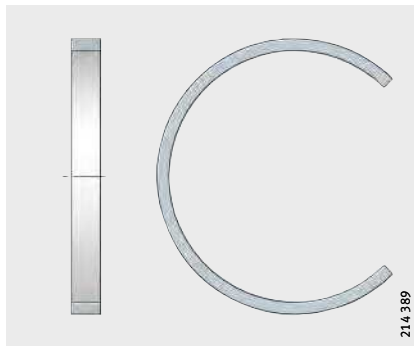
- ① RSV2, RSV3
- ② RSV5, RSV6

*Figure 48*  
Grease valves RSV



**Locating rings**

*Figure 49*  
Locating ring FRM



# Bearing housings

## Seals

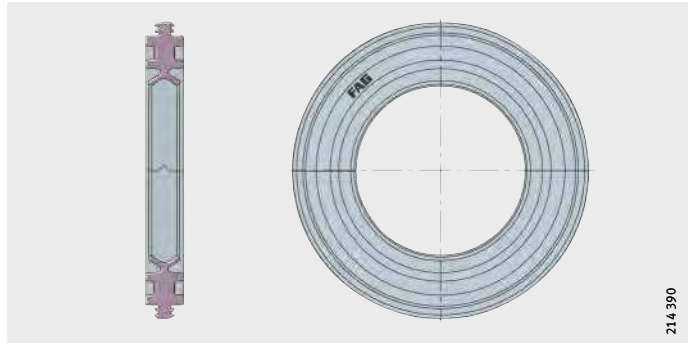
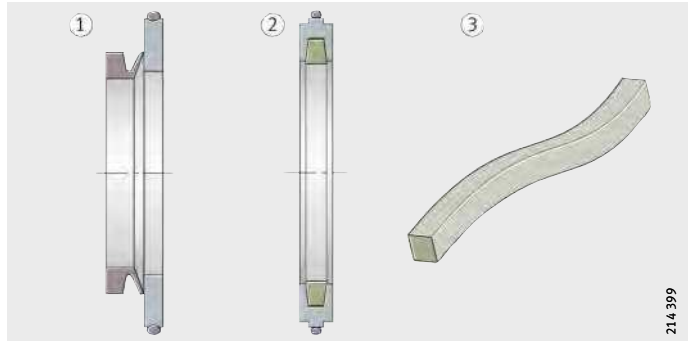


Figure 50  
Double lip seal DH

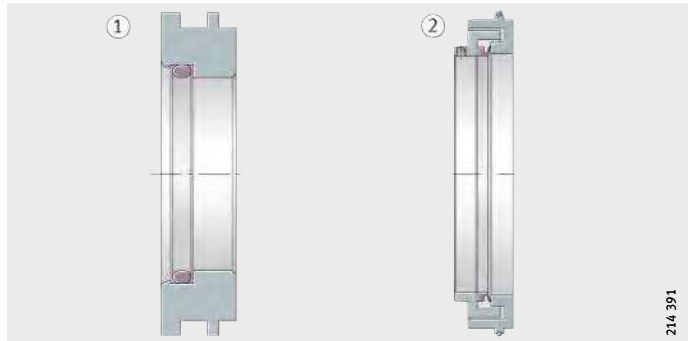
214 390



- ① V ring seal DHV
- ② Felt seal FSV
- ③ Felt strip FJST

Figure 51  
Seals DHV, FSV and FJST

214 399



- ① TSV
- ② TCV

Figure 52  
Seals TSV and TCV

214 391

## Covers

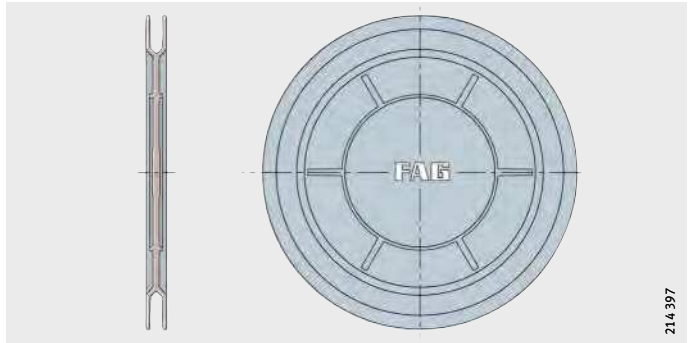
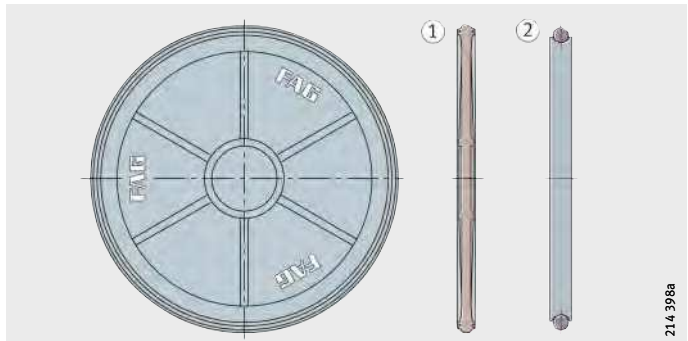


Figure 53  
Cover DK

214.397



- ① Cover DKV
- ② Cover DKVT

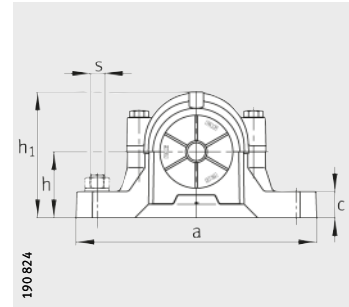
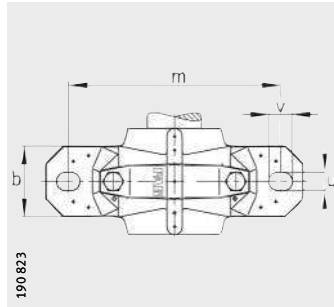
Figure 54  
Covers DKV and DKVT

214.398a



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve

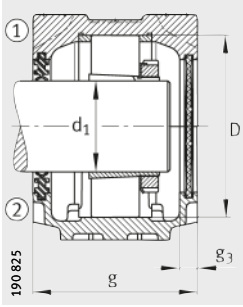


- ① Locating bearing
- ② Non-locating bearing

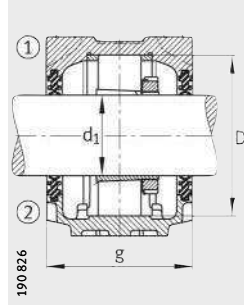
**Dimension table** - Dimensions in mm

Designation

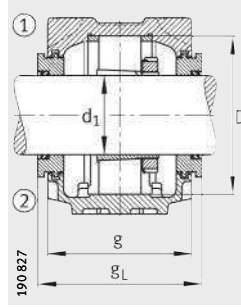
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV052-L</b>	1205-K-TVH-C3	H205X012	FRM52/6	DH505X012	TSV505X012	FSV505X012	DHV505X012	–
<b>SNV052-L</b>	20205-K-T-VPC3	H205X012	FRM52/6	DH505X012	TSV505X012	FSV505X012	DHV505X012	–
<b>SNV052-L</b>	2205-K-TVH-C3	H305X012	FRM52/4,5	DH505X012	TSV505X012	FSV505X012	DHV505X012	–
<b>SNV052-L</b>	22205-E1-K	H305X012	FRM52/4,5	DH505X012	TSV505X012	FSV505X012	DHV505X012	–
<b>SNV062-L</b>	1305-K-TVH-C3	H305X012	FRM62/6,5	DH605X012	TSV605X012	FSV605X012	DHV605X012	–
<b>SNV062-L</b>	2305-K-TVH-C3	H2305X012	FRM62/3	DH605X012	TSV605X012	FSV605X012	DHV605X012	–
<b>SNV052-L</b>	1205-K-TVH-C3	H205	FRM52/6	DH505	TSV505	FSV505	DHV505	–
<b>SNV052-L</b>	20205-K-T-VPC3	H205	FRM52/6	DH505	TSV505	FSV505	DHV505	–
<b>SNV052-L</b>	2205-K-TVH-C3	H305	FRM52/4,5	DH505	TSV505	FSV505	DHV505	–
<b>SNV052-L</b>	22205-E1-K	H305	FRM52/4,5	DH505	TSV505	FSV505	DHV505	–
<b>SNV062-L</b>	1305-K-TVH-C3	H305	FRM62/6,5	DH605	TSV605	FSV605	DHV605	–
<b>SNV062-L</b>	2305-K-TVH-C3	H2305	FRM62/3	DH605	TSV605	FSV605	DHV605	–
<b>SNV052-L</b>	1205-K-TVH-C3	H205X013	FRM52/6	DH505	TSV505X013	FSV505	DHV505	–
<b>SNV052-L</b>	20205-K-T-VPC3	H205X013	FRM52/6	DH505	TSV505X013	FSV505	DHV505	–
<b>SNV052-L</b>	2205-K-TVH-C3	H305X013	FRM52/4,5	DH505	TSV505X013	FSV505	DHV505	–
<b>SNV052-L</b>	22205-E1-K	H305X013	FRM52/4,5	DH505	TSV505X013	FSV505	DHV505	–
<b>SNV062-L</b>	1206-K-TVH-C3	H206X014	FRM62/7	DH506X014	TSV506X014	FSV506X014	DHV506X014	–
<b>SNV062-L</b>	20206-K-T-VPC3	H206X014	FRM62/7	DH506X014	TSV506X014	FSV506X014	DHV506X014	–
<b>SNV062-L</b>	2206-K-TVH-C3	H306X014	FRM62/5	DH506X014	TSV506X014	FSV506X014	DHV506X014	–
<b>SNV062-L</b>	22206-E1-K	H306X014	FRM62/5	DH506X014	TSV506X014	FSV506X014	DHV506X014	–
<b>SNV072-L</b>	1306-K-TVH-C3	H306X014	FRM72/7	DH606X014	TSV606X014	FSV606X014	DHV606X014	TCV606X014
<b>SNV072-L</b>	2306-K-TVH-C3	H2306X014	FRM72/3	DH606X014	TSV606X014	FSV606X014	DHV606X014	TCV606X014
<b>SNV062-L</b>	1206-K-TVH-C3	H206X015	FRM62/7	DH506X014	TSV506X015	FSV506X015	DHV506X015	–
<b>SNV062-L</b>	20206-K-T-VPC3	H206X015	FRM62/7	DH506X014	TSV506X015	FSV506X015	DHV506X015	–
<b>SNV062-L</b>	2206-K-TVH-C3	H306X015	FRM62/5	DH506X014	TSV506X015	FSV506X015	DHV506X015	–
<b>SNV062-L</b>	22206-E1-K	H306X015	FRM62/5	DH506X014	TSV506X015	FSV506X015	DHV506X015	–
<b>SNV072-L</b>	1306-K-TVH-C3	H306X015	FRM72/7	DH606X014	TSV606X015	FSV606X015	DHV606X015	TCV606X015
<b>SNV072-L</b>	2306-K-TVH-C3	H2306X015	FRM72/3	DH606X014	TSV606X015	FSV606X015	DHV606X015	TCV606X015



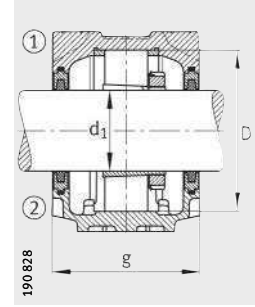
Double lip seal DH  
Cover DKV



Double lip seal DH



Labyrinth ring TSV



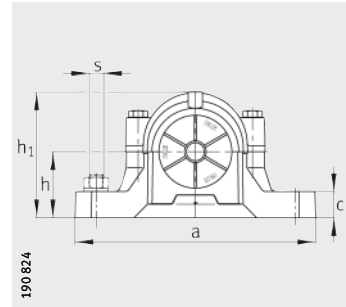
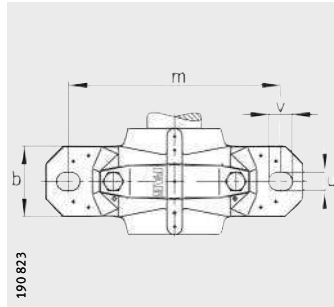
Felt seal FSV

Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV052	1,3	<b>19,05</b>	3/4	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	1/2
DKV052	1,3	<b>19,05</b>	3/4	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	1/2
DKV052	1,3	<b>19,05</b>	3/4	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	1/2
DKV052	1,3	<b>19,05</b>	3/4	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	1/2
DKV062	1,9	<b>19,05</b>	3/4	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	<b>19,05</b>	3/4	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV052	1,3	<b>20</b>	-	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	1/2
DKV052	1,3	<b>20</b>	-	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	1/2
DKV052	1,3	<b>20</b>	-	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	1/2
DKV052	1,3	<b>20</b>	-	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	1/2
DKV062	1,9	<b>20</b>	-	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	<b>20</b>	-	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV052	1,3	<b>20,638</b>	13/16	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	1/2
DKV052	1,3	<b>20,638</b>	13/16	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	1/2
DKV052	1,3	<b>20,638</b>	13/16	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	1/2
DKV052	1,3	<b>20,638</b>	13/16	165	70	75	46	19	52	83	76	-	10,5	40	130	15	20	M12	1/2
DKV062	1,9	<b>22,225</b>	7/8	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	<b>22,225</b>	7/8	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	<b>22,225</b>	7/8	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	<b>22,225</b>	7/8	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV072	2	<b>22,225</b>	7/8	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2
DKV072	2	<b>22,225</b>	7/8	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2
DKV062	1,9	<b>23,813</b>	15/16	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	<b>23,813</b>	15/16	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	<b>23,813</b>	15/16	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV062	1,9	<b>23,813</b>	15/16	185	75	91	52	22	62	88	81	-	10,5	50	150	15	20	M12	1/2
DKV072	2	<b>23,813</b>	15/16	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2
DKV072	2	<b>23,813</b>	15/16	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve

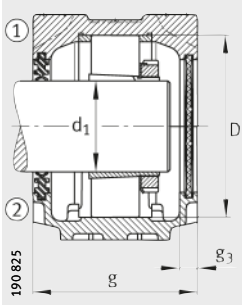


- ① Locating bearing
- ② Non-locating bearing

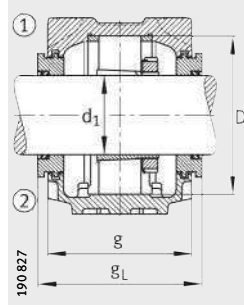
**Dimension table** (continued) · Dimensions in mm

Designation

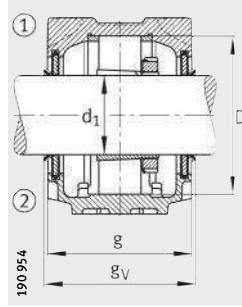
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV062-L</b>	1206-K-TVH-C3	H206	FRM62/7	DH506	TSV506	FSV506	DHV506	–
<b>SNV062-L</b>	20206-K-T-VPC3	H206	FRM62/7	DH506	TSV506	FSV506	DHV506	–
<b>SNV062-L</b>	2206-K-TVH-C3	H306	FRM62/5	DH506	TSV506	FSV506	DHV506	–
<b>SNV062-L</b>	22206-E1-K	H306	FRM62/5	DH506	TSV506	FSV506	DHV506	–
<b>SNV072-L</b>	1306-K-TVH-C3	H306	FRM72/7	DH606	TSV606	FSV606	DHV606	TCV606
<b>SNV072-L</b>	2306-K-TVH-C3	H2306	FRM72/3	DH606	TSV606	FSV606	DHV606	TCV606
<b>SNV062-L</b>	1206-K-TVH-C3	H206X100	FRM62/7	DH506	TSV506X100	FSV506	DHV506	–
<b>SNV062-L</b>	20206-K-T-VPC3	H206X100	FRM62/7	DH506	TSV506X100	FSV506	DHV506	–
<b>SNV062-L</b>	2206-K-TVH-C3	H306X100	FRM62/5	DH506	TSV506X100	FSV506	DHV506	–
<b>SNV062-L</b>	22206-E1-K	H306X100	FRM62/5	DH506	TSV506X100	FSV506	DHV506	–
<b>SNV072-L</b>	1306-K-TVH-C3	H306X100	FRM72/7	DH606	TSV606X100	FSV606	DHV606	TCV606
<b>SNV072-L</b>	2306-K-TVH-C3	H2306X100	FRM72/3	DH606	TSV606X100	FSV606	DHV606	TCV606
<b>SNV072-L</b>	1207-K-TVH-C3	H207X102	FRM72/8	DH507X102	TSV507X102	FSV507X102	DHV507X102	–
<b>SNV072-L</b>	20207-K-T-VPC3	H207X102	FRM72/8	DH507X102	TSV507X102	FSV507X102	DHV507X102	–
<b>SNV072-L</b>	2207-K-TVH-C3	H307X102	FRM72/5	DH507X102	TSV507X102	FSV507X102	DHV507X102	–
<b>SNV072-L</b>	22207-E1-K	H307X102	FRM72/5	DH507X102	TSV507X102	FSV507X102	DHV507X102	–
<b>SNV080-L</b>	1307-K-TVH-C3	H307X102	FRM80/9	DH607X102	TSV607X102	FSV607X102	DHV607X102	TCV607X102
<b>SNV080-L</b>	21307-E1-K-TVPB	H307X102	FRM80/9	DH607X102	TSV607X102	FSV607X102	DHV607X102	TCV607X102
<b>SNV080-L</b>	2307-K-TVH-C3	H2307X102	FRM80/4	DH607X102	TSV607X102	FSV607X102	DHV607X102	TCV607X102
<b>SNV072-L</b>	1207-K-TVH-C3	H207	FRM72/8	DH507	TSV507	FSV507	DHV507	–
<b>SNV072-L</b>	20207-K-T-VPC3	H207	FRM72/8	DH507	TSV507	FSV507	DHV507	–
<b>SNV072-L</b>	2207-K-TVH-C3	H307	FRM72/5	DH507	TSV507	FSV507	DHV507	–
<b>SNV072-L</b>	22207-E1-K	H307	FRM72/5	DH507	TSV507	FSV507	DHV507	–
<b>SNV080-L</b>	1307-K-TVH-C3	H307	FRM80/9	DH607	TSV607	FSV607	DHV607	TCV607
<b>SNV080-L</b>	21307-E1-K-TVPB	H307	FRM80/9	DH607	TSV607	FSV607	DHV607	TCV607
<b>SNV080-L</b>	2307-K-TVH-C3	H2307	FRM80/4	DH607	TSV607	FSV607	DHV607	TCV607
<b>SNV072-L</b>	1207-K-TVH-C3	H207X103	FRM72/8	DH507	TSV507	FSV507	DHV507	–
<b>SNV072-L</b>	20207-K-T-VPC3	H207X103	FRM72/8	DH507	TSV507	FSV507	DHV507	–
<b>SNV072-L</b>	2207-K-TVH-C3	H307X103	FRM72/5	DH507	TSV507	FSV507	DHV507	–
<b>SNV072-L</b>	22207-E1-K	H307X103	FRM72/5	DH507	TSV507	FSV507	DHV507	–
<b>SNV080-L</b>	1307-K-TVH-C3	H307X103	FRM80/9	DH607	TSV607	FSV607	DHV607	TCV607
<b>SNV080-L</b>	21307-E1-K-TVPB	H307X103	FRM80/9	DH607	TSV607	FSV607	DHV607	TCV607
<b>SNV080-L</b>	2307-K-TVH-C3	H2307X103	FRM80/4	DH607	TSV607	FSV607	DHV607	TCV607



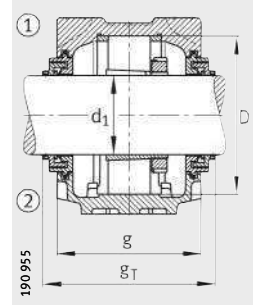
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



V ring seal DHV



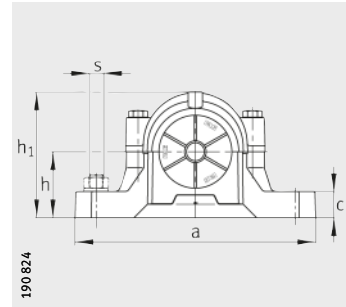
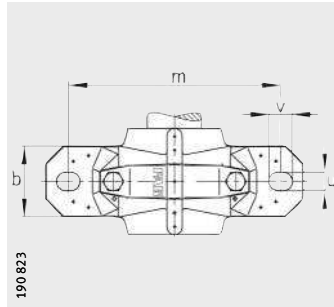
Taconite seal TCV

Cover	Mass m ≈kg	Dimensions																		
		Housing		d <sub>1</sub>	a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch																mm	inch
DKV062	1,9	<b>25</b>	–	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2	
DKV062	1,9	<b>25</b>	–	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2	
DKV062	1,9	<b>25</b>	–	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2	
DKV062	1,9	<b>25</b>	–	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>25</b>	–	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>25</b>	–	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2	
DKV062	1,9	<b>25,4</b>	<b>1</b>	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2	
DKV062	1,9	<b>25,4</b>	<b>1</b>	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2	
DKV062	1,9	<b>25,4</b>	<b>1</b>	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2	
DKV062	1,9	<b>25,4</b>	<b>1</b>	185	75	91	52	22	62	88	81	–	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>25,4</b>	<b>1</b>	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>25,4</b>	<b>1</b>	185	80	97	52	22	72	93	86	117	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>28,575</b>	<b>1 1/8</b>	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>28,575</b>	<b>1 1/8</b>	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>28,575</b>	<b>1 1/8</b>	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>28,575</b>	<b>1 1/8</b>	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2	
DKV080	2,9	<b>28,575</b>	<b>1 1/8</b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2	
DKV080	2,9	<b>28,575</b>	<b>1 1/8</b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2	
DKV080	2,9	<b>28,575</b>	<b>1 1/8</b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2	
DKV072	2	<b>30</b>	–	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>30</b>	–	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>30</b>	–	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>30</b>	–	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2	
DKV080	2,9	<b>30</b>	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2	
DKV080	2,9	<b>30</b>	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2	
DKV080	2,9	<b>30</b>	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2	
DKV072	2	<b>30,163</b>	<b>1 3/16</b>	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>30,163</b>	<b>1 3/16</b>	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>30,163</b>	<b>1 3/16</b>	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2	
DKV072	2	<b>30,163</b>	<b>1 3/16</b>	185	80	97	52	22	72	93	86	–	10,5	50	150	15	20	M12	1/2	
DKV080	2,9	<b>30,163</b>	<b>1 3/16</b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2	
DKV080	2,9	<b>30,163</b>	<b>1 3/16</b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2	
DKV080	2,9	<b>30,163</b>	<b>1 3/16</b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	1/2	



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve



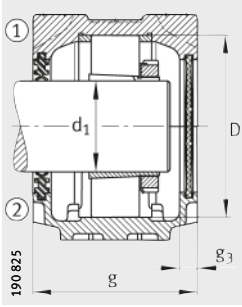
- ① Locating bearing
- ② Non-locating bearing

**Dimension table** (continued) · Dimensions in mm

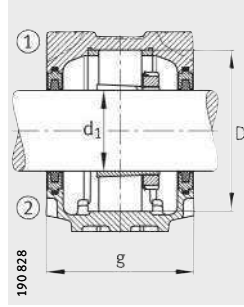
Designation

Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV080-L</b>	1208-K-TV-C3	H208X104	FRM80/10,5	DH508X104	TSV508X104	FSV508X104	DHV508X104	TCV508X104
<b>SNV080-L</b>	20208-K-T-VPC3	H208X104	FRM80/10,5	DH508X104	TSV508X104	FSV508X104	DHV508X104	TCV508X104
<b>SNV080-L</b>	2208-K-TVH-C3	H308X104	FRM80/8	DH508X104	TSV508X104	FSV508X104	DHV508X104	TCV508X104
<b>SNV080-L</b>	22208-E1-K	H308X104	FRM80/8	DH508X104	TSV508X104	FSV508X104	DHV508X104	TCV508X104
<b>SNV090-L</b>	1308-K-TVH-C3	H308X104	FRM90/9	DH608X104	TSV608X104	FSV608X104	DHV608X104	TCV608X104
<b>SNV090-L</b>	21308-E1-K	H308X104	FRM90/9	DH608X104	TSV608X104	FSV608X104	DHV608X104	TCV608X104
<b>SNV090-L</b>	2308-K-TVH-C3	H2308X104	FRM90/4	DH608X104	TSV608X104	FSV608X104	DHV608X104	TCV608X104
<b>SNV090-L</b>	22308-E1-K	H2308X104	FRM90/4	DH608X104	TSV608X104	FSV608X104	DHV608X104	TCV608X104
<b>SNV080-L</b>	1208-K-TVH-C3	H208X105	FRM80/10,5	DH508X104	TSV508X105	FSV508X105	DHV508X105	TCV508X105
<b>SNV080-L</b>	20208-K-T-VPC3	H208X105	FRM80/10,5	DH508X104	TSV508X105	FSV508X105	DHV508X105	TCV508X105
<b>SNV080-L</b>	2208-K-TVH-C3	H308X105	FRM80/8	DH508X104	TSV508X105	FSV508X105	DHV508X105	TCV508X105
<b>SNV080-L</b>	22208-E1-K	H308X105	FRM80/8	DH508X104	TSV508X105	FSV508X105	DHV508X105	TCV508X105
<b>SNV090-L</b>	1308-K-TVH-C3	H308X105	FRM90/9	DH608X104	TSV608X105	FSV608X105	DHV608X105	TCV608X105
<b>SNV090-L</b>	21308-E1-K	H308X105	FRM90/9	DH608X104	TSV608X105	FSV608X105	DHV608X105	TCV608X105
<b>SNV090-L</b>	2308-K-TVH-C3	H2308X105	FRM90/4	DH608X104	TSV608X105	FSV608X105	DHV608X105	TCV608X105
<b>SNV090-L</b>	22308-E1-K	H2308X105	FRM90/4	DH608X104	TSV608X105	FSV608X105	DHV608X105	TCV608X105
<b>SNV080-L</b>	1208-K-TVH-C3	H208X106	FRM80/10,5	DH508	TSV508	FSV508	DHV508	TCV508
<b>SNV080-L</b>	20208-K-T-VPC3	H208X106	FRM80/10,5	DH508	TSV508	FSV508	DHV508	TCV508
<b>SNV080-L</b>	2208-K-TVH-C3	H308X106	FRM80/8	DH508	TSV508	FSV508	DHV508	TCV508
<b>SNV080-L</b>	22208-E1-K	H308X106	FRM80/8	DH508	TSV508	FSV508	DHV508	TCV508
<b>SNV090-L</b>	1308-K-TVH-C3	H308X106	FRM90/9	DH608	TSV608	FSV608	DHV608	TCV608
<b>SNV090-L</b>	21308-E1-K	H308X106	FRM90/9	DH608	TSV608	FSV608	DHV608	TCV608
<b>SNV090-L</b>	2308-K-TVH-C3	H2308X106	FRM90/4	DH608	TSV608	FSV608	DHV608	TCV608
<b>SNV090-L</b>	22308-E1-K	H2308X106	FRM90/4	DH608	TSV608	FSV608	DHV608	TCV608
<b>SNV080-L</b>	1208-K-TVH-C3	H208	FRM80/10,5	DH508	TSV508	FSV508	DHV508	TCV508
<b>SNV080-L</b>	20208-K-T-VPC3	H208	FRM80/10,5	DH508	TSV508	FSV508	DHV508	TCV508
<b>SNV080-L</b>	2208-K-TVH-C3	H308	FRM80/8	DH508	TSV508	FSV508	DHV508	TCV508
<b>SNV080-L</b>	22208-E1-K	H308	FRM80/8	DH508	TSV508	FSV508	DHV508	TCV508
<b>SNV090-L</b>	1308-K-TVH-C3	H308	FRM90/9	DH608	TSV608	FSV608	DHV608	TCV608
<b>SNV090-L</b>	21308-E1-K	H308	FRM90/9	DH608	TSV608	FSV608	DHV608	TCV608
<b>SNV090-L</b>	2308-K-TVH-C3	H2308	FRM90/4	DH608	TSV608	FSV608	DHV608	TCV608
<b>SNV090-L</b>	22308-E1-K	H2308	FRM90/4	DH608	TSV608	FSV608	DHV608	TCV608

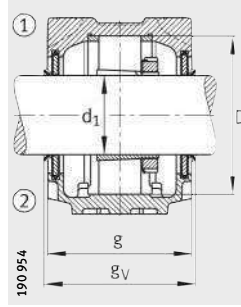




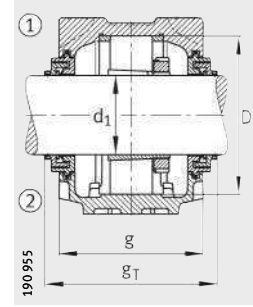
Double lip seal DH  
Cover DKV



Felt seal FSV



V ring seal DHV



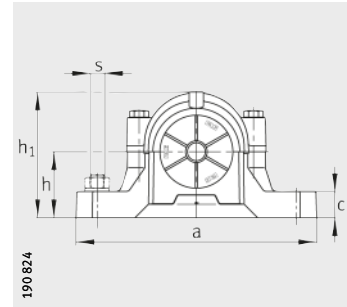
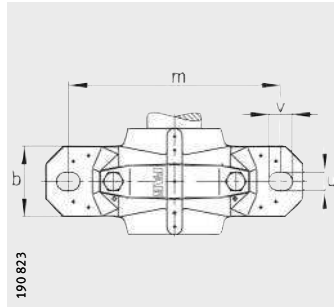
Taconite seal TCV

Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV080	2,9	<b>31,75</b>	<b>1<sup>1</sup>/<sub>4</sub></b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>31,75</b>	<b>1<sup>1</sup>/<sub>4</sub></b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>31,75</b>	<b>1<sup>1</sup>/<sub>4</sub></b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>31,75</b>	<b>1<sup>1</sup>/<sub>4</sub></b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>31,75</b>	<b>1<sup>1</sup>/<sub>4</sub></b>	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>31,75</b>	<b>1<sup>1</sup>/<sub>4</sub></b>	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>31,75</b>	<b>1<sup>1</sup>/<sub>4</sub></b>	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>31,75</b>	<b>1<sup>1</sup>/<sub>4</sub></b>	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>33,338</b>	<b>1<sup>5</sup>/<sub>16</sub></b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>33,338</b>	<b>1<sup>5</sup>/<sub>16</sub></b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>33,338</b>	<b>1<sup>5</sup>/<sub>16</sub></b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>33,338</b>	<b>1<sup>5</sup>/<sub>16</sub></b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>33,338</b>	<b>1<sup>5</sup>/<sub>16</sub></b>	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>33,338</b>	<b>1<sup>5</sup>/<sub>16</sub></b>	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>33,338</b>	<b>1<sup>5</sup>/<sub>16</sub></b>	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>33,338</b>	<b>1<sup>5</sup>/<sub>16</sub></b>	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>34,925</b>	<b>1<sup>3</sup>/<sub>8</sub></b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>34,925</b>	<b>1<sup>3</sup>/<sub>8</sub></b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>34,925</b>	<b>1<sup>3</sup>/<sub>8</sub></b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>34,925</b>	<b>1<sup>3</sup>/<sub>8</sub></b>	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>34,925</b>	<b>1<sup>3</sup>/<sub>8</sub></b>	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>34,925</b>	<b>1<sup>3</sup>/<sub>8</sub></b>	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>34,925</b>	<b>1<sup>3</sup>/<sub>8</sub></b>	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>34,925</b>	<b>1<sup>3</sup>/<sub>8</sub></b>	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>35</b>	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>35</b>	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>35</b>	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV080	2,9	<b>35</b>	–	205	85	112	60	25	80	98	91	122	10,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>35</b>	–	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>35</b>	–	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>35</b>	–	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>
DKV090	3,1	<b>35</b>	–	205	100	117	60	25	90	114	104	136	12,5	60	170	15	20	M12	<sup>1</sup> / <sub>2</sub>



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve

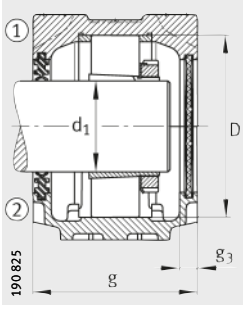


- ① Locating bearing
- ② Non-locating bearing

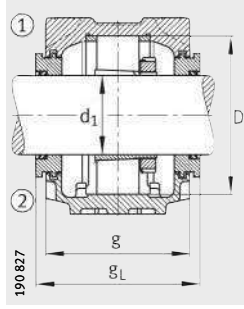
**Dimension table** (continued) · Dimensions in mm

Designation

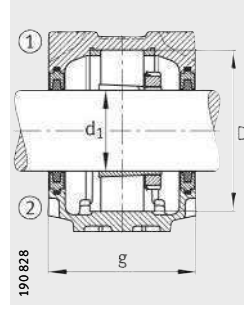
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV085-L</b>	1209-K-TVH-C3	H209X107	FRM85/6	DH509X107	TSV509X107	FSV509X107	DHV509X107	TCV509X107
<b>SNV085-L</b>	20209-K-T-VPC3	H209X107	FRM85/6	DH509X107	TSV509X107	FSV509X107	DHV509X107	TCV509X107
<b>SNV085-L</b>	2209-K-TVH-C3	H309X107	FRM85/4	DH509X107	TSV509X107	FSV509X107	DHV509X107	TCV509X107
<b>SNV085-L</b>	22209-E1-K	H309X107	FRM85/4	DH509X107	TSV509X107	FSV509X107	DHV509X107	TCV509X107
<b>SNV100-L</b>	1309-K-TVH-C3	H309X107	FRM100/9,5	DH609X107	TSV609X107	FSV609X107	DHV609X107	TCV609X107
<b>SNV100-L</b>	21309-E1-K	H309X107	FRM100/9,5	DH609X107	TSV609X107	FSV609X107	DHV609X107	TCV609X107
<b>SNV100-L</b>	2309-K-TVH-C3	H2309X107	FRM100/4	DH609X107	TSV609X107	FSV609X107	DHV609X107	TCV609X107
<b>SNV100-L</b>	22309-E1-K	H2309X107	FRM100/4	DH609X107	TSV609X107	FSV609X107	DHV609X107	TCV609X107
<b>SNV085-L</b>	1209-K-TVH-C3	H209X108	FRM85/6	DH509X107	TSV509X108	FSV509X108	DHV509X108	TCV509X108
<b>SNV085-L</b>	20209-K-T-VPC3	H209X108	FRM85/6	DH509X107	TSV509X108	FSV509X108	DHV509X108	TCV509X108
<b>SNV085-L</b>	2209-K-TVH-C3	H309X108	FRM85/4	DH509X107	TSV509X108	FSV509X108	DHV509X108	TCV509X108
<b>SNV085-L</b>	22209-E1-K	H309X108	FRM85/4	DH509X107	TSV509X108	FSV509X108	DHV509X108	TCV509X108
<b>SNV100-L</b>	1309-K-TVH-C3	H309X108	FRM100/9,5	DH609X107	TSV609X108	FSV609X108	DHV609X108	TCV609X108
<b>SNV100-L</b>	21309-E1-K	H309X108	FRM100/9,5	DH609X107	TSV609X108	FSV609X108	DHV609X108	TCV609X108
<b>SNV100-L</b>	2309-K-TVH-C3	H2309X108	FRM100/4	DH609X107	TSV609X108	FSV609X108	DHV609X108	TCV609X108
<b>SNV100-L</b>	22309-E1-K	H2309X108	FRM100/4	DH609X107	TSV609X108	FSV609X108	DHV609X108	TCV609X108
<b>SNV100-L</b>	1309-K-TVH-C3	H309X109	FRM100/9,5	DH609	TSV609	FSV609	DHV609	TCV609
<b>SNV100-L</b>	21309-E1-K	H309X109	FRM100/9,5	DH609	TSV609	FSV609	DHV609	TCV609
<b>SNV100-L</b>	2309-K-TVH-C3	H2309X109	FRM100/4	DH609	TSV609	FSV609	DHV609	TCV609
<b>SNV100-L</b>	22309-E1-K	H2309X109	FRM100/4	DH609	TSV609	FSV609	DHV609	TCV609
<b>SNV085-L</b>	1209-K-TVH-C3	H209	FRM85/6	DH509	TSV509	FSV509	DHV509	TCV509
<b>SNV085-L</b>	20209-K-T-VPC3	H209	FRM85/6	DH509	TSV509	FSV509	DHV509	TCV509
<b>SNV085-L</b>	2209-K-TVH-C3	H309	FRM85/4	DH509	TSV509	FSV509	DHV509	TCV509
<b>SNV085-L</b>	22209-E1-K	H309	FRM85/4	DH509	TSV509	FSV509	DHV509	TCV509
<b>SNV100-L</b>	1309-K-TVH-C3	H309	FRM100/9,5	DH609	TSV609	FSV609	DHV609	TCV609
<b>SNV100-L</b>	21309-E1-K	H309	FRM100/9,5	DH609	TSV609	FSV609	DHV609	TCV609
<b>SNV100-L</b>	2309-K-TVH-C3	H2309	FRM100/4	DH609	TSV609	FSV609	DHV609	TCV609
<b>SNV100-L</b>	22309-E1-K	H2309	FRM100/4	DH609	TSV609	FSV609	DHV609	TCV609
<b>SNV090-L</b>	1210-K-TVH-C3	H210X110	FRM90/10,5	DH510X110	TSV510X110	FSV510X110	DHV510X110	TCV510X110
<b>SNV090-L</b>	20210-K-T-VPC3	H210X110	FRM90/10,5	DH510X110	TSV510X110	FSV510X110	DHV510X110	TCV510X110
<b>SNV090-L</b>	2210-K-TVH-C3	H310X110	FRM90/9	DH510X110	TSV510X110	FSV510X110	DHV510X110	TCV510X110
<b>SNV090-L</b>	22210-E1-K	H310X110	FRM90/9	DH510X110	TSV510X110	FSV510X110	DHV510X110	TCV510X110
<b>SNV110-L</b>	1310-K-TVH-C3	H310X110	FRM110/10,5	DH610X110	TSV610X110	FSV610X110	DHV610X110	TCV610X110
<b>SNV110-L</b>	21310-E1-K	H310X110	FRM110/10,5	DH610X110	TSV610X110	FSV610X110	DHV610X110	TCV610X110
<b>SNV110-L</b>	2310-K-TVH-C3	H2310X110	FRM110/4	DH610X110	TSV610X110	FSV610X110	DHV610X110	TCV610X110
<b>SNV110-L</b>	22310-E1-K	H2310X110	FRM110/4	DH610X110	TSV610X110	FSV610X110	DHV610X110	TCV610X110



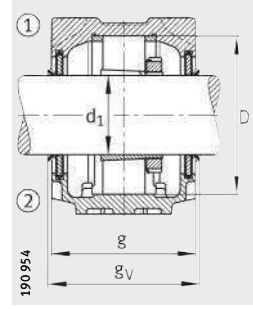
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



Felt seal FSV



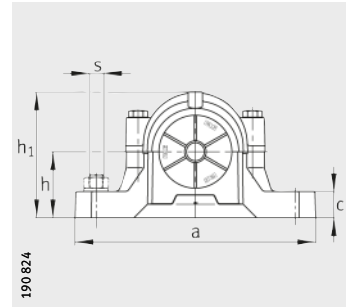
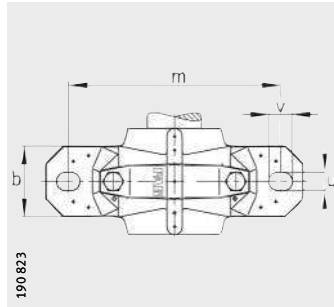
V ring seal DHV

Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV085	2,8	<b>36,513</b>	<b>17/16</b>	205	87	114	60	25	85	101	91	123	12,5	60	170	15	20	M12	1/2
DKV085	2,8	<b>36,513</b>	<b>17/16</b>	205	87	114	60	25	85	101	91	123	12,5	60	170	15	20	M12	1/2
DKV085	2,8	<b>36,513</b>	<b>17/16</b>	205	87	114	60	25	85	101	91	123	12,5	60	170	15	20	M12	1/2
DKV085	2,8	<b>36,513</b>	<b>17/16</b>	205	87	114	60	25	85	101	91	123	12,5	60	170	15	20	M12	1/2
DKV100	4,3	<b>36,513</b>	<b>17/16</b>	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>36,513</b>	<b>17/16</b>	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>36,513</b>	<b>17/16</b>	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>36,513</b>	<b>17/16</b>	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV085	2,8	<b>38,1</b>	<b>1 1/2</b>	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV085	2,8	<b>38,1</b>	<b>1 1/2</b>	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV085	2,8	<b>38,1</b>	<b>1 1/2</b>	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV085	2,8	<b>38,1</b>	<b>1 1/2</b>	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV100	4,3	<b>38,1</b>	<b>1 1/2</b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>38,1</b>	<b>1 1/2</b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>38,1</b>	<b>1 1/2</b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>38,1</b>	<b>1 1/2</b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>39,688</b>	<b>1 9/16</b>	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>39,688</b>	<b>1 9/16</b>	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>39,688</b>	<b>1 9/16</b>	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>39,688</b>	<b>1 9/16</b>	255	105	133	70	28	100	119	109	141	12,5	70	210	18	23	M16	5/8
DKV085	2,8	<b>40</b>	–	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV085	2,8	<b>40</b>	–	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV085	2,8	<b>40</b>	–	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV085	2,8	<b>40</b>	–	205	87	114	60	25	85	101	93	125	12,5	60	170	15	20	M12	1/2
DKV100	4,3	<b>40</b>	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>40</b>	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>40</b>	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>40</b>	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV090	3,1	<b>41,275</b>	<b>1 5/8</b>	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	<b>41,275</b>	<b>1 5/8</b>	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	<b>41,275</b>	<b>1 5/8</b>	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	<b>41,275</b>	<b>1 5/8</b>	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV110	4,9	<b>41,275</b>	<b>1 5/8</b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>41,275</b>	<b>1 5/8</b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>41,275</b>	<b>1 5/8</b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>41,275</b>	<b>1 5/8</b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve

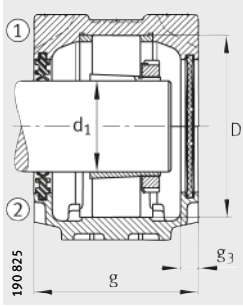


- ① Locating bearing
- ② Non-locating bearing

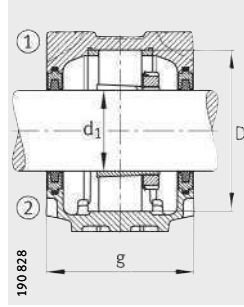
**Dimension table** (continued) · Dimensions in mm

Designation

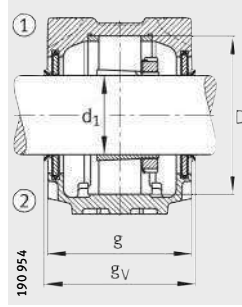
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV090-L</b>	1210-K-TVH-C3	H210X111	FRM90/10,5	DH510X110	TSV510X111	FSV510X111	DHV510X111	TCV510X111
<b>SNV090-L</b>	20210-K-T-VPC3	H210X111	FRM90/10,5	DH510X110	TSV510X111	FSV510X111	DHV510X111	TCV510X111
<b>SNV090-L</b>	2210-K-TVH-C3	H310X111	FRM90/9	DH510X110	TSV510X111	FSV510X111	DHV510X111	TCV510X111
<b>SNV090-L</b>	22210-E1-K	H310X111	FRM90/9	DH510X110	TSV510X111	FSV510X111	DHV510X111	TCV510X111
<b>SNV110-L</b>	1310-K-TVH-C3	H310X111	FRM110/10,5	DH610X110	TSV610X111	FSV610X111	DHV610X111	TCV610X111
<b>SNV110-L</b>	21310-E1-K	H310X111	FRM110/10,5	DH610X110	TSV610X111	FSV610X111	DHV610X111	TCV610X111
<b>SNV110-L</b>	2310-K-TVH-C3	H2310X111	FRM110/4	DH610X110	TSV610X111	FSV610X111	DHV610X111	TCV610X111
<b>SNV110-L</b>	22310-E1-K	H2310X111	FRM110/4	DH610X110	TSV610X111	FSV610X111	DHV610X111	TCV610X111
<b>SNV090-L</b>	1210-K-TVH-C3	H210X112	FRM90/10,5	DH510	TSV510X112	FSV510	DHV510	TCV510
<b>SNV090-L</b>	20210-K-T-VPC3	H210X112	FRM90/10,5	DH510	TSV510X112	FSV510	DHV510	TCV510
<b>SNV090-L</b>	2210-K-TVH-C3	H310X112	FRM90/9	DH510	TSV510X112	FSV510	DHV510	TCV510
<b>SNV090-L</b>	22210-E1-K	H310X112	FRM90/9	DH510	TSV510X112	FSV510	DHV510	TCV510
<b>SNV110-L</b>	1310-K-TVH-C3	H310X112	FRM110/10,5	DH610	TSV610X112	FSV610	DHV610	TCV610
<b>SNV110-L</b>	21310-E1-K	H310X112	FRM110/10,5	DH610	TSV610X112	FSV610	DHV610	TCV610
<b>SNV110-L</b>	2310-K-TVH-C3	H2310X112	FRM110/4	DH610	TSV610X112	FSV610	DHV610	TCV610
<b>SNV110-L</b>	22310-E1-K	H2310X112	FRM110/4	DH610	TSV610X112	FSV610	DHV610	TCV610
<b>SNV090-L</b>	1210-K-TVH-C3	H210	FRM90/10,5	DH510	TSV510	FSV510	DHV510	TCV510
<b>SNV090-L</b>	20210-K-T-VPC3	H210	FRM90/10,5	DH510	TSV510	FSV510	DHV510	TCV510
<b>SNV090-L</b>	2210-K-TVH-C3	H310	FRM90/9	DH510	TSV510	FSV510	DHV510	TCV510
<b>SNV090-L</b>	22210-E1-K	H310	FRM90/9	DH510	TSV510	FSV510	DHV510	TCV510
<b>SNV110-L</b>	1310-K-TVH-C3	H310	FRM110/10,5	DH610	TSV610	FSV610	DHV610	TCV610
<b>SNV110-L</b>	21310-E1-K	H310	FRM110/10,5	DH610	TSV610	FSV610	DHV610	TCV610
<b>SNV110-L</b>	2310-K-TVH-C3	H2310	FRM110/4	DH610	TSV610	FSV610	DHV610	TCV610
<b>SNV110-L</b>	22310-E1-K	H2310	FRM110/4	DH610	TSV610	FSV610	DHV610	TCV610
<b>SNV100-L</b>	1211-K-TVH-C3	H211X114	FRM100/11,5	DH511X114	TSV511X114	FSV511X114	DHV511X114	TCV511X114
<b>SNV100-L</b>	20211-K-T-VPC3	H211X114	FRM100/11,5	DH511X114	TSV511X114	FSV511X114	DHV511X114	TCV511X114
<b>SNV100-L</b>	2211-K-TVH-C3	H311X114	FRM100/9,5	DH511X114	TSV511X114	FSV511X114	DHV511X114	TCV511X114
<b>SNV100-L</b>	22211-E1-K	H311X114	FRM100/9,5	DH511X114	TSV511X114	FSV511X114	DHV511X114	TCV511X114
<b>SNV120-L</b>	1311-K-TVH-C3	H311X114	FRM120/11	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114
<b>SNV120-L</b>	20311-K-T-VPC3	H311X114	FRM120/11	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114
<b>SNV120-L</b>	21311-E1-K	H311X114	FRM120/11	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114
<b>SNV120-L</b>	2311-K-TVH-C3	H2311X114	FRM120/4	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114
<b>SNV120-L</b>	22311-E1-K	H2311X114	FRM120/4	DH611X114	TSV611X114	FSV611X114	DHV611X114	TCV611X114



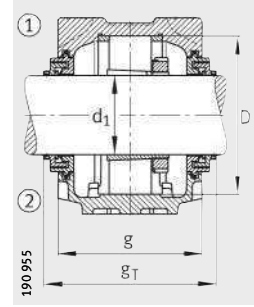
Double lip seal DH  
Cover DKV



Felt seal FSV



V ring seal DHV



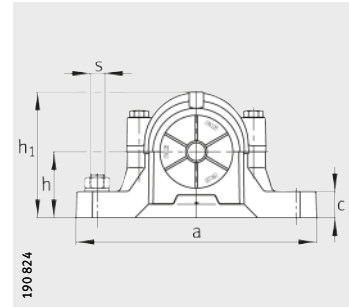
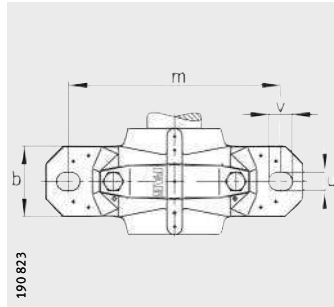
Taconite seal TCV

Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>v</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV090	3,1	<b>42,863</b>	<b>1<sup>11</sup>/<sub>16</sub></b>	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	<b>42,863</b>	<b>1<sup>11</sup>/<sub>16</sub></b>	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	<b>42,863</b>	<b>1<sup>11</sup>/<sub>16</sub></b>	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	<b>42,863</b>	<b>1<sup>11</sup>/<sub>16</sub></b>	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV110	4,9	<b>42,863</b>	<b>1<sup>11</sup>/<sub>16</sub></b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>42,863</b>	<b>1<sup>11</sup>/<sub>16</sub></b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>42,863</b>	<b>1<sup>11</sup>/<sub>16</sub></b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>42,863</b>	<b>1<sup>11</sup>/<sub>16</sub></b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV090	3,1	<b>44,45</b>	<b>1<sup>3</sup>/<sub>4</sub></b>	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	<b>44,45</b>	<b>1<sup>3</sup>/<sub>4</sub></b>	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	<b>44,45</b>	<b>1<sup>3</sup>/<sub>4</sub></b>	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	<b>44,45</b>	<b>1<sup>3</sup>/<sub>4</sub></b>	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV110	4,9	<b>44,45</b>	<b>1<sup>3</sup>/<sub>4</sub></b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>44,45</b>	<b>1<sup>3</sup>/<sub>4</sub></b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>44,45</b>	<b>1<sup>3</sup>/<sub>4</sub></b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>44,45</b>	<b>1<sup>3</sup>/<sub>4</sub></b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV090	3,1	<b>45</b>	–	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	<b>45</b>	–	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	<b>45</b>	–	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV090	3,1	<b>45</b>	–	205	100	117	60	25	90	114	106	138	12,5	60	170	15	20	M12	1/2
DKV110	4,9	<b>45</b>	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>45</b>	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>45</b>	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>45</b>	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>47,625</b>	<b>1<sup>7</sup>/<sub>8</sub></b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>47,625</b>	<b>1<sup>7</sup>/<sub>8</sub></b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>47,625</b>	<b>1<sup>7</sup>/<sub>8</sub></b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>47,625</b>	<b>1<sup>7</sup>/<sub>8</sub></b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV120	6,1	<b>47,625</b>	<b>1<sup>7</sup>/<sub>8</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>47,625</b>	<b>1<sup>7</sup>/<sub>8</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>47,625</b>	<b>1<sup>7</sup>/<sub>8</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>47,625</b>	<b>1<sup>7</sup>/<sub>8</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>47,625</b>	<b>1<sup>7</sup>/<sub>8</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve

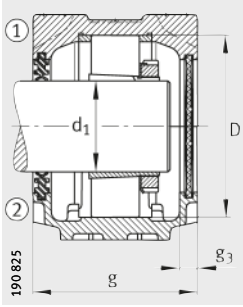


- ① Locating bearing
- ② Non-locating bearing

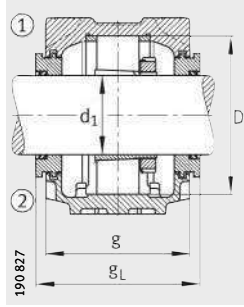
**Dimension table** (continued) · Dimensions in mm

Designation

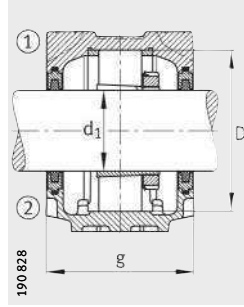
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV100-L</b>	1211-K-TVH-C3	H211X115	FRM100/11,5	DH511	TSV511X115	FSV511X115	DHV511X115	TCV511X115
<b>SNV100-L</b>	20211-K-T-VPC3	H211X115	FRM100/11,5	DH511	TSV511X115	FSV511X115	DHV511X115	TCV511X115
<b>SNV100-L</b>	2211-K-TVH-C3	H311X115	FRM100/9,5	DH511	TSV511X115	FSV511X115	DHV511X115	TCV511X115
<b>SNV100-L</b>	22211-E1-K	H311X115	FRM100/9,5	DH511	TSV511X115	FSV511X115	DHV511X115	TCV511X115
<b>SNV120-L</b>	1311-K-TVH-C3	H311X115	FRM120/11	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
<b>SNV120-L</b>	20311-K-T-VPC3	H311X115	FRM120/11	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
<b>SNV120-L</b>	21311-E1-K	H311X115	FRM120/11	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
<b>SNV120-L</b>	2311-K-TVH-C3	H2311X115	FRM120/4	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
<b>SNV120-L</b>	22311-E1-K	H2311X115	FRM120/4	DH611	TSV611X115	FSV611X115	DHV611X115	TCV611X115
<b>SNV100-L</b>	1211-K-TVH-C3	H211	FRM100/11,5	DH511	TSV511	FSV511	DHV511	TCV511
<b>SNV100-L</b>	20211-K-T-VPC3	H211	FRM100/11,5	DH511	TSV511	FSV511	DHV511	TCV511
<b>SNV100-L</b>	2211-K-TVH-C3	H311	FRM100/9,5	DH511	TSV511	FSV511	DHV511	TCV511
<b>SNV100-L</b>	22211-E1-K	H311	FRM100/9,5	DH511	TSV511	FSV511	DHV511	TCV511
<b>SNV120-L</b>	1311-K-TVH-C3	H311	FRM120/11	DH611	TSV611	FSV611	DHV611	TCV611
<b>SNV120-L</b>	20311-K-T-VPC3	H311	FRM120/11	DH611	TSV611	FSV611	DHV611	TCV611
<b>SNV120-L</b>	21311-E1-K	H311	FRM120/11	DH611	TSV611	FSV611	DHV611	TCV611
<b>SNV120-L</b>	2311-K-TVH-C3	H2311	FRM120/4	DH611	TSV611	FSV611	DHV611	TCV611
<b>SNV120-L</b>	22311-E1-K	H2311	FRM120/4	DH611	TSV611	FSV611	DHV611	TCV611
<b>SNV100-L</b>	1211-K-TVH-C3	H211X200	FRM100/11,5	DH511	TSV511X200	FSV511	DHV511	TCV511X200
<b>SNV100-L</b>	20211-K-T-VPC3	H211X200	FRM100/11,5	DH511	TSV511X200	FSV511	DHV511	TCV511X200
<b>SNV100-L</b>	2211-K-TVH-C3	H311X200	FRM100/9,5	DH511	TSV511X200	FSV511	DHV511	TCV511X200
<b>SNV100-L</b>	22211-E1-K	H311X200	FRM100/9,5	DH511	TSV511X200	FSV511	DHV511	TCV511X200
<b>SNV120-L</b>	1311-K-TVH-C3	H311X200	FRM120/11	DH611	TSV611X200	FSV611	DHV611	TCV611X200
<b>SNV120-L</b>	20311-K-T-VPC3	H311X200	FRM120/11	DH611	TSV611X200	FSV611	DHV611	TCV611X200
<b>SNV120-L</b>	21311-E1-K	H311X200	FRM120/11	DH611	TSV611X200	FSV611	DHV611	TCV611X200
<b>SNV120-L</b>	2311-K-TVH-C3	H2311X200	FRM120/4	DH611	TSV611X200	FSV611	DHV611	TCV611X200
<b>SNV120-L</b>	22311-E1-K	H2311X200	FRM120/4	DH611	TSV611X200	FSV611	DHV611	TCV611X200



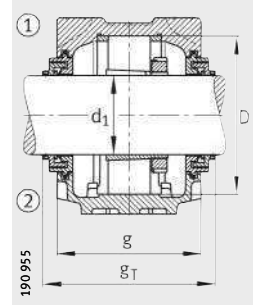
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



Felt seal FSV



Taconite seal TCV

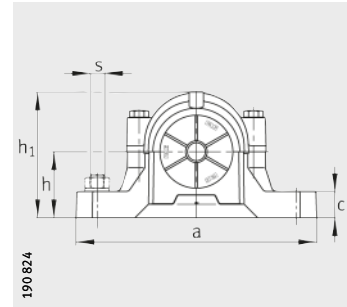
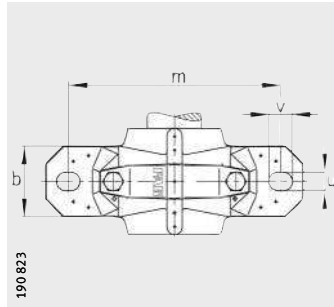
Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>v</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV100	4,3	<b>49,213</b>	<b>1<sup>15</sup>/<sub>16</sub></b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>49,213</b>	<b>1<sup>15</sup>/<sub>16</sub></b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>49,213</b>	<b>1<sup>15</sup>/<sub>16</sub></b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>49,213</b>	<b>1<sup>15</sup>/<sub>16</sub></b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV120	6,1	<b>49,213</b>	<b>1<sup>15</sup>/<sub>16</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>49,213</b>	<b>1<sup>15</sup>/<sub>16</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>49,213</b>	<b>1<sup>15</sup>/<sub>16</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>49,213</b>	<b>1<sup>15</sup>/<sub>16</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>49,213</b>	<b>1<sup>15</sup>/<sub>16</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV100	4,3	<b>50</b>	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>50</b>	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>50</b>	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>50</b>	–	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV120	6,1	<b>50</b>	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>50</b>	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>50</b>	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>50</b>	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>50</b>	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV100	4,3	<b>50,8</b>	<b>2</b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>50,8</b>	<b>2</b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>50,8</b>	<b>2</b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV100	4,3	<b>50,8</b>	<b>2</b>	255	105	133	70	28	100	119	111	143	12,5	70	210	18	23	M16	5/8
DKV120	6,1	<b>50,8</b>	<b>2</b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>50,8</b>	<b>2</b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>50,8</b>	<b>2</b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>50,8</b>	<b>2</b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8





# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve



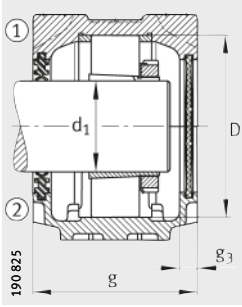
- ① Locating bearing
- ② Non-locating bearing

**Dimension table** (continued) · Dimensions in mm

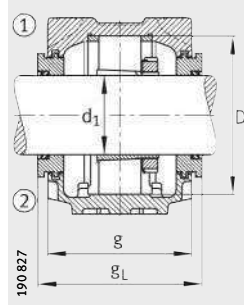
Designation

Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV110-L</b>	1212-K-TVH-C3	H212X202	FRM110/13	DH512	TSV512X202	FSV512X202	DHV512	TCV512X202
<b>SNV110-L</b>	20212-K-T-VPC3	H212X202	FRM110/13	DH512	TSV512X202	FSV512X202	DHV512	TCV512X202
<b>SNV110-L</b>	2212-K-TVH-C3	H312X202	FRM110/10	DH512	TSV512X202	FSV512X202	DHV512	TCV512X202
<b>SNV110-L</b>	22212-E1-K	H312X202	FRM110/10	DH512	TSV512X202	FSV512X202	DHV512	TCV512X202
<b>SNV130-L</b>	1312-K-TVH-C3	H312X202	FRM130/12,5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
<b>SNV130-L</b>	20312-K-T-VPC3	H312X202	FRM130/12,5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
<b>SNV130-L</b>	21312-E1-K	H312X202	FRM130/12,5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
<b>SNV130-L</b>	2312-K-TVH-C3	H2312X202	FRM130/5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
<b>SNV130-L</b>	22312-E1-K	H2312X202	FRM130/5	DH612	TSV612X202	FSV612X202	DHV612	TCV612X202
<b>SNV110-L</b>	1212-K-TVH-C3	H212	FRM110/13	DH512	TSV512	FSV512	DHV512	TCV512
<b>SNV110-L</b>	20212-K-T-VPC3	H212	FRM110/13	DH512	TSV512	FSV512	DHV512	TCV512
<b>SNV110-L</b>	2212-K-TVH-C3	H312	FRM110/10	DH512	TSV512	FSV512	DHV512	TCV512
<b>SNV110-L</b>	22212-E1-K	H312	FRM110/10	DH512	TSV512	FSV512	DHV512	TCV512
<b>SNV130-L</b>	1312-K-TVH-C3	H312	FRM130/12,5	DH612	TSV612	FSV612	DHV612	TCV612
<b>SNV130-L</b>	20312-K-T-VPC3	H312	FRM130/12,5	DH612	TSV612	FSV612	DHV612	TCV612
<b>SNV130-L</b>	21312-E1-K	H312	FRM130/12,5	DH612	TSV612	FSV612	DHV612	TCV612
<b>SNV130-L</b>	2312-K-TVH-C3	H2312	FRM130/5	DH612	TSV612	FSV612	DHV612	TCV612
<b>SNV130-L</b>	22312-E1-K	H2312	FRM130/5	DH612	TSV612	FSV612	DHV612	TCV612
<b>SNV120-L</b>	1213-K-TVH-C3	H213X203	FRM120/14	DH513X203	TSV513X203	FSV513X203	DHV513X203	TCV513X203
<b>SNV120-L</b>	20213-K-T-VPC3	H213X203	FRM120/14	DH513X203	TSV513X203	FSV513X203	DHV513X203	TCV513X203
<b>SNV120-L</b>	2213-K-TVH-C3	H313X203	FRM120/10	DH513X203	TSV513X203	FSV513X203	DHV513X203	TCV513X203
<b>SNV120-L</b>	22213-E1-K	H313X203	FRM120/10	DH513X203	TSV513X203	FSV513X203	DHV513X203	TCV513X203
<b>SNV140-L</b>	1313-K-TVH-C3	H313X203	FRM140/12,5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
<b>SNV140-L</b>	20313-K-MB-C3	H313X203	FRM140/12,5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
<b>SNV140-L</b>	21313-E1-K	H313X203	FRM140/12,5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
<b>SNV140-L</b>	2313-K-TVH-C3	H2313X203	FRM140/5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
<b>SNV140-L</b>	22313-E1-K	H2313X203	FRM140/5	DH613X203	TSV613X203	FSV613X203	DHV613X203	TCV613X203
<b>SNV120-L</b>	1213-K-TVH-C3	H213X204	FRM120/14	DH513X203	TSV513X204	FSV513X204	DHV513X204	TCV513X204
<b>SNV120-L</b>	20213-K-T-VPC3	H213X204	FRM120/14	DH513X203	TSV513X204	FSV513X204	DHV513X204	TCV513X204
<b>SNV120-L</b>	2213-K-TVH-C3	H313X204	FRM120/10	DH513X203	TSV513X204	FSV513X204	DHV513X204	TCV513X204
<b>SNV120-L</b>	22213-E1-K	H313X204	FRM120/10	DH513X203	TSV513X204	FSV513X204	DHV513X204	TCV513X204
<b>SNV140-L</b>	1313-K-TVH-C3	H313X204	FRM140/12,5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204
<b>SNV140-L</b>	20313-K-MB-C3	H313X204	FRM140/12,5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204
<b>SNV140-L</b>	21313-E1-K	H313X204	FRM140/12,5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204
<b>SNV140-L</b>	2313-K-TVH-C3	H2313X204	FRM140/5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204
<b>SNV140-L</b>	22313-E1-K	H2313X204	FRM140/5	DH613X203	TSV613X204	FSV613X204	DHV613X204	TCV613X204

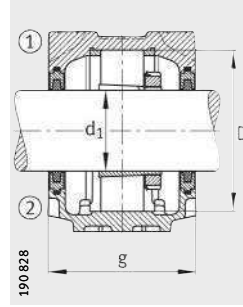




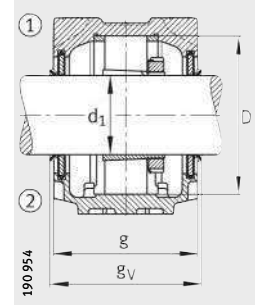
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



Felt seal FSV



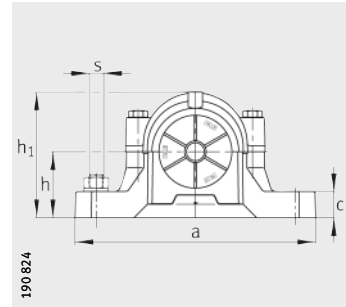
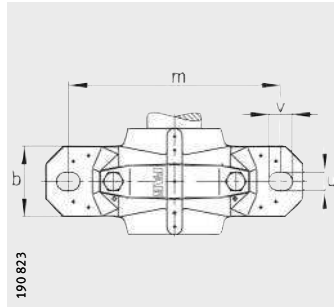
V ring seal DHV

Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV110	4,9	<b>53,975</b>	<b>2<sup>1</sup>/<sub>8</sub></b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>53,975</b>	<b>2<sup>1</sup>/<sub>8</sub></b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>53,975</b>	<b>2<sup>1</sup>/<sub>8</sub></b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>53,975</b>	<b>2<sup>1</sup>/<sub>8</sub></b>	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV130	6,8	<b>53,975</b>	<b>2<sup>1</sup>/<sub>8</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>53,975</b>	<b>2<sup>1</sup>/<sub>8</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>53,975</b>	<b>2<sup>1</sup>/<sub>8</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>53,975</b>	<b>2<sup>1</sup>/<sub>8</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>53,975</b>	<b>2<sup>1</sup>/<sub>8</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV110	4,9	<b>55</b>	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>55</b>	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>55</b>	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV110	4,9	<b>55</b>	–	255	110	139	70	30	110	124	116	148	12,5	70	210	18	23	M16	5/8
DKV130	6,8	<b>55</b>	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>55</b>	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>55</b>	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>55</b>	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>55</b>	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>55,563</b>	<b>2<sup>3</sup>/<sub>16</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>55,563</b>	<b>2<sup>3</sup>/<sub>16</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>55,563</b>	<b>2<sup>3</sup>/<sub>16</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>55,563</b>	<b>2<sup>3</sup>/<sub>16</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV140	9,3	<b>55,563</b>	<b>2<sup>3</sup>/<sub>16</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>55,563</b>	<b>2<sup>3</sup>/<sub>16</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>55,563</b>	<b>2<sup>3</sup>/<sub>16</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>55,563</b>	<b>2<sup>3</sup>/<sub>16</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV120	6,1	<b>57,15</b>	<b>2<sup>1</sup>/<sub>4</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>57,15</b>	<b>2<sup>1</sup>/<sub>4</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>57,15</b>	<b>2<sup>1</sup>/<sub>4</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>57,15</b>	<b>2<sup>1</sup>/<sub>4</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV140	9,3	<b>57,15</b>	<b>2<sup>1</sup>/<sub>4</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>57,15</b>	<b>2<sup>1</sup>/<sub>4</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>57,15</b>	<b>2<sup>1</sup>/<sub>4</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>57,15</b>	<b>2<sup>1</sup>/<sub>4</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>57,15</b>	<b>2<sup>1</sup>/<sub>4</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve

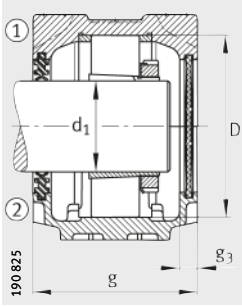


- ① Locating bearing
- ② Non-locating bearing

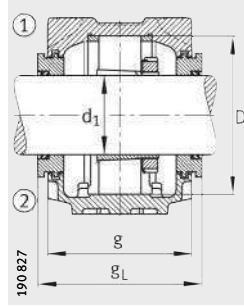
**Dimension table** (continued) · Dimensions in mm

Designation

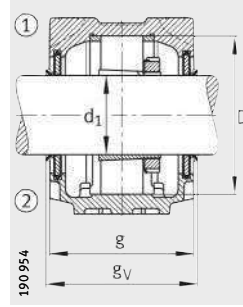
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV120-L</b>	1213-K-TVH-C3	H213	FRM120/14	DH513	TSV513	FSV513	DHV513	TCV513
<b>SNV120-L</b>	20213-K-T-VPC3	H213	FRM120/14	DH513	TSV513	FSV513	DHV513	TCV513
<b>SNV120-L</b>	2213-K-TVH-C3	H313	FRM120/10	DH513	TSV513	FSV513	DHV513	TCV513
<b>SNV120-L</b>	22213-E1-K	H313	FRM120/10	DH513	TSV513	FSV513	DHV513	TCV513
<b>SNV140-L</b>	1313-K-TVH-C3	H313	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
<b>SNV140-L</b>	20313-K-MB-C3	H313	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
<b>SNV140-L</b>	21313-E1-K	H313	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
<b>SNV140-L</b>	2313-K-TVH-C3	H2313	FRM140/5	DH613	TSV613	FSV613	DHV613	TCV613
<b>SNV140-L</b>	22313-E1-K	H2313	FRM140/5	DH613	TSV613	FSV613	DHV613	TCV613
<b>SNV120-L</b>	1213-K-TVH-C3	H213X206	FRM120/14	DH513	TSV513	FSV513	DHV513	TCV513
<b>SNV120-L</b>	20213-K-T-VPC3	H213X206	FRM120/14	DH513	TSV513	FSV513	DHV513	TCV513
<b>SNV120-L</b>	2213-K-TVH-C3	H313X206	FRM120/10	DH513	TSV513	FSV513	DHV513	TCV513
<b>SNV120-L</b>	22213-E1-K	H313X206	FRM120/10	DH513	TSV513	FSV513	DHV513	TCV513
<b>SNV140-L</b>	1313-K-TVH-C3	H313X206	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
<b>SNV140-L</b>	20313-K-MB-C3	H313X206	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
<b>SNV140-L</b>	21313-E1-K	H313X206	FRM140/12,5	DH613	TSV613	FSV613	DHV613	TCV613
<b>SNV140-L</b>	2313-K-TVH-C3	H2313X206	FRM140/5	DH613	TSV613	FSV613	DHV613	TCV613
<b>SNV140-L</b>	22313-E1-K	H2313X206	FRM140/5	DH613	TSV613	FSV613	DHV613	TCV613
<b>SNV130-L</b>	1215-K-TVH-C3	H215X207	FRM130/15,5	DH515X207	TSV515X207	FSV515X207	DHV515X207	TCV515X207
<b>SNV130-L</b>	20215-K-T-VPC3	H215X207	FRM130/15,5	DH515X207	TSV515X207	FSV515X207	DHV515X207	TCV515X207
<b>SNV130-L</b>	2215-K-TVH-C3	H315X207	FRM130/12,5	DH515X207	TSV515X207	FSV515X207	DHV515X207	TCV515X207
<b>SNV130-L</b>	22215-E1-K	H315X207	FRM130/12,5	DH515X207	TSV515X207	FSV515X207	DHV515X207	TCV515X207
<b>SNV160-L</b>	1315-K-M-C3	H315X207	FRM160/14	DH615X207	TSV615X207	FSV615X207	DHV615X207	TCV615X207
<b>SNV160-L</b>	21315-E-1K	H315X207	FRM160/14	DH615X207	TSV615X207	FSV615X207	DHV615X207	TCV615X207
<b>SNV160-L</b>	2315-K-M-C3	H2315X207	FRM160/5	DH615X207	TSV615X207	FSV615X207	DHV615X207	TCV615X207
<b>SNV160-L</b>	22315-E1-K	H2315X207	FRM160/5	DH615X207	TSV615X207	FSV615X207	DHV615X207	TCV615X207
<b>SNV130-L</b>	1215-K-TVH-C3	H215X208	FRM130/15,5	DH515X207	TSV515X208	FSV515X208	DHV515X208	TCV515X208
<b>SNV130-L</b>	20215-K-T-VPC3	H215X208	FRM130/15,5	DH515X207	TSV515X208	FSV515X208	DHV515X208	TCV515X208
<b>SNV130-L</b>	2215-K-TVH-C3	H315X208	FRM130/12,5	DH515X207	TSV515X208	FSV515X208	DHV515X208	TCV515X208
<b>SNV130-L</b>	22215-E1-K	H315X208	FRM130/12,5	DH515X207	TSV515X208	FSV515X208	DHV515X208	TCV515X208
<b>SNV160-L</b>	1315-K-M-C3	H315X208	FRM160/14	DH615X207	TSV615X208	FSV615X208	DHV615X208	TCV615X208
<b>SNV160-L</b>	21315-E1-K	H315X208	FRM160/14	DH615X207	TSV615X208	FSV615X208	DHV615X208	TCV615X208
<b>SNV160-L</b>	2315-K-M-C3	H2315X208	FRM160/5	DH615X207	TSV615X208	FSV615X208	DHV615X208	TCV615X208
<b>SNV160-L</b>	22315-E1-K	H2315X208	FRM160/5	DH615X207	TSV615X208	FSV615X208	DHV615X208	TCV615X208



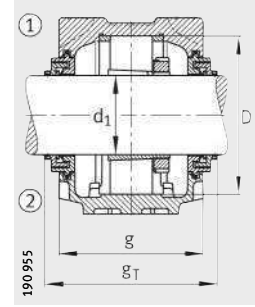
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



V ring seal DHV



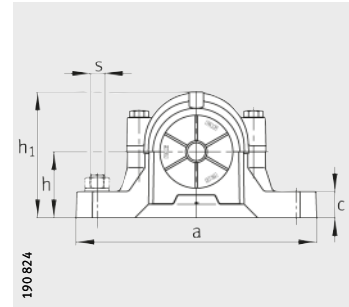
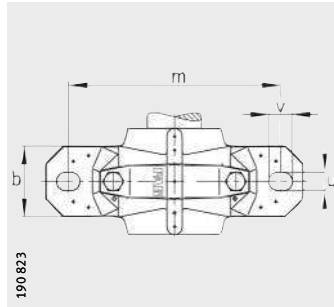
Taconite seal TCV

Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>v</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV120	6,1	<b>60</b>	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>60</b>	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>60</b>	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>60</b>	–	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV140	9,3	<b>60</b>	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>60</b>	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>60</b>	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>60</b>	–	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV120	6,1	<b>60,325</b>	<b>2<sup>3</sup>/<sub>8</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>60,325</b>	<b>2<sup>3</sup>/<sub>8</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>60,325</b>	<b>2<sup>3</sup>/<sub>8</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV120	6,1	<b>60,325</b>	<b>2<sup>3</sup>/<sub>8</sub></b>	275	115	155	80	30	120	129	121	153	12,5	80	230	18	23	M16	5/8
DKV140	9,3	<b>60,325</b>	<b>2<sup>3</sup>/<sub>8</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>60,325</b>	<b>2<sup>3</sup>/<sub>8</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>60,325</b>	<b>2<sup>3</sup>/<sub>8</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>60,325</b>	<b>2<sup>3</sup>/<sub>8</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>60,325</b>	<b>2<sup>3</sup>/<sub>8</sub></b>	315	135	183	90	32	140	150,3	139	172	15	95	260	22	27	M20	3/4
DKV130	6,8	<b>61,913</b>	<b>2<sup>7</sup>/<sub>16</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>61,913</b>	<b>2<sup>7</sup>/<sub>16</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>61,913</b>	<b>2<sup>7</sup>/<sub>16</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>61,913</b>	<b>2<sup>7</sup>/<sub>16</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV160	12,8	<b>61,913</b>	<b>2<sup>7</sup>/<sub>16</sub></b>	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>61,913</b>	<b>2<sup>7</sup>/<sub>16</sub></b>	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>61,913</b>	<b>2<sup>7</sup>/<sub>16</sub></b>	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>61,913</b>	<b>2<sup>7</sup>/<sub>16</sub></b>	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV130	6,8	<b>63,5</b>	<b>2<sup>1</sup>/<sub>2</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>63,5</b>	<b>2<sup>1</sup>/<sub>2</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>63,5</b>	<b>2<sup>1</sup>/<sub>2</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>63,5</b>	<b>2<sup>1</sup>/<sub>2</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV160	12,8	<b>63,5</b>	<b>2<sup>1</sup>/<sub>2</sub></b>	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>63,5</b>	<b>2<sup>1</sup>/<sub>2</sub></b>	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>63,5</b>	<b>2<sup>1</sup>/<sub>2</sub></b>	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>63,5</b>	<b>2<sup>1</sup>/<sub>2</sub></b>	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve

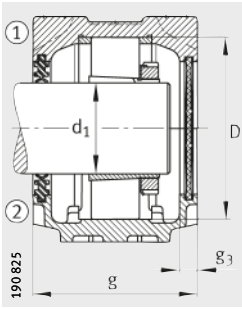


- ① Locating bearing
- ② Non-locating bearing

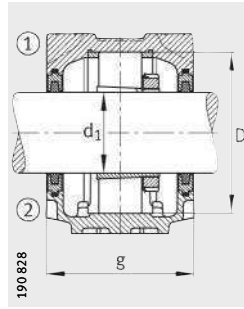
**Dimension table** (continued) · Dimensions in mm

Designation

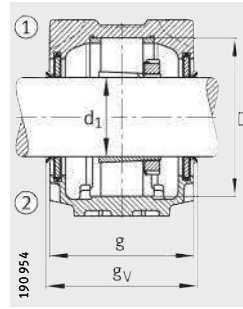
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV130-L</b>	1215-K-TVH-C3	H215	FRM130/15,5	DH515	TSV515	FSV515	DHV515	TCV515
<b>SNV130-L</b>	20215-K-T-VPC3	H215	FRM130/15,5	DH515	TSV515	FSV515	DHV515	TCV515
<b>SNV130-L</b>	2215-K-TVH-C3	H315	FRM130/12,5	DH515	TSV515	FSV515	DHV515	TCV515
<b>SNV130-L</b>	22215-E1-K	H315	FRM130/12,5	DH515	TSV515	FSV515	DHV515	TCV515
<b>SNV160-L</b>	1315-K-M-C3	H315	FRM160/14	DH615	TSV615	FSV615	DHV615	TCV615
<b>SNV160-L</b>	21315-E1-K	H315	FRM160/14	DH615	TSV615	FSV615	DHV615	TCV615
<b>SNV160-L</b>	2315-K-M-C3	H2315	FRM160/5	DH615	TSV615	FSV615	DHV615	TCV615
<b>SNV160-L</b>	22315-E1-K	H2315	FRM160/5	DH615	TSV615	FSV615	DHV615	TCV615
<b>SNV130-L</b>	1215-K-TVH-C3	H215X210	FRM130/15,5	DH515	TSV515X210	FSV515X210	DHV515X210	TCV515X210
<b>SNV130-L</b>	20215-K-T-VPC3	H215X210	FRM130/15,5	DH515	TSV515X210	FSV515X210	DHV515X210	TCV515X210
<b>SNV130-L</b>	2215-K-TVH-C3	H315X210	FRM130/12,5	DH515	TSV515X210	FSV515X210	DHV515X210	TCV515X210
<b>SNV130-L</b>	22215-E1-K	H315X210	FRM130/12,5	DH515	TSV515X210	FSV515X210	DHV515X210	TCV515X210
<b>SNV160-L</b>	1315-K-M-C3	H315X210	FRM160/14	DH615	TSV615X210	FSV615X210	DHV615X210	TCV615X210
<b>SNV160-L</b>	21315-E1-K	H315X210	FRM160/14	DH615	TSV615X210	FSV615X210	DHV615X210	TCV615X210
<b>SNV160-L</b>	2315-K-M-C3	H2315X210	FRM160/5	DH615	TSV615X210	FSV615X210	DHV615X210	TCV615X210
<b>SNV160-L</b>	22315-E1-K	H2315X210	FRM160/5	DH615	TSV615X210	FSV615X210	DHV615X210	TCV615X210
<b>SNV140-L</b>	1216-K-TVH-C3	H216X211	FRM140/16	DH516X211	TSV516X211	FSV516X211	DHV516X211	TCV516X211
<b>SNV140-L</b>	20216-K-T-VPC3	H216X211	FRM140/16	DH516X211	TSV516X211	FSV516X211	DHV516X211	TCV516X211
<b>SNV140-L</b>	2216-K-TVH-C3	H316X211	FRM140/12,5	DH516X211	TSV516X211	FSV516X211	DHV516X211	TCV516X211
<b>SNV140-L</b>	22216-E1-K	H316X211	FRM140/12,5	DH516X211	TSV516X211	FSV516X211	DHV516X211	TCV516X211
<b>SNV170-L</b>	1316-K-M-C3	H316X211	FRM170/14,5	DH616X211	TSV616X211	FSV616X211	DHV616X211	TCV616X211
<b>SNV170-L</b>	21316-E1-K	H316X211	FRM170/14,5	DH616X211	TSV616X211	FSV616X211	DHV616X211	TCV616X211
<b>SNV170-L</b>	2316-K-M-C3	H2316X211	FRM170/5	DH616X211	TSV616X211	FSV616X211	DHV616X211	TCV616X211
<b>SNV170-L</b>	22316-E1-K	H2316X211	FRM170/5	DH616X211	TSV616X211	FSV616X211	DHV616X211	TCV616X211
<b>SNV140-L</b>	1216-K-TVH-C3	H216X212	FRM140/16	DH516	TSV516	FSV516	DHV516	TCV516
<b>SNV140-L</b>	20216-K-T-VPC3	H216X212	FRM140/16	DH516	TSV516	FSV516	DHV516	TCV516
<b>SNV140-L</b>	2216-K-TVH-C3	H316X212	FRM140/12,5	DH516	TSV516	FSV516	DHV516	TCV516
<b>SNV140-L</b>	22216-E1-K	H316X212	FRM140/12,5	DH516	TSV516	FSV516	DHV516	TCV516
<b>SNV170-L</b>	1316-K-M-C3	H316X212	FRM170/14,5	DH616	TSV616	FSV616	DHV616	TCV616
<b>SNV170-L</b>	21316-E1-K	H316X212	FRM170/14,5	DH616	TSV616	FSV616	DHV616	TCV616
<b>SNV170-L</b>	2316-K-M-C3	H2316X212	FRM170/5	DH616	TSV616	FSV616	DHV616	TCV616
<b>SNV170-L</b>	22316-E1-K	H2316X212	FRM170/5	DH616	TSV616	FSV616	DHV616	TCV616



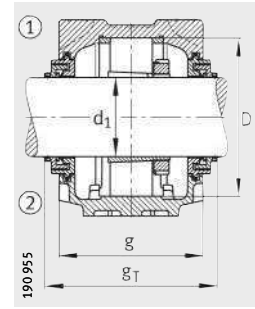
Double lip seal DH  
Cover DKV



Felt seal FSV



V ring seal DHV



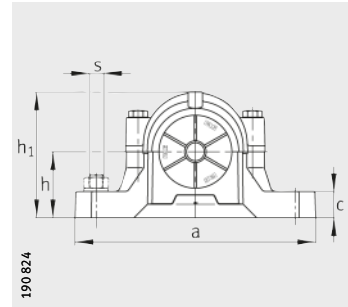
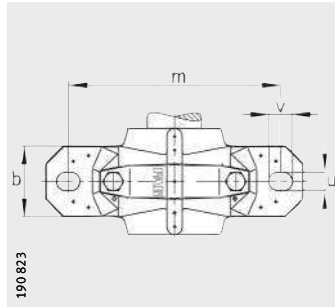
Taconite seal TCV

Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV130	6,8	<b>65</b>	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>65</b>	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>65</b>	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>65</b>	–	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV160	12,8	<b>65</b>	–	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>65</b>	–	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>65</b>	–	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>65</b>	–	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV130	6,8	<b>66,675</b>	<b>2<sup>5</sup>/<sub>8</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>66,675</b>	<b>2<sup>5</sup>/<sub>8</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>66,675</b>	<b>2<sup>5</sup>/<sub>8</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV130	6,8	<b>66,675</b>	<b>2<sup>5</sup>/<sub>8</sub></b>	280	120	161	80	30	130	134	126	158	12,5	80	230	18	23	M16	5/8
DKV160	12,8	<b>66,675</b>	<b>2<sup>5</sup>/<sub>8</sub></b>	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>66,675</b>	<b>2<sup>5</sup>/<sub>8</sub></b>	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>66,675</b>	<b>2<sup>5</sup>/<sub>8</sub></b>	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>66,675</b>	<b>2<sup>5</sup>/<sub>8</sub></b>	345	145	201	100	35	160	160,3	149	182	15	100	290	22	27	M20	3/4
DKV140	9,3	<b>68,263</b>	<b>2<sup>11</sup>/<sub>16</sub></b>	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>68,263</b>	<b>2<sup>11</sup>/<sub>16</sub></b>	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>68,263</b>	<b>2<sup>11</sup>/<sub>16</sub></b>	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>68,263</b>	<b>2<sup>11</sup>/<sub>16</sub></b>	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV170	14,4	<b>68,263</b>	<b>2<sup>11</sup>/<sub>16</sub></b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	<b>68,263</b>	<b>2<sup>11</sup>/<sub>16</sub></b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	<b>68,263</b>	<b>2<sup>11</sup>/<sub>16</sub></b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	<b>68,263</b>	<b>2<sup>11</sup>/<sub>16</sub></b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV140	9,3	<b>69,85</b>	<b>2<sup>3</sup>/<sub>4</sub></b>	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>69,85</b>	<b>2<sup>3</sup>/<sub>4</sub></b>	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>69,85</b>	<b>2<sup>3</sup>/<sub>4</sub></b>	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>69,85</b>	<b>2<sup>3</sup>/<sub>4</sub></b>	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV170	14,4	<b>69,85</b>	<b>2<sup>3</sup>/<sub>4</sub></b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	<b>69,85</b>	<b>2<sup>3</sup>/<sub>4</sub></b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	<b>69,85</b>	<b>2<sup>3</sup>/<sub>4</sub></b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	<b>69,85</b>	<b>2<sup>3</sup>/<sub>4</sub></b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve

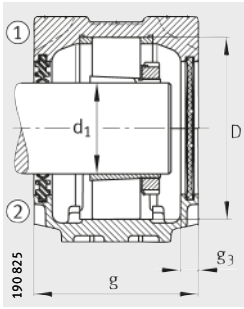


- ① Locating bearing
- ② Non-locating bearing

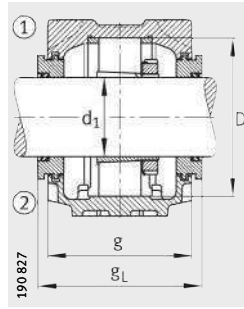
**Dimension table** (continued) · Dimensions in mm

Designation

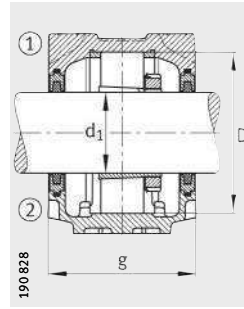
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV140-L</b>	1216-K-TVH-C3	H216	FRM140/16	DH516	TSV516	FSV516	DHV516	TCV516
<b>SNV140-L</b>	20216-K-T-VPC3	H216	FRM140/16	DH516	TSV516	FSV516	DHV516	TCV516
<b>SNV140-L</b>	2216-K-TVH-C3	H316	FRM140/12,5	DH516	TSV516	FSV516	DHV516	TCV516
<b>SNV140-L</b>	22216-E1-K	H316	FRM140/12,5	DH516	TSV516	FSV516	DHV516	TCV516
<b>SNV170-L</b>	1316-K-M-C3	H316	FRM170/14,5	DH616	TSV616	FSV616	DHV616	TCV616
<b>SNV170-L</b>	21316-E1-K	H316	FRM170/14,5	DH616	TSV616	FSV616	DHV616	TCV616
<b>SNV170-L</b>	2316-K-M-C3	H2316	FRM170/5	DH616	TSV616	FSV616	DHV616	TCV616
<b>SNV170-L</b>	22316-E1-K	H2316	FRM170/5	DH616	TSV616	FSV616	DHV616	TCV616
<b>SNV140-L</b>	1216-K-TVH-C3	H216X214	FRM140/16	DH516X214	TSV516X214	FSV516X214	DHV516X214	TCV516X214
<b>SNV140-L</b>	20216-K-T-VPC3	H216X214	FRM140/16	DH516X214	TSV516X214	FSV516X214	DHV516X214	TCV516X214
<b>SNV140-L</b>	2216-K-TVH-C3	H316X214	FRM140/12,5	DH516X214	TSV516X214	FSV516X214	DHV516X214	TCV516X214
<b>SNV140-L</b>	22216-E1-K	H316X214	FRM140/12,5	DH516X214	TSV516X214	FSV516X214	DHV516X214	TCV516X214
<b>SNV170-L</b>	1316-K-M-C3	H316X214	FRM170/14,5	DH616X214	TSV616X214	FSV616X214	DHV616X214	TCV616X214
<b>SNV170-L</b>	21316-E1-K	H316X214	FRM170/14,5	DH616X214	TSV616X214	FSV616X214	DHV616X214	TCV616X214
<b>SNV170-L</b>	2316-K-M-C3	H2316X214	FRM170/5	DH616X214	TSV616X214	FSV616X214	DHV616X214	TCV616X214
<b>SNV170-L</b>	22316-E1-K	H2316X214	FRM170/5	DH616X214	TSV616X214	FSV616X214	DHV616X214	TCV616X214
<b>SNV150-L</b>	1217-K-TVH-C3	H217X215	FRM150/16,5	DH517	TSV517	FSV517	DHV517	TCV517
<b>SNV150-L</b>	20217-K-MB-C3	H217X215	FRM150/16,5	DH517	TSV517	FSV517	DHV517	TCV517
<b>SNV150-L</b>	2217-K-M-C3	H317X215	FRM150/12,5	DH517	TSV517	FSV517	DHV517	TCV517
<b>SNV150-L</b>	22217-E1-K	H317X215	FRM150/12,5	DH517	TSV517	FSV517	DHV517	TCV517
<b>SNV180-L</b>	1317-K-M-C3	H317X215	FRM180/14,5	DH617	TSV617	FSV617	DHV617	TCV617
<b>SNV180-L</b>	21317-E1-K	H317X215	FRM180/14,5	DH617	TSV617	FSV617	DHV617	TCV617
<b>SNV180-L</b>	2317-K-M-C3	H2317X215	FRM180/5	DH617	TSV617	FSV617	DHV617	TCV617
<b>SNV180-L</b>	22317-E1-K	H2317X215	FRM180/5	DH617	TSV617	FSV617	DHV617	TCV617



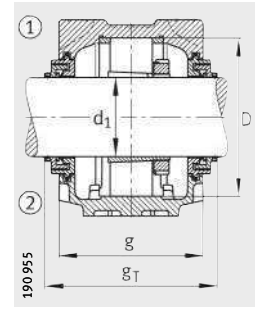
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



Felt seal FSV



Taconite seal TCV

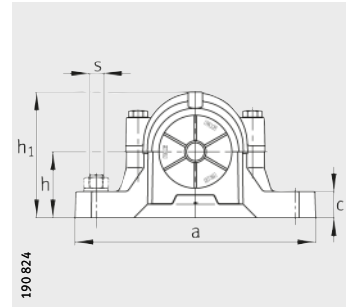
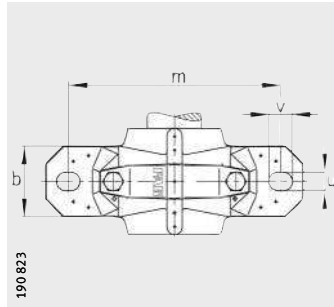
Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>v</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV140	9,3	<b>70</b>	–	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>70</b>	–	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>70</b>	–	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>70</b>	–	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV170	14,4	<b>70</b>	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	<b>70</b>	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	<b>70</b>	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	<b>70</b>	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV140	9,3	<b>73,025</b>	<b>27/8</b>	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>73,025</b>	<b>27/8</b>	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>73,025</b>	<b>27/8</b>	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV140	9,3	<b>73,025</b>	<b>27/8</b>	315	135	183	90	32	140	150,3	143	176	15	95	260	22	27	M20	3/4
DKV170	14,4	<b>73,025</b>	<b>27/8</b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	<b>73,025</b>	<b>27/8</b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	<b>73,025</b>	<b>27/8</b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV170	14,4	<b>73,025</b>	<b>27/8</b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4
DKV150	9,9	<b>74,613</b>	<b>215/16</b>	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	<b>74,613</b>	<b>215/16</b>	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	<b>74,613</b>	<b>215/16</b>	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	<b>74,613</b>	<b>215/16</b>	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV180	17	<b>74,613</b>	<b>215/16</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	<b>74,613</b>	<b>215/16</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	<b>74,613</b>	<b>215/16</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	<b>74,613</b>	<b>215/16</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8





# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve



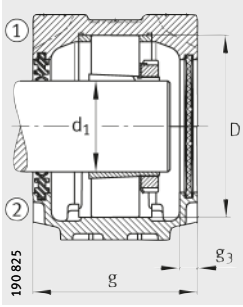
- ① Locating bearing
- ② Non-locating bearing

**Dimension table** (continued) · Dimensions in mm

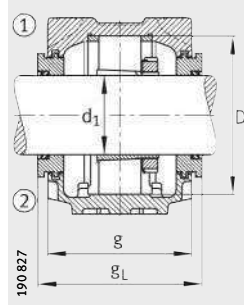
Designation

Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV150-L</b>	1217-K-TVH-C3	H217	FRM150/16,5	DH517	TSV517	FSV517	DHV517	TCV517
<b>SNV150-L</b>	20217-K-MB-C3	H217	FRM150/16,5	DH517	TSV517	FSV517	DHV517	TCV517
<b>SNV150-L</b>	2217-K-M-C3	H317	FRM150/12,5	DH517	TSV517	FSV517	DHV517	TCV517
<b>SNV150-L</b>	22217-E1-K	H317	FRM150/12,5	DH517	TSV517	FSV517	DHV517	TCV517
<b>SNV180-L</b>	1317-K-M-C3	H317	FRM180/14,5	DH617	TSV617	FSV617	DHV617	TCV617
<b>SNV180-L</b>	21317-E1-K	H317	FRM180/14,5	DH617	TSV617	FSV617	DHV617	TCV617
<b>SNV180-L</b>	2317-K-M-C3	H2317	FRM180/5	DH617	TSV617	FSV617	DHV617	TCV617
<b>SNV180-L</b>	22317-E1-K	H2317	FRM180/5	DH617	TSV617	FSV617	DHV617	TCV617
<b>SNV150-L</b>	1217-K-TVH-C3	H217X300	FRM150/16,5	DH517	TSV517X300	FSV517X300	DHV517X300	TCV517X300
<b>SNV150-L</b>	20217-K-MB-C3	H217X300	FRM150/16,5	DH517	TSV517X300	FSV517X300	DHV517X300	TCV517X300
<b>SNV150-L</b>	2217-K-M-C3	H317X300	FRM150/12,5	DH517	TSV517X300	FSV517X300	DHV517X300	TCV517X300
<b>SNV150-L</b>	22217-E1-K	H317X300	FRM150/12,5	DH517	TSV517X300	FSV517X300	DHV517X300	TCV517X300
<b>SNV180-L</b>	1317-K-M-C3	H317X300	FRM180/14,5	DH617	TSV617X300	FSV617X300	DHV617X300	TCV617X300
<b>SNV180-L</b>	21317-E1-K	H317X300	FRM180/14,5	DH617	TSV617X300	FSV617X300	DHV617X300	TCV617X300
<b>SNV180-L</b>	2317-K-M-C3	H2317X300	FRM180/5	DH617	TSV617X300	FSV617X300	DHV617X300	TCV617X300
<b>SNV180-L</b>	22317-E1-K	H2317X300	FRM180/5	DH617	TSV617X300	FSV617X300	DHV617X300	TCV617X300
<b>SNV160-L</b>	1218-K-TVH-C3	H218X302	FRM160/17,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
<b>SNV160-L</b>	20218-K-MB-C3	H218X302	FRM160/17,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
<b>SNV160-L</b>	2218-K-TVH-C3	H318X302	FRM160/12,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
<b>SNV160-L</b>	22218-E1-K	H318X302	FRM160/12,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
<b>SNV160-L</b>	23218-E1-K-TVPB	H2318X302	FRM160/6,3	DH518	TSV518X302	FSV518	DHV518	TCV518X302
<b>SNV190-L</b>	1318-K-M-C3	H318X302	FRM190/15,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
<b>SNV190-L</b>	20318-K-MB-C3	H318X302	FRM190/15,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
<b>SNV190-L</b>	21318-E1-K	H318X302	FRM190/15,5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
<b>SNV190-L</b>	2318-K-M-C3	H2318X302	FRM190/5	DH518	TSV518X302	FSV518	DHV518	TCV518X302
<b>SNV190-L</b>	22318-E1-K	H2318X302	FRM190/5	DH518	TSV518X302	FSV518	DHV518	TCV518X302

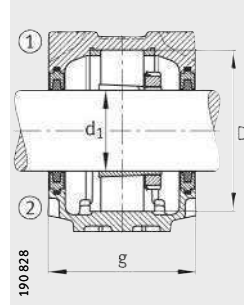




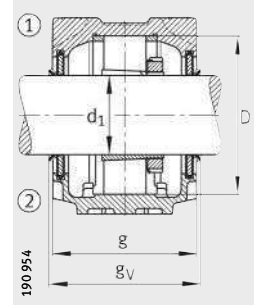
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



Felt seal FSV



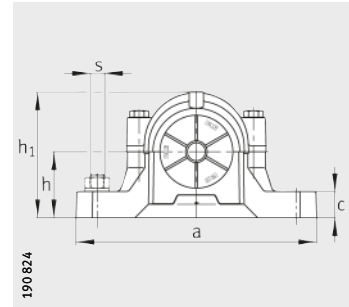
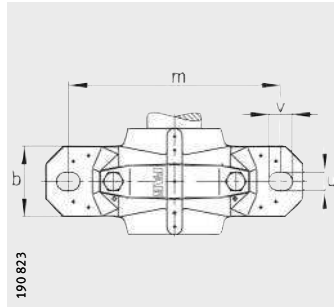
V ring seal DHV

Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV150	9,9	<b>75</b>	–	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	<b>75</b>	–	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	<b>75</b>	–	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	<b>75</b>	–	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV180	17	<b>75</b>	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	<b>75</b>	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	<b>75</b>	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	<b>75</b>	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV150	9,9	<b>76,2</b>	<b>3</b>	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	<b>76,2</b>	<b>3</b>	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	<b>76,2</b>	<b>3</b>	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV150	9,9	<b>76,2</b>	<b>3</b>	320	140	189	90	32	150	155,3	148	181	15	95	260	22	27	M20	3/4
DKV180	17	<b>76,2</b>	<b>3</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	<b>76,2</b>	<b>3</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	<b>76,2</b>	<b>3</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV180	17	<b>76,2</b>	<b>3</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8
DKV160	12,8	<b>79,375</b>	<b>3 1/8</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>79,375</b>	<b>3 1/8</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>79,375</b>	<b>3 1/8</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>79,375</b>	<b>3 1/8</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>79,375</b>	<b>3 1/8</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	22	<b>79,375</b>	<b>3 1/8</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>79,375</b>	<b>3 1/8</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>79,375</b>	<b>3 1/8</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>79,375</b>	<b>3 1/8</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>79,375</b>	<b>3 1/8</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve

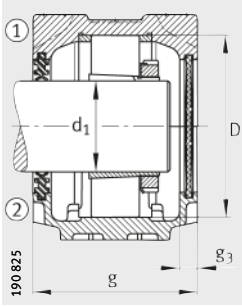


- ① Locating bearing
- ② Non-locating bearing

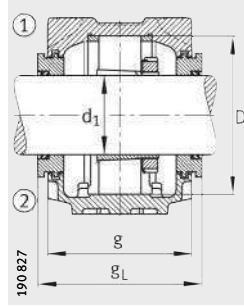
**Dimension table** (continued) · Dimensions in mm

Designation

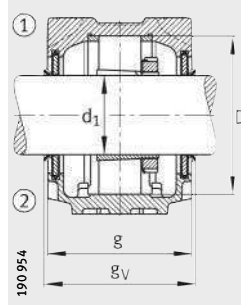
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV160-L</b>	1218-K-TVH-C3	H218	FRM160/17,5	DH518	TSV518	FSV518	DHV518	TCV518
<b>SNV160-L</b>	20218-K-MB-C3	H218	FRM160/17,5	DH518	TSV518	FSV518	DHV518	TCV518
<b>SNV160-L</b>	2218-K-TVH-C3	H318	FRM160/12,5	DH518	TSV518	FSV518	DHV518	TCV518
<b>SNV160-L</b>	22218-E1-K	H318	FRM160/12,5	DH518	TSV518	FSV518	DHV518	TCV518
<b>SNV160-L</b>	23218-E1-K-TVPB	H2318	FRM160/6,3	DH518	TSV518	FSV518	DHV518	TCV518
<b>SNV190-L</b>	1318-K-M-C3	H318	FRM190/15,5	DH518	TSV518	FSV518	DHV518	TCV518
<b>SNV190-L</b>	20318-K-MB-C3	H318	FRM190/15,5	DH518	TSV518	FSV518	DHV518	TCV518
<b>SNV190-L</b>	21318-E1-K	H318	FRM190/15,5	DH518	TSV518	FSV518	DHV518	TCV518
<b>SNV190-L</b>	2318-K-M-C3	H2318	FRM190/5	DH518	TSV518	FSV518	DHV518	TCV518
<b>SNV190-L</b>	22318-E1-K	H2318	FRM190/5	DH518	TSV518	FSV518	DHV518	TCV518
<b>SNV160-L</b>	1218-K-TVH-C3	H218X303	FRM160/17,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
<b>SNV160-L</b>	20218-K-MB-C3	H218X303	FRM160/17,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
<b>SNV160-L</b>	2218-K-TVH-C3	H318X303	FRM160/12,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
<b>SNV160-L</b>	22218-E1-K	H318X303	FRM160/12,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
<b>SNV160-L</b>	23218-E1-K-TVPB	H2318X303	FRM160/6,3	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
<b>SNV190-L</b>	1318-K-M-C3	H318X303	FRM190/15,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
<b>SNV190-L</b>	20318-K-MB-C3	H318X303	FRM190/15,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
<b>SNV190-L</b>	21318-E1-K	H318X303	FRM190/15,5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
<b>SNV190-L</b>	2318-K-M-C3	H2318X303	FRM190/5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
<b>SNV190-L</b>	22318-E1-K	H2318X303	FRM190/5	DH518	TSV518X303	FSV518X303	DHV518X303	TCV518X303
<b>SNV160-L</b>	1218-K-TVH-C3	H218X304	FRM160/17,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
<b>SNV160-L</b>	20218-K-MB-C3	H218X304	FRM160/17,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
<b>SNV160-L</b>	2218-K-TVH-C3	H318X304	FRM160/12,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
<b>SNV160-L</b>	22218-E1-K	H318X304	FRM160/12,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
<b>SNV160-L</b>	23218-E1-K-TVPB	H2318X304	FRM160/6,3	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
<b>SNV190-L</b>	1318-K-M-C3	H318X304	FRM190/15,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
<b>SNV190-L</b>	20318-K-MB-C3	H318X304	FRM190/15,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
<b>SNV190-L</b>	21318-E1-K	H318X304	FRM190/15,5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
<b>SNV190-L</b>	2318-K-M-C3	H2318X304	FRM190/5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304
<b>SNV190-L</b>	22318-E1-K	H2318X304	FRM190/5	DH518X304	TSV518X304	FSV518X304	DHV518X304	TCV518X304



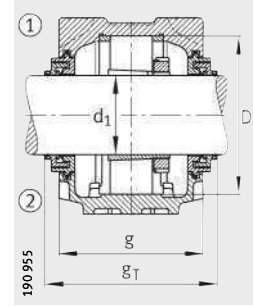
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



V ring seal DHV



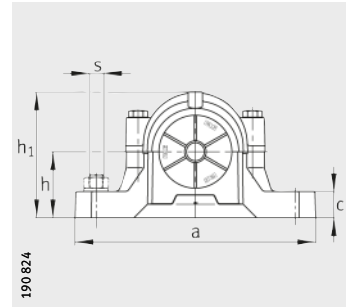
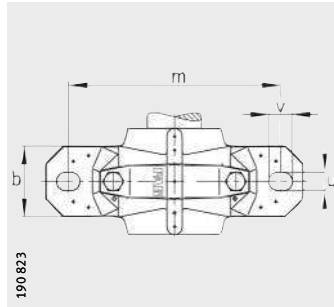
Taconite seal TCV

Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV160	12,8	<b>80</b>	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>80</b>	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>80</b>	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>80</b>	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>80</b>	–	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	22	<b>80</b>	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>80</b>	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>80</b>	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>80</b>	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>80</b>	–	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	12,8	<b>80,963</b>	<b>33/16</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>80,963</b>	<b>33/16</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>80,963</b>	<b>33/16</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>80,963</b>	<b>33/16</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>80,963</b>	<b>33/16</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	22	<b>80,963</b>	<b>33/16</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>80,963</b>	<b>33/16</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>80,963</b>	<b>33/16</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>80,963</b>	<b>33/16</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>80,963</b>	<b>33/16</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	12,8	<b>82,55</b>	<b>31/4</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>82,55</b>	<b>31/4</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>82,55</b>	<b>31/4</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>82,55</b>	<b>31/4</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	12,8	<b>82,55</b>	<b>31/4</b>	345	145	201	100	35	160	160,3	153	186	15	100	290	22	27	M20	3/4
DKV160	22	<b>82,55</b>	<b>31/4</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>82,55</b>	<b>31/4</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>82,55</b>	<b>31/4</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>82,55</b>	<b>31/4</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>82,55</b>	<b>31/4</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8
DKV160	22	<b>82,55</b>	<b>31/4</b>	380	155	229	110	40	190	170,3	163	178	15	112	320	26	32	M24	7/8



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve



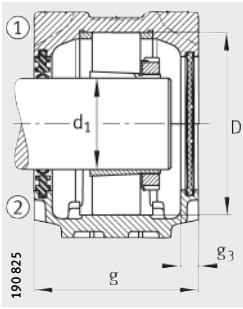
- ① Locating bearing
- ② Non-locating bearing

**Dimension table** (continued) · Dimensions in mm

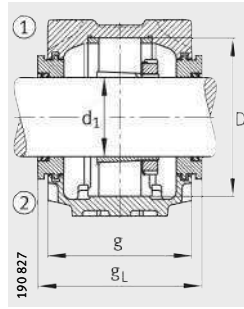
Designation

Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV170-L</b>	1219-K-M-C3	H219	FRM170/18	DH519	TSV519	FSV519	DHV519	TCV519
<b>SNV170-L</b>	2219-K-M-C3	H319	FRM170/12,5	DH519	TSV519	FSV519	DHV519	TCV519
<b>SNV170-L</b>	22219-E1-K	H319	FRM170/12,5	DH519	TSV519	FSV519	DHV519	TCV519
<b>SNV200-L</b>	1319-K-M-C3	H319	FRM200/17,5	DH619	TSV619	FSV619	DHV619	TCV619
<b>SNV200-L</b>	21319-E1-K-TVPB	H319	FRM200/17,5	DH619	TSV619	FSV619	DHV619	TCV619
<b>SNV200-L</b>	2319-K-M-C3	H2319	FRM200/6,5	DH619	TSV619	FSV619	DHV619	TCV619
<b>SNV200-L</b>	22319-E1-K	H2319	FRM200/6,5	DH619	TSV619	FSV619	DHV619	TCV619
<b>SNV170-L</b>	1219-K-M-C3	H219X306	FRM170/18	DH519	TSV519X306	FSV519	DHV519	TCV519X306
<b>SNV170-L</b>	2219-K-M-C3	H319X306	FRM170/12,5	DH519	TSV519X306	FSV519	DHV519	TCV519X306
<b>SNV170-L</b>	22219-E1-K	H319X306	FRM170/12,5	DH519	TSV519X306	FSV519	DHV519	TCV519X306
<b>SNV200-L</b>	1319-K-M-C3	H319X306	FRM200/17,5	DH619	TSV619X306	FSV619	DHV619	TCV619X306
<b>SNV200-L</b>	21319-E1-K-TVPB	H319X306	FRM200/17,5	DH619	TSV619X306	FSV619	DHV619	TCV619X306
<b>SNV200-L</b>	2319-K-M-C3	H2319X306	FRM200/6,5	DH619	TSV619X306	FSV619	DHV619	TCV619X306
<b>SNV200-L</b>	22319-E1-K	H2319X306	FRM200/6,5	DH619	TSV619X306	FSV619	DHV619	TCV619X306
<b>SNV180-L</b>	1220-K-M-C3	H220X307	FRM180/18	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
<b>SNV180-L</b>	20220-K-MB-C3	H220X307	FRM180/18	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
<b>SNV180-L</b>	2220-K-M-C3	H320X307	FRM180/12	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
<b>SNV180-L</b>	22220-E1-K	H320X307	FRM180/12	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
<b>SNV180-L</b>	23220-E1-K-TVPB	H2320X307	FRM180/4,85	DH520X307	TSV520X307	FSV520X307	DHV520X307	TCV520X307
<b>SNV215-L</b> <sup>1)</sup>	1320-K-M-C3	H320X307	FRM215/19,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
<b>SNV215-L</b> <sup>1)</sup>	20320-K-MB-C3	H320X307	FRM215/19,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
<b>SNV215-L</b> <sup>1)</sup>	21320-E1-K-TVPB	H320X307	FRM215/19,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
<b>SNV215-L</b> <sup>1)</sup>	2320-K-M-C3	H2320X307	FRM215/6,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
<b>SNV215-L</b> <sup>1)</sup>	22320-E1-K	H2320X307	FRM215/6,5	DH620X307	TSV620X307	FSV620X307	DHV620X307	TCV620X307
<b>SNV180-L</b>	1220-K-M-C3	H220X308	FRM180/18	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
<b>SNV180-L</b>	20220-K-MB-C3	H220X308	FRM180/18	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
<b>SNV180-L</b>	2220-K-M-C3	H320X308	FRM180/12	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
<b>SNV180-L</b>	22220-E1-K	H320X308	FRM180/12	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
<b>SNV180-L</b>	23220-E1-K-TVPB	H2320X308	FRM180/4,85	DH520X308	TSV520X308	FSV520X308	DHV520X308	TCV520X308
<b>SNV215-L</b> <sup>1)</sup>	1320-K-M-C3	H320X308	FRM215/19,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308
<b>SNV215-L</b> <sup>1)</sup>	20320-K-MB-C3	H320X308	FRM215/19,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308
<b>SNV215-L</b> <sup>1)</sup>	21320-E1-K-TVPB	H320X308	FRM215/19,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308
<b>SNV215-L</b> <sup>1)</sup>	2320-K-M-C3	H2320X308	FRM215/6,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308
<b>SNV215-L</b> <sup>1)</sup>	22320-E1-K	H2320X308	FRM215/6,5	DH620	TSV620X308	FSV620X308	DHV620	TCV620X308

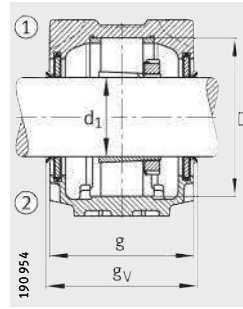
<sup>1)</sup> Housing with ring bolt.



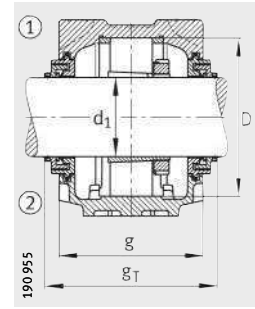
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



V ring seal DHV



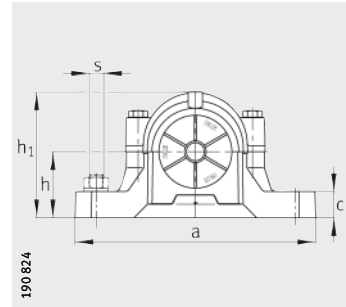
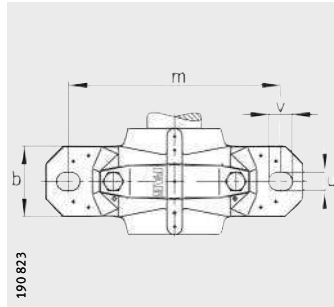
Taconite seal TCV

Cover	Mass m ≈kg	Dimensions																		
		Housing		d <sub>1</sub>	a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch																mm	inch
DKV170	14,4	<b>85</b>	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4	
DKV170	14,4	<b>85</b>	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4	
DKV170	14,4	<b>85</b>	–	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4	
DKV200	21	<b>85</b>	–	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	<b>85</b>	–	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	<b>85</b>	–	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	<b>85</b>	–	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8	
DKV170	14,4	<b>85,725</b>	<b>3 3/8</b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4	
DKV170	14,4	<b>85,725</b>	<b>3 3/8</b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4	
DKV170	14,4	<b>85,725</b>	<b>3 3/8</b>	345	150	219	100	35	170	167,3	158	193	16	112	290	22	27	M20	3/4	
DKV200	21	<b>85,725</b>	<b>3 3/8</b>	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	<b>85,725</b>	<b>3 3/8</b>	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	<b>85,725</b>	<b>3 3/8</b>	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8	
DKV200	21	<b>85,725</b>	<b>3 3/8</b>	410	175	248	120	45	200	192,3	183	218	16	125	350	26	32	M24	7/8	
DKV180	17	<b>87,313</b>	<b>3 7/16</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>87,313</b>	<b>3 7/16</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>87,313</b>	<b>3 7/16</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>87,313</b>	<b>3 7/16</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>87,313</b>	<b>3 7/16</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV215	24,5	<b>87,313</b>	<b>3 7/16</b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>87,313</b>	<b>3 7/16</b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>87,313</b>	<b>3 7/16</b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>87,313</b>	<b>3 7/16</b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>87,313</b>	<b>3 7/16</b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV180	17	<b>88,9</b>	<b>3 1/2</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>88,9</b>	<b>3 1/2</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>88,9</b>	<b>3 1/2</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>88,9</b>	<b>3 1/2</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>88,9</b>	<b>3 1/2</b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV215	24,5	<b>88,9</b>	<b>3 1/2</b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>88,9</b>	<b>3 1/2</b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>88,9</b>	<b>3 1/2</b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>88,9</b>	<b>3 1/2</b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>88,9</b>	<b>3 1/2</b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve



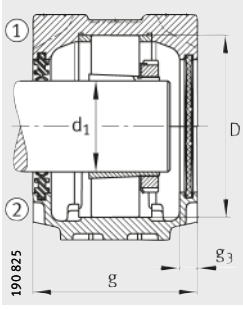
- ① Locating bearing
- ② Non-locating bearing

**Dimension table** (continued) · Dimensions in mm

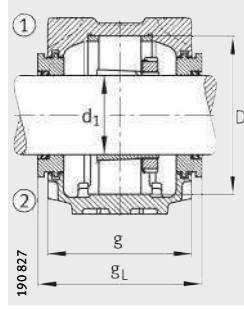
Designation

Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV180-L</b>	1220-K-M-C3	H220	FRM180/18	DH520	TSV520	FSV520	DHV520	TCV520
<b>SNV180-L</b>	20220-K-MB-C3	H220	FRM180/18	DH520	TSV520	FSV520	DHV520	TCV520
<b>SNV180-L</b>	2220-K-M-C3	H320	FRM180/12	DH520	TSV520	FSV520	DHV520	TCV520
<b>SNV180-L</b>	22220-E1-K	H320	FRM180/12	DH520	TSV520	FSV520	DHV520	TCV520
<b>SNV180-L</b>	23220-E1-K-TVPB	H2320	FRM180/4,85	DH520	TSV520	FSV520	DHV520	TCV520
<b>SNV215-L<sup>1)</sup></b>	1320-K-M-C3	H320	FRM215/19,5	DH620	TSV620	FSV620	DHV620	TCV620
<b>SNV215-L<sup>1)</sup></b>	20320-K-MB-C3	H320	FRM215/19,5	DH620	TSV620	FSV620	DHV620	TCV620
<b>SNV215-L<sup>1)</sup></b>	21320-E1-K-TVPB	H320	FRM215/19,5	DH620	TSV620	FSV620	DHV620	TCV620
<b>SNV215-L<sup>1)</sup></b>	2320-K-M-C3	H2320	FRM215/6,5	DH620	TSV620	FSV620	DHV620	TCV620
<b>SNV215-L<sup>1)</sup></b>	22320-E1-K	H2320	FRM215/6,5	DH620	TSV620	FSV620	DHV620	TCV620
<b>SNV180-L</b>	1220-K-M-C3	H220X310	FRM180/18	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
<b>SNV180-L</b>	20220-K-MB-C3	H220X310	FRM180/18	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
<b>SNV180-L</b>	2220-K-M-C3	H320X310	FRM180/12	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
<b>SNV180-L</b>	22220-E1-K	H320X310	FRM180/12	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
<b>SNV180-L</b>	23220-E1-K-TVPB	H2320X310	FRM180/4,85	DH520X310	TSV520X310	FSV520X310	DHV520X310	TCV520X310
<b>SNV215-L<sup>1)</sup></b>	1320-K-M-C3	H320X310	FRM215/19,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
<b>SNV215-L<sup>1)</sup></b>	20320-K-MB-C3	H320X310	FRM215/19,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
<b>SNV215-L<sup>1)</sup></b>	21320-E1-K-TVPB	H320X310	FRM215/19,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
<b>SNV215-L<sup>1)</sup></b>	2320-K-M-C3	H2320X310	FRM215/6,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
<b>SNV215-L<sup>1)</sup></b>	22320-E1-K	H2320X310	FRM215/6,5	DH620X310	TSV620X310	FSV620X310	DHV620X310	TCV620X310
<b>SNV180-L</b>	1220-K-M-C3	H220X311	FRM180/18	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
<b>SNV180-L</b>	20220-K-MB-C3	H220X311	FRM180/18	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
<b>SNV180-L</b>	2220-K-M-C3	H320X311	FRM180/12	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
<b>SNV180-L</b>	22220-E1-K	H320X311	FRM180/12	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
<b>SNV180-L</b>	23220-E1-K-TVPB	H2320X311	FRM180/4,85	DH520X310	TSV520X311	FSV520X311	DHV520X311	TCV520X311
<b>SNV215-L<sup>1)</sup></b>	1320-K-M-C3	H320X311	FRM215/19,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311
<b>SNV215-L<sup>1)</sup></b>	20320-K-MB-C3	H320X311	FRM215/19,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311
<b>SNV215-L<sup>1)</sup></b>	21320-E1-K-TVPB	H320X311	FRM215/19,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311
<b>SNV215-L<sup>1)</sup></b>	2320-K-M-C3	H2320X311	FRM215/6,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311
<b>SNV215-L<sup>1)</sup></b>	22320-E1-K	H2320X311	FRM215/6,5	DH620X310	TSV620X311	FSV620X311	DHV620X311	TCV620X311

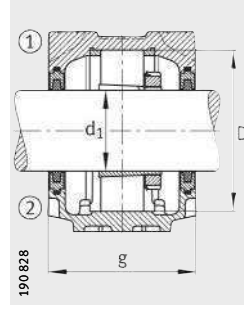
<sup>1)</sup> Housing with ring bolt.



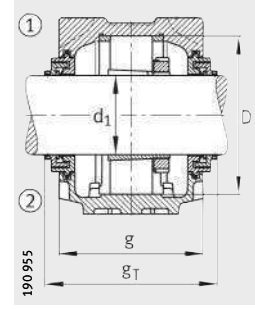
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



Felt seal FSV



Taconite seal TCV

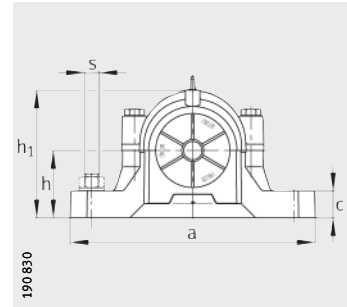
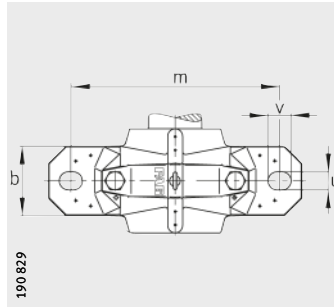
Cover	Mass m ≈kg	Dimensions																		
		Housing		d <sub>1</sub>	a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>v</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch																mm	inch
DKV180	17	<b>90</b>	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>90</b>	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>90</b>	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>90</b>	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>90</b>	–	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV215	24,5	<b>90</b>	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>90</b>	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>90</b>	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>90</b>	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>90</b>	–	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV180	17	<b>92,075</b>	<b>3<sup>5</sup>/<sub>8</sub></b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>92,075</b>	<b>3<sup>5</sup>/<sub>8</sub></b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>92,075</b>	<b>3<sup>5</sup>/<sub>8</sub></b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>92,075</b>	<b>3<sup>5</sup>/<sub>8</sub></b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>92,075</b>	<b>3<sup>5</sup>/<sub>8</sub></b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV215	24,5	<b>92,075</b>	<b>3<sup>5</sup>/<sub>8</sub></b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>92,075</b>	<b>3<sup>5</sup>/<sub>8</sub></b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>92,075</b>	<b>3<sup>5</sup>/<sub>8</sub></b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>92,075</b>	<b>3<sup>5</sup>/<sub>8</sub></b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>92,075</b>	<b>3<sup>5</sup>/<sub>8</sub></b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV180	17	<b>93,663</b>	<b>3<sup>11</sup>/<sub>16</sub></b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>93,663</b>	<b>3<sup>11</sup>/<sub>16</sub></b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>93,663</b>	<b>3<sup>11</sup>/<sub>16</sub></b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>93,663</b>	<b>3<sup>11</sup>/<sub>16</sub></b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV180	17	<b>93,663</b>	<b>3<sup>11</sup>/<sub>16</sub></b>	380	160	223	110	40	180	177,3	168	203	16	112	320	26	32	M24	7/8	
DKV215	24,5	<b>93,663</b>	<b>3<sup>11</sup>/<sub>16</sub></b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>93,663</b>	<b>3<sup>11</sup>/<sub>16</sub></b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>93,663</b>	<b>3<sup>11</sup>/<sub>16</sub></b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>93,663</b>	<b>3<sup>11</sup>/<sub>16</sub></b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	
DKV215	24,5	<b>93,663</b>	<b>3<sup>11</sup>/<sub>16</sub></b>	410	180	271	120	45	215	197,3	188	224	16	140	350	26	32	M24	7/8	





# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve



- ① Locating bearing
- ② Non-locating bearing

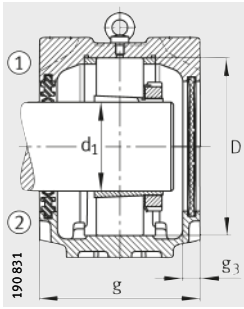
**Dimension table** (continued) · Dimensions in mm

Designation

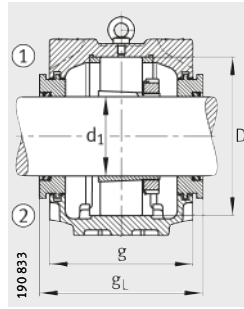
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
SNV200-L <sup>1)</sup>	1222-K-M-C3	H222X312	FRM200/21	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV200-L <sup>1)</sup>	20222-K-MB-C3	H222X312	FRM200/21	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV200-L <sup>1)</sup>	22222-E1-K	H322X312	FRM200/13,5	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV200-L <sup>1)</sup>	23222-E1-K-TVPB	H2322X312	FRM200/5,1	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV240-L	1322-K-M-C3	H322X312	FRM240/20	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV240-L	21322-E1-K-TVPB	H322X312	FRM240/20	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV240-L	2322-K-M-C3	H2322X312	FRM240/5	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV240-L	22322-E1-K	H2322X312	FRM240/5	DH522X312	TSV522X312	FSV522X312	DHV522X312	TCV522X312
SNV200-L <sup>1)</sup>	1222-K-M-C3	H222X314	FRM200/21	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L <sup>1)</sup>	20222-K-MB-C3	H222X314	FRM200/21	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L <sup>1)</sup>	2222-K-M-C3	H322X314	FRM200/13,5	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L <sup>1)</sup>	22222-E1-K	H322X314	FRM200/13,5	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L <sup>1)</sup>	23222-E1-K-TVPB	H2322X314	FRM200/5,1	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV240-L	1322-K-M-C3	H322X314	FRM240/20	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV240-L	21322-E1-K-TVPB	H322X314	FRM240/20	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV240-L	2322-K-M-C3	H2322X314	FRM240/5	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV240-L	22322-E1-K	H2322X314	FRM240/5	DH522X314	TSV522X314	FSV522X314	DHV522X314	TCV522X314
SNV200-L <sup>1)</sup>	1222-K-M-C3	H222	FRM200/21	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L <sup>1)</sup>	20222-K-MB-C3	H222	FRM200/21	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L <sup>1)</sup>	2222-K-M-C3	H322	FRM200/13,5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L <sup>1)</sup>	22222-E1-K	H322	FRM200/13,5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L <sup>1)</sup>	23222-E1-K-TVPB	H2322	FRM200/5,1	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	1322-K-M-C3	H322	FRM240/20	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	21322-E1-K-TVPB	H322	FRM240/20	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	2322-K-M-C3	H2322	FRM240/5	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	22322-E1-K	H2322	FRM240/5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L <sup>1)</sup>	1222-K-M-C3	H222X315	FRM200/21	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L <sup>1)</sup>	20222-K-MB-C3	H222X315	FRM200/21	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L <sup>1)</sup>	2222-K-M-C3	H322X315	FRM200/13,5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L <sup>1)</sup>	22222-E1-K	H322X315	FRM200/13,5	DH522	TSV522	FSV522	DHV522	TCV522
SNV200-L <sup>1)</sup>	23222-E1-K-TVPB	H2322X315	FRM200/5,1	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	1322-K-M-C3	H322X315	FRM240/20	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	21322-E1-K-TVPB	H322X315	FRM240/20	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	2322-K-M-C3	H2322X315	FRM240/5	DH522	TSV522	FSV522	DHV522	TCV522
SNV240-L	22322-E1-K	H2322X315	FRM240/5	DH522	TSV522	FSV522	DHV522	TCV522

<sup>1)</sup> Housing without ring bolt.

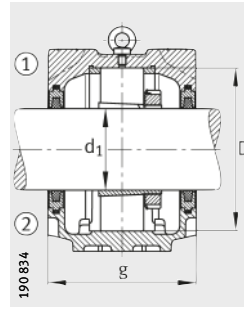




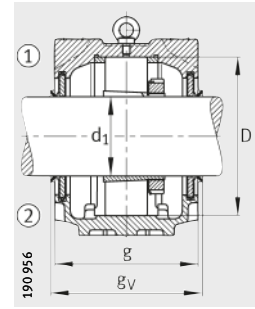
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



Felt seal FSV



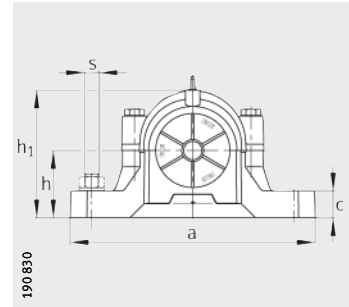
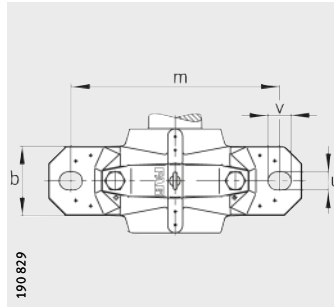
V ring seal DHV

Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV200	21	95,25	3 <sup>3</sup> / <sub>4</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	95,25	3 <sup>3</sup> / <sub>4</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	95,25	3 <sup>3</sup> / <sub>4</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	95,25	3 <sup>3</sup> / <sub>4</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	32	95,25	3 <sup>3</sup> / <sub>4</sub>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	95,25	3 <sup>3</sup> / <sub>4</sub>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	95,25	3 <sup>3</sup> / <sub>4</sub>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	21	98,425	3 <sup>7</sup> / <sub>8</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	98,425	3 <sup>7</sup> / <sub>8</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	98,425	3 <sup>7</sup> / <sub>8</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	98,425	3 <sup>7</sup> / <sub>8</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	98,425	3 <sup>7</sup> / <sub>8</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	32	98,425	3 <sup>7</sup> / <sub>8</sub>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	98,425	3 <sup>7</sup> / <sub>8</sub>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	98,425	3 <sup>7</sup> / <sub>8</sub>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	98,425	3 <sup>7</sup> / <sub>8</sub>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	21	100	-	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	100	-	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	100	-	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	100	-	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	100	-	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	32	100	-	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	100	-	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	100	-	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	100	-	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	21	100,013	3 <sup>15</sup> / <sub>16</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	100,013	3 <sup>15</sup> / <sub>16</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	100,013	3 <sup>15</sup> / <sub>16</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	100,013	3 <sup>15</sup> / <sub>16</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	100,013	3 <sup>15</sup> / <sub>16</sub>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	32	100,013	3 <sup>15</sup> / <sub>16</sub>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	100,013	3 <sup>15</sup> / <sub>16</sub>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	100,013	3 <sup>15</sup> / <sub>16</sub>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	100,013	3 <sup>15</sup> / <sub>16</sub>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve



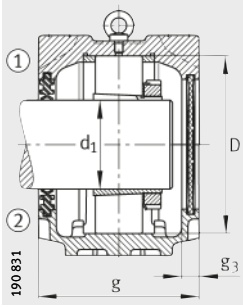
- ① Locating bearing
- ② Non-locating bearing

**Dimension table** (continued) · Dimensions in mm

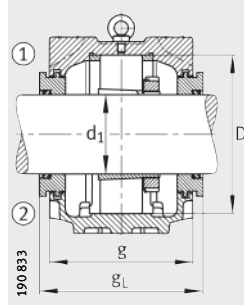
Designation

Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV200-L</b> <sup>1)</sup>	1222-K-M-C3	H222X400	FRM200/21	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
<b>SNV200-L</b> <sup>1)</sup>	20222-K-MB-C3	H222X400	FRM200/21	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
<b>SNV200-L</b> <sup>1)</sup>	2222-K-M-C3	H322X400	FRM200/13,5	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
<b>SNV200-L</b> <sup>1)</sup>	22222-E1-K	H322X400	FRM200/13,5	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
<b>SNV200-L</b> <sup>1)</sup>	23222-E1-K-TVPB	H2322X400	FRM200/5,1	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
<b>SNV240-L</b>	1322-K-M-C3	H322X400	FRM240/20	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
<b>SNV240-L</b>	21322-E1-K-TVPB	H322X400	FRM240/20	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
<b>SNV240-L</b>	2322-K-M-C3	H2322X400	FRM240/5	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
<b>SNV240-L</b>	22322-E1-K	H2322X400	FRM240/5	DH522	TSV522X400	FSV522X400	DHV522X400	TCV522X400
<b>SNV215-L</b>	20224-K-MB-C3	H3024X403	FRM215/23	DH524X403	TSV524X403	FSV524X403	DHV524X403	TCV524X403
<b>SNV215-L</b>	22224-E1-K	H3124X403	FRM215/14	DH524X403	TSV524X403	FSV524X403	DHV524X403	TCV524X403
<b>SNV215-L</b>	23224-E1-K-TVPB	H2324X403	FRM215/5	DH524X403	TSV524X403	FSV524X403	DHV524X403	TCV524X403
<b>SNV260-L</b>	22324-E1-K	H2324X403	FRM260/5	DH524X403	TSV524X403	FSV524X403	DHV524X403	TCV524X403
<b>SNV215-L</b>	20224-K-MB-C3	H3024X404	FRM215/23	DH524X403	TSV524X404	FSV524X404	DHV524X404	TCV524X404
<b>SNV215-L</b>	22224-E1-K	H3124X404	FRM215/14	DH524X403	TSV524X404	FSV524X404	DHV524X404	TCV524X404
<b>SNV215-L</b>	23224-E1-K-TVPB	H2324X404	FRM215/5	DH524X403	TSV524X404	FSV524X404	DHV524X404	TCV524X404
<b>SNV260-L</b>	22324-E1-K	H2324X404	FRM260/5	DH524X403	TSV524X404	FSV524X404	DHV524X404	TCV524X404
<b>SNV215-L</b>	20224-K-MB-C3	H3024	FRM215/23	DH524	TSV524	FSV524	DHV524	TCV524
<b>SNV215-L</b>	22224-E1-K	H3124	FRM215/14	DH524	TSV524	FSV524	DHV524	TCV524
<b>SNV215-L</b>	23224-E1-K-TVPB	H2324	FRM215/5	DH524	TSV524	FSV524	DHV524	TCV524
<b>SNV260-L</b>	22324-E1-K	H2324	FRM260/5	DH524	TSV524	FSV524	DHV524	TCV524
<b>SNV230-L</b>	20226-K-MB-C3	H3026X407	FRM230/25	DH526X407	TSV526X407	FSV526X407	DHV526X407	TCV526X407
<b>SNV230-L</b>	22226-E1-K	H3126X407	FRM230/13	DH526X407	TSV526X407	FSV526X407	DHV526X407	TCV526X407
<b>SNV230-L</b>	23226-E1-K-TVPB	H2326X407	FRM230/5	DH526X407	TSV526X407	FSV526X407	DHV526X407	TCV526X407
<b>SNV280-L</b>	22326-E1-K	H2326X407	FRM280/5	DH526X407	TSV526X407	FSV526X407	DHV526X407	TCV526X407
<b>SNV230-L</b>	20226-K-MB-C3	H3026X408	FRM230/25	DH526	TSV526X408	FSV526	DHV526	TCV526
<b>SNV230-L</b>	22226-E1-K	H3126X408	FRM230/13	DH526	TSV526X408	FSV526	DHV526	TCV526
<b>SNV230-L</b>	23226-E1-K-TVPB	H2326X408	FRM230/5	DH526	TSV526X408	FSV526	DHV526	TCV526
<b>SNV280-L</b>	22326-E1-K	H2326X408	FRM280/5	DH526	TSV526X408	FSV526	DHV526	TCV526

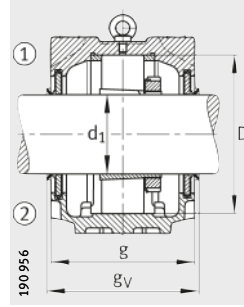
<sup>1)</sup> Housing without ring bolt.



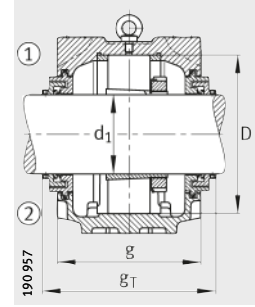
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



V ring seal DHV



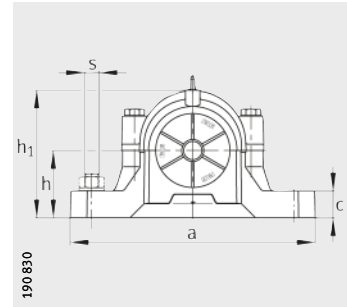
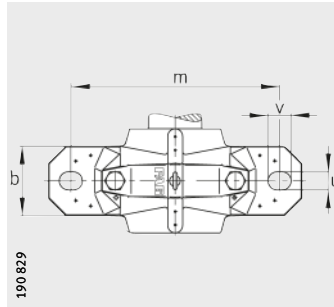
Taconite seal TCV

Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV200	21	<b>101,6</b>	<b>4</b>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	<b>101,6</b>	<b>4</b>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	<b>101,6</b>	<b>4</b>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	<b>101,6</b>	<b>4</b>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	21	<b>101,6</b>	<b>4</b>	410	175	248	120	45	200	195,3	183	218	16	125	350	26	32	M24	7/8
DKV200	32	<b>101,6</b>	<b>4</b>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	<b>101,6</b>	<b>4</b>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	<b>101,6</b>	<b>4</b>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV200	32	<b>101,6</b>	<b>4</b>	450	185	298	130	50	240	203,3	191	226	18	150	390	28	35	M24	1
DKV215	24,5	<b>106,363</b>	<b>4<sup>3/16</sup></b>	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	24,5	<b>106,363</b>	<b>4<sup>3/16</sup></b>	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	24,5	<b>106,363</b>	<b>4<sup>3/16</sup></b>	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	48	<b>106,363</b>	<b>4<sup>3/16</sup></b>	530	190	321	160	60	260	208,3	199	235	18	160	450	35	42	M30	1 <sup>1/4</sup>
DKV215	24,5	<b>107,95</b>	<b>4<sup>1/4</sup></b>	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	24,5	<b>107,95</b>	<b>4<sup>1/4</sup></b>	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	24,5	<b>107,95</b>	<b>4<sup>1/4</sup></b>	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	48	<b>107,95</b>	<b>4<sup>1/4</sup></b>	530	190	321	160	60	260	208,3	199	235	18	160	450	35	42	M30	1 <sup>1/4</sup>
DKV215	24,5	<b>110</b>	–	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	24,5	<b>110</b>	–	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	24,5	<b>110</b>	–	410	180	271	120	45	215	200,3	191	227	16	140	350	26	32	M24	7/8
DKV215	48	<b>110</b>	–	530	190	321	160	60	260	208,3	199	235	18	160	450	35	42	M30	1 <sup>1/4</sup>
DKV230	30	<b>112,713</b>	<b>4<sup>7/16</sup></b>	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	<b>112,713</b>	<b>4<sup>7/16</sup></b>	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	<b>112,713</b>	<b>4<sup>7/16</sup></b>	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	55	<b>112,713</b>	<b>4<sup>7/16</sup></b>	550	205	344	160	60	280	223,3	214	250	18	170	470	35	42	M30	1 <sup>1/4</sup>
DKV230	30	<b>114,3</b>	<b>4<sup>1/2</sup></b>	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	<b>114,3</b>	<b>4<sup>1/2</sup></b>	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	<b>114,3</b>	<b>4<sup>1/2</sup></b>	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	55	<b>114,3</b>	<b>4<sup>1/2</sup></b>	550	205	344	160	60	280	223,3	214	250	18	170	470	35	42	M30	1 <sup>1/4</sup>



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve

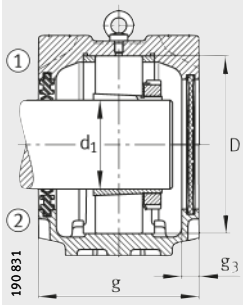


- ① Locating bearing
- ② Non-locating bearing

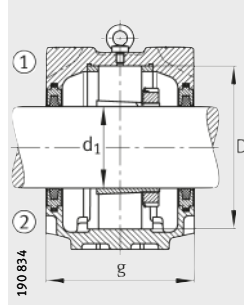
**Dimension table** (continued) · Dimensions in mm

Designation

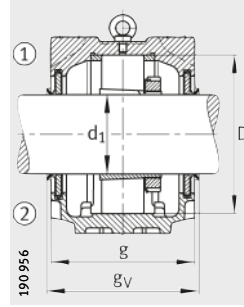
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV230-L</b>	20226-K-MB-C3	H3026	FRM230/25	DH526	TSV526	FSV526	DHV526	TCV526
<b>SNV230-L</b>	22226-E1-K	H3126	FRM230/13	DH526	TSV526	FSV526	DHV526	TCV526
<b>SNV230-L</b>	23226-E1-K-TVPB	H2326	FRM230/5	DH526	TSV526	FSV526	DHV526	TCV526
<b>SNV280-L</b>	22326-E1-K	H2326	FRM280/5	DH526	TSV526	FSV526	DHV526	TCV526
<b>SNV230-L</b>	20226-K-MB-C3	H3026X412	FRM230/25	DH526X412	TSV526X412	FSV526X412	DHV526X412	TCV526X412
<b>SNV230-L</b>	22226-E1-K	H3126X412	FRM230/13	DH526X412	TSV526X412	FSV526X412	DHV526X412	TCV526X412
<b>SNV230-L</b>	23226-E1-K-TVPB	H2326X412	FRM230/5	DH526X412	TSV526X412	FSV526X412	DHV526X412	TCV526X412
<b>SNV280-L</b>	22326-E1-K	H2326X412	FRM280/5	DH526X412	TSV526X412	FSV526X412	DHV526X412	TCV526X412
<b>SNV250-L</b>	20228-K-MB-C3	H3028	FRM250/28	DH528	TSV528	FSV528	DHV528	TCV528
<b>SNV250-L</b>	22228-E1-K	H3128	FRM250/15	DH528	TSV528	FSV528	DHV528	TCV528
<b>SNV250-L</b>	23228-E1-K-TVPB	H2328	FRM250/5	DH528	TSV528	FSV528	DHV528	TCV528
<b>SNV300-L</b>	22328-E1-K	H2328	FRM300/5	DH528	TSV528	FSV528	DHV528	TCV528
<b>SNV250-L</b>	20228-K-MB-C3	H3028X415	FRM250/28	DH528	TSV528X415	FSV528	DHV528	TCV528X415
<b>SNV250-L</b>	22228-E1-K	H3128X415	FRM250/15	DH528	TSV528X415	FSV528	DHV528	TCV528X415
<b>SNV250-L</b>	23228-E1-K-TVPB	H2328X415	FRM250/5	DH528	TSV528X415	FSV528	DHV528	TCV528X415
<b>SNV300-L</b>	22328-E1-K	H2328X415	FRM300/5	DH528	TSV528X415	FSV528	DHV528	TCV528X415
<b>SNV250-L</b>	20228-K-MB-C3	H3028X500	FRM250/28	DH528	TSV528X500	FSV528X500	DHV528X500	TCV528X500
<b>SNV250-L</b>	22228-E1-K	H3128X500	FRM250/15	DH528	TSV528X500	FSV528X500	DHV528X500	TCV528X500
<b>SNV250-L</b>	23228-E1-K-TVPB	H2328X500	FRM250/5	DH528	TSV528X500	FSV528X500	DHV528X500	TCV528X500
<b>SNV300-L</b>	22328-E1-K	H2328X500	FRM300/5	DH528	TSV528X500	FSV528X500	DHV528X500	TCV528X500
<b>SNV270-L</b>	20230-K-MB-C3	H3030X503	FRM270/30,5	DH530X503	TSV530X503	FSV530X503	DHV530X503	TCV530X503
<b>SNV270-L</b>	22230-E1-K	H3130X503	FRM270/16,5	DH530X503	TSV530X503	FSV530X503	DHV530X503	TCV530X503
<b>SNV270-L</b>	23230-E1-K-TVPB	H2330X503	FRM270/5	DH530X503	TSV530X503	FSV530X503	DHV530X503	TCV530X503
<b>SNV320-L</b>	22330-E1-K	H2330X503	FRM320/5	DH530X503	TSV530X503	FSV530X503	DHV530X503	TCV530X503
<b>SNV270-L</b>	20230-K-MB-C3	H3030X504	FRM270/30,5	DH530X504	TSV530X504	FSV530X504	DHV530X504	TCV530X504
<b>SNV270-L</b>	22230-E1-K	H3130X504	FRM270/16,5	DH530X504	TSV530X504	FSV530X504	DHV530X504	TCV530X504
<b>SNV270-L</b>	23230-E1-K-TVPB	H2330X504	FRM270/5	DH530X504	TSV530X504	FSV530X504	DHV530X504	TCV530X504
<b>SNV320-L</b>	22330-E1-K	H2330X504	FRM320/5	DH530X504	TSV530X504	FSV530X504	DHV530X504	TCV530X504



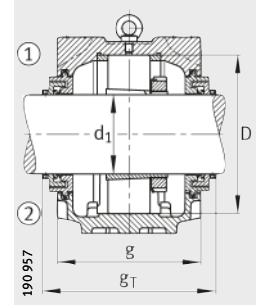
Double lip seal DH  
Cover DKV



Felt seal FSV



V ring seal DHV



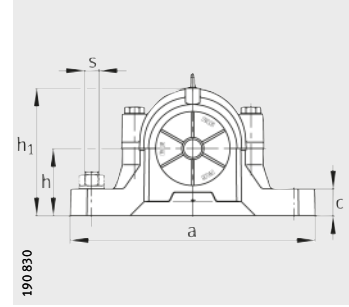
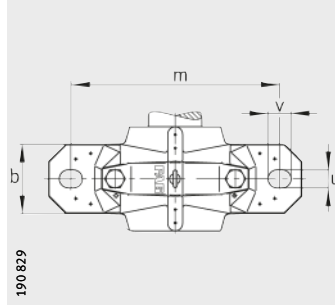
Taconite seal TCV

Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch																mm
DKV230	30	<b>115</b>	–	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	<b>115</b>	–	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	<b>115</b>	–	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	55	<b>115</b>	–	550	205	344	160	60	280	223,3	214	250	18	170	470	35	42	M30	1 <sup>1/4</sup>
DKV230	30	<b>120,65</b>	<b>4<sup>3/4</sup></b>	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	<b>120,65</b>	<b>4<sup>3/4</sup></b>	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	30	<b>120,65</b>	<b>4<sup>3/4</sup></b>	445	190	291	130	50	230	208,3	199	235	18	150	380	28	35	M24	1
DKV230	55	<b>120,65</b>	<b>4<sup>3/4</sup></b>	550	205	344	160	60	280	223,3	214	250	18	170	470	35	42	M30	1 <sup>1/4</sup>
DKV250	38	<b>125</b>	–	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 <sup>1/4</sup>
DKV250	38	<b>125</b>	–	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 <sup>1/4</sup>
DKV250	38	<b>125</b>	–	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 <sup>1/4</sup>
DKV250	70	<b>125</b>	–	620	215	366	170	65	300	233,3	224	260	18	180	520	35	42	M30	1 <sup>1/4</sup>
DKV250	38	<b>125,413</b>	<b>4<sup>15/16</sup></b>	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 <sup>1/4</sup>
DKV250	38	<b>125,413</b>	<b>4<sup>15/16</sup></b>	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 <sup>1/4</sup>
DKV250	38	<b>125,413</b>	<b>4<sup>15/16</sup></b>	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 <sup>1/4</sup>
DKV250	70	<b>125,413</b>	<b>4<sup>15/16</sup></b>	620	215	366	170	65	300	233,3	224	260	18	180	520	35	42	M30	1 <sup>1/4</sup>
DKV250	38	<b>127</b>	<b>5</b>	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 <sup>1/4</sup>
DKV250	38	<b>127</b>	<b>5</b>	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 <sup>1/4</sup>
DKV250	38	<b>127</b>	<b>5</b>	500	200	304	150	50	250	218,3	209	245	18	150	420	35	42	M30	1 <sup>1/4</sup>
DKV250	70	<b>127</b>	<b>5</b>	620	215	366	170	65	300	233,3	224	260	18	180	520	35	42	M30	1 <sup>1/4</sup>
DKV270	45,5	<b>131,763</b>	<b>5<sup>3/16</sup></b>	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 <sup>1/4</sup>
DKV270	45,5	<b>131,763</b>	<b>5<sup>3/16</sup></b>	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 <sup>1/4</sup>
DKV270	45,5	<b>131,763</b>	<b>5<sup>3/16</sup></b>	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 <sup>1/4</sup>
DKV270	95	<b>131,763</b>	<b>5<sup>3/16</sup></b>	650	225	386	180	65	320	243,3	234	270	18	190	560	35	42	M30	1 <sup>1/4</sup>
DKV270	45,5	<b>133,35</b>	<b>5<sup>1/4</sup></b>	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 <sup>1/4</sup>
DKV270	45,5	<b>133,35</b>	<b>5<sup>1/4</sup></b>	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 <sup>1/4</sup>
DKV270	45,5	<b>133,35</b>	<b>5<sup>1/4</sup></b>	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 <sup>1/4</sup>
DKV270	95	<b>133,35</b>	<b>5<sup>1/4</sup></b>	650	225	386	180	65	320	243,3	234	270	18	190	560	35	42	M30	1 <sup>1/4</sup>



# Plummer block housings

SNV, split  
For bearings with tapered bore and adapter sleeve

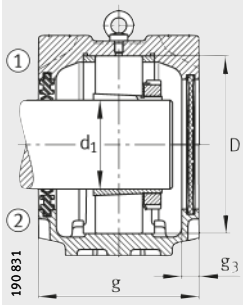


- ① Locating bearing
- ② Non-locating bearing

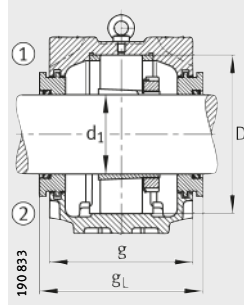
**Dimension table** (continued) · Dimensions in mm

Designation

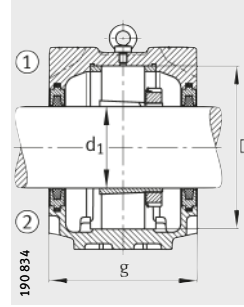
Housing	Bearing	Adapter sleeve	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal
<b>SNV270-L</b>	20230-K-MB-C3	H3030	FRM270/30,5	DH530	TSV530	FSV530	DHV530	TCV530
<b>SNV270-L</b>	22230-E1-K	H3130	FRM270/16,5	DH530	TSV530	FSV530	DHV530	TCV530
<b>SNV270-L</b>	23230-E1-K-TVPB	H2330	FRM270/5	DH530	TSV530	FSV530	DHV530	TCV530
<b>SNV320-L</b>	22330-E1-K	H2330	FRM320/5	DH530	TSV530	FSV530	DHV530	TCV530
<b>SNV290-L</b>	20232-K-MB-C3	H3032X507	FRM290/33	DH532X507	TSV532X507	FSV532X507	DHV532X507	TCV532X507
<b>SNV290-L</b>	22232-E1-K	H3132X507	FRM290/17	DH532X507	TSV532X507	FSV532X507	DHV532X507	TCV532X507
<b>SNV290-L</b>	23232-E1-K-TVPB	H2332X507	FRM290/5	DH532X507	TSV532X507	FSV532X507	DHV532X507	TCV532X507
<b>SNV340-L</b>	22332-K-MB	H2332X507	FRM340/5	DH532X507	TSV532X507	FSV532X507	DHV532X507	TCV532X507
<b>SNV290-L</b>	20232-K-MB-C3	H3032X508	FRM290/33	DH532	TSV532	FSV532	DHV532	TCV532
<b>SNV290-L</b>	22232-E1-K	H3132X508	FRM290/17	DH532	TSV532	FSV532	DHV532	TCV532
<b>SNV290-L</b>	23232-E1-K-TVPB	H2332X508	FRM290/5	DH532	TSV532	FSV532	DHV532	TCV532
<b>SNV340-L</b>	22332-K-MB	H2332X508	FRM340/5	DH532	TSV532	FSV532	DHV532	TCV532
<b>SNV290-L</b>	20232-K-MB-C3	H3032	FRM290/33	DH532	TSV532	FSV532	DHV532	TCV532
<b>SNV290-L</b>	22232-E1-K	H3132	FRM290/17	DH532	TSV532	FSV532	DHV532	TCV532
<b>SNV290-L</b>	23232-E1-K-TVPB	H2332	FRM290/5	DH532	TSV532	FSV532	DHV532	TCV532
<b>SNV340-L</b>	22332-K-MB	H2332	FRM340/5	DH532	TSV532	FSV532	DHV532	TCV532



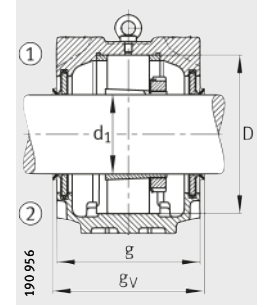
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



Felt seal FSV



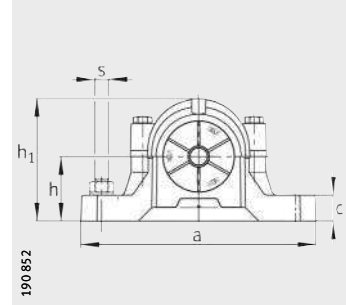
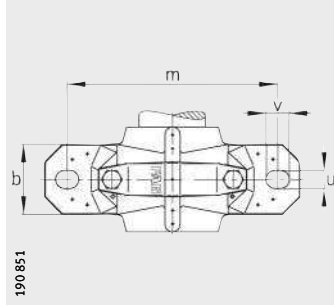
V ring seal DHV

Cover	Mass m Housing ≈kg	Dimensions																	
		d <sub>1</sub>		a	g	h <sub>1</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s	
		mm	inch															mm	inch
DKV270	45,5	<b>135</b>	–	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 <sup>1</sup> / <sub>4</sub>
DKV270	45,5	<b>135</b>	–	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 <sup>1</sup> / <sub>4</sub>
DKV270	45,5	<b>135</b>	–	530	215	328	160	60	270	233,3	224	260	18	160	450	35	42	M30	1 <sup>1</sup> / <sub>4</sub>
DKV270	95	<b>135</b>	–	650	225	386	180	65	320	243,3	234	270	18	190	560	35	42	M30	1 <sup>1</sup> / <sub>4</sub>
DKV290	53,8	<b>138,113</b>	<b>5<sup>7</sup>/<sub>16</sub></b>	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 <sup>1</sup> / <sub>4</sub>
DKV290	53,8	<b>138,113</b>	<b>5<sup>7</sup>/<sub>16</sub></b>	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 <sup>1</sup> / <sub>4</sub>
DKV290	53,8	<b>138,113</b>	<b>5<sup>7</sup>/<sub>16</sub></b>	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 <sup>1</sup> / <sub>4</sub>
DKV290	115	<b>138,113</b>	<b>5<sup>7</sup>/<sub>16</sub></b>	680	235	406	190	70	340	253,3	244	298	18	200	580	42	50	M36	1 <sup>1</sup> / <sub>2</sub>
DKV290	53,8	<b>139,7</b>	<b>5<sup>1</sup>/<sub>2</sub></b>	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 <sup>1</sup> / <sub>4</sub>
DKV290	53,8	<b>139,7</b>	<b>5<sup>1</sup>/<sub>2</sub></b>	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 <sup>1</sup> / <sub>4</sub>
DKV290	53,8	<b>139,7</b>	<b>5<sup>1</sup>/<sub>2</sub></b>	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 <sup>1</sup> / <sub>4</sub>
DKV290	115	<b>139,7</b>	<b>5<sup>1</sup>/<sub>2</sub></b>	680	235	406	190	70	340	253,3	244	298	18	200	580	42	50	M36	1 <sup>1</sup> / <sub>2</sub>
DKV290	53,8	<b>140</b>	–	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 <sup>1</sup> / <sub>4</sub>
DKV290	53,8	<b>140</b>	–	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 <sup>1</sup> / <sub>4</sub>
DKV290	53,8	<b>140</b>	–	550	225	351	160	60	290	243,3	234	270	18	170	470	35	42	M30	1 <sup>1</sup> / <sub>4</sub>
DKV290	115	<b>140</b>	–	680	235	406	190	70	340	253,3	244	298	18	200	580	42	50	M36	1 <sup>1</sup> / <sub>2</sub>



# Plummer block housings

SNV, split  
For bearings with cylindrical bore

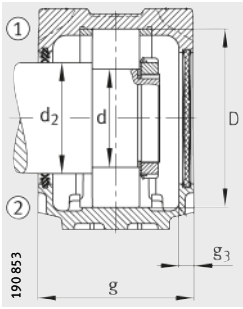


- ① Locating bearing
- ② Non-locating bearing

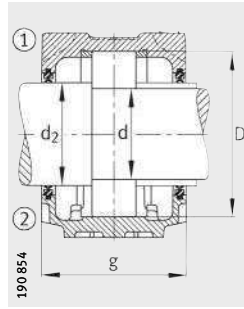
**Dimension table** - Dimensions in mm

Designation										Mass m
Housing	Bearing	Lock- nut	Tab washer	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Cover	Hous- ing ≈kg
<b>SNV052-L</b>	1304-TVH	KM4	MB4	FRM52/6	DH304	TSV304	–	DHV304	DKV052	1,3
<b>SNV052-L</b>	20304-TVP	KM4	MB4	FRM52/6	DH304	TSV304	–	DHV304	DKV052	1,3
<b>SNV052-L</b>	21304-E1-TVPB	KM4	MB4	FRM52/6	DH304	TSV304	–	DHV304	DKV052	1,3
<b>SNV052-L</b>	2304-TVH	KM4	MB4	FRM52/3	DH304	TSV304	–	DHV304	DKV052	1,3
<b>SNV052-L</b>	1205-TVH	KM5	MB5	FRM52/6	DH205	TSV205	–	–	DKV052	1,3
<b>SNV052-L</b>	20205-TVP	KM5	MB5	FRM52/6	DH205	TSV205	–	–	DKV052	1,3
<b>SNV052-L</b>	2205-TVH	KM5	MB5	FRM52/4,5	DH205	TSV205	–	–	DKV052	1,3
<b>SNV052-L</b>	22205-E1	KM5	MB5	FRM52/4,5	DH205	TSV205	–	–	DKV052	1,3
<b>SNV062-L</b>	1305-TVH	KM5	MB5	FRM62/6,5	DH305	TSV305	FSV305	DHV305	DKV062	1,9
<b>SNV062-L</b>	20305-TVP	KM5	MB5	FRM62/6,5	DH305	TSV305	FSV305	DHV305	DKV062	1,9
<b>SNV062-L</b>	21305-E1-TVPB	KM5	MB5	FRM62/6,5	DH305	TSV305	FSV305	DHV305	DKV062	1,9
<b>SNV062-L</b>	2305-TVH	KM5	MB5	FRM62/3	DH305	TSV305	FSV305	DHV305	DKV062	1,9
<b>SNV062-L</b>	1206-TVH	KM6	MB6	FRM62/7	DH206	TSV206	–	–	DKV062	1,9
<b>SNV062-L</b>	20206-TVP	KM6	MB6	FRM62/7	DH206	TSV206	–	–	DKV062	1,9
<b>SNV062-L</b>	2206-TVH	KM6	MB6	FRM62/5	DH206	TSV206	–	–	DKV062	1,9
<b>SNV062-L</b>	22206-E1	KM6	MB6	FRM62/5	DH206	TSV206	–	–	DKV062	1,9
<b>SNV072-L</b>	1306-TVH	KM6	MB6	FRM72/7	DH306	TSV306	FSV306	DHV306	DKV072	2
<b>SNV072-L</b>	20306-TVP	KM6	MB6	FRM72/7	DH306	TSV306	FSV306	DHV306	DKV072	2
<b>SNV072-L</b>	21306-E1-TVPB	KM6	MB6	FRM72/7	DH306	TSV306	FSV306	DHV306	DKV072	2
<b>SNV072-L</b>	2306-TVH	KM6	MB6	FRM72/3	DH306	TSV306	FSV306	DHV306	DKV072	2
<b>SNV072-L</b>	1207-TVH	KM7	MB7	FRM72/8	DH207	TSV207	–	–	DKV072	2
<b>SNV072-L</b>	20207-TVP	KM7	MB7	FRM72/8	DH207	TSV207	–	–	DKV072	2
<b>SNV072-L</b>	2207-TVH	KM7	MB7	FRM72/5	DH207	TSV207	–	–	DKV072	2
<b>SNV072-L</b>	22207-E1	KM7	MB7	FRM72/5	DH207	TSV207	–	–	DKV072	2
<b>SNV080-L</b>	1307-TVH	KM7	MB7	FRM80/9	DH307	TSV307	FSV307	DHV307	DKV080	2,9
<b>SNV080-L</b>	20307-TVP	KM7	MB7	FRM80/9	DH307	TSV307	FSV307	DHV307	DKV080	2,9
<b>SNV080-L</b>	21307-E1-TVPB	KM7	MB7	FRM80/9	DH307	TSV307	FSV307	DHV307	DKV080	2,9
<b>SNV080-L</b>	2307-TVH	KM7	MB7	FRM80/4	DH307	TSV307	FSV307	DHV307	DKV080	2,9

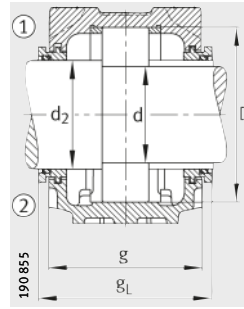




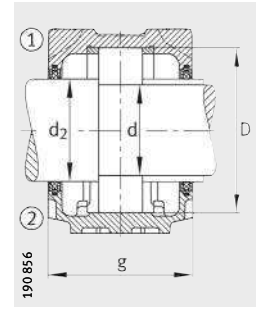
Double lip seal DH  
Cover DKV



Double lip seal DH



Labyrinth ring TSV



Felt seal FSV

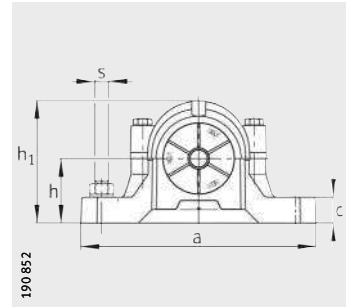
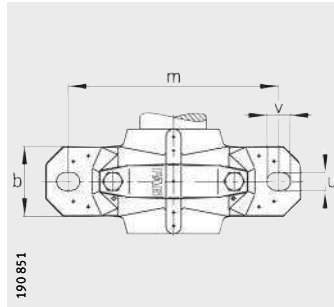
Dimensions

d	a	g	h <sub>1</sub>	d <sub>2</sub>	b	c	D	g <sub>L</sub>	g <sub>v</sub>	g <sub>3</sub>	h	m	u	v	s	
															mm	inch
20	165	70	75	25	46	19	52	95	76	10,5	40	130	15	20	M12	1/2
20	165	70	75	25	46	19	52	95	76	10,5	40	130	15	20	M12	1/2
20	165	70	75	25	46	19	52	95	76	10,5	40	130	15	20	M12	1/2
20	165	70	75	25	46	19	52	95	76	10,5	40	130	15	20	M12	1/2
25	165	70	75	30	46	19	52	95	-	10,5	40	130	15	20	M12	1/2
25	165	70	75	30	46	19	52	95	-	10,5	40	130	15	20	M12	1/2
25	165	70	75	30	46	19	52	95	-	10,5	40	130	15	20	M12	1/2
25	165	70	75	30	46	19	52	95	-	10,5	40	130	15	20	M12	1/2
25	185	75	91	30	52	22	62	100	81	10,5	50	150	15	20	M12	1/2
25	185	75	91	30	52	22	62	100	81	10,5	50	150	15	20	M12	1/2
25	185	75	91	30	52	22	62	100	81	10,5	50	150	15	20	M12	1/2
25	185	75	91	30	52	22	62	100	81	10,5	50	150	15	20	M12	1/2
30	185	75	91	35	52	22	62	100	-	10,5	50	150	15	20	M12	1/2
30	185	75	91	35	52	22	62	100	-	10,5	50	150	15	20	M12	1/2
30	185	75	91	35	52	22	62	100	-	10,5	50	150	15	20	M12	1/2
30	185	75	91	35	52	22	62	100	-	10,5	50	150	15	20	M12	1/2
30	185	80	97	35	52	22	72	93	86	10,5	50	150	15	20	M12	1/2
30	185	80	97	35	52	22	72	93	86	10,5	50	150	15	20	M12	1/2
30	185	80	97	35	52	22	72	93	86	10,5	50	150	15	20	M12	1/2
30	185	80	97	35	52	22	72	93	86	10,5	50	150	15	20	M12	1/2
35	185	80	97	45	52	22	72	107	-	10,5	50	150	15	20	M12	1/2
35	185	80	97	45	52	22	72	107	-	10,5	50	150	15	20	M12	1/2
35	185	80	97	45	52	22	72	107	-	10,5	50	150	15	20	M12	1/2
35	185	80	97	45	52	22	72	107	-	10,5	50	150	15	20	M12	1/2
35	205	85	112	45	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
35	205	85	112	45	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
35	205	85	112	45	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
35	205	85	112	45	60	25	80	98	93	10,5	60	170	15	20	M12	1/2



# Plummer block housings

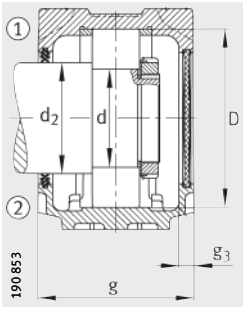
SNV, split  
For bearings with cylindrical bore



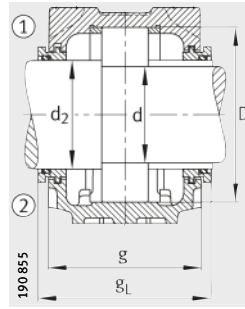
- ① Locating bearing
- ② Non-locating bearing

**Dimension table** (continued) · Dimensions in mm

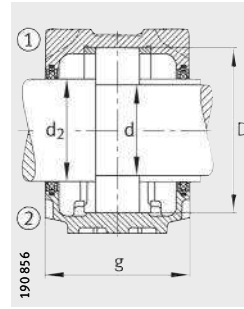
Designation										Mass m
Housing	Bearing	Lock- nut	Tab washer	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Cover	Hous- ing ≈kg
<b>SNV080-L</b>	1208-TVH	KM8	MB8	FRM80/10,5	DH208	TSV208	FSV208	DHV208	DKV080	2,9
<b>SNV080-L</b>	20208-TVP	KM8	MB8	FRM80/10,5	DH208	TSV208	FSV208	DHV208	DKV080	2,9
<b>SNV080-L</b>	2208-TVH	KM8	MB8	FRM80/8	DH208	TSV208	FSV208	DHV208	DKV080	2,9
<b>SNV080-L</b>	22208-E1	KM8	MB8	FRM80/8	DH208	TSV208	FSV208	DHV208	DKV080	2,9
<b>SNV090-L</b>	1308-TVH	KM8	MB8	FRM90/9	DH308	TSV308	FSV308	DHV308	DKV090	3,1
<b>SNV090-L</b>	20308-TVP	KM8	MB8	FRM90/9	DH308	TSV308	FSV308	DHV308	DKV090	3,1
<b>SNV090-L</b>	21308-E1	KM8	MB8	FRM90/9	DH308	TSV308	FSV308	DHV308	DKV090	3,1
<b>SNV090-L</b>	2308-TVH	KM8	MB8	FRM90/4	DH308	TSV308	FSV308	DHV308	DKV090	3,1
<b>SNV090-L</b>	22308-E1	KM8	MB8	FRM90/4	DH308	TSV308	FSV308	DHV308	DKV090	3,1
<b>SNV085-L</b>	1209-TVH	KM9	MB9	FRM85/6	DH209	TSV209	FSV209	DHV209	DKV085	2,8
<b>SNV085-L</b>	20209-TVP	KM9	MB9	FRM85/6	DH209	TSV209	FSV209	DHV209	DKV085	2,8
<b>SNV085-L</b>	2209-TVH	KM9	MB9	FRM85/4	DH209	TSV209	FSV209	DHV209	DKV085	2,8
<b>SNV085-L</b>	22209-E1	KM9	MB9	FRM85/4	DH209	TSV209	FSV209	DHV209	DKV085	2,8
<b>SNV100-L</b>	1309-TVH	KM9	MB9	FRM100/9,5	DH309	TSV309	FSV309	DHV309	DKV100	4,3
<b>SNV100-L</b>	20309-TVP	KM9	MB9	FRM100/9,5	DH309	TSV309	FSV309	DHV309	DKV100	4,3
<b>SNV100-L</b>	21309-E1	KM9	MB9	FRM100/9,5	DH309	TSV309	FSV309	DHV309	DKV100	4,3
<b>SNV100-L</b>	2309-TVH	KM9	MB9	FRM100/4	DH309	TSV309	FSV309	DHV309	DKV100	4,3
<b>SNV100-L</b>	22309-E1	KM9	MB9	FRM100/4	DH309	TSV309	FSV309	DHV309	DKV100	4,3
<b>SNV090-L</b>	1210-TVH	KM10	MB10	FRM90/10,5	DH210	TSV210	FSV210	DHV210	DKV090	3,1
<b>SNV090-L</b>	20210-TVP	KM10	MB10	FRM90/10,5	DH210	TSV210	FSV210	DHV210	DKV090	3,1
<b>SNV090-L</b>	2210-TVH	KM10	MB10	FRM90/9	DH210	TSV210	FSV210	DHV210	DKV090	3,1
<b>SNV090-L</b>	22210-E1	KM10	MB10	FRM90/9	DH210	TSV210	FSV210	DHV210	DKV090	3,1
<b>SNV110-L</b>	1310-TVH	KM10	MB10	FRM110/10,5	DH310	TSV310	FSV310	DHV310	DKV110	4,9
<b>SNV110-L</b>	20310-TVP	KM10	MB10	FRM110/10,5	DH310	TSV310	FSV310	DHV310	DKV110	4,9
<b>SNV110-L</b>	21310-E1	KM10	MB10	FRM110/10,5	DH310	TSV310	FSV310	DHV310	DKV110	4,9
<b>SNV110-L</b>	2310-TVH	KM10	MB10	FRM110/4	DH310	TSV310	FSV310	DHV310	DKV110	4,9
<b>SNV110-L</b>	22310-E1	KM10	MB10	FRM110/4	DH310	TSV310	FSV310	DHV310	DKV110	4,9
<b>SNV100-L</b>	1211-TVH	KM11	MB11	FRM100/11,5	DH211	TSV211	FSV211	DHV211	DKV100	4,3
<b>SNV100-L</b>	20211-TVP	KM11	MB11	FRM100/11,5	DH211	TSV211	FSV211	DHV211	DKV100	4,3
<b>SNV100-L</b>	2211-TVH	KM11	MB11	FRM100/9,5	DH211	TSV211	FSV211	DHV211	DKV100	4,3
<b>SNV100-L</b>	22211-E1	KM11	MB11	FRM100/9,5	DH211	TSV211	FSV211	DHV211	DKV100	4,3
<b>SNV120-L</b>	1311-TVH	KM11	MB11	FRM120/11	DH311	TSV311	FSV311	DHV311	DKV120	6,1
<b>SNV120-L</b>	20311-TVP	KM11	MB11	FRM120/11	DH311	TSV311	FSV311	DHV311	DKV120	6,1
<b>SNV120-L</b>	21311-E1	KM11	MB11	FRM120/11	DH311	TSV311	FSV311	DHV311	DKV120	6,1
<b>SNV120-L</b>	2311-TVH	KM11	MB11	FRM120/4	DH311	TSV311	FSV311	DHV311	DKV120	6,1
<b>SNV120-L</b>	22311-E1	KM11	MB11	FRM120/4	DH311	TSV311	FSV311	DHV311	DKV120	6,1



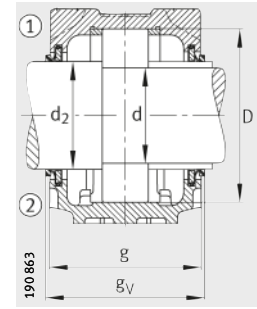
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



Felt seal FSV



V ring seal DHV

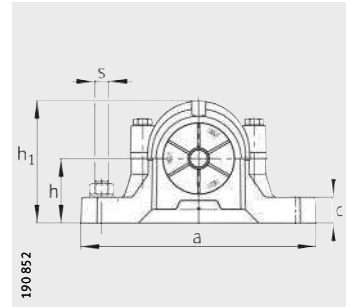
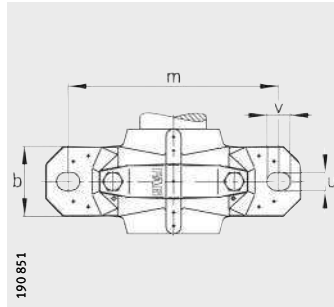
Dimensions

d	a	g	h <sub>1</sub>	d <sub>2</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>3</sub>	h	m	u	v	s	
															mm	inch
40	205	85	112	50	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
40	205	85	112	50	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
40	205	85	112	50	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
40	205	85	112	50	60	25	80	98	93	10,5	60	170	15	20	M12	1/2
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
40	205	100	117	50	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
45	205	87	114	55	60	25	85	101	93	12,5	60	170	15	20	M12	1/2
45	205	87	114	55	60	25	85	101	93	12,5	60	170	15	20	M12	1/2
45	205	87	114	55	60	25	85	101	93	12,5	60	170	15	20	M12	1/2
45	205	87	114	55	60	25	85	101	93	12,5	60	170	15	20	M12	1/2
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
45	255	105	133	55	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
50	205	100	117	60	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
50	205	100	117	60	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
50	205	100	117	60	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
50	205	100	117	60	60	25	90	114	106	12,5	60	170	15	20	M12	1/2
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	5/8
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	5/8
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	5/8
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	5/8
50	255	110	139	60	70	30	110	124	116	12,5	70	210	18	23	M16	5/8
55	255	105	133	65	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
55	255	105	133	65	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
55	255	105	133	65	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
55	255	105	133	65	70	28	100	119	111	12,5	70	210	18	23	M16	5/8
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	5/8
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	5/8
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	5/8
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	5/8
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	5/8
55	275	115	155	65	80	30	120	129	121	12,5	80	230	18	23	M16	5/8



# Plummer block housings

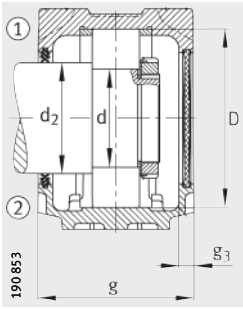
SNV, split  
For bearings with cylindrical bore



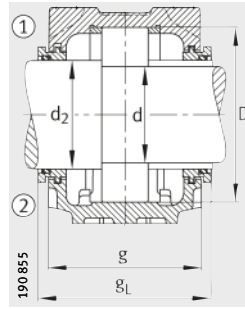
- ① Locating bearing
- ② Non-locating bearing

**Dimension table** (continued) · Dimensions in mm

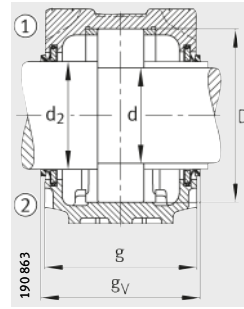
Designation											Mass m
Housing	Bearing	Lock-nut	Tab washer	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal	Cover	Housing ≈kg
SNV110-L	1212-TVH	KM12	MB12	FRM110/13	DH212	TSV212	FSV212	DHV212	-	DKV110	4,9
SNV110-L	20212-TVP	KM12	MB12	FRM110/13	DH212	TSV212	FSV212	DHV212	-	DKV110	4,9
SNV110-L	2212-TVH	KM12	MB12	FRM110/10	DH212	TSV212	FSV212	DHV212	-	DKV110	4,9
SNV110-L	22212-E1	KM12	MB12	FRM110/10	DH212	TSV212	FSV212	DHV212	-	DKV110	4,9
SNV130-L	1312-TVH	KM12	MB12	FRM130/12,5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV130-L	20312-TVP	KM12	MB12	FRM130/12,5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV130-L	21312-E1	KM12	MB12	FRM130/12,5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV130-L	2312-TVH	KM12	MB12	FRM130/5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV130-L	22312-E1	KM12	MB12	FRM130/5	DH312	TSV312	FSV312	DHV312	TCV312	DKV130	6,8
SNV120-L	1213-TVH	KM13	MB13	FRM120/14	DH213	TSV213	FSV213	DHV213	-	DKV120	6,1
SNV120-L	20213-TVP	KM13	MB13	FRM120/14	DH213	TSV213	FSV213	DHV213	-	DKV120	6,1
SNV120-L	2213-TVH	KM13	MB13	FRM120/10	DH213	TSV213	FSV213	DHV213	-	DKV120	6,1
SNV120-L	22213-E1	KM13	MB13	FRM120/10	DH213	TSV213	FSV213	DHV213	-	DKV120	6,1
SNV140-L	1313-TVH	KM13	MB13	FRM140/12,5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV140-L	20313-MB	KM13	MB13	FRM140/12,5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV140-L	21313-E1	KM13	MB13	FRM140/12,5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV140-L	2313-TVH	KM13	MB13	FRM140/5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV140-L	22313-E1	KM13	MB13	FRM140/5	DH313	TSV313	FSV313	DHV313	TCV313	DKV140	9,3
SNV125-L	1214-TVH	KM14	MB14	FRM125/7,5	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	6,5
SNV125-L	20214-TVP	KM14	MB14	FRM125/7,5	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	6,5
SNV125-L	2214-M	KM14	MB14	FRM125/4	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	6,5
SNV125-L	22214-E1	KM14	MB14	FRM125/4	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	6,5
SNV150-L	1314-M	KM14	MB14	FRM150/13	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV150-L	20314-MB	KM14	MB14	FRM150/13	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV150-L	21314-E1	KM14	MB14	FRM150/13	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV150-L	2314-M	KM14	MB14	FRM150/5	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV150-L	22314-E1	KM14	MB14	FRM150/5	DH214	TSV214	FSV214	DHV214	TCV214	DKV150	9,9
SNV130-L	1215-TVH	KM15	MB15	FRM130/15,5	DH215	TSV215	FSV215	DHV215	-	DKV130	6,8
SNV130-L	20215-TVP	KM15	MB15	FRM130/15,5	DH215	TSV215	FSV215	DHV215	-	DKV130	6,8
SNV130-L	2215-TVH	KM15	MB15	FRM130/12,5	DH215	TSV215	FSV215	DHV215	-	DKV130	6,8
SNV130-L	22215-E1	KM15	MB15	FRM130/12,5	DH215	TSV215	FSV215	DHV215	-	DKV130	6,8
SNV160-L	1315-M	KM15	MB15	FRM160/14	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8
SNV160-L	20315-MB	KM15	MB15	FRM160/14	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8
SNV160-L	21315-E1	KM15	MB15	FRM160/14	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8
SNV160-L	2315-M	KM15	MB15	FRM160/5	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8
SNV160-L	22315-E1	KM15	MB15	FRM160/5	DH315	TSV315	FSV315	DHV315	TCV315	DKV160	12,8



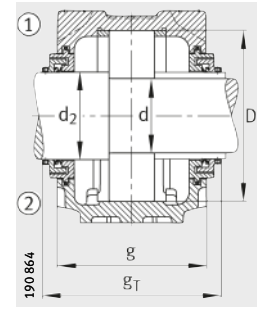
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



V ring seal DHV



Taconite seal TCV

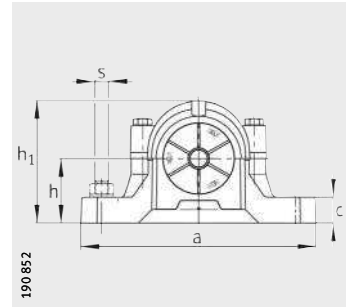
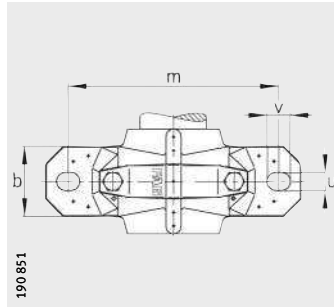
Dimensions

d	a	g	h <sub>1</sub>	d <sub>2</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s		
																	mm	inch
60	255	110	139	70	70	30	110	124	120	—	12,5	70	210	18	23	M16	5/8	
60	255	110	139	70	70	30	110	124	120	—	12,5	70	210	18	23	M16	5/8	
60	255	110	139	70	70	30	110	124	120	—	12,5	70	210	18	23	M16	5/8	
60	255	110	139	70	70	30	110	124	120	—	12,5	70	210	18	23	M16	5/8	
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8	
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8	
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8	
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8	
60	280	120	161	70	80	30	130	134	130	158	12,5	80	230	18	23	M16	5/8	
65	275	115	155	75	80	30	120	129	125	—	12,5	80	230	18	23	M16	5/8	
65	275	115	155	75	80	30	120	129	125	—	12,5	80	230	18	23	M16	5/8	
65	275	115	155	75	80	30	120	129	125	—	12,5	80	230	18	23	M16	5/8	
65	275	115	155	75	80	30	120	129	125	—	12,5	80	230	18	23	M16	5/8	
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4	
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4	
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4	
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4	
65	315	135	183	75	90	32	140	150,3	142,5	175,5	15	95	260	22	27	M20	3/4	
70	275	105	158	80	80	30	125	120,3	110	143	15	80	230	18	23	M16	5/8	
70	275	105	158	80	80	30	125	120,3	110	143	15	80	230	18	23	M16	5/8	
70	275	105	158	80	80	30	125	120,3	110	143	15	80	230	18	23	M16	5/8	
70	275	105	158	80	80	30	125	120,3	110	143	15	80	230	18	23	M16	5/8	
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4	
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4	
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4	
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4	
70	320	140	189	80	90	32	150	155,3	147,5	180,5	15	95	260	22	27	M20	3/4	
75	280	120	161	85	80	30	130	134	130	—	12,5	80	230	18	23	M16	5/8	
75	280	120	161	85	80	30	130	134	130	—	12,5	80	230	18	23	M16	5/8	
75	280	120	161	85	80	30	130	134	130	—	12,5	80	230	18	23	M16	5/8	
75	280	120	161	85	80	30	130	134	130	—	12,5	80	230	18	23	M16	5/8	
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4	
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4	
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4	
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4	
75	345	145	201	85	100	35	160	160,3	152,5	185,5	15	100	290	22	27	M20	3/4	



# Plummer block housings

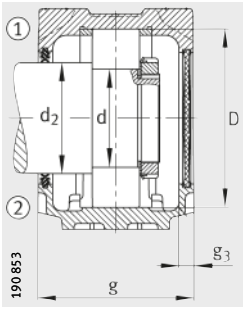
SNV, split  
For bearings with cylindrical bore



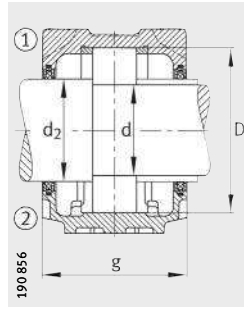
- ① Locating bearing
- ② Non-locating bearing

**Dimension table** (continued) · Dimensions in mm

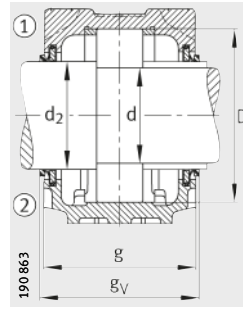
Designation											Mass m
Housing	Bearing	Locknut	Tab washer	Locating ring 2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taconite seal	Cover	Housing ≈kg
<b>SNV140-L</b>	1216-TVH	KM16	MB16	FRM140/16	DH216	TSV216	FSV216	DHV216	–	DKV140	9,3
<b>SNV140-L</b>	20216-TVP	KM16	MB16	FRM140/16	DH216	TSV216	FSV216	DHV216	–	DKV140	9,3
<b>SNV140-L</b>	2216-TVH	KM16	MB16	FRM140/12,5	DH216	TSV216	FSV216	DHV216	–	DKV140	9,3
<b>SNV140-L</b>	22216-E1	KM16	MB16	FRM140/12,5	DH216	TSV216	FSV216	DHV216	–	DKV140	9,3
<b>SNV170-L</b>	1316-M	KM16	MB16	FRM170/14,5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
<b>SNV170-L</b>	20316-MB	KM16	MB16	FRM170/14,5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
<b>SNV170-L</b>	21316-E1	KM16	MB16	FRM170/14,5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
<b>SNV170-L</b>	2316-M	KM16	MB16	FRM170/5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
<b>SNV170-L</b>	22316-E1	KM16	MB16	FRM170/5	DH316	TSV316	FSV316	DHV316	TCV316	DKV170	14,4
<b>SNV150-L</b>	1217-TVH	KM17	MB17	FRM150/16,5	DH217	TSV217	FSV217	DHV217	–	DKV150	9,9
<b>SNV150-L</b>	20217-MB	KM17	MB17	FRM150/16,5	DH217	TSV217	FSV217	DHV217	–	DKV150	9,9
<b>SNV150-L</b>	2217-M	KM17	MB17	FRM150/12,5	DH217	TSV217	FSV217	DHV217	–	DKV150	9,9
<b>SNV150-L</b>	22217-E1	KM17	MB17	FRM150/12,5	DH217	TSV217	FSV217	DHV217	–	DKV150	9,9
<b>SNV180-L</b>	1317-M	KM17	MB17	FRM180/14,5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
<b>SNV180-L</b>	20317-MB	KM17	MB17	FRM180/14,5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
<b>SNV180-L</b>	21317-E1	KM17	MB17	FRM180/14,5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
<b>SNV180-L</b>	2317-M	KM17	MB17	FRM180/5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
<b>SNV180-L</b>	22317-E1	KM17	MB17	FRM180/5	DH317	TSV317	FSV317	DHV317	TCV317	DKV180	17
<b>SNV160-L</b>	1218-TVH	KM18	MB18	FRM160/17,5	DH218	TSV218	FSV218	DHV218	–	DKV160	12,8
<b>SNV160-L</b>	20218-MB	KM18	MB18	FRM160/17,5	DH218	TSV218	FSV218	DHV218	–	DKV160	12,8
<b>SNV160-L</b>	2218-TVH	KM18	MB18	FRM160/12,5	DH218	TSV218	FSV218	DHV218	–	DKV160	12,8
<b>SNV160-L</b>	22218-E1	KM18	MB18	FRM160/12,5	DH218	TSV218	FSV218	DHV218	–	DKV160	12,8
<b>SNV160-L</b>	23218-E1	KM18	MB18	FRM160/6,3	DH218	TSV218	FSV218	DHV218	–	DKV160	12,8
<b>SNV190-L</b>	1318-M	KM18	MB18	FRM190/15,5	DH318	TSV318	FSV318	DHV318	–	DKV160	22
<b>SNV190-L</b>	20318-MB	KM18	MB18	FRM190/15,5	DH318	TSV318	FSV318	DHV318	–	DKV160	22
<b>SNV190-L</b>	21318-E1	KM18	MB18	FRM190/15,5	DH318	TSV318	FSV318	DHV318	–	DKV160	22
<b>SNV190-L</b>	2318-M	KM18	MB18	FRM190/5	DH318	TSV318	FSV318	DHV318	–	DKV160	22
<b>SNV190-L</b>	22318-E1	KM18	MB18	FRM190/5	DH318	TSV318	FSV318	DHV318	–	DKV160	22



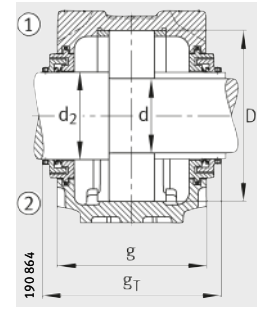
Double lip seal DH  
Cover DKV



Felt seal FSV



V ring seal DHV



Taconite seal TCV

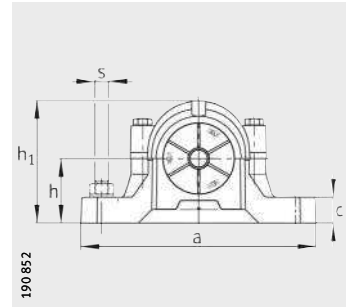
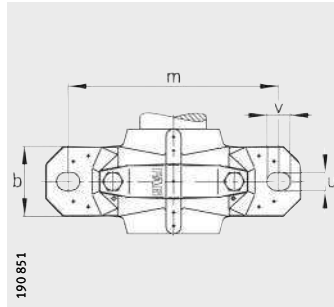
Dimensions

d	a	g	h <sub>1</sub>	d <sub>2</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s		
																	mm	inch
80	315	135	183	90	90	32	140	150,3	142,5	–	15	95	260	22	27	M20	3/4	
80	315	135	183	90	90	32	140	150,3	142,5	–	15	95	260	22	27	M20	3/4	
80	315	135	183	90	90	32	140	150,3	142,5	–	15	95	260	22	27	M20	3/4	
80	315	135	183	90	90	32	140	150,3	142,5	–	15	95	260	22	27	M20	3/4	
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4	
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4	
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4	
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4	
80	345	150	219	90	100	35	170	167,3	157,5	192,5	16	112	290	22	27	M20	3/4	
85	320	140	189	95	90	32	150	155,3	137,5	–	15	95	260	22	27	M20	3/4	
85	320	140	189	95	90	32	150	155,3	137,5	–	15	95	260	22	27	M20	3/4	
85	320	140	189	95	90	32	150	155,3	137,5	–	15	95	260	22	27	M20	3/4	
85	320	140	189	95	90	32	150	155,3	137,5	–	15	95	260	22	27	M20	3/4	
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8	
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8	
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8	
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8	
85	380	160	223	95	110	40	180	177,3	167,5	202,5	16	112	320	26	32	M24	7/8	
90	345	145	201	100	100	35	160	160,3	152,5	–	15	100	290	22	27	M20	3/4	
90	345	145	201	100	100	35	160	160,3	152,5	–	15	100	290	22	27	M20	3/4	
90	345	145	201	100	100	35	160	160,3	152,5	–	15	100	290	22	27	M20	3/4	
90	345	145	201	100	100	35	160	160,3	152,5	–	15	100	290	22	27	M20	3/4	
90	345	145	201	100	100	35	160	160,3	152,5	–	15	100	290	22	27	M20	3/4	
90	380	155	229	105	110	40	190	170,3	162,5	–	15	112	320	26	32	M24	7/8	
90	380	155	229	105	110	40	190	170,3	162,5	–	15	112	320	26	32	M24	7/8	
90	380	155	229	105	110	40	190	170,3	162,5	–	15	112	320	26	32	M24	7/8	
90	380	155	229	105	110	40	190	170,3	162,5	–	15	112	320	26	32	M24	7/8	
90	380	155	229	105	110	40	190	170,3	162,5	–	15	112	320	26	32	M24	7/8	



# Plummer block housings

SNV, split  
For bearings with cylindrical bore



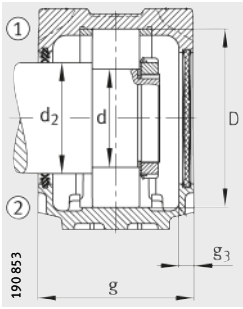
- ① Locating bearing
- ② Non-locating bearing

**Dimension table** (continued) · Dimensions in mm

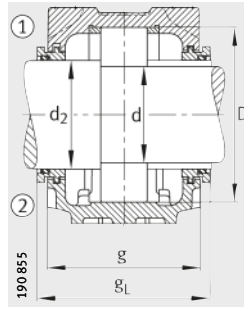
Designation											Mass m
Housing	Bearing	Lock- nut	Tab washer	Locating ring  2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Taco- nite seal	Cover	Hous- ing  ≈kg
SNV170-L	1219-M	KM19	MB19	FRM170/18	DH219	TSV219	FSV219	DHV219	-	DKV170	14,4
SNV170-L	20219-MB	KM19	MB19	FRM170/18	DH219	TSV219	FSV219	DHV219	-	DKV170	14,4
SNV170-L	2219-M	KM19	MB19	FRM170/12,5	DH219	TSV219	FSV219	DHV219	-	DKV170	14,4
SNV170-L	22219-E1	KM19	MB19	FRM170/12,5	DH219	TSV219	FSV219	DHV219	-	DKV170	14,4
SNV200-L	1319-M	KM19	MB19	FRM200/17,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV200-L	20319-MB	KM19	MB19	FRM200/17,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV200-L	21319-E1-TVPB	KM19	MB19	FRM200/17,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV200-L	2319-M	KM19	MB19	FRM200/6,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV200-L	22319-E1	KM19	MB19	FRM200/6,5	DH319	TSV319	FSV319	DHV319	TCV319	DKV200	21
SNV180-L	1220-M	KM20	MB20	FRM180/18	DH220	TSV220	FSV220	DHV220	-	DKV180	17
SNV180-L	20220-MB	KM20	MB20	FRM180/18	DH220	TSV220	FSV220	DHV220	-	DKV180	17
SNV180-L	2220-M	KM20	MB20	FRM180/12	DH220	TSV220	FSV220	DHV220	-	DKV180	17
SNV180-L	22220-E1	KM20	MB20	FRM180/12	DH220	TSV220	FSV220	DHV220	-	DKV180	17
SNV180-L	23220-E1-TVPB	KM20	MB20	FRM180/4,85	DH220	TSV220	FSV220	DHV220	-	DKV180	17
SNV215-L <sup>1)</sup>	1320-M	KM20	MB20	FRM215/19,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV215-L <sup>1)</sup>	20320-MB	KM20	MB20	FRM215/19,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV215-L <sup>1)</sup>	21320-E1-TVPB	KM20	MB20	FRM215/19,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV215-L <sup>1)</sup>	2320-M	KM20	MB20	FRM215/6,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV215-L <sup>1)</sup>	22320-E1	KM20	MB20	FRM215/6,5	DH320	TSV320	FSV320	DHV320	TCV320	DKV215	24,5
SNV200-L	1222-M	KM22	MB22	FRM200/21	DH222	TSV222	FSV222	DHV222	-	DKV200	21
SNV200-L	20222-MB	KM22	MB22	FRM200/21	DH222	TSV222	FSV222	DHV222	-	DKV200	21
SNV200-L	2222-M	KM22	MB22	FRM200/13,5	DH222	TSV222	FSV222	DHV222	-	DKV200	21
SNV200-L	22222-E1	KM22	MB22	FRM200/13,5	DH222	TSV222	FSV222	DHV222	-	DKV200	21
SNV200-L	23222-E1-TVPB	KM22	MB22	FRM200/5,1	DH222	TSV222	FSV222	DHV222	-	DKV200	21
SNV240-L <sup>1)</sup>	1322-M	KM22	MB22	FRM240/20	DH222	TSV222	FSV222	DHV222	-	DKV200	32
SNV240-L <sup>1)</sup>	20322-MB	KM22	MB22	FRM240/20	DH222	TSV222	FSV222	DHV222	-	DKV200	32
SNV240-L <sup>1)</sup>	21322-E1-TVPB	KM22	MB22	FRM240/20	DH222	TSV222	FSV222	DHV222	-	DKV200	32
SNV240-L <sup>1)</sup>	2322-M	KM22	MB22	FRM240/5	DH222	TSV222	FSV222	DHV222	-	DKV200	32
SNV240-L <sup>1)</sup>	22322-E1	KM22	MB22	FRM240/5	DH222	TSV222	FSV222	DHV222	-	DKV200	32

<sup>1)</sup> Housing with ring bolt.

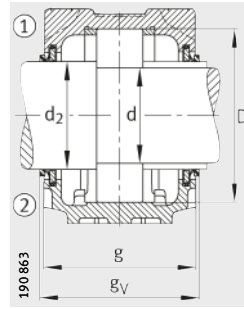




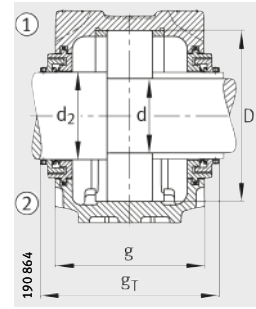
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



V ring seal DHV



Taconite seal TCV

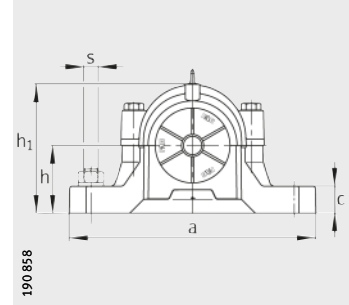
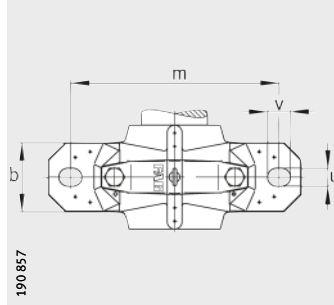
Dimensions

d	a	g	h <sub>1</sub>	d <sub>2</sub>	b	c	D	g <sub>L</sub>	g <sub>V</sub>	g <sub>T</sub>	g <sub>3</sub>	h	m	u	v	s		
																	mm	inch
95	345	150	219	110	100	35	170	167,3	160,5	–	16	112	290	22	27	M20	3/4	
95	345	150	219	110	100	35	170	167,3	160,5	–	16	112	290	22	27	M20	3/4	
95	345	150	219	110	100	35	170	167,3	160,5	–	16	112	290	22	27	M20	3/4	
95	345	150	219	110	100	35	170	167,3	160,5	–	16	112	290	22	27	M20	3/4	
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8	
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8	
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8	
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8	
95	410	175	248	110	120	45	200	192,3	185,5	217,5	16	125	350	26	32	M24	7/8	
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8	
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8	
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8	
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8	
100	380	160	223	115	110	40	180	177,3	170,5	–	16	112	320	26	32	M24	7/8	
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8	
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8	
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8	
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8	
100	410	180	271	115	120	45	215	197,3	190,5	226,5	16	140	350	26	32	M24	7/8	
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8	
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8	
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8	
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8	
110	410	175	248	125	120	45	200	195,3	185,5	–	16	125	350	26	32	M24	7/8	
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1	
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1	
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1	
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1	
110	450	185	298	125	130	50	240	203,3	193,5	–	18	150	390	28	35	M24	1	



# Plummer block housings

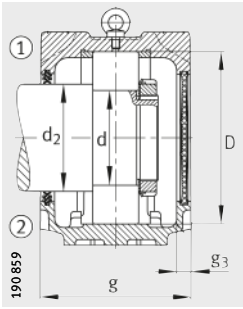
SNV, split  
For bearings with cylindrical bore



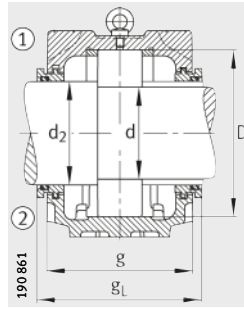
- ① Locating bearing
- ② Non-locating bearing

**Dimension table** (continued) · Dimensions in mm

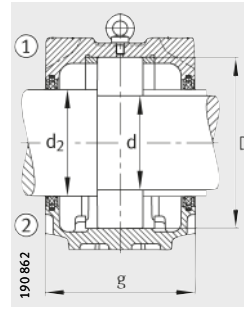
Designation										Mass m
Housing	Bearing	Lock- nut	Tab washer	Locating ring  2 pieces	Double lip seal	Labyrinth ring with round cord	Felt seal	V ring seal	Cover	Hous- ing  ≈kg
<b>SNV215-L</b>	20224-MB	KM24	MB24	FRM215/23	DH224	TSV224	FSV224	DHV224	DKV215	24,5
<b>SNV215-L</b>	22224-E1	KM24	MB24	FRM215/14	DH224	TSV224	FSV224	DHV224	DKV215	24,5
<b>SNV215-L</b>	23224-E1-TVPB	KM24	MB24	FRM215/5	DH224	TSV224	FSV224	DHV224	DKV215	24,5
<b>SNV260-L</b>	20324-MB	KM24	MB24	FRM260/20,5	DH224	TSV224	FSV224	DHV224	DKV215	48
<b>SNV260-L</b>	22324-E1	KM24	MB24	FRM260/5	DH224	TSV224	FSV224	DHV224	DKV215	48
<b>SNV230-L</b>	20226-MB	KM26	MB26	FRM230/25	DH226	TSV226	FSV226	DHV226	DKV230	30
<b>SNV230-L</b>	22226-E1	KM26	MB26	FRM230/13	DH226	TSV226	FSV226	DHV226	DKV230	30
<b>SNV230-L</b>	23226-E1-TVPB	KM26	MB26	FRM230/5	DH226	TSV226	FSV226	DHV226	DKV230	30
<b>SNV280-L</b>	20326-MB	KM26	MB26	FRM280/22,5	DH326	TSV326	FSV326	DHV326	DKV230	55
<b>SNV280-L</b>	22326-E1	KM26	MB26	FRM280/5	DH326	TSV326	FSV326	DHV326	DKV230	55
<b>SNV250-L</b>	20228-MB	KM28	MB28	FRM250/28	DH228	TSV228	FSV228	DHV228	DKV250	38
<b>SNV250-L</b>	22228-E1	KM28	MB28	FRM250/15	DH228	TSV228	FSV228	DHV228	DKV250	38
<b>SNV250-L</b>	23228-E1-TVPB	KM28	MB28	FRM250/5	DH228	TSV228	FSV228	DHV228	DKV250	38
<b>SNV300-L</b>	20328-MB	KM28	MB28	FRM300/25	DH328	TSV328	FSV328	DHV328	DKV250	70
<b>SNV300-L</b>	22328-E1	KM28	MB28	FRM300/5	DH328	TSV328	FSV328	DHV328	DKV250	70
<b>SNV270-L</b>	20230-MB	KM30	MB30	FRM270/30,5	DH230	TSV230	FSV230	DHV230	DKV270	45,5
<b>SNV270-L</b>	22230-E1	KM30	MB30	FRM270/16,5	DH230	TSV230	FSV230	DHV230	DKV270	45,5
<b>SNV270-L</b>	23230-E1-TVPB	KM30	MB30	FRM270/5	DH230	TSV230	FSV230	DHV230	DKV270	45,5
<b>SNV320-L</b>	20330-MB	KM30	MB30	FRM320/26,5	DH330	TSV330	FSV330	DHV330	DKV270	95
<b>SNV320-L</b>	22330-E1	KM30	MB30	FRM320/5	DH330	TSV330	FSV330	DHV330	DKV270	95
<b>SNV290-L</b>	20232-MB	KM32	MB32	FRM290/33	DH232	TSV232	FSV232	DHV232	DKV290	53,8
<b>SNV290-L</b>	22232-E1	KM32	MB32	FRM290/17	DH232	TSV232	FSV232	DHV232	DKV290	53,8
<b>SNV290-L</b>	23232-E1-TVPB	KM32	MB32	FRM290/5	DH232	TSV232	FSV232	DHV232	DKV290	53,8
<b>SNV340-L</b>	22332-MB	KM32	MB32	FRM340/5	DH332	TSV332	FSV332	DHV332	DKV290	115



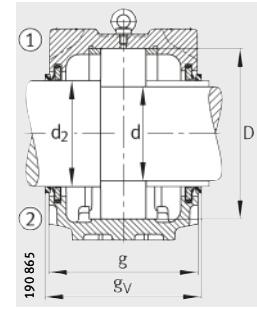
Double lip seal DH  
Cover DKV



Labyrinth ring TSV



Felt seal FSV



V ring seal DHV

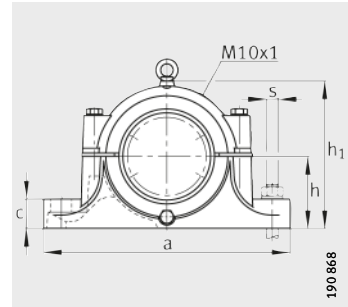
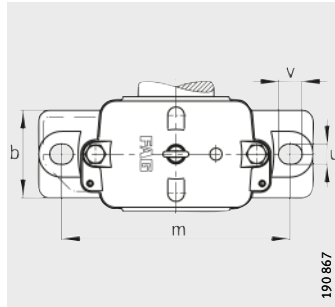
Dimensions

d	a	g	h <sub>1</sub>	d <sub>2</sub>	b	c	D	g <sub>L</sub>	g <sub>v</sub>	g <sub>3</sub>	h	m	u	v	s	
															mm	inch
120	410	180	271	135	120	45	215	200,3	190,5	16	140	350	26	32	M24	7/8
120	410	180	271	135	120	45	215	200,3	190,5	16	140	350	26	32	M24	7/8
120	410	180	271	135	120	45	215	200,3	190,5	16	140	350	26	32	M24	7/8
120	530	190	321	135	160	60	260	208,3	198,5	18	160	450	35	42	M30	1 1/4
120	530	190	321	135	160	60	260	208,3	198,5	18	160	450	35	42	M30	1 1/4
130	445	190	291	145	130	50	230	208,3	198,5	18	150	380	28	35	M24	1
130	445	190	291	145	130	50	230	208,3	198,5	18	150	380	28	35	M24	1
130	445	190	291	145	130	50	230	208,3	198,5	18	150	380	28	35	M24	1
130	550	205	344	150	160	60	280	223,3	213,5	18	170	470	35	42	M30	1 1/4
130	550	205	344	150	160	60	280	223,3	213,5	18	170	470	35	42	M30	1 1/4
140	500	200	304	155	150	50	250	218,3	211,5	18	150	420	35	42	M30	1 1/4
140	500	200	304	155	150	50	250	218,3	211,5	18	150	420	35	42	M30	1 1/4
140	500	200	304	155	150	50	250	218,3	211,5	18	150	420	35	42	M30	1 1/4
140	620	215	366	160	170	65	300	233,3	226,5	18	180	520	35	42	M30	1 1/4
140	620	215	366	160	170	65	300	233,3	226,5	18	180	520	35	42	M30	1 1/4
150	530	215	328	165	160	60	270	233,3	228,5	18	160	450	35	42	M30	1 1/4
150	530	215	328	165	160	60	270	233,3	228,5	18	160	450	35	42	M30	1 1/4
150	530	215	328	165	160	60	270	233,3	228,5	18	160	450	35	42	M30	1 1/4
150	650	225	386	170	180	65	320	243,3	236,5	18	190	560	35	42	M30	1 1/4
150	650	225	386	170	180	65	320	243,3	236,5	18	190	560	35	42	M30	1 1/4
160	550	225	351	175	160	60	290	243,3	236,5	18	170	470	35	42	M30	1 1/4
160	550	225	351	175	160	60	290	243,3	236,5	18	170	470	35	42	M30	1 1/4
160	550	225	351	175	160	60	290	243,3	236,5	18	170	470	35	42	M30	1 1/4
160	680	235	406	180	190	70	340	253,3	246,5	18	200	580	42	50	M36	1 1/2



# Plummer block housings

S30, split  
For spherical roller bearings with tapered bore and adapter sleeve

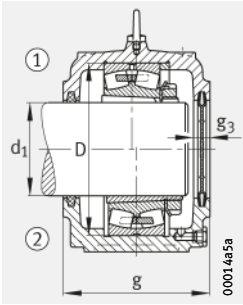


- ① Locating bearing
- ② Non-locating bearing

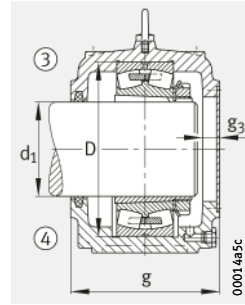
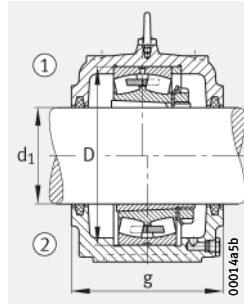
**Dimension table** - Dimensions in mm

Designation					Felt strips		Mass m
Housing	Bearing	Adapter sleeve	Locating ring	Cover	aXbXl mm	Pieces	Housing ≈kg
S3024-H-N-FZ-AB-L <sup>1)</sup>	23024-E1-K-TVPB	H3024	FRM180/10	DK127-135	10X8,5X195	2/4	16,5
S3026-H-N-FZ-AB-L <sup>1)</sup>	23026-E1-K-TVPB	H3026	FRM200/10	DK127-135	10X8,5X200	2/4	19,3
S3028-H-N-FZ-AB-L <sup>1)</sup>	23028-E1-K-TVPB	H3028	FRM210/10	DK147-155	14X11X225	2/4	24,6
S3030-H-N-FZ-AB-L <sup>1)</sup>	23030-E1-K-TVPB	H3030	FRM225/10	DK156-163	14X11X240	2/4	29
S3032-H-N-FZ-AB-L <sup>1)</sup>	23032-E1-K-TVPB	H3032	FRM240/10	DK166-182	14X11X250	2/4	37
S3034-H-N-FZ-AB-L	23034-E1-K-TVPB	H3034	FRM260/10	DK166-182	16X12X270	2/4	45
S3036-H-N-FZ-AB-L	23036-E1-K-TVPB	H3036	FRM280/10	DK185-197	16X12X285	2/4	65
S3038-H-N-FZ-AB-L	23038-E1-K-TVPB	H3038	FRM290/10	DK200-212	16X12X300	2/4	67
S3040-H-N-FZ-AB-L	23040-E1-K-TVPB	H3040	FRM310/10	DK200-212	16X12X315	2/4	72
S3044-H-N-FZ-AF-L	23044-K-MB	H3044X	-	-	16X12X350	2	98
S3044-H-N-FZ-AL-L	23044-K-MB	H3044X	-	-	16X12X350	2	98
S3044-H-N-FZ-BF-L	23044-K-MB	H3044X	-	-	16X12X350	4	98
S3044-H-N-FZ-BL-L	23044-K-MB	H3044X	-	-	16X12X350	4	98
S3048-H-N-FZ-AF-L	23048-K-MB	H3048	-	-	16X12X380	2	110
S3048-H-N-FZ-AL-L	23048-K-MB	H3048	-	-	16X12X380	2	110
S3048-H-N-FZ-BF-L	23048-K-MB	H3048	-	-	16X12X380	4	110
S3048-H-N-FZ-BL-L	23048-K-MB	H3048	-	-	16X12X380	4	110
S3052-H-N-FZ-AF-L	23052-K-MB	H3052X	-	-	16X12X410	2	148
S3052-H-N-FZ-AL-L	23052-K-MB	H3052X	-	-	16X12X410	2	148
S3052-H-N-FZ-BF-L	23052-K-MB	H3052X	-	-	16X12X410	4	148
S3052-H-N-FZ-BL-L	23052-K-MB	H3052X	-	-	16X12X410	4	148
S3056-H-N-FZ-AF-L	23056-B-K-MB	H3056	-	-	16X12X445	2	165
S3056-H-N-FZ-AL-L	23056-B-K-MB	H3056	-	-	16X12X445	2	165
S3056-H-N-FZ-BF-L	23056-B-K-MB	H3056	-	-	16X12X445	4	165
S3056-H-N-FZ-BL-L	23056-B-K-MB	H3056	-	-	16X12X445	4	165

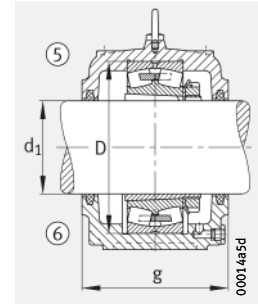
<sup>1)</sup> Housing without eye bolt.



Cover DK,  
locating bearings up to and including size S3040  
with locating ring



Design A  
③ Locating bearing AF  
④ Non-locating brg. AL



Design B  
⑤ Locating bearing BF  
⑥ Non-locating brg. BL

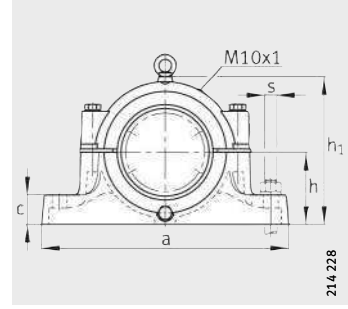
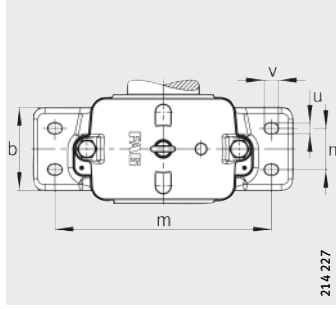
Dimensions

d <sub>1</sub>	a	g	h <sub>1</sub>	b	c	D	g <sub>3</sub>	h	m	u	v	s	
												mm	inch
110	390	150	215	110	40	180	18	112	320	30	36	M24	1
115	420	160	239	120	45	200	18	125	350	30	36	M24	1
125	420	170	259	120	45	210	21	140	350	30	36	M24	1
135	460	175	278	130	45	225	21	150	380	30	36	M24	1
140	470	190	288	130	50	240	21	150	390	30	36	M24	1
150	540	200	320	160	55	260	25	160	450	36	48	M30	1 1/8
160	560	210	340	160	55	280	25	170	470	36	48	M30	1 1/8
170	560	210	353	160	55	290	25	170	470	36	48	M30	1 1/8
180	615	235	373	170	60	310	25	180	515	36	48	M30	1 1/8
200	690	255	408	190	70	340	25	200	580	42	50	M36	1 3/8
200	690	255	408	190	70	340	25	200	580	42	50	M36	1 3/8
200	690	255	408	190	70	340	-	200	580	42	50	M36	1 3/8
200	690	255	408	190	70	340	-	200	580	42	50	M36	1 3/8
220	720	265	433	200	75	360	30	210	610	42	50	M36	1 3/8
220	720	265	433	200	75	360	30	210	610	42	50	M36	1 3/8
220	720	265	433	200	75	360	-	210	610	42	50	M36	1 3/8
220	720	265	433	200	75	360	-	210	610	42	50	M36	1 3/8
240	820	285	485	220	80	400	30	240	680	52	70	M45	1 3/4
240	820	285	485	220	80	400	30	240	680	52	70	M45	1 3/4
240	820	285	485	220	80	400	-	240	680	52	70	M45	1 3/4
240	820	285	485	220	80	400	-	240	680	52	70	M45	1 3/4
260	860	295	505	230	80	420	30	250	720	52	70	M45	1 3/4
260	860	295	505	230	80	420	30	250	720	52	70	M45	1 3/4
260	860	295	505	230	80	420	-	250	720	52	70	M45	1 3/4
260	860	295	505	230	80	420	-	250	720	52	70	M45	1 3/4



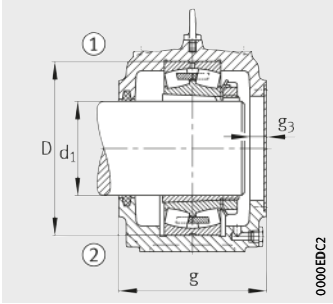
# Plummer block housings

S30, split  
For spherical roller bearings with tapered bore and adapter sleeve



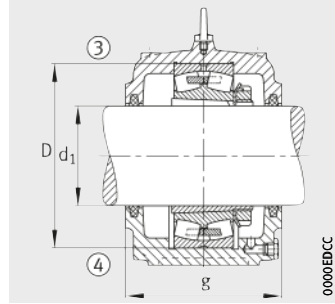
**Dimension table** (continued) · Dimensions in mm

Designation			Felt strips		Mass m Housing ≈ kg
Housing	Bearing	Adapter sleeve	aXbXl mm	Pieces	
S3060-H-N-FZ-AF-L	23060-K-MB	H3060	16X12X470	2	205
S3060-H-N-FZ-AL-L	23060-K-MB	H3060	16X12X470	2	205
S3060-H-N-FZ-BF-L	23060-K-MB	H3060	16X12X470	4	205
S3060-H-N-FZ-BL-L	23060-K-MB	H3060	16X12X470	4	205
S3064-H-N-FZ-AF-L	23064-K-MB	H3064-HG	16X12X505	2	235
S3064-H-N-FZ-AL-L	23064-K-MB	H3064-HG	16X12X505	2	235
S3064-H-N-FZ-BF-L	23064-K-MB	H3064-HG	16X12X505	4	235
S3064-H-N-FZ-BL-L	23064-K-MB	H3064-HG	16X12X505	4	235
S3068-H-N-FZ-AF-L	23068-K-MB	H3068-HG	16X12X535	2	280
S3068-H-N-FZ-AL-L	23068-K-MB	H3068-HG	16X12X535	2	280
S3068-H-N-FZ-BF-L	23068-K-MB	H3068-HG	16X12X535	4	280
S3068-H-N-FZ-BL-L	23068-K-MB	H3068-HG	16X12X535	4	280
S3072-H-N-FZ-AF-L	23072-K-MB	H3072-HG	16X12X565	2	340
S3072-H-N-FZ-AL-L	23072-K-MB	H3072-HG	16X12X565	2	340
S3072-H-N-FZ-BF-L	23072-K-MB	H3072-HG	16X12X565	4	340
S3072-H-N-FZ-BL-L	23072-K-MB	H3072-HG	16X12X565	4	340
S3076-H-N-FZ-AF-L	23076-B-K-MB	H3076-HG	16X12X600	2	400
S3076-H-N-FZ-AL-L	23076-B-K-MB	H3076-HG	16X12X600	2	400
S3076-H-N-FZ-BF-L	23076-B-K-MB	H3076-HG	16X12X600	4	400
S3076-H-N-FZ-BL-L	23076-B-K-MB	H3076-HG	16X12X600	4	400
S3080-H-N-FZ-AF-L	23080-K-MB	H3080-HG	16X12X630	2	460
S3080-H-N-FZ-AL-L	23080-K-MB	H3080-HG	16X12X630	2	460
S3080-H-N-FZ-BF-L	23080-K-MB	H3080-HG	16X12X630	4	460
S3080-H-N-FZ-BL-L	23080-K-MB	H3080-HG	16X12X630	4	460
S3084-H-N-FZ-AF-L	23084-B-K-MB	H3084X-HG	16X12X660	2	500
S3084-H-N-FZ-AL-L	23084-B-K-MB	H3084X-HG	16X12X660	2	500
S3084-H-N-FZ-BF-L	23084-B-K-MB	H3084X-HG	16X12X660	4	500
S3084-H-N-FZ-BL-L	23084-B-K-MB	H3084X-HG	16X12X660	4	500



Design A

- ① Locating bearing AF
- ② Non-locating bearing AL



Design B

- ③ Locating bearing BF
- ④ Non-locating bearing BL

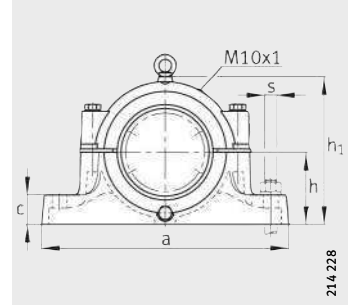
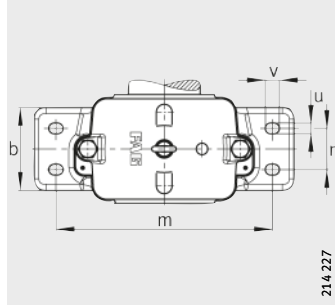
Dimensions

d <sub>1</sub>	a	g	h <sub>1</sub>	b	c	D	g <sub>3</sub>	h	m	n	u	v	s	
													mm	inch
<b>280</b>	920	320	565	260	90	460	30	280	780	130	42	50	M36	1 3/8
<b>280</b>	920	320	565	260	90	460	30	280	780	130	42	50	M36	1 3/8
<b>280</b>	920	320	565	260	90	460	–	280	780	130	42	50	M36	1 3/8
<b>280</b>	920	320	565	260	90	460	–	280	780	130	42	50	M36	1 3/8
<b>300</b>	940	320	570	260	90	480	30	280	800	130	42	50	M36	1 3/8
<b>300</b>	940	320	570	260	90	480	30	280	800	130	42	50	M36	1 3/8
<b>300</b>	940	320	570	260	90	480	–	280	800	130	42	50	M36	1 3/8
<b>300</b>	940	320	570	260	90	480	–	280	800	130	42	50	M36	1 3/8
<b>320</b>	1 000	340	615	280	95	520	30	300	860	140	42	50	M36	1 3/8
<b>320</b>	1 000	340	615	280	95	520	30	300	860	140	42	50	M36	1 3/8
<b>320</b>	1 000	340	615	280	95	520	–	300	860	140	42	50	M36	1 3/8
<b>320</b>	1 000	340	615	280	95	520	–	300	860	140	42	50	M36	1 3/8
<b>340</b>	1 060	345	655	280	95	540	30	320	900	140	42	50	M36	1 3/8
<b>340</b>	1 060	345	655	280	95	540	30	320	900	140	42	50	M36	1 3/8
<b>340</b>	1 060	345	655	280	95	540	–	320	900	140	42	50	M36	1 3/8
<b>340</b>	1 060	345	655	280	95	540	–	320	900	140	42	50	M36	1 3/8
<b>360</b>	1 060	380	675	280	100	560	30	330	900	140	42	50	M36	1 3/8
<b>360</b>	1 060	380	675	280	100	560	30	330	900	140	42	50	M36	1 3/8
<b>360</b>	1 060	380	675	280	100	560	–	330	900	140	42	50	M36	1 3/8
<b>360</b>	1 060	380	675	280	100	560	–	330	900	140	42	50	M36	1 3/8
<b>380</b>	1 100	400	715	325	120	600	30	350	950	160	42	50	M36	1 3/8
<b>380</b>	1 100	400	715	325	120	600	30	350	950	160	42	50	M36	1 3/8
<b>380</b>	1 100	400	715	325	120	600	–	350	950	160	42	50	M36	1 3/8
<b>380</b>	1 100	400	715	325	120	600	–	350	950	160	42	50	M36	1 3/8
<b>400</b>	1 160	430	750	340	120	620	30	375	980	170	42	50	M36	1 3/8
<b>400</b>	1 160	430	750	340	120	620	30	375	980	170	42	50	M36	1 3/8
<b>400</b>	1 160	430	750	340	120	620	–	375	980	170	42	50	M36	1 3/8
<b>400</b>	1 160	430	750	340	120	620	–	375	980	170	42	50	M36	1 3/8



# Plummer block housings

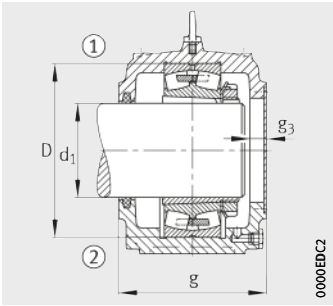
S30, split  
For spherical roller bearings with tapered bore and adapter sleeve



**Dimension table** (continued) · Dimensions in mm

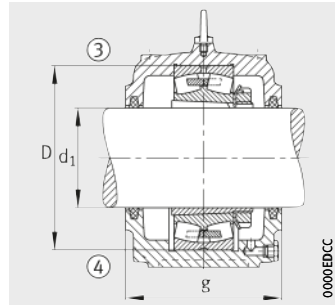
Designation			Felt strips		Mass m Housing ≈ kg
Housing	Bearing	Adapter sleeve	aXbXl mm	Pieces	
<b>S3088-H-N-FZ-AF-L</b>	23088-K-MB	H3088-HG	16X12X675	2	600
<b>S3088-H-N-FZ-AL-L</b>	23088-K-MB	H3088-HG	16X12X675	2	600
<b>S3088-H-N-FZ-BF-L</b>	23088-K-MB	H3088-HG	16X12X675	4	600
<b>S3088-H-N-FZ-BL-L</b>	23088-K-MB	H3088-HG	16X12X675	4	600
<b>S3092-H-N-FZ-AF-L</b>	23092-B-K-MB	H3092-HG	16X12X710	2	700
<b>S3092-H-N-FZ-AL-L</b>	23092-B-K-MB	H3092-HG	16X12X710	2	700
<b>S3092-H-N-FZ-BF-L</b>	23092-B-K-MB	H3092-HG	16X12X710	4	700
<b>S3092-H-N-FZ-BL-L</b>	23092-B-K-MB	H3092-HG	16X12X710	4	700
<b>S3096-H-N-FZ-AF-L</b>	23096-K-MB	H3096-HG	16X12X740	2	800
<b>S3096-H-N-FZ-AL-L</b>	23096-K-MB	H3096-HG	16X12X740	2	800
<b>S3096-H-N-FZ-BF-L</b>	23096-K-MB	H3096-HG	16X12X740	4	800
<b>S3096-H-N-FZ-BL-L</b>	23096-K-MB	H3096-HG	16X12X740	4	800





Design A

- ① Locating bearing AF
- ② Non-locating bearing AL



Design B

- ③ Locating bearing BF
- ④ Non-locating bearing BL

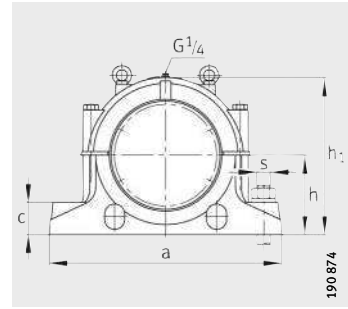
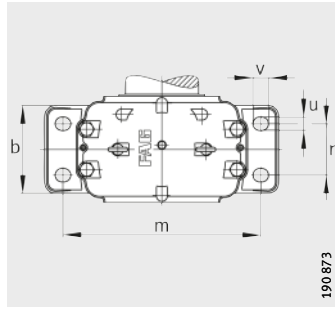
Dimensions

d <sub>1</sub>	a	g	h <sub>1</sub>	b	c	D	g <sub>3</sub>	h	m	n	u	v	s	
													mm	inch
<b>410</b>	1 200	430	780	340	125	650	30	390	1 020	170	42	50	M36	1 <sup>3</sup> / <sub>8</sub>
<b>410</b>	1 200	430	780	340	125	650	30	390	1 020	170	42	50	M36	1 <sup>3</sup> / <sub>8</sub>
<b>410</b>	1 200	430	780	340	125	650	–	390	1 020	170	42	50	M36	1 <sup>3</sup> / <sub>8</sub>
<b>410</b>	1 200	430	780	340	125	650	–	390	1 020	170	42	50	M36	1 <sup>3</sup> / <sub>8</sub>
<b>430</b>	1 260	440	805	360	130	680	30	400	1 080	180	56	75	M48	1 <sup>7</sup> / <sub>8</sub>
<b>430</b>	1 260	440	805	360	130	680	30	400	1 080	180	56	75	M48	1 <sup>7</sup> / <sub>8</sub>
<b>430</b>	1 260	440	805	360	130	680	–	400	1 080	180	56	75	M48	1 <sup>7</sup> / <sub>8</sub>
<b>430</b>	1 260	440	805	360	130	680	–	400	1 080	180	56	75	M48	1 <sup>7</sup> / <sub>8</sub>
<b>450</b>	1 380	440	825	380	190	700	30	410	1 180	190	56	75	M48	1 <sup>7</sup> / <sub>8</sub>
<b>450</b>	1 380	440	825	380	190	700	30	410	1 180	190	56	75	M48	1 <sup>7</sup> / <sub>8</sub>
<b>450</b>	1 380	440	825	380	190	700	–	410	1 180	190	56	75	M48	1 <sup>7</sup> / <sub>8</sub>
<b>450</b>	1 380	440	825	380	190	700	–	410	1 180	190	56	75	M48	1 <sup>7</sup> / <sub>8</sub>



# Plummer block housings

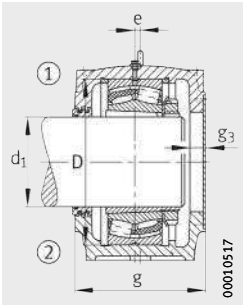
SD31, split  
For spherical roller bearings with tapered bore and adapter sleeve



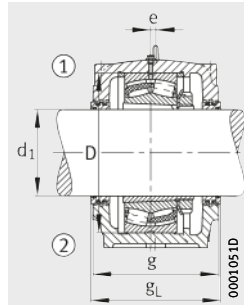
- ① Locating bearing
- ② Non-locating bearing

**Dimension table** - Dimensions in mm

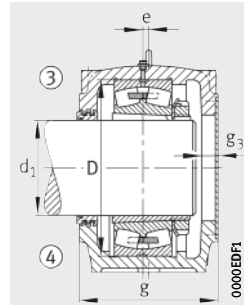
Designation							Mass m
Housing	Bearing	Adapter sleeve	Locating ring		Labyrinth ring with round cord		Housing ≈kg
				Pieces		Pieces	
SD3134-H-TS-A-L	23134-E1-K-TVPB	H3134	FRM280/10	2	TS34	1	70
SD3134-H-TS-B-L	23134-E1-K-TVPB	H3134	FRM280/10	2	TS34	2	70
SD3136-H-TS-A-L	23136-E1-K-TVPB	H3136	FRM300/10	2	TS36	1	78
SD3136-H-TS-B-L	23136-E1-K-TVPB	H3136	FRM300/10	2	TS36	2	78
SD3138-H-TS-A-L	23138-E1-K-TVPB	H3138	FRM320/10	2	TS38	1	95
SD3138-H-TS-B-L	23138-E1-K-TVPB	H3138	FRM320/10	2	TS38	2	95
SD3140-H-TS-A-L	23140-B-K-MB	H3140	FRM340/10	2	TS40	1	120
SD3140-H-TS-B-L	23140-B-K-MB	H3140	FRM340/10	2	TS40	2	120
SD3144-H-TS-AF-L	23144-B-K-MB	H3144X	–	–	TS44	1	135
SD3144-H-TS-AL-L	23144-B-K-MB	H3144X	–	–	TS44	1	135
SD3144-H-TS-BF-L	23144-B-K-MB	H3144X	–	–	TS44	2	135
SD3144-H-TS-BL-L	23144-B-K-MB	H3144X	–	–	TS44	2	135
SD3148-H-TS-AF-L	23148-B-K-MB	H3148X	–	–	TS48	1	175
SD3148-H-TS-AL-L	23148-B-K-MB	H3148X	–	–	TS48	1	175
SD3148-H-TS-BF-L	23148-B-K-MB	H3148X	–	–	TS48	2	175
SD3148-H-TS-BL-L	23148-B-K-MB	H3148X	–	–	TS48	2	175
SD3152-H-TS-AF-L	23152-K-MB	H3152X	–	–	TS52	1	210
SD3152-H-TS-AL-L	23152-K-MB	H3152X	–	–	TS52	1	210
SD3152-H-TS-BF-L	23152-K-MB	H3152X	–	–	TS52	2	210
SD3152-H-TS-BL-L	23152-K-MB	H3152X	–	–	TS52	2	210
SD3156-H-TS-AF-L	23156-B-K-MB	H3156X	–	–	TS56	1	240
SD3156-H-TS-AL-L	23156-B-K-MB	H3156X	–	–	TS56	1	240
SD3156-H-TS-BF-L	23156-B-K-MB	H3156X	–	–	TS56	2	240
SD3156-H-TS-BL-L	23156-B-K-MB	H3156X	–	–	TS56	2	240
SD3160-H-TS-AF-L	23160-B-K-MB	H3160-HG	–	–	TS60	1	290
SD3160-H-TS-AL-L	23160-B-K-MB	H3160-HG	–	–	TS60	1	290
SD3160-H-TS-BF-L	23160-B-K-MB	H3160-HG	–	–	TS60	2	290
SD3160-H-TS-BL-L	23160-B-K-MB	H3160-HG	–	–	TS60	2	290
SD3164-H-TS-AF-L	23164-K-MB	H3164-HG	–	–	TS64	1	330
SD3164-H-TS-AL-L	23164-K-MB	H3164-HG	–	–	TS64	1	330
SD3164-H-TS-BF-L	23164-K-MB	H3164-HG	–	–	TS64	2	330
SD3164-H-TS-BL-L	23164-K-MB	H3164-HG	–	–	TS64	2	330



Design A (TS-A)

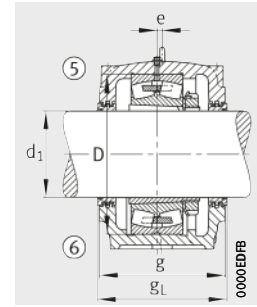


Design B (TS-B)



Design A

- ③ Loc. bearing TS-AF
- ④ Non-loc. brg. TS-AL



Design B

- ⑤ Locating TS-BF
- ⑥ Non-loc. brg. TS-BL

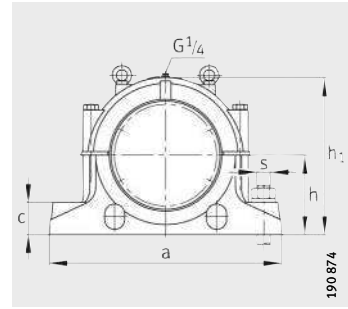
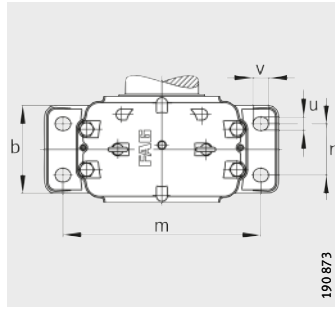
Dimensions

d <sub>1</sub>	a	g	h <sub>1</sub>	b	c	D	e	g <sub>L</sub>	g <sub>3</sub>	h	m	n	u	v	s	
															mm	inch
150	510	230	335	180	70	280	14	-	35	170	430	100	30	36	M24	1
150	510	230	335	180	70	280	14	240	-	170	430	100	30	36	M24	1
160	530	240	355	190	75	300	15	-	35	180	450	110	30	36	M24	1
160	530	240	355	190	75	300	15	250	-	180	450	110	30	36	M24	1
170	560	260	375	210	80	320	10	-	35	190	480	120	30	36	M24	1
170	560	260	375	210	80	320	10	270	-	190	480	120	30	36	M24	1
180	610	280	410	230	85	340	10	-	35	210	510	130	36	42	M30	1 <sup>1</sup> / <sub>8</sub>
180	610	280	410	230	85	340	10	290	-	210	510	130	36	42	M30	1 <sup>1</sup> / <sub>8</sub>
200	640	290	435	240	90	370	12	-	35	220	540	140	36	42	M30	1 <sup>1</sup> / <sub>8</sub>
200	640	290	435	240	90	370	12	-	35	220	540	140	36	42	M30	1 <sup>1</sup> / <sub>8</sub>
200	640	290	435	240	90	370	12	300	-	220	540	140	36	42	M30	1 <sup>1</sup> / <sub>8</sub>
200	640	290	435	240	90	370	12	300	-	220	540	140	36	42	M30	1 <sup>1</sup> / <sub>8</sub>
220	700	310	475	260	95	400	12	-	35	240	600	150	36	42	M30	1 <sup>1</sup> / <sub>8</sub>
220	700	310	475	260	95	400	12	-	35	240	600	150	36	42	M30	1 <sup>1</sup> / <sub>8</sub>
220	700	310	475	260	95	400	12	320	-	240	600	150	36	42	M30	1 <sup>1</sup> / <sub>8</sub>
220	700	310	475	260	95	400	12	320	-	240	600	150	36	42	M30	1 <sup>1</sup> / <sub>8</sub>
240	770	320	515	280	100	440	13	-	35	260	650	160	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
240	770	320	515	280	100	440	13	-	35	260	650	160	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
240	770	320	515	280	100	440	13	330	-	260	650	160	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
240	770	320	515	280	100	440	13	330	-	260	650	160	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
260	790	320	550	280	105	460	16	-	35	280	670	160	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
260	790	320	550	280	105	460	16	-	35	280	670	160	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
260	790	320	550	280	105	460	16	330	-	280	670	160	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
260	790	320	550	280	105	460	16	330	-	280	670	160	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
280	830	350	590	310	110	500	22	-	35	300	710	190	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
280	830	350	590	310	110	500	22	-	35	300	710	190	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
280	830	350	590	310	110	500	22	360	-	300	710	190	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
280	830	350	590	310	110	500	22	360	-	300	710	190	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
300	880	370	630	330	115	540	23	-	35	320	750	200	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
300	880	370	630	330	115	540	23	-	35	320	750	200	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
300	880	370	630	330	115	540	23	380	-	320	750	200	42	52	M36	1 <sup>3</sup> / <sub>8</sub>
300	880	370	630	330	115	540	23	380	-	320	750	200	42	52	M36	1 <sup>3</sup> / <sub>8</sub>



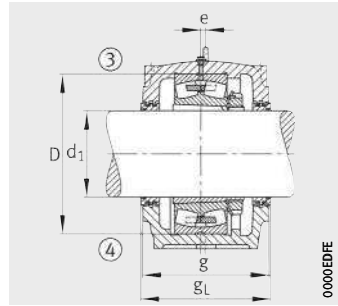
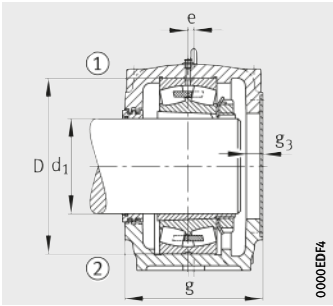
# Plummer block housings

SD31, split  
For spherical roller bearings with tapered bore and adapter sleeve



**Dimension table** (continued) · Dimensions in mm

Designation					Mass m
Housing	Bearing	Adapter sleeve	Labyrinth ring with round cord		Housing ≈kg
				Pieces	
SD3168-H-TS-AF-L	23168-B-K-MB	H3168-HG	TS68	1	380
SD3168-H-TS-AL-L	23168-B-K-MB	H3168-HG	TS68	1	380
SD3168-H-TS-BF-L	23168-B-K-MB	H3168-HG	TS68	2	380
SD3168-H-TS-BL-L	23168-B-K-MB	H3168-HG	TS68	2	380
SD3172-H-TS-AF-L	23172-K-MB	H3172-HG	TS72	1	420
SD3172-H-TS-AL-L	23172-K-MB	H3172-HG	TS72	1	420
SD3172-H-TS-BF-L	23172-K-MB	H3172-HG	TS72	2	420
SD3172-H-TS-BL-L	23172-K-MB	H3172-HG	TS72	2	420
SD3176-H-TS-AF-L	23176-K-MB	H3176-HG	TS76	1	490
SD3176-H-TS-AL-L	23176-K-MB	H3176-HG	TS76	1	490
SD3176-H-TS-BF-L	23176-K-MB	H3176-HG	TS76	2	490
SD3176-H-TS-BL-L	23176-K-MB	H3176-HG	TS76	2	490
SD3180-H-TS-AF-L	23180-B-K-MB	H3180-HG	TS80	1	570
SD3180-H-TS-AL-L	23180-B-K-MB	H3180-HG	TS80	1	570
SD3180-H-TS-BF-L	23180-B-K-MB	H3180-HG	TS80	2	570
SD3180-H-TS-BL-L	23180-B-K-MB	H3180-HG	TS80	2	570
SD3184-H-TS-AF-L	23184-K-MB	H3184-HG	TS84	1	610
SD3184-H-TS-AL-L	23184-K-MB	H3184-HG	TS84	1	610
SD3184-H-TS-BF-L	23184-K-MB	H3184-HG	TS84	2	610
SD3184-H-TS-BL-L	23184-K-MB	H3184-HG	TS84	2	610
SD3188-H-TS-AF-L	23188-K-MB	H3188-HG	TS88	1	770
SD3188-H-TS-AL-L	23188-K-MB	H3188-HG	TS88	1	770
SD3188-H-TS-BF-L	23188-K-MB	H3188-HG	TS88	2	770
SD3188-H-TS-BL-L	23188-K-MB	H3188-HG	TS88	2	770
SD3192-H-TS-AF-L	23192-K-MB	H3192-HG	TS92	1	830
SD3192-H-TS-AL-L	23192-K-MB	H3192-HG	TS92	1	830
SD3192-H-TS-BF-L	23192-K-MB	H3192-HG	TS92	2	830
SD3192-H-TS-BL-L	23192-K-MB	H3192-HG	TS92	2	830
SD3196-H-TS-AF-L	23196-K-MB	H3196-HG	TS96	1	930
SD3196-H-TS-AL-L	23196-K-MB	H3196-HG	TS96	1	930
SD3196-H-TS-BF-L	23196-K-MB	H3196-HG	TS96	2	930
SD3196-H-TS-BL-L	23196-K-MB	H3196-HG	TS96	2	930



Design A

- ① Locating bearing TS-AF
- ② Non-locating bearing TS-AL

Design B

- ③ Locating bearing TS-BF
- ④ Non-locating bearing TS-BL

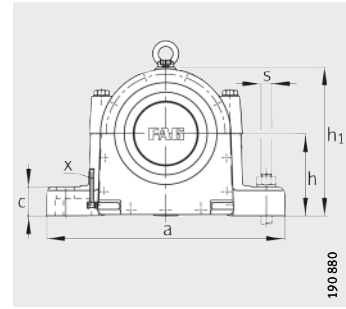
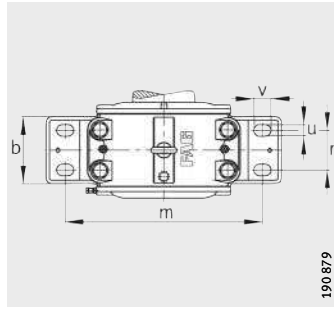
Dimensions

d <sub>1</sub>	a	g	h <sub>1</sub>	b	c	D	e	g <sub>L</sub>	g <sub>3</sub>	h	m	n	u	v	s	
															mm	inch
320	950	400	675	360	120	580	24	-	35	340	810	220	42	52	M36	1 3/8
320	950	400	675	360	120	580	24	-	35	340	810	220	42	52	M36	1 3/8
320	950	400	675	360	120	580	24	410	-	340	810	220	42	52	M36	1 3/8
320	950	400	675	360	120	580	24	410	-	340	810	220	42	52	M36	1 3/8
340	1000	400	695	360	120	600	30	-	35	350	840	220	42	52	M36	1 3/8
340	1000	400	695	360	120	600	30	-	35	350	840	220	42	52	M36	1 3/8
340	1000	400	695	360	120	600	30	410	-	350	840	220	42	52	M36	1 3/8
340	1000	400	695	360	120	600	30	410	-	350	840	220	42	52	M36	1 3/8
360	1040	400	715	360	120	620	30	-	35	360	870	220	42	52	M36	1 3/8
360	1040	400	715	360	120	620	30	-	35	360	870	220	42	52	M36	1 3/8
360	1040	400	715	360	120	620	30	410	-	360	870	220	42	52	M36	1 3/8
360	1040	400	715	360	120	620	30	410	-	360	870	220	42	52	M36	1 3/8
380	1120	430	755	390	125	650	30	-	35	380	950	240	48	60	M42	1 5/8
380	1120	430	755	390	125	650	30	-	35	380	950	240	48	60	M42	1 5/8
380	1120	430	755	390	125	650	30	440	-	380	950	240	48	60	M42	1 5/8
380	1120	430	755	390	125	650	30	440	-	380	950	240	48	60	M42	1 5/8
400	1170	460	810	420	130	700	35	-	35	410	1000	260	48	60	M42	1 5/8
400	1170	460	810	420	130	700	35	-	35	410	1000	260	48	60	M42	1 5/8
400	1170	460	810	420	130	700	35	470	-	410	1000	260	48	60	M42	1 5/8
400	1170	460	810	420	130	700	35	470	-	410	1000	260	48	60	M42	1 5/8
410	1220	460	835	430	135	720	35	-	35	420	1030	260	48	60	M42	1 5/8
410	1220	460	835	430	135	720	35	-	35	420	1030	260	48	60	M42	1 5/8
410	1220	460	835	430	135	720	35	470	-	420	1030	260	48	60	M42	1 5/8
410	1220	460	835	430	135	720	35	470	-	420	1030	260	48	60	M42	1 5/8
430	1280	470	875	440	145	760	35	-	35	440	1070	260	48	60	M42	1 5/8
430	1280	470	875	440	145	760	35	-	35	440	1070	260	48	60	M42	1 5/8
430	1280	470	875	440	145	760	35	480	-	440	1070	260	48	60	M42	1 5/8
430	1280	470	875	440	145	760	35	480	-	440	1070	260	48	60	M42	1 5/8
450	1330	470	920	440	155	790	45	-	35	460	1110	260	66	80	M56	2 1/4
450	1330	470	920	440	155	790	45	-	35	460	1110	260	66	80	M56	2 1/4
450	1330	470	920	440	155	790	45	480	-	460	1110	260	66	80	M56	2 1/4
450	1330	470	920	440	155	790	45	480	-	460	1110	260	66	80	M56	2 1/4



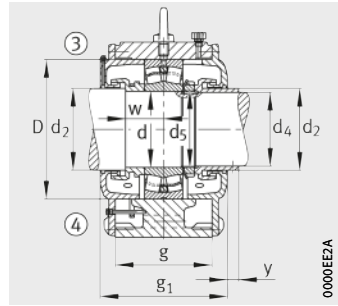
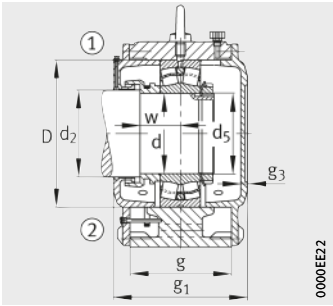
# Plummer block housings

LOE, split  
For spherical roller bearings with cylindrical bore



**Dimension table** - Dimensions in mm

Designation					Oil quantity	Oil level	Mass
Housing		Bearing	Shaft nut	Tab washer	Initial filling	Height	m
Locating bearing	Non-locating bearing				l	x mm	Housing
							≈kg
LOE310-N-AF-L	LOE310-N-AL-L	22310-E1	KM10	MB10	0,9	50- 65	30
LOE310-N-BF-L	LOE310-N-BL-L	22310-E1	KM10	MB10	0,9	50- 65	30
LOE312-N-AF-L	LOE312-N-AL-L	22312-E1	KM12	MB12	1	50- 65	35
LOE312-N-BF-L	LOE312-N-BL-L	22312-E1	KM12	MB12	1	50- 65	35
LOE314-N-AF-L	LOE314-N-AL-L	22314-E1	KM14	MB14	1,4	50- 65	45
LOE314-N-BF-L	LOE314-N-BL-L	22314-E1	KM14	MB14	1,4	50- 65	45
LOE316-N-AF-L	LOE316-N-AL-L	22316-E1	KM16	MB16	1,6	55- 70	60
LOE316-N-BF-L	LOE316-N-BL-L	22316-E1	KM16	MB16	1,6	55- 70	60
LOE217-N-AF-L	LOE217-N-AL-L	22217-E1	KM17	MB17	1,4	50- 65	45
LOE217-N-BF-L	LOE217-N-BL-L	22217-E1	KM17	MB17	1,4	50- 65	45
LOE218-N-AF-L	LOE218-N-AL-L	22218-E1	KM18	MB18	1,5	45- 60	47
LOE218-N-BF-L	LOE218-N-BL-L	22218-E1	KM18	MB18	1,5	45- 60	47
LOE318-N-AF-L	LOE318-N-AL-L	22318-E1	KM18	MB18	2,3	65- 85	73
LOE318-N-BF-L	LOE318-N-BL-L	22318-E1	KM18	MB18	2,3	65- 85	73
LOE219-N-AF-L	LOE219-N-AL-L	22219-E1	KM19	MB19	1,6	55- 70	60
LOE219-N-BF-L	LOE219-N-BL-L	22219-E1	KM19	MB19	1,6	55- 70	60
LOE220-N-AF-L	LOE220-N-AL-L	22220-E1	KM20	MB20	1,7	50- 65	67
LOE220-N-BF-L	LOE220-N-BL-L	22220-E1	KM20	MB20	1,7	50- 65	67
LOE320-N-AF-L	LOE320-N-AL-L	22320-E1	KM20	MB20	2,4	55- 75	81
LOE320-N-BF-L	LOE320-N-BL-L	22320-E1	KM20	MB20	2,4	55- 75	81
LOE222-N-AF-L	LOE222-N-AL-L	22222-E1	KM22	MB22	2,1	50- 70	74
LOE222-N-BF-L	LOE222-N-BL-L	22222-E1	KM22	MB22	2,1	50- 70	74
LOE322-N-AF-L	LOE322-N-AL-L	22322-E1	KM22	MB22	2,4	45- 65	100
LOE322-N-BF-L	LOE322-N-BL-L	22322-E1	KM22	MB22	2,4	45- 65	100
LOE224-N-AF-L	LOE224-N-AL-L	22224-E1	KM24	MB24	2,3	50- 70	80
LOE224-N-BF-L	LOE224-N-BL-L	22224-E1	KM24	MB24	2,3	50- 70	80
LOE324-N-AF-L	LOE324-N-AL-L	22324-E1	KM24	MB24	4,2	65- 90	130
LOE324-N-BF-L	LOE324-N-BL-L	22324-E1	KM24	MB24	4,2	65- 90	130
LOE226-N-AF-L	LOE226-N-AL-L	22226-E1	KM26	MB26	2,3	55- 75	93
LOE226-N-BF-L	LOE226-N-BL-L	22226-E1	KM26	MB26	2,3	55- 75	93
LOE326-N-AF-L	LOE326-N-AL-L	22326-E1	KM26	MB26	3,7	75-105	142
LOE326-N-BF-L	LOE326-N-BL-L	22326-E1	KM26	MB26	3,7	75-105	142



Design A

- ① Locating bearing AF
- ② Non-locating bearing AL

Design B

- ③ Locating bearing BF
- ④ Non-locating bearing BL

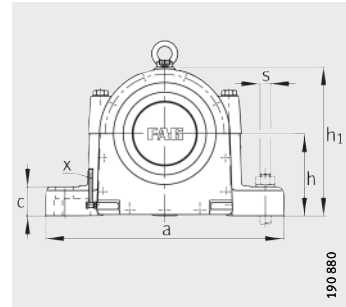
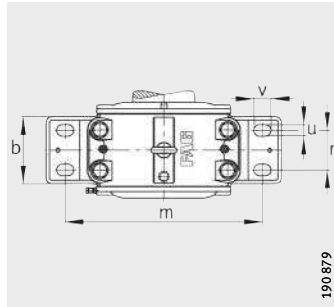
Dimensions

d	a	g <sub>1</sub>	h <sub>1</sub>	d <sub>2</sub>	d <sub>4</sub>	d <sub>5</sub>	w	b	c	D	g	g <sub>3</sub>	h	m	n	u	v	s	y
50	350	210	205	55	-	M50X2	52	125	40	110	135	18	115	290	75	20	30	M16	-
50	350	210	205	55	47	M50X2	52	125	40	110	135	-	115	290	75	20	30	M16	15
60	370	220	220	65	-	M60X2	55	130	45	130	140	18	125	310	80	20	30	M16	-
60	370	220	220	65	57	M60X2	55	130	45	130	140	-	125	310	80	20	30	M16	15
70	410	225	240	75	-	M70X2	62	150	48	150	160	18	135	340	80	25	35	M20	-
70	410	225	240	75	67	M70X2	62	150	48	150	160	-	135	340	80	25	35	M20	15
80	490	250	270	85	-	M80X2	67	160	50	170	170	18	150	400	80	30	45	M24	-
80	490	250	270	85	77	M80X2	67	160	50	170	170	-	150	400	80	30	45	M24	15
85	410	225	240	90	-	M85X2	62	150	48	150	160	18	135	340	80	25	35	M20	-
85	410	225	240	90	82	M85X2	62	150	48	150	160	-	135	340	80	25	35	M20	15
90	410	225	245	95	-	M90X2	61	150	48	160	160	17,5	135	340	80	25	35	M20	-
90	410	225	245	95	87	M90X2	61	150	48	160	160	-	135	340	80	25	35	M20	15
90	500	250	305	95	-	M90X2	72	165	55	190	175	18	175	420	80	30	45	M24	-
90	500	250	305	95	87	M90X2	72	165	55	190	175	-	175	420	80	30	45	M24	15
95	490	250	270	100	-	M95X2	67	160	50	170	170	18	150	400	80	30	45	M24	-
95	490	250	270	100	92	M95X2	67	160	50	170	170	-	150	400	80	30	45	M24	15
100	490	250	270	110	-	M100X2	60	160	50	180	170	20	150	400	80	30	45	M24	-
100	490	250	270	110	97	M100X2	60	160	50	180	170	-	150	400	80	30	45	M24	15
100	550	250	320	106	-	M100X2	72	165	55	215	175	18	175	440	80	36	50	M30	-
100	550	250	320	106	97	M100X2	72	165	55	215	175	-	175	440	80	36	50	M30	15
110	510	250	300	116	-	M110X2	70	165	50	200	175	18	165	420	80	30	45	M24	-
110	510	250	300	116	107	M110X2	70	165	50	200	175	-	165	420	80	30	45	M24	15
110	570	270	335	120	-	M110X2	77	180	65	240	190	20	180	460	95	36	50	M30	-
110	570	270	335	120	107	M110X2	77	180	65	240	190	-	180	460	95	36	50	M30	15
120	550	250	320	126	-	M120X2	72	165	55	215	175	18	175	440	80	36	50	M30	-
120	550	250	320	126	117	M120X2	72	165	55	215	175	-	175	440	80	36	50	M30	15
120	660	300	390	126	-	M120X2	90	200	75	260	210	18	220	530	110	42	60	M36	-
120	660	300	390	126	117	M120X2	90	200	75	260	210	-	220	530	110	42	60	M36	15
130	570	260	345	136	-	M130X2	77	175	65	230	185	18	190	460	90	36	50	M30	-
130	570	260	345	136	127	M130X2	77	175	65	230	185	-	190	460	90	36	50	M30	15
130	660	315	420	140	-	M130X2	86	200	80	280	220	18	235	530	110	42	60	M36	-
130	660	315	420	140	127	M130X2	86	200	80	280	220	-	235	530	110	42	60	M36	15



# Plummer block housings

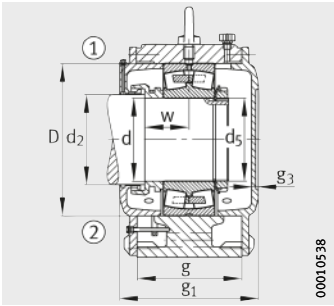
LOE, split  
For spherical roller bearings with cylindrical bore



**Dimension table** (continued) · Dimensions in mm

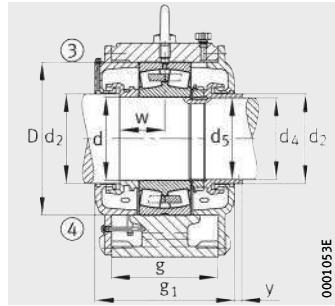
Designation					Oil quantity	Oil level	Mass
Housing		Bearing	Shaft nut	Tab washer	Initial filling	Height	m
Locating bearing	Non-locating bearing				l	x mm	Housing
							≈kg
LOE228-N-AF-L	LOE228-N-AL-L	22228-E1	KM28	MB28	3,7	55– 70	100
LOE228-N-BF-L	LOE228-N-BL-L	22228-E1	KM28	MB28	3,7	55– 70	100
LOE328-N-AF-L	LOE328-N-AL-L	22328-E1	KM28	MB28	6,7	80–110	170
LOE328-N-BF-L	LOE328-N-BL-L	22328-E1	KM28	MB28	6,7	80–110	170
LOE230-N-AF-L	LOE230-N-AL-L	22230-E1	KM30	MB30	4,2	65– 90	125
LOE230-N-BF-L	LOE230-N-BL-L	22230-E1	KM30	MB30	4,2	65– 90	125
LOE330-N-AF-L	LOE330-N-AL-L	22330-E1	KM30	MB30	6,2	75–110	200
LOE330-N-BF-L	LOE330-N-BL-L	22330-E1	KM30	MB30	6,2	75–110	200
LOE232-N-AF-L	LOE232-N-AL-L	22232-E1	KM32	MB32	4,7	60– 80	136
LOE232-N-BF-L	LOE232-N-BL-L	22232-E1	KM32	MB32	4,7	60– 80	136
LOE332-N-AF-L	LOE332-N-AL-L	22332-MB	KM32	MB32	7	80–105	240
LOE332-N-BF-L	LOE332-N-BL-L	22332-MB	KM32	MB32	7	80–105	240
LOE234-N-AF-L	LOE234-N-AL-L	22234-E1	KM34	MB34	6	90–105	160
LOE234-N-BF-L	LOE234-N-BL-L	22234-E1	KM34	MB34	6	90–105	160
LOE334-N-AF-L	LOE334-N-AL-L	22334-MB	KM34	MB34	7,2	80–105	270
LOE334-N-BF-L	LOE334-N-BL-L	22334-MB	KM34	MB34	7,2	80–105	270
LOE236-N-AF-L	LOE236-N-AL-L	22236-E1	KM36	MB36	6	75–110	200
LOE236-N-BF-L	LOE236-N-BL-L	22236-E1	KM36	MB36	6	75–110	200
LOE336-N-AF-L	LOE336-N-AL-L	22336-MB	KM36	MB36	7,4	80–105	330
LOE336-N-BF-L	LOE336-N-BL-L	22336-MB	KM36	MB36	7,4	80–105	330
LOE238-N-AF-L	LOE238-N-AL-L	22238-MB	KM38	MB38	7,2	70–100	230
LOE238-N-BF-L	LOE238-N-BL-L	22238-MB	KM38	MB38	7,2	70–100	230
LOE240-N-AF-L	LOE240-N-AL-L	22240-B-MB	KM40	MB40	7,2	75–100	250
LOE240-N-BF-L	LOE240-N-BL-L	22240-B-MB	KM40	MB40	7,2	75–100	250
LOE244-N-AF-L	LOE244-N-AL-L	22244-B-MB	HM44T	MB44	8,2	80–110	310
LOE244-N-BF-L	LOE244-N-BL-L	22244-B-MB	HM44T	MB44	8,2	80–110	310
LOE248-N-AF-L	LOE248-N-AL-L	22248-B-MB	HM48T	MB48	8,4	100–125	385
LOE248-N-BF-L	LOE248-N-BL-L	22248-B-MB	HM48T	MB48	8,4	100–125	385





Design A

- ① Locating bearing AF
- ② Non-locating bearing AL



Design B

- ③ Locating bearing BF
- ④ Non-locating bearing BL

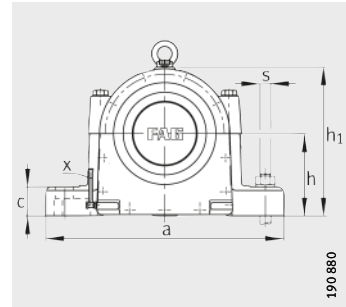
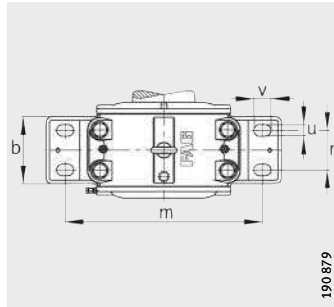
Dimensions

d	a	g <sub>1</sub>	h <sub>1</sub>	d <sub>2</sub>	d <sub>4</sub>	d <sub>5</sub>	w	b	c	D	g	g <sub>3</sub>	h	m	n	u	v	s	y
140	570	260	355	150	-	M140X2	73	175	65	250	180	18	190	460	100	36	50	M30	-
140	570	260	355	150	137	M140X2	73	175	65	250	180	-	190	460	100	36	50	M30	22
140	710	325	450	146	-	M140X2	95	220	85	300	230	19,5	260	580	125	42	60	M36	-
140	710	325	450	146	137	M140X2	95	220	85	300	230	-	260	580	125	42	60	M36	15
150	660	275	395	156	-	M150X2	82	190	70	270	200	18	220	530	100	42	60	M36	-
150	660	275	395	156	147	M150X2	82	190	70	270	200	-	220	530	100	42	60	M36	15
150	760	335	465	160	-	M150X2	95	200	85	320	240	18	265	630	125	42	60	M36	-
150	760	335	465	160	147	M150X2	95	200	85	320	240	-	265	630	125	42	60	M36	15
160	660	290	400	170	-	M160X3	80	200	70	290	210	20	220	530	110	42	60	M36	-
160	660	290	400	170	155	M160X3	80	200	70	290	210	-	220	530	110	42	60	M36	22
160	820	350	485	166	-	M160X3	100	240	90	340	250	20	270	670	130	48	70	M42	-
160	820	350	485	166	155	M160X3	100	240	90	340	250	-	270	670	130	48	70	M42	15
170	710	300	460	176	-	M170X3	90	200	85	310	210	18	260	580	110	42	60	M36	-
170	710	300	460	176	165	M170X3	90	200	85	310	210	-	260	580	110	42	60	M36	15
170	830	350	510	180	-	M170X3	105	240	90	360	255	18	280	670	130	48	70	M42	-
170	830	350	510	180	165	M170X3	105	240	90	360	255	-	280	670	130	48	70	M42	15
180	710	300	465	190	-	M180X3	90	200	85	320	210	20	260	580	110	42	60	M36	-
180	710	300	465	190	175	M180X3	90	200	85	320	210	-	260	580	110	42	60	M36	22
180	840	360	530	190	-	M180X3	108	240	90	380	260	20	290	680	130	48	70	M42	-
180	840	360	530	190	175	M180X3	108	240	90	380	260	-	290	680	130	48	70	M42	15
190	820	350	485	196	-	M190X3	95	240	90	340	250	20	270	670	130	48	70	M42	-
190	820	350	485	196	185	M190X3	95	240	90	340	250	-	270	670	130	48	70	M42	15
200	830	344	510	210	-	M200X3	100	240	90	360	260	20	280	670	130	48	70	M42	-
200	830	344	510	210	195	M200X3	100	240	90	360	260	-	280	670	130	48	70	M42	15
220	880	380	565	230	-	Tr220X4	108	240	105	400	280	20	310	720	130	48	70	M42	-
220	880	380	565	230	212	Tr220X4	108	240	105	400	280	-	310	720	130	48	70	M42	15
240	980	400	615	260	-	Tr240X4	120	280	120	440	300	20	340	820	165	48	70	M42	-
240	980	400	615	260	235	Tr240X4	120	280	120	440	300	-	340	820	165	48	70	M42	22



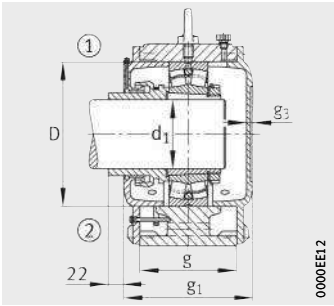
# Plummer block housings

LOE, split  
For spherical roller bearings with tapered bore and adapter sleeve



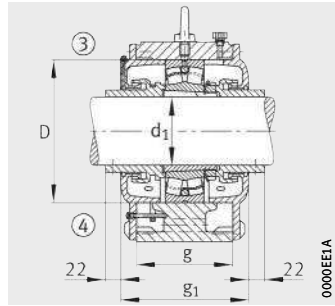
**Dimension table** - Dimensions in mm

Designation				Oil quantity	Oil level	Mass
Housing		Bearing	Adapter sleeve	Initial filling l	Height x mm	Housing m ≈kg
Locating bearing	Non-locating bearing					
LOE614-N-AF-L	LOE614-N-AL-L	22314-E1-K	H2314	1,4	50– 65	45
LOE614-N-BF-L	LOE614-N-BL-L	22314-E1-K	H2314	1,4	50– 65	45
LOE616-N-AF-L	LOE616-N-AL-L	22316-E1-K	H2316	1,6	55– 70	60
LOE616-N-BF-L	LOE616-N-BL-L	22316-E1-K	H2316	1,6	55– 70	60
LOE517-N-AF-L	LOE517-N-AL-L	22217-E1-K	H317	1,4	50– 65	45
LOE517-N-BF-L	LOE517-N-BL-L	22217-E1-K	H317	1,4	50– 65	45
LOE518-N-AF-L	LOE518-N-AL-L	22218-E1-K	H318	1,5	45– 60	47
LOE518-N-BF-L	LOE518-N-BL-L	22218-E1-K	H318	1,5	45– 60	47
LOE618-N-AF-L	LOE618-N-AL-L	22318-E1-K	H2318	2,3	65– 85	73
LOE618-N-BF-L	LOE618-N-BL-L	22318-E1-K	H2318	2,3	65– 85	73
LOE519-N-AF-L	LOE519-N-AL-L	22219-E1-K	H319	1,6	55– 70	60
LOE519-N-BF-L	LOE519-N-BL-L	22219-E1-K	H319	1,6	55– 70	60
LOE520-N-AF-L	LOE520-N-AL-L	22220-E1-K	H320	1,7	50– 65	67
LOE520-N-BF-L	LOE520-N-BL-L	22220-E1-K	H320	1,7	50– 65	67
LOE620-N-AF-L	LOE620-N-AL-L	22320-E1-K	H2320	2,4	55– 75	81
LOE620-N-BF-L	LOE620-N-BL-L	22320-E1-K	H2320	2,4	55– 75	81
LOE522-N-AF-L	LOE522-N-AL-L	22222-E1-K	H322	2,1	50– 70	74
LOE522-N-BF-L	LOE522-N-BL-L	22222-E1-K	H322	2,1	50– 70	74
LOE622-N-AF-L	LOE622-N-AL-L	22322-E1-K	H2322	2,4	45– 65	100
LOE622-N-BF-L	LOE622-N-BL-L	22322-E1-K	H2322	2,4	45– 65	100
LOE524-N-AF-L	LOE524-N-AL-L	22224-E1-K	H3124	2,3	50– 70	80
LOE524-N-BF-L	LOE524-N-BL-L	22224-E1-K	H3124	2,3	50– 70	80
LOE624-N-AF-L	LOE624-N-AL-L	22324-E1-K	H2324	4,2	65– 90	130
LOE624-N-BF-L	LOE624-N-BL-L	22324-E1-K	H2324	4,2	65– 90	130
LOE526-N-AF-L	LOE526-N-AL-L	22226-E1-K	H3126	2,3	55– 75	93
LOE526-N-BF-L	LOE526-N-BL-L	22226-E1-K	H3126	2,3	55– 75	93
LOE626-N-AF-L	LOE626-N-AL-L	22326-E1-K	H2326	3,7	75–105	142
LOE626-N-BF-L	LOE626-N-BL-L	22326-E1-K	H2326	3,7	75–105	142
LOE528-N-AF-L	LOE528-N-AL-L	22228-E1-K	H3128	3,7	55– 75	100
LOE528-N-BF-L	LOE528-N-BL-L	22228-E1-K	H3128	3,7	55– 75	100
LOE628-N-AF-L	LOE628-N-AL-L	22328-E1-K	H2328	6,7	80–110	170
LOE628-N-BF-L	LOE628-N-BL-L	22328-E1-K	H2328	6,7	80–110	170



Design A

- ① Locating bearing AF
- ② Non-locating bearing AL



Design B

- ③ Locating bearing BF
- ④ Non-locating bearing BL

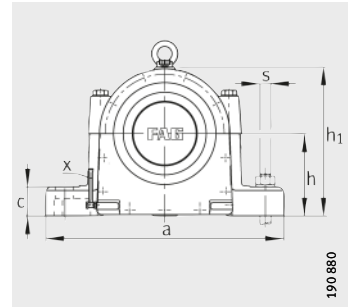
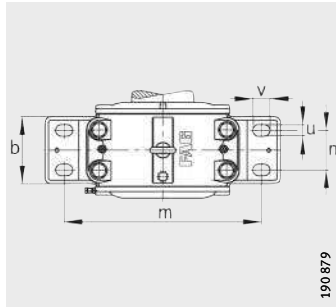
Dimensions

d <sub>1</sub>	a	g <sub>1</sub>	h <sub>1</sub>	b	c	D	g	g <sub>3</sub>	h	m	n	u	v	s
60	410	225	240	150	48	150	160	18	135	340	80	25	35	M20
60	410	225	240	150	48	150	160	-	135	340	80	25	35	M20
70	490	250	270	160	50	170	170	18	150	400	80	30	45	M24
70	490	250	270	160	50	170	170	-	150	400	80	30	45	M24
75	410	225	240	150	48	150	160	18	135	340	80	25	35	M20
75	410	225	240	150	48	150	160	-	135	340	80	25	35	M20
80	410	225	245	150	48	160	160	17,5	135	340	80	25	35	M20
80	410	225	245	150	48	160	160	-	135	340	80	25	35	M20
80	500	250	305	165	55	190	175	18	175	420	80	30	45	M24
80	500	250	305	165	55	190	175	-	175	420	80	30	45	M24
85	490	250	270	160	50	170	170	18	150	400	80	30	45	M24
85	490	250	270	160	50	170	170	-	150	400	80	30	45	M24
90	490	250	270	160	50	180	170	20	150	400	80	30	45	M24
90	490	250	270	160	50	180	170	-	150	400	80	30	45	M24
90	550	250	320	165	55	215	175	18	175	440	80	36	50	M30
90	550	250	320	165	55	215	175	-	175	440	80	36	50	M30
100	510	250	300	165	50	200	175	18	165	420	80	30	45	M24
100	510	250	300	165	50	200	175	-	165	420	80	30	45	M24
100	570	270	335	180	65	240	190	20	180	460	95	36	50	M30
100	570	270	335	180	65	240	190	-	180	460	95	36	50	M30
110	550	250	320	165	55	215	175	18	175	440	80	36	50	M30
110	550	250	320	165	55	215	175	-	175	440	80	36	50	M30
110	660	300	390	200	75	260	210	18	220	530	110	42	60	M36
110	660	300	390	200	75	260	210	-	220	530	110	42	60	M36
115	570	260	345	175	65	230	185	18	190	460	90	36	50	M30
115	570	260	345	175	65	230	185	-	190	460	90	36	50	M30
115	660	315	420	200	80	280	220	18	235	530	110	42	60	M36
115	660	315	420	200	80	280	220	-	235	530	110	42	60	M36
125	570	260	355	175	65	250	180	18	190	460	100	36	50	M30
125	570	260	355	175	65	250	180	-	190	460	100	36	50	M30
125	710	325	450	220	85	300	230	19,5	260	580	125	42	60	M36
125	710	325	450	220	85	300	230	-	260	580	125	42	60	M36



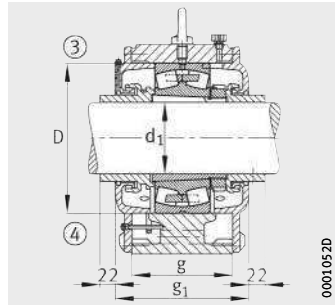
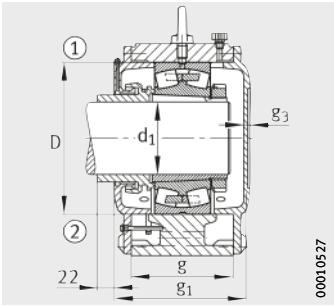
# Plummer block housings

LOE, split  
For spherical roller bearings with tapered bore and adapter sleeve



**Dimension table** (continued) · Dimensions in mm

Designation				Oil quantity	Oil level	Mass
Housing		Bearing	Adapter sleeve	Initial filling l	Height x mm	Housing m ≈kg
Locating bearing	Non-locating bearing					
LOE530-N-AF-L	LOE530-N-AL-L	22230-E1-K	H3130	4,2	65– 90	125
LOE530-N-BF-L	LOE530-N-BL-L	22230-E1-K	H3130	4,2	65– 90	125
LOE630-N-AF-L	LOE630-N-AL-L	22330-E1-K	H2330	6,2	75–110	200
LOE630-N-BF-L	LOE630-N-BL-L	22330-E1-K	H2330	6,2	75–110	200
LOE532-N-AF-L	LOE532-N-AL-L	22232-E1-K	H3132	4,7	60– 80	135
LOE532-N-BF-L	LOE532-N-BL-L	22232-E1-K	H3132	4,7	60– 80	135
LOE632-N-AF-L	LOE632-N-AL-L	22332-K-MB	H2332	7	80–105	240
LOE632-N-BF-L	LOE632-N-BL-L	22332-K-MB	H2332	7	80–105	240
LOE534-N-AF-L	LOE534-N-AL-L	22234-E1-K	H3134	6	90–105	160
LOE534-N-BF-L	LOE534-N-BL-L	22234-E1-K	H3134	6	80–105	160
LOE634-N-AF-L	LOE634-N-AL-L	22334-K-MB	H2334	7,2	80–105	270
LOE634-N-BF-L	LOE634-N-BL-L	22334-K-MB	H2334	7,2	80–105	270
LOE536-N-AF-L	LOE536-N-AL-L	22236-E1-K	H3136	6	75–110	200
LOE536-N-BF-L	LOE536-N-BL-L	22236-E1-K	H3136	6	75–110	200
LOE636-N-AF-L	LOE636-N-AL-L	22336-K-MB	H2336	7,4	80–105	330
LOE636-N-BF-L	LOE636-N-BL-L	22336-K-MB	H2336	7,4	80–105	330
LOE538-N-AF-L	LOE538-N-AL-L	22238-K-MB	H3138	7,2	70–100	230
LOE538-N-BF-L	LOE538-N-BL-L	22238-K-MB	H3138	7,2	70–100	230
LOE540-N-AF-L	LOE540-N-AL-L	22240-B-K-MB	H3140	7,2	75–100	250
LOE540-N-BF-L	LOE540-N-BL-L	22240-B-K-MB	H3140	7,2	75–100	250
LOE544-N-AF-L	LOE544-N-AL-L	22244-B-K-MB	H3144X	8,2	80–110	310
LOE544-N-BF-L	LOE544-N-BL-L	22244-B-K-MB	H3144X	8,2	80–110	310
LOE548-N-AF-L	LOE548-N-AL-L	22248-B-K-MB	H3148X	8,4	100–120	385
LOE548-N-BF-L	LOE548-N-BL-L	22248-B-K-MB	H3148X	8,4	100–120	385



Design A

- ① Locating bearing AF
- ② Non-locating bearing AL

Design B

- ③ Locating bearing BF
- ④ Non-locating bearing BL

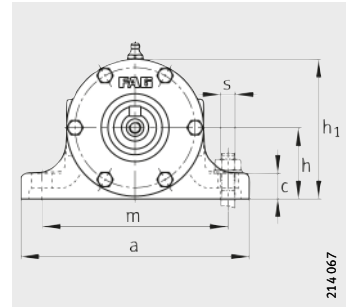
Dimensions

d <sub>1</sub>	a	g <sub>1</sub>	h <sub>1</sub>	b	c	D	g	g <sub>3</sub>	h	m	n	u	v	s
135	660	275	395	190	70	270	200	18	220	530	100	42	60	M36
135	660	275	395	190	70	270	200	–	220	530	100	42	60	M36
135	760	335	465	200	85	320	240	18	265	630	125	42	60	M36
135	760	335	465	200	85	320	240	–	265	630	125	42	60	M36
140	660	290	400	200	70	290	210	20	220	530	110	42	60	M36
140	660	290	400	200	70	290	210	–	220	530	110	42	60	M36
140	820	350	485	240	90	340	250	20	270	670	130	48	70	M42
140	820	350	485	240	90	340	250	–	270	670	130	48	70	M42
150	710	300	460	200	85	310	210	18	260	580	110	42	60	M36
150	710	300	460	200	85	310	210	–	260	580	110	42	60	M36
150	830	350	510	240	90	360	255	18	280	670	130	48	70	M42
150	830	350	510	240	90	360	255	–	280	670	130	48	70	M42
160	710	300	465	200	85	320	210	20	260	580	110	42	60	M36
160	710	300	465	200	85	320	210	–	260	580	110	42	60	M36
160	840	360	530	240	90	380	260	20	290	680	130	48	70	M42
160	840	360	530	240	90	380	260	–	290	680	130	48	70	M42
170	820	350	485	240	90	340	250	20	270	670	130	48	70	M42
170	820	350	485	240	90	340	250	–	270	670	130	48	70	M42
180	830	344	510	240	90	360	260	20	280	670	130	48	70	M42
180	830	344	510	240	90	360	260	–	280	670	130	48	70	M42
200	880	380	565	240	105	400	280	20	310	720	130	48	70	M42
200	880	380	565	240	105	400	280	–	310	720	130	48	70	M42
220	980	400	625	280	120	440	300	20	340	820	165	48	70	M42
220	980	400	625	280	120	440	300	–	340	820	165	48	70	M42



# Plummer block housing units

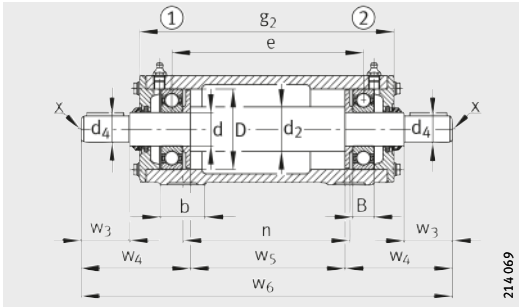
VRE3, unsplit  
With bearings and shaft



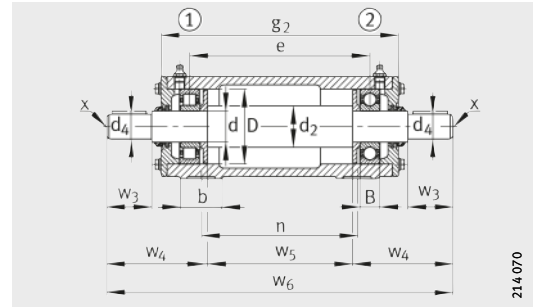
Cross-sections of designs C, D, page 1433, designs E, F, page 1435

**Dimension table** - Dimensions in mm

Designation					Mass m		Dimensions		
Bearing unit	Bearing ①	Bearing ②	Housing	Shaft Complete	Housing	Unit	d	D	B
					≈kg	≈kg			
<b>VRE305-A</b>	6305-C3	6305-C3	VR305-A	VRW305-A	5	7	<b>25</b>	62	17
<b>VRE305-B</b>	NJ305-E-TVP2	6305-C3	VR305-A	VRW305-A	5	7	<b>25</b>	62	17
<b>VRE305-C</b>	NU305-E-TVP2-C3	2X7305-B-TVP-UA	VR305-C	VRW305-C	5,2	7,4	<b>25</b>	62	17
<b>VRE305-D</b>	NU305-E-TVP2-C3	6305-C3	VR305-D	VRW305-D	5,2	7,2	<b>25</b>	62	17
<b>VRE305-E</b>	NU305-E-TVP2-C3	NU305-E-TVP2-C3 + 6305-C3	VR305-E	VRW305-C	5,2	7,5	<b>25</b>	62	17
<b>VRE305-F</b>	6305-C3	6305-C3	VR305-F	VRW305-F	5	7	<b>25</b>	62	17
<b>VRE306-A</b>	6306-C3	6306-C3	VR306-A	VRW306-A	5,8	9	<b>30</b>	72	19
<b>VRE306-B</b>	NJ306-E-TVP2	6306-C3	VR306-A	VRW306-A	5,8	9	<b>30</b>	72	19
<b>VRE306-C</b>	NU306-E-TVP2-C3	2X7306-B-TVP-UA	VR306-C	VRW306-C	6	9,4	<b>30</b>	72	19
<b>VRE306-D</b>	NU306-E-TVP2-C3	6306-C3	VR306-D	VRW306-D	6	9,2	<b>30</b>	72	19
<b>VRE306-E</b>	NU306-E-TVP2-C3	NU306-E-TVP2-C3 + 6306-C3	VR306-E	VRW306-C	6	9,4	<b>30</b>	72	19
<b>VRE306-F</b>	6306-C3	6306-C3	VR306-F	VRW306-F	5,8	9	<b>30</b>	72	19
<b>VRE307-A</b>	6307-C3	6307-C3	VR307-A	VRW307-A	8,5	13	<b>35</b>	80	21
<b>VRE307-B</b>	NJ307-E-TVP2	6307-C3	VR307-A	VRW307-A	8,5	13	<b>35</b>	80	21
<b>VRE307-C</b>	NU307-E-TVP2-C3	2X7307-B-TVP-UA	VR307-C	VRW307-C	8,8	13,6	<b>35</b>	80	21
<b>VRE307-D</b>	NU307-E-TVP2-C3	6307-C3	VR307-D	VRW307-D	8,8	13,3	<b>35</b>	80	21
<b>VRE307-E</b>	NU307-E-TVP2-C3	NU307-E-TVP2-C3 + 6307-C3	VR307-E	VRW307-C	8,8	13,6	<b>35</b>	80	21
<b>VRE307-F</b>	6307-C3	6307-C3	VR307-F	VRW307-F	8,5	13	<b>35</b>	80	21
<b>VRE308-A</b>	6308-C3	6308-C3	VR308-A	VRW308-A	10,9	18	<b>40</b>	90	23
<b>VRE308-B</b>	NJ308-E-TVP2	6308-C3	VR308-A	VRW308-A	10,9	18	<b>40</b>	90	23
<b>VRE308-C</b>	NU308-E-TVP2-C3	2X7308-B-TVP-UA	VR308-C	VRW308-C	11,7	19,1	<b>40</b>	90	23
<b>VRE308-D</b>	NU308-E-TVP2-C3	6308-C3	VR308-D	VRW308-D	11,7	18,8	<b>40</b>	90	23
<b>VRE308-E</b>	NU308-E-TVP2-C3	NU308-E-TVP2-C3 + 6308-C3	VR308-E	VRW308-C	11,7	19,2	<b>40</b>	90	23
<b>VRE308-F</b>	6308-C3	6308-C3	VR308-F	VRW308-F	10,9	18	<b>40</b>	90	23
<b>VRE309-A</b>	6309-C3	6309-C3	VR309-A	VRW309-A	14,9	24,3	<b>45</b>	100	25
<b>VRE309-B</b>	NJ309-E-TVP2	6309-C3	VR309-A	VRW309-A	14,9	24,4	<b>45</b>	100	25
<b>VRE309-C</b>	NU309-E-TVP2-C3	2X7309-B-TVP-UA	VR309-C	VRW309-C	15,3	25,3	<b>45</b>	100	25
<b>VRE309-D</b>	NU309-E-TVP2-C3	6309-C3	VR309-D	VRW309-D	15,3	24,8	<b>45</b>	100	25
<b>VRE309-E</b>	NU309-E-TVP2-C3	NU309-E-TVP2-C3 + 6309-C3	VR309-E	VRW309-C	15,3	25,3	<b>45</b>	100	25
<b>VRE309-F</b>	6309-C3	6309-C3	VR309-F	VRW309-F	14,9	24,2	<b>45</b>	100	25



VRE3..-A



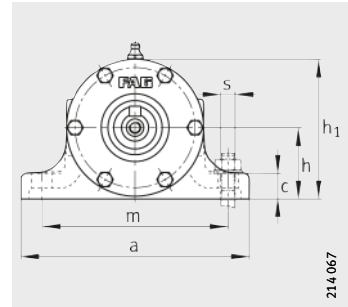
VRE..-B

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155	198	87	35	19	-	40	90,5	117	298	-	148	35	135	120	16	45	M12
155	198	87	35	19	-	40	90,5	117	298	-	149	35	135	120	16	45	M12
155	198	87	35	19	40	42	90	101	298	107	140,5	35	135	120	16	45	M12
155	198	87	35	19	40	42	90	118	298	-	149	35	135	120	16	45	M12
155	198	87	35	19	40	42	90	101	298	107	132	35	135	120	16	45	M12
155	198	87	35	19	-	40	91,25	116,25	298	90,5	147,25	35	135	120	16	45	M12
160	225	98	40	24	-	50	102,5	140	345	-	173	40	150	130	18	50	M12
160	225	98	40	24	-	50	102,5	140	345	-	174	40	150	130	18	50	M12
160	225	98	40	24	50	52	104	122	349	123	164,5	40	150	130	18	50	M12
160	225	98	40	24	50	52	104	141	349	-	174	40	150	130	18	50	M12
160	225	98	40	24	50	52	104	122	349	123	155	40	150	130	18	50	M12
160	225	98	40	24	-	50	103,25	139,25	345	102,5	172,25	40	150	130	18	50	M12
190	255	113	45	28	-	60	117,5	160	395	-	197	45	175	150	18	60	M12
190	255	113	45	28	-	60	117,5	160	395	-	198	45	175	150	18	60	M12
190	255	113	45	28	60	62	119	140	399	140	187,5	45	175	150	18	60	M12
190	255	113	45	28	60	62	119	161	399	-	198	45	175	150	18	60	M12
190	255	113	45	28	60	62	119	140	399	140	177	45	175	150	18	60	M12
190	255	113	45	28	-	60	118,5	159	395	117,5	196	45	175	150	18	60	M12
190	317	118	50	32	-	80	143,5	214	501	-	257	52	225	150	20	60	M12
190	317	118	50	32	-	80	143,5	214	501	-	258	52	225	150	20	60	M12
190	317	118	50	32	80	82	143	192	501	166	246,5	52	225	150	20	60	M12
190	317	118	50	32	80	82	143	215	501	-	258	52	225	150	20	60	M12
190	317	118	50	32	80	82	143	192	501	166	235	52	225	150	20	60	M12
190	317	118	50	32	-	80	144,5	213	501	143,5	256	52	225	150	20	60	M12
210	343	135	55	38	-	80	145,5	236	527	-	281	52	250	170	22	70	M12
210	343	135	55	38	-	80	145,5	236	527	-	282	52	250	170	22	70	M12
210	343	135	55	38	80	82	145	212	527	170	269,5	52	250	170	22	70	M12
210	343	135	55	38	80	82	145	237	527	-	282	52	250	170	22	70	M12
210	343	135	55	38	80	82	145	212	527	170	257	52	250	170	22	70	M12
210	343	135	55	38	-	80	146,5	235	527	145,5	280	52	250	170	22	70	M12



# Plummer block housing units

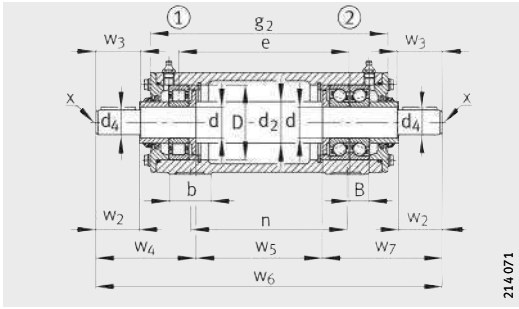
VRE3, unsplit  
With bearings and shaft



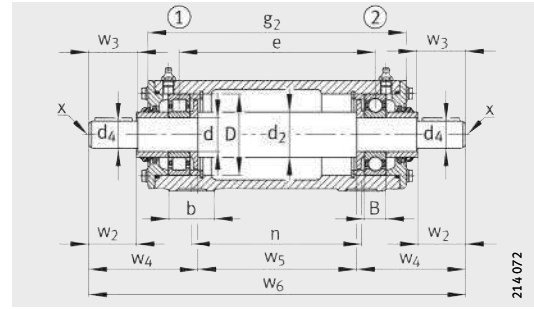
Cross-sections of designs A, B, page 1431, designs E, F, page 1435

Dimension table (continued) · Dimensions in mm									
Designation					Mass m		Dimensions		
Bearing unit	Bearing ①	Bearing ②	Housing	Shaft Complete	Housing	Unit	d	D	B
					≈kg	≈kg			
<b>VRE310-A</b>	6310-C3	6310-C3	VR310-A	VRW310-A	17,3	30,3	<b>50</b>	110	27
<b>VRE310-B</b>	NJ310-E-TVP2	6310-C3	VR310-A	VRW310-A	17,3	30,3	<b>50</b>	110	27
<b>VRE310-C</b>	NU310-E-TVP2-C3	2X7310-B-TVP-UA	VR310-C	VRW310-C	17,9	31,7	<b>50</b>	110	27
<b>VRE310-D</b>	NU310E-TVP2-C3	6310-C3	VR310-D	VRW310-D	17,9	30,9	<b>50</b>	110	27
<b>VRE310-E</b>	NU310-E-TVP2-C3	NU310-E-TVP2-C3 + 6310-C3	VR310-E	VRW310-C	17,9	31,8	<b>50</b>	110	27
<b>VRE310-F</b>	6310-C3	6310-C3	VR310-F	VRW310-F	17,3	30,3	<b>50</b>	110	27
<b>VRE311-A</b>	6311-C3	6311-C3	VR311-A	VRW311-A	22	38,6	<b>55</b>	120	29
<b>VRE311-B</b>	NJ311-E-TVP2	6311-C3	VR311-A	VRW311-A	22	38,7	<b>55</b>	120	29
<b>VRE311-C</b>	NU311-E-TVP2-C3	2X7311-B-TVP-UA	VR311-C	VRW311-C	22,5	40,2	<b>55</b>	120	29
<b>VRE311-D</b>	NU311-E-TVP2-C3	6311-C3	VR311-D	VRW311-D	22,5	39,2	<b>55</b>	120	29
<b>VRE311-E</b>	NU311-E-TVP2-C3	NU311-E-TVP2-C3 + 6311-C3	VR311-E	VRW311-C	22,5	40,2	<b>55</b>	120	29
<b>VRE311-F</b>	6311-C3	6311-C3	VR311-F	VRW311-F	22	38,6	<b>55</b>	120	29
<b>VRE312-A</b>	6312-C3	6312-C3	VR312-A	VRW312-A	30,7	51,2	<b>60</b>	130	31
<b>VRE312-B</b>	NJ312-E-TVP2	6312-C3	VR312-A	VRW312-A	30,7	51,4	<b>60</b>	130	31
<b>VRE312-C</b>	NU312-E-TVP2-C3	2X7312-B-TVP-UA	VR312-C	VRW312-C	31,7	53,8	<b>60</b>	130	31
<b>VRE312-D</b>	NU312-E-TVP2-C3	6312-C3	VR312-D	VRW312-D	31,7	52,4	<b>60</b>	130	31
<b>VRE312-E</b>	NU312-E-TVP2-C3	NU312-E-TVP2-C3 + 6312-C3	VR312-E	VRW312-C	31,7	53,7	<b>60</b>	130	31
<b>VRE312-F</b>	6312-C3	6312-C3	VR312-F	VRW312-F	30,7	51,1	<b>60</b>	130	31
<b>VRE313-A</b>	6313-C3	6313-C3	VR313-A	VRW313-A	32,8	58	<b>65</b>	140	33
<b>VRE313-B</b>	NJ313-E-TVP2	6313-C3	VR313-A	VRW313-A	32,8	58,2	<b>65</b>	140	33
<b>VRE313-C</b>	NU313-E-TVP2-C3	2X7313-B-TVP-UA	VR313-C	VRW313-C	33,8	60,8	<b>65</b>	140	33
<b>VRE313-D</b>	NU313-E-TVP2-C3	6313-C3	VR313-D	VRW313-D	33,8	59,3	<b>65</b>	140	33
<b>VRE313-E</b>	NU313-E-TVP2-C3	NU313-E-TVP2-C3 + 6313-C3	VR313-E	VRW313-C	33,8	60,8	<b>65</b>	140	33
<b>VRE313-F</b>	6313-C3	6313-C3	VR313-F	VRW313-F	32,8	58	<b>65</b>	140	33
<b>VRE314-A</b>	6314-C3	6314-C3	VR314-A	VRW314-A	35	66,9	<b>70</b>	150	35
<b>VRE314-B</b>	NJ314-E-TVP2	6314-C3	VR314-A	VRW314-A	35	67,1	<b>70</b>	150	35
<b>VRE314-C</b>	NU314-E-TVP2-C3	2X7314-B-TVP-UA	VR314-C	VRW314-C	36	70,4	<b>70</b>	150	35
<b>VRE314-D</b>	NU314-E-TVP2-C3	6314-C3	VR314-D	VRW314-D	36	68	<b>70</b>	150	35
<b>VRE314-E</b>	NU314-E-TVP2-C3	NU314-E-TVP2-C3 + 6314-C3	VR314-E	VRW314-C	36	70,6	<b>70</b>	150	35
<b>VRE314-F</b>	6314-C3	6314-C3	VR314-F	VRW314-F	35	66,8	<b>70</b>	150	35





VRE3...-C



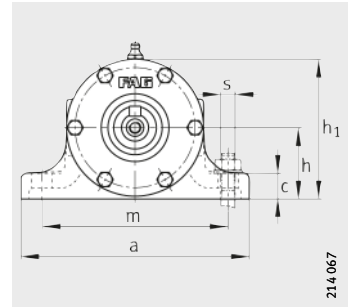
VRE3...-D

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210	381	138	60	42	-	110	179,5	266	625	-	313	60	275	170	25	70	M12
210	381	138	60	42	-	110	179,5	266	625	-	314	60	275	170	25	70	M12
210	381	138	60	42	110	112	179	240	625	206	300,5	60	275	170	25	70	M12
210	381	138	60	42	110	112	179	267	625	-	314	60	275	170	25	70	M12
210	381	138	60	42	110	112	179	240	625	206	287	60	275	170	25	70	M12
210	381	138	60	42	-	110	180,5	265	625	179,5	312	60	275	170	25	70	M12
260	407	158	65	48	-	110	181,5	288	651	-	337	60	300	210	25	80	M16
260	407	158	65	48	-	110	181,5	288	651	-	338	60	300	210	25	80	M16
260	407	158	65	48	110	112	181	260	651	210	323,5	60	300	210	25	80	M16
260	407	158	65	48	110	112	181	289	651	-	338	60	300	210	25	80	M16
260	407	158	65	48	110	112	181	260	651	210	309	60	300	210	25	80	M16
260	407	158	65	48	-	110	182,5	287	651	181,5	336	60	300	210	25	80	M16
260	457	162	70	48	-	110	183,5	334	701	-	385	70	340	210	25	80	M16
260	457	162	70	48	-	110	183,5	334	701	-	386	70	340	210	25	80	M16
260	457	162	70	48	110	112	185,5	304	706	216,5	370,5	70	340	210	25	80	M16
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260	457	162	70	48	110	112	185,5	304	706	216,5	355	70	340	210	25	80	M16
260	457	162	70	48	-	110	184,5	333	701	183,5	384	70	340	210	25	80	M16
290	480	183	75	55	-	110	187,5	349	724	-	404	70	360	230	25	95	M16
290	480	183	75	55	-	110	187,5	349	724	-	405	70	360	230	25	95	M16
290	480	183	75	55	110	112	189,5	317	729	222,5	388,5	70	360	230	25	95	M16
290	480	183	75	55	110	112	189,5	350	729	-	405	70	360	230	25	95	M16
290	480	183	75	55	110	112	189,5	317	729	222,5	372	70	360	230	25	95	M16
290	480	183	75	55	-	110	189	347,5	724	187,5	402,5	70	360	230	25	95	M16
290	500	188	80	60	-	140	223	365	811	-	422	70	380	230	25	95	M16
290	500	188	80	60	-	140	223	365	811	-	423	70	380	230	25	95	M16
290	500	188	80	60	140	143	222,5	331	811	257,5	405,5	70	380	230	25	95	M16
290	500	188	80	60	140	143	222,5	366	811	-	423	70	380	230	25	95	M16
290	500	188	80	60	140	143	222,5	331	811	257,5	388	70	380	230	25	95	M16
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# Plummer block housing units

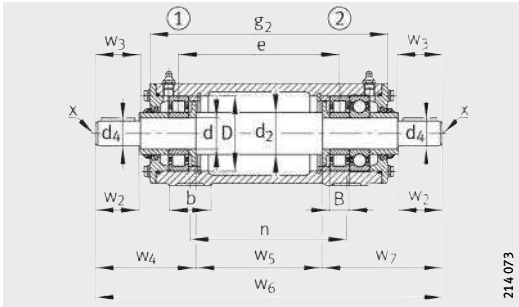
VRE3, unsplit  
With bearings and shaft



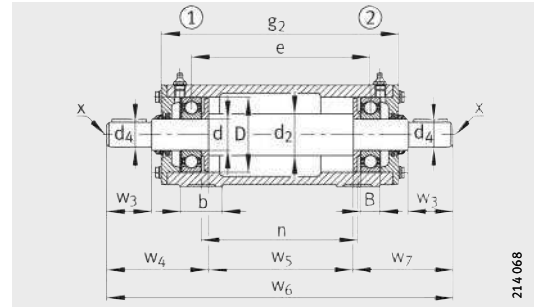
Cross-sections of designs A, B, page 1431, designs C, D, page 1433

**Dimension table** (continued) · Dimensions in mm

Designation					Mass m		Dimensions		
Bearing unit	Bearing ①	Bearing ②	Housing	Shaft Complete	Housing ≈kg	Unit ≈kg	d	D	B
<b>VRE315-A</b>	6315-C3	6315-C3	VR315-A	VRW315-A	44,8	84,8	<b>75</b>	160	37
<b>VRE315-B</b>	NJ315-E-TVP2	6315-C3	VR315-A	VRW315-A	44,8	85	<b>75</b>	160	37
<b>VRE315-C</b>	NU315-E-TVP2-C3	2X7315-B-TVP-UA	VR315-C	VRW315-C	46,4	89,3	<b>75</b>	160	37
<b>VRE315-D</b>	NU315-E-TVP2-C3	6315-C3	VR315-D	VRW315-D	46,4	86,4	<b>75</b>	160	37
<b>VRE315-E</b>	NU315-E-TVP2-C3	NU315-E-TVP2-C3 + 6315-C3	VR315-E	VRW315-C	46,4	89,4	<b>75</b>	160	37
<b>VRE315-F</b>	6315-C3	6315-C3	VR315-F	VRW315-F	44,8	84,8	<b>75</b>	160	37
<b>VRE316-A</b>	6316-C3	6316-C3	VR316-A	VRW316-A	44	90,8	<b>80</b>	170	39
<b>VRE316-B</b>	NJ316-E-TVP2	6316-C3	VR316-A	VRW316-A	44	91	<b>80</b>	170	39
<b>VRE316-C</b>	NU316-E-TVP2-C3	2X7316-B-TVP-UA	VR316-C	VRW316-C	45	96,2	<b>80</b>	170	39
<b>VRE316-D</b>	NU316-E-TVP2-C3	6316-C3	VR316-D	VRW316-D	45	91,9	<b>80</b>	170	39
<b>VRE316-E</b>	NU316-E-TVP2-C3	NU316-E-TVP2-C3 + 6316-C3	VR316-E	VRW316-C	45	95,3	<b>80</b>	170	39
<b>VRE316-F</b>	6316-C3	6316-C3	VR316-F	VRW316-F	44	90,8	<b>80</b>	170	39
<b>VRE317-A</b>	6317-C3	6317-C3	VR317-A	VRW317-A	59,2	114	<b>85</b>	180	41
<b>VRE317-B</b>	NJ317-E-TVP2	6317-C3	VR317-A	VRW317-A	59,2	115	<b>85</b>	180	41
<b>VRE317-C</b>	NU317-E-TVP2-C3	2X7317-B-TVP-UA	VR317-C	VRW317-C	60	120	<b>85</b>	180	41
<b>VRE317-D</b>	NU317-E-TVP2-C3	6317-C3	VR317-D	VRW317-D	60	115	<b>85</b>	180	41
<b>VRE317-E</b>	NU317-E-TVP2-C3	NU317-E-TVP2-C3 + 6317-C3	VR317-E	VRW317-C	60	120	<b>85</b>	180	41
<b>VRE318-A</b>	6318-C3	6318-C3	VR318-A	VRW318-A	62	128	<b>90</b>	190	43
<b>VRE318-B</b>	NJ318-E-TVP2	6318-C3	VR318-A	VRW318-A	62	128	<b>90</b>	190	43
<b>VRE318-C</b>	NU318-E-TVP2-C3	2X7318-B-TVP-UA	VR318-C	VRW318-C	63	134	<b>90</b>	190	43
<b>VRE318-D</b>	NU318-E-TVP2-C3	6318-C3	VR318-D	VRW318-D	63	129	<b>90</b>	190	43
<b>VRE318-E</b>	NU318-E-TVP2-C3	NU318-E-TVP2-C3 + 6318-C3	VR318-E	VRW318-C	63	134	<b>90</b>	190	43
<b>VRE319-A</b>	6319-C3	6319-C3	VR319-A	VRW319-A	84,1	156	<b>95</b>	200	45
<b>VRE319-B</b>	NJ319-E-TVP2	6319-C3	VR319-A	VRW319-A	84,1	157	<b>95</b>	200	45
<b>VRE319-C</b>	NU319-E-TVP2-C3	2X7319-B-TVP-UA	VR319-C	VRW319-C	86	164	<b>95</b>	200	45
<b>VRE319-D</b>	NU319-E-TVP2-C3	6319-C3	VR319-D	VRW319-D	86	158	<b>95</b>	200	45
<b>VRE319-E</b>	NU319-E-TVP2-C3	NU319-E-TVP2-C3 + 6319-C3	VR319-E	VRW319-C	86	164	<b>95</b>	200	45
<b>VRE320-A</b>	6320-C3	6320-C3	VR320-A	VRW320-A	90	177	<b>100</b>	215	47
<b>VRE320-B</b>	NJ320-E-TVP2	6320-C3	VR320-A	VRW320-A	90	177	<b>100</b>	215	47
<b>VRE320-C</b>	NU320-E-TVP2-C3	2X7320-B-TVP-UA	VR320-C	VRW320-C	92	186	<b>100</b>	215	47
<b>VRE320-D</b>	NU320-E-TVP2-C3	6320-C3	VR320-D	VRW320-D	92	179	<b>100</b>	215	47
<b>VRE320-E</b>	NU320-E-TVP2-C3	NU320-E-TVP2-C3 + 6320-C3	VR320-E	VRW320-C	92	186	<b>100</b>	215	47



VRE3...-E



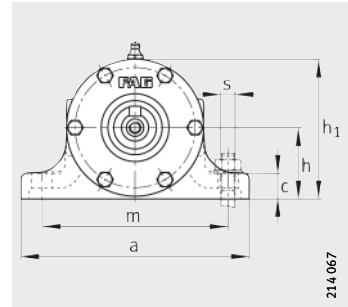
VRE3...-F

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320	530	198	90	65	-	140	226	389	841	-	451	80	400	260	30	100	M16
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320	530	198	90	65	140	143	225,5	353	841	262,5	414	80	400	260	30	100	M16
320	530	198	90	65	-	140	227,5	387,5	841	226	448,5	80	400	260	30	100	M16
320	550	217	95	70	-	140	228	405	861	-	468	80	420	260	30	112	M16
320	550	217	95	70	-	140	228	405	861	-	469	80	420	260	30	112	M16
320	550	217	95	70	140	143	227,5	367	861	266,5	449,5	80	420	260	30	112	M16
320	550	217	95	70	140	143	227,5	406	861	-	469	80	420	260	30	112	M16
320	550	217	95	70	140	143	227,5	367	861	266,5	430	80	420	260	30	112	M16
320	550	217	95	70	-	140	229,5	403,5	861	228	466,5	80	420	260	30	112	M16
350	570	222	100	75	-	140	230	421	881	-	486	80	440	290	30	112	M16
350	570	222	100	75	-	140	230	421	881	-	487	80	440	290	30	112	M16
350	570	222	100	75	140	143	229,5	381	881	270,5	466,5	80	440	290	30	112	M16
350	570	222	100	75	140	143	229,5	422	881	-	487	80	440	290	30	112	M16
350	570	222	100	75	140	143	229,5	381	881	270,5	446	80	440	290	30	112	M16
350	600	227	105	80	-	170	263	445	971	-	510	85	460	290	30	112	M16
350	600	227	105	80	-	170	263	445	971	-	511	85	460	290	30	112	M16
350	600	227	105	80	170	173	264,5	403	975	307,5	489,5	85	460	290	30	112	M16
350	600	227	105	80	170	173	264,5	446	975	-	511	85	460	290	30	112	M16
350	600	227	105	80	170	173	264,5	403	975	307,5	468	85	460	290	30	112	M16
400	633	248	110	85	-	170	267,5	469	1004	-	540	90	480	320	35	125	M20
400	633	248	110	85	-	170	267,5	469	1004	-	541	90	480	320	35	125	M20
400	633	248	110	85	170	173	269	425	1008	314	518,5	90	480	320	35	125	M20
400	633	248	110	85	170	173	269	470	1008	-	541	90	480	320	35	125	M20
400	633	248	110	85	170	173	269	425	1008	314	496	90	480	320	35	125	M20
400	665	260	120	90	-	170	268	500	1036	-	570	95	500	320	40	130	M20
400	665	260	120	90	-	170	268	500	1036	-	571	95	500	320	40	130	M20
400	665	260	120	90	170	173	269,5	454	1040	316,5	547,5	95	500	320	40	130	M20
400	665	260	120	90	170	173	269,5	501	1040	-	571	95	500	320	40	130	M20
400	665	260	120	90	170	173	269,5	454	1040	316,5	524	95	500	320	40	130	M20



# Plummer block housing units

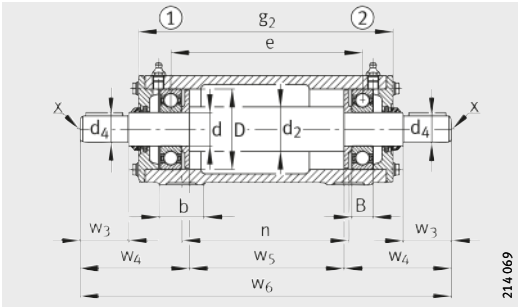
VRE3, unsplit  
With bearings and shaft



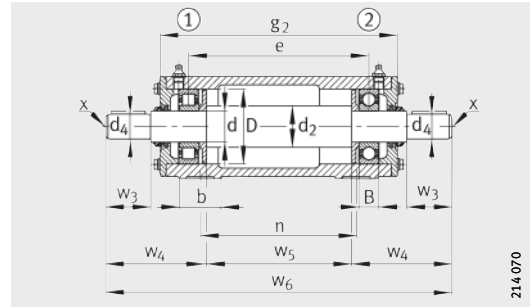
Cross-sections of designs C, D, page 1433, design E, page 1435

**Dimension table** (continued) · Dimensions in mm

Designation					Mass m		Dimensions		
Bearing unit	Bearing ①	Bearing ②	Housing	Shaft Complete	Housing ≈kg	Unit ≈kg	d	D	B
<b>VRE322-A</b>	6322-C3	6322-C3	VR322-A	VRW322-A	130	226	<b>110</b>	240	50
<b>VRE322-B</b>	NJ322-E-TVP2	6322-C3	VR322-A	VRW322-A	130	226	<b>110</b>	240	50
<b>VRE322-C</b>	NU322-E-TVP2-C3	2X7322-B-TVP-UA	VR322-C	VRW322-C	132	238	<b>110</b>	240	50
<b>VRE322-D</b>	NU322-E-TVP2-C3	6322-C3	VR322-D	VRW322-D	132	228	<b>110</b>	240	50
<b>VRE322-E</b>	NU322-E-TVP2-C3	NU322-E-TVP2-C3 + 6322-C3	VR322-E	VRW322-C	132	238	<b>110</b>	240	50
<b>VRE324-A</b>	6324-C3	6324-C3	VR324-A	VRW324-A	170	276	<b>120</b>	260	55
<b>VRE324-B</b>	NJ324-E-TVP2	6324-C3	VR324-A	VRW324-A	170	277	<b>120</b>	260	55
<b>VRE324-C</b>	NU324-E-TVP2-C3	2X7324-B-TVP-UA	VR324-C	VRW324-C	172	294	<b>120</b>	260	55
<b>VRE324-D</b>	NU324-E-TVP2-C3	6324-C3	VR324-D	VRW324-D	172	278	<b>120</b>	260	55
<b>VRE324-E</b>	NU324-E-TVP2-C3	NU324-E-TVP2-C3 + 6324-C3	VR324-E	VRW324-C	172	291	<b>120</b>	260	55



VRE3...-A



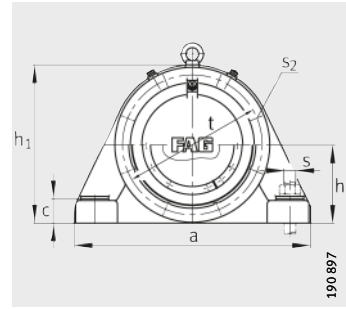
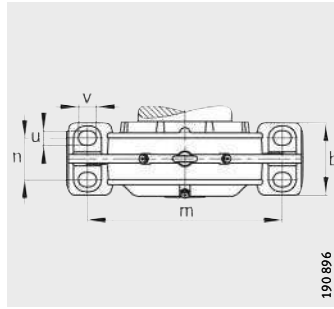
VRE3...-B

a	g <sub>2</sub>	h <sub>1</sub>	d <sub>2</sub>	d <sub>4</sub>	w <sub>2</sub>	w <sub>3</sub>	w <sub>4</sub>	w <sub>5</sub>	w <sub>6</sub>	w <sub>7</sub>	e	b	n	m	c	h	s
450	678	295	130	100	–	210	313	507	1 133	–	580	95	520	380	40	150	M24
450	678	295	130	100	–	210	313	507	1 133	–	581	95	520	380	40	150	M24
450	678	295	130	100	210	213	312,5	458	1 133	362,5	556	95	520	380	40	150	M24
450	678	295	130	100	210	213	312,5	508	1 133	–	581	95	520	380	40	150	M24
450	678	295	130	100	210	213	312,5	458	1 133	362,5	531	95	520	380	40	150	M24
500	705	320	140	110	–	210	318	524	1 160	–	602	100	540	410	40	160	M24
500	705	320	140	110	–	210	318	524	1 160	–	603	100	540	410	40	160	M24
500	705	320	140	110	210	213	317,5	470	1 160	372,5	575,5	100	540	410	40	160	M24
500	705	320	140	110	210	213	317,5	525	1 160	–	603	100	540	410	40	160	M24
500	705	320	140	110	210	213	317,5	470	1 160	372,5	548	100	540	410	40	160	M24



# Plummer block housings

BND, unsplit  
For spherical roller bearings

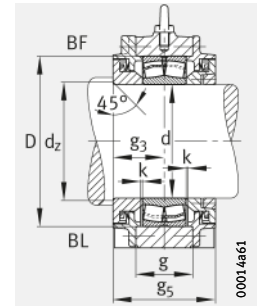
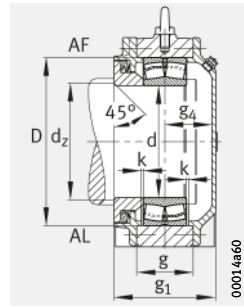
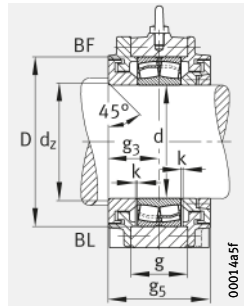
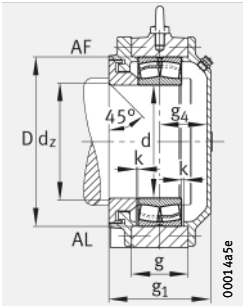


Cross-section of BND housings for bearings with tapered bore: see page 1441 to page 1443

**Dimension table** - Dimensions in mm

Designation <sup>1)</sup>			Mass m  ≈kg	Dimensions									
Housing	Bearing	Adapter sleeve		Housing	d	d <sub>1</sub>	a	g <sub>1</sub>	h <sub>1</sub>	b	c	D	d <sub>c</sub> min.
<b>BND2213</b>	22213-	H313	23	<b>65</b>	60	235	100	155	70	22	120	66	71
<b>BND2215</b>	22215-	H315	15	<b>75</b>	65	285	105	180	85	35	130	71	81
<b>BND2218</b>	22218-	H318	28	<b>90</b>	80	370	104	220	110	38	160	88	98
<b>BND2220</b>	22220-	H320	30	<b>100</b>	90	400	141	255	120	40	180	98	108
<b>BND2222</b>	22222-	H322	50	<b>110</b>	100	440	149,2	280	130	42	200	108	118
<b>BND3122</b>	23122-	H3122	40	<b>110</b>	100	400	146	263	140	40	180	108	118
<b>BND3222</b>	23222-	H2322	35	<b>110</b>	100	440	166	280	130	42	200	108	118
<b>BND2224</b>	22224-	H3124	58	<b>120</b>	110	470	143	300	140	42	215	118	128
<b>BND3024</b>	23024-	H3024	20	<b>120</b>	110	370	126	230	110	35	180	118	128
<b>BND3124</b>	23124-	H3124	50	<b>120</b>	110	410	160	280	150	40	200	118	128
<b>BND3224</b>	23224-	H2324	40	<b>120</b>	110	470	161	300	140	42	215	118	128
<b>BND2226</b>	22226-	H3126	65	<b>130</b>	115	500	172	315	150	45	230	127	142
<b>BND3026</b>	23026-	H3026	30	<b>130</b>	115	410	133	260	120	38	200	123	138
<b>BND3126</b>	23126-	H3126	55	<b>130</b>	115	430	165	295	150	40	210	123	138
<b>BND3226</b>	23226-	H2326	50	<b>130</b>	115	500	188	315	150	45	230	127	142
<b>BND2228</b>	22228-	H3128	70	<b>140</b>	125	530	166	345	160	50	250	137	152
<b>BND3028</b>	23028-	H3028	35	<b>140</b>	125	430	136	275	130	40	210	133	148
<b>BND3128</b>	23128-	H3128	60	<b>140</b>	125	470	170	315	160	45	225	133	148
<b>BND3228</b>	23228-	H2328	65	<b>140</b>	125	530	186	345	160	50	250	137	152
<b>BND2230</b>	22230-	H3130	85	<b>150</b>	135	550	177	365	170	54	270	147	162
<b>BND3030</b>	23030-	H3030	40	<b>150</b>	135	455	149	290	140	42	225	143	158
<b>BND3130</b>	23130-	H3130	70	<b>150</b>	135	580	186	345	200	60	250	143	158
<b>BND3230</b>	23230-	H2330	75	<b>150</b>	135	550	200	365	170	54	270	147	162
<b>BND2232</b>	22232-	H3132	100	<b>160</b>	140	600	189	385	180	58	290	152	172
<b>BND3032</b>	23032-	H3032	45	<b>160</b>	140	480	156	310	150	45	240	148	168
<b>BND3132</b>	23132-	H3132	80	<b>160</b>	140	540	200	360	200	55	270	148	168
<b>BND3232</b>	23232-	H2332	90	<b>160</b>	140	600	213	385	180	58	290	152	172
<b>BND2234</b>	22234-	H3134	105	<b>170</b>	150	640	216	405	200	62	310	166	186
<b>BND3034</b>	23034-	H3034	70	<b>170</b>	150	510	166	330	160	50	260	158	178
<b>BND3134</b>	23134-	H3134	100	<b>170</b>	150	570	215	380	200	55	280	158	178
<b>BND3234</b>	23234-	H2334	120	<b>170</b>	150	640	240	405	200	62	310	166	186

<sup>1)</sup> Ordering example:  
Housing BND3030-Z-Y-BL-S (see also page 1345), bearing 23030-E1-TVPB (see bearing tables).



Design A  
Housings with labyrinth seal  
for bearings with cylindrical bore

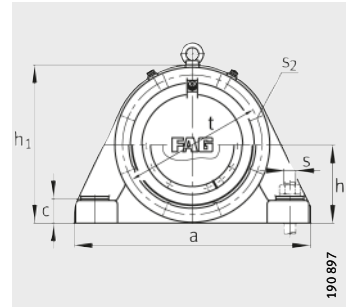
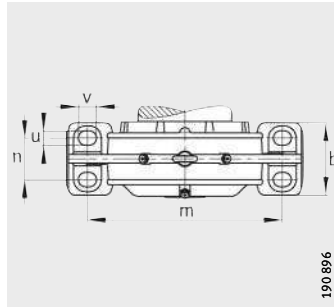
Design A  
Housings with Taconite seal  
for bearings with cylindrical bore

g	g <sub>2</sub>	g <sub>3</sub>	g <sub>4</sub> min.	g <sub>5</sub>	h	k	m	n	u	v	s	t	s <sub>2</sub>	s <sub>2</sub> Quantity
44	120	55	39	110	80	2	185	40	15	20	M10	135	M6	6
45	125	55	44	110	90	2	225	45	20	28	M16	155	M6	6
55	123	53	45	106	110	2	290	60	23	32	M20	185	M8	6
65	168	78	57	156	130	2,5	320	65	30	35	M24	205	M8	6
73	172	82,6	60	165,2	140	2,5	350	70	30	35	M24	230	M12	6
80	171	78	62	156	130	2,5	300	80	25	35	M20	215	M12	8
89,8	194	91	68	182	140	2,5	350	70	30	35	M24	230	M12	6
77	168	74	61	148	150	2,5	370	75	30	35	M24	245	M12	6
60	146	63	57	126	115	2,5	300	60	25	35	M20	205	M8	8
85	180	80	74	160	140	2,5	330	80	25	35	M20	235	M12	8
95	186	83	70	166	150	2,5	370	75	30	35	M24	245	M12	6
84	202	95	69	190	160	3	400	85	30	35	M24	260	M12	6
70	156	68	59	136	130	2	340	60	25	35	M20	225	M10	8
90	190	85	72	170	145	3	350	80	25	35	M20	245	M12	8
100	218	103	77	206	160	3	400	85	30	35	M24	260	M12	6
88	196	88	70	176	170	3	430	85	30	35	M24	285	M16	6
70	156	68	61	136	140	3	360	70	30	35	M24	240	M10	8
95	190	85	77	170	155	3	380	85	25	35	M20	270	M12	8
108	216	98	80	196	170	3	430	85	30	35	M24	285	M16	6
97	202	93,5	76	187	180	3	450	90	36	45	M30	305	M16	6
80	176	78	64	156	145	2	370	80	30	35	M24	250	M12	8
102	206	93	85	186	170	2	450	110	30	35	M24	285	M12	8
120	225	105	87	210	180	3	450	90	36	45	M30	305	M16	6
106	226	103	78	206	190	3	490	105	36	45	M30	330	M16	6
85	181	78	71	156	155	3	390	90	30	35	M24	265	M12	8
110	230	105	87	210	180	3	430	110	30	35	M24	310	M16	6
130	250	115	90	230	190	3	490	105	36	45	M30	330	M16	6
111	256	118	88	236	200	3	525	110	36	45	M30	350	M16	8
90	191	83	75	166	165	2	420	95	36	45	M30	285	M12	8
120	250	115	90	230	190	3	470	110	36	45	M30	330	M12	8
135	280	130	100	260	200	3	525	110	36	45	M30	350	M16	8



# Plummer block housings

BND, unsplit  
For spherical roller bearings



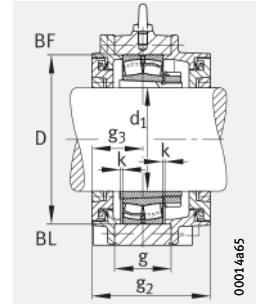
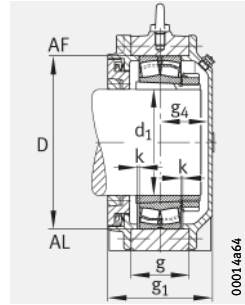
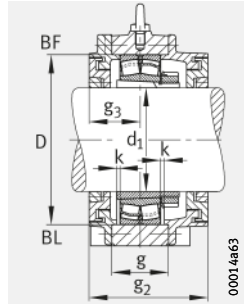
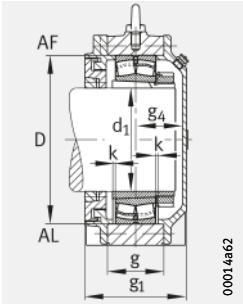
Cross-section of BND housings for bearings with cylindrical bore: see page 1439

Dimension table (continued) · Dimensions in mm

Designation <sup>1)</sup>			Mass m ≈kg	Dimensions									
Housing	Bearing	Adapter sleeve		Housing	d	d <sub>1</sub>	a	g <sub>1</sub>	h <sub>1</sub>	b	c	D	d <sub>c</sub> min.
<b>BND2236</b>	22236-	H3136	130	<b>180</b>	160	680	214	425	210	65	320	176	196
<b>BND3036</b>	23036-	H3036	70	<b>180</b>	160	540	176	360	170	52	280	168	188
<b>BND3136</b>	23136-	H3136	110	<b>180</b>	160	600	220	395	200	58	300	172	192
<b>BND3236</b>	23236-	H2336	140	<b>180</b>	160	680	240	425	210	65	320	176	196
<b>BND2238</b>	22238-	H3138	170	<b>190</b>	170	710	222	455	220	85	340	186	206
<b>BND3038</b>	23038-	H3038	80	<b>190</b>	170	570	181	370	180	55	290	178	198
<b>BND3138</b>	23138-	H3138	125	<b>190</b>	170	680	232	425	210	65	320	182	202
<b>BND3238</b>	23228-	H2338	170	<b>190</b>	170	710	250	455	220	85	340	186	206
<b>BND2240</b>	22240-	H3140	185	<b>200</b>	180	780	230	475	240	75	360	196	216
<b>BND3040</b>	23040-	H3040	95	<b>200</b>	180	600	196	400	190	60	310	188	208
<b>BND3140</b>	23140-	H3140	170	<b>200</b>	180	710	242	455	220	85	340	192	212
<b>BND3240</b>	23240-	H2340	205	<b>200</b>	180	780	260	475	240	75	360	196	216
<b>BND2244</b>	22244-	H3144X	290	<b>220</b>	200	890	264	550	250	80	400	216	236
<b>BND3044</b>	23044-	H3044X	100	<b>220</b>	200	640	206	430	200	65	340	212	232
<b>BND3144</b>	23144-	H3144X	190	<b>220</b>	200	780	252	475	240	75	370	216	236
<b>BND3244</b>	23244-	H2344X	240	<b>220</b>	200	850	279	525	250	80	400	216	236
<b>BND2248</b>	22248-	H3148X	315	<b>240</b>	220	900	268	585	250	90	440	236	256
<b>BND3048</b>	23048-	H3048	130	<b>240</b>	220	680	216	455	210	70	360	232	252
<b>BND3148</b>	23148-	H3148X	280	<b>240</b>	220	890	284	550	250	80	400	236	256
<b>BND3248</b>	23248-	H2348X	330	<b>240</b>	220	900	308	585	250	90	440	236	256
<b>BND2252</b>	22252-	H3152X	370	<b>260</b>	240	960	286	625	290	95	480	260	280
<b>BND3052</b>	23052-	H3052X	160	<b>260</b>	240	720	226	500	220	75	400	256	276
<b>BND3152</b>	23152-	H3152X	310	<b>260</b>	240	900	292	585	250	90	440	256	276
<b>BND3252</b>	23252-	H2352X	380	<b>260</b>	240	960	330	625	290	95	480	260	280
<b>BND2256</b>	22256-	H3156X	420	<b>280</b>	260	1 000	297	645	300	100	500	280	300
<b>BND3056</b>	23056-	H3056	180	<b>280</b>	260	760	236	520	240	80	420	276	296
<b>BND3156</b>	23156-	H3156X	335	<b>280</b>	260	900	294	585	250	90	460	280	300
<b>BND3256</b>	23256-	H2356X	490	<b>280</b>	260	1 000	343	645	300	100	500	280	300

<sup>1)</sup> Ordering example:  
Housing BND3040-H-W-T-BL-S (see also page 1346), bearing 23040-E1-K-TVPB (see bearing tables), adapter sleeve H3040-HG (see dimension tables).





Design A  
Housings with labyrinth seal  
for bearings with tapered bore

Design B

Design A  
Housings with Taconite seal  
for bearings with tapered bore

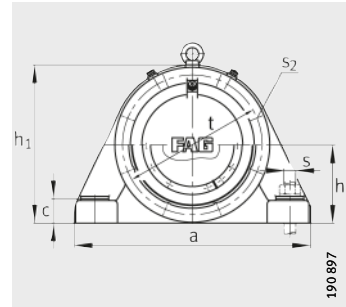
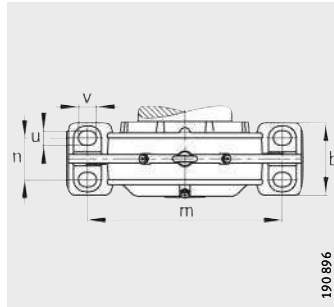
Design B

g	g <sub>2</sub>	g <sub>3</sub>	g <sub>4</sub> min.	g <sub>5</sub>	h	k	m	n	u	v	s	t	s <sub>2</sub>	S <sub>2</sub> Quantity
112	248	114	92	228	210	3	550	120	36	45	M30	370	M16	8
100	201	88	80	176	180	3	450	100	36	45	M30	310	M12	8
125	250	115	95	230	200	3	490	105	36	45	M30	350	M16	8
138	274	127	105	254	210	3	550	120	36	45	M30	370	M16	8
115	258	114	98	228	220	3	560	120	42	52	M36	380	M16	8
105	211	93	80	186	185	3	480	105	36	45	M30	325	M12	8
130	266	123	98	246	210	3	550	120	36	45	M30	370	M16	8
143	286	128	112	256	220	3	560	120	42	52	M36	380	M16	8
128	269	123	99	246	235	4	640	140	42	52	M36	420	M16	8
110	226	98	90	196	200	3	510	110	36	45	M30	340	M16	8
135	278	124	108	248	220	3	560	120	42	52	M36	380	M16	8
158	299	138	114	276	235	4	640	140	42	52	M36	420	M16	8
140	314	142	112	284	270	4	720	140	42	52	M36	455	M20	8
115	241	103	95	206	215	3	540	115	42	52	M36	375	M16	8
150	291	134	110	268	235	4	640	140	42	52	M36	420	M16	8
175	329	147	122	294	260	4	700	140	42	52	M36	445	M20	8
150	311	138	120	276	290	4	750	140	42	52	M36	510	M20	8
120	251	108	100	216	225	4	560	120	42	52	M36	400	M16	8
160	334	152	122	304	270	4	720	140	42	52	M36	455	M20	8
190	351	158	140	316	290	4	750	140	42	52	M36	510	M20	8
161	326	148	126	296	310	3	800	160	42	52	M36	535	M20	8
130	261	113	103	226	250	4	600	130	42	52	M36	440	M16	8
174	335	150	132	300	290	4	750	140	42	52	M36	510	M20	8
205	370	170	148	340	310	3	800	160	42	52	M36	535	M20	8
160	354	157	128	314	320	4	840	170	42	52	M36	555	M24	8
135	281	118	108	236	260	4	630	140	42	52	M36	460	M16	8
176	337	151	133	302	290	4	750	140	42	52	M36	510	M20	8
206	400	180	151	360	320	4	840	170	42	52	M36	555	M24	8



# Plummer block housings

BND, unsplit  
For spherical roller bearings

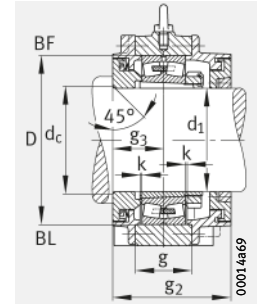
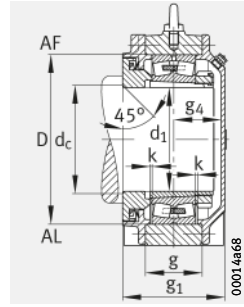
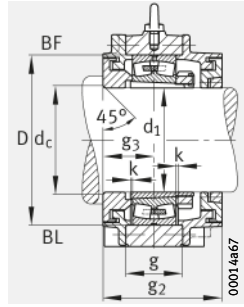
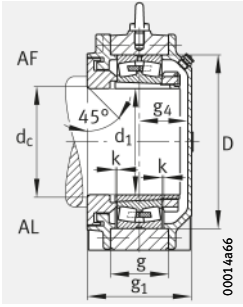


Cross-section of BND housings for bearings with cylindrical bore: see page 1439

Dimension table (continued) · Dimensions in mm

Designation <sup>1)</sup>			Mass m ≈kg	Dimensions									
Housing	Bearing	Adapter sleeve		Housing	d	d <sub>1</sub>	a	g <sub>1</sub>	h <sub>1</sub>	b	c	D	d <sub>c</sub> min.
BND2260	22260-	H3160	485	300	280	1 100	317	695	330	105	540	300	320
BND3060	23060-	H3060	220	300	280	820	261	570	250	85	460	296	316
BND3160	23160-	H3160	400	300	280	1 000	327	645	300	100	500	300	320
BND3260	23260-	H3260	570	300	280	1 100	369	705	330	105	540	300	320
BND2264	22264-	H3164	600	320	300	1 150	333	745	360	115	580	320	340
BND3064	23064-	H3064	250	320	300	860	266	590	260	90	480	316	336
BND3164	23164-	H3164	500	320	300	1 150	359	700	300	100	540	320	340
BND3264	23264-	H3264	665	320	300	1 150	391	745	360	115	580	320	340
BND2268	22268-	H3168	635	340	320	1 200	375	790	380	125	620	344	364
BND3068	23068-	H3068	300	340	320	900	276	630	270	95	520	340	360
BND3168	23168-	H3168	520	340	320	1 150	373	745	360	115	580	340	360
BND3268	23268-	H3268	755	340	320	1 200	434	790	380	125	620	344	364
BND2272	22272-	H3172	690	360	340	1 280	375	820	400	130	650	364	384
BND3072	23072-	H3072	330	360	340	960	290	660	280	100	540	360	380
BND3172	23172-	H3172	600	360	340	1 200	400	760	370	115	600	360	380
BND3272	23272-	H3272	950	360	340	1 280	437	820	400	130	650	364	384
BND2276	22276-	H3176	900	380	360	1 350	433	865	405	135	680	384	404
BND3076	23076-	H3076	360	380	360	1 000	294	680	300	105	560	380	400
BND3176	23176-	H3176	720	380	360	1 200	404	790	380	125	620	380	400
BND3276	23276-	H3276	1 100	380	360	1 350	489	860	405	135	680	384	404
BND2280	22280-	H3180	940	400	380	1 430	433	900	450	145	720	404	424
BND3080	23080-	H3080	400	400	380	1 060	310	720	320	110	600	400	420
BND3180	23180-	H3180	750	400	380	1 280	405	820	400	130	650	404	424
BND3280	23280-	H3280	1 205	400	380	1 430	504	900	450	145	720	404	424
BND2284	22284-	H3184	1 055	420	400	1 500	433	950	470	150	760	430	450
BND3084	23084-	H3084	435	420	400	1 100	310	755	340	115	620	420	440
BND3184	23184-	H3184	950	420	400	1 350	440	900	420	135	700	424	444
BND3284	23284-	H3284	1 310	420	400	1 500	510	950	470	150	760	430	450

<sup>1)</sup> Ordering example:  
Housing BND3276-H-C-T-BL-S (see also page 1348), bearing 23276-B-K-MB (see bearing tables), adapter sleeve H3276-HG (see dimension tables).



Design A  
Housings with labyrinth seal for bearings  
with tapered bore, shaft with abutment shoulder

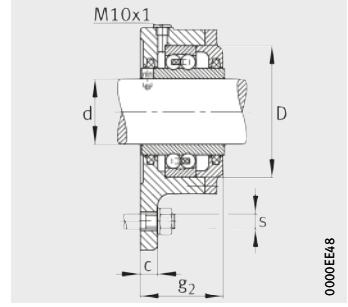
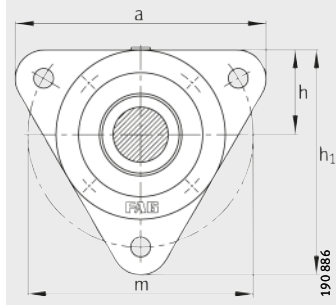
Design A  
Housings with Taconite seal for bearings  
with tapered bore, shaft with abutment shoulder

g	g <sub>3</sub>	g <sub>2</sub>	g <sub>4</sub> min.	g <sub>5</sub>	h	k	m	n	u	v	s	t	s <sub>2</sub>	s <sub>2</sub> Quantity
178	156	352	149	312	350	4	920	180	56	75	M48	600	M24	8
140	128	296	121	256	285	4	690	150	42	52	M36	510	M16	8
190	172	384	143	344	320	4	840	170	42	52	M36	555	M24	8
230	182	404	175	364	350	4	920	180	56	75	M48	600	M24	8
180	163	381	158	326	370	5	960	200	56	75	M48	640	M24	8
150	133	311	123	266	295	4	730	160	42	52	M36	530	M16	8
210	186	412	161	372	350	4	940	160	42	52	M36	590	M24	8
238	192	439	187	384	370	5	960	200	56	75	M48	640	M24	8
201	187,5	430	176	375	390	5	990	200	64	85	M56	680	M30	8
160	133	311	132	266	315	5	770	170	42	52	M36	565	M20	8
220	183	421	178	366	370	5	960	200	56	75	M48	640	M24	8
260	217	489	205	434	390	5	990	200	64	85	M56	680	M30	8
205	185	435	178	370	410	5	1040	210	72	90	M64	710	M30	8
170	140	325	138	280	330	5	820	180	42	52	M36	590	M20	8
225	200	450	188	400	380	4	1000	200	56	75	M48	650	M24	8
267	216	497	209	432	410	5	1040	210	72	90	M64	710	M30	8
230	203	470	218	406	425	5	1100	225	72	90	M64	745	M30	8
160	142	329	141	284	340	7	840	190	56	75	M48	610	M20	8
230	202	459	190	404	390	5	1000	200	64	85	M56	680	M30	8
295	232	529	244	464	425	5	1100	225	72	90	M64	745	M30	8
229	216,5	498	202	433	450	5	1160	240	72	90	M64	790	M30	8
175	150	355	145	300	360	7	900	200	56	75	M48	650	M20	8
235	200	465	193	400	410	5	1040	210	72	90	M64	710	M30	8
300	252	569	237	504	450	5	1160	240	72	90	M64	790	M30	8
238	216,5	498	202	433	470	5	1220	255	72	90	M64	835	M30	8
180	150	350	149	300	375	7	940	210	56	75	M48	670	M20	8
260	210	510	215	420	450	7	1100	210	64	85	M56	760	M30	8
315	255	575	240	510	470	5	1220	255	72	90	M64	835	M30	8



# Flanged housings

F112, unsplit  
 For self-aligning  
 ball bearings with  
 extended inner ring



**Dimension table** - Dimensions in mm

Designation				Mass m Housing ≈ kg
Housing	Bearing	Felt strips		
		aXbXl	Pieces	
<b>F11204</b>	11204-TVH	5X4X108	2	0,9
<b>F11205</b>	11205-TVH	5X4X120	2	1,1
<b>F11206</b>	11206-TVH	5X4X145	2	1,5
<b>F11207</b>	11207-TVH	5X4X165	2	1,9
<b>F11208</b>	11208-TVH	5X4X185	2	2,3
<b>F11209</b>	11209-TVH	5X4X197	2	3,3
<b>F11210</b>	11210-TVH	5X4X213	2	3,6

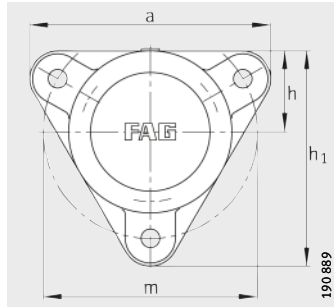
Dimensions

d	a	g <sub>2</sub>	h <sub>1</sub>	c	D	h	m	s	
								mm	inch
<b>20</b>	105	42	92	10	47	35	90	M10	3/8
<b>25</b>	110	46	100	10	52	38	96	M10	3/8
<b>30</b>	130	49	117	12	62	44	116	M10	3/8
<b>35</b>	145	54	129,5	12	72	48,5	130	M12	1/2
<b>40</b>	160	60	143	12	80	54	140	M12	1/2
<b>45</b>	180	62,5	160	15	85	60	160	M12	1/2
<b>50</b>	180	62,5	160	15	90	60	160	M12	1/2

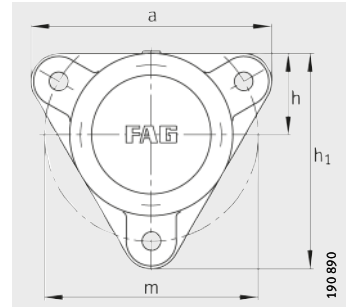


# Flanged housings

F5, unsplit  
For bearings with tapered bore and adapter sleeve



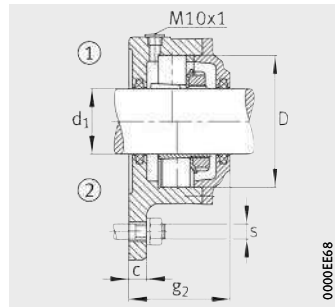
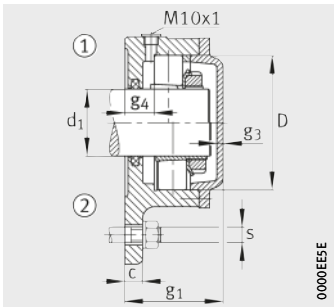
F505, F506, F508



F507, F509 to F513

**Dimension table** - Dimensions in mm

Designation								Mass m Housing ≈kg
Housing	Bearing		Adapter sleeve	Locating ring		Felt strips		
					Pieces	aXbXl	Pieces	
F505-A-L	1205-K-TVH-C3	20205-K-TVP-C3	H205	FE52/2	1	5X4X90	1	1,2
F505-B-L	1205-K-TVH-C3	20205-K-TVP-C3	H205	FE52/2	1	5X4X90	2	1,2
F505-WA-L	2205-K-TVH-C3	22205-E1-K	H305	FE52/2	1	5X4X90	1	1,2
F505-WB-L	2205-K-TVH-C3	22205-E1-K	H305	FE52/2	1	5X4X90	2	1,2
F506-A-L	1206-K-TVH-C3	20206-K-TVP-C3	H206	FE62/2	1	6X5X115	1	1,6
F506-B-L	1206-K-TVH-C3	20206-K-TVP-C3	H206	FE62/2	1	6X5X115	2	1,6
F506-WA-L	2206-K-TVH-C3	22206-E1-K	H306	FE62/2	1	6X5X115	1	1,6
F506-WB-L	2206-K-TVH-C3	22206-E1-K	H306	FE62/2	1	6X5X115	2	1,6
F507-A-L	1207-K-TVH-C3	20207-K-TVP-C3	H207	FE72/2	1	6X5X130	1	2
F507-B-L	1207-K-TVH-C3	20207-K-TVP-C3	H207	FE72/2	1	6X5X130	2	2
F507-WA-L	2207-K-TVH-C3	22207-E1-K	H307	FE72/2	1	6X5X130	1	2
F507-WB-L	2207-K-TVH-C3	22207-E1-K	H307	FE72/2	1	6X5X130	2	2
F508-A-L	1208-K-TVH-C3	20208-K-TVP-C3	H208	FE80/2	1	6X5X145	1	2,5
F508-B-L	1208-K-TVH-C3	20208-K-TVP-C3	H208	FE80/2	1	6X5X145	2	2,5
F508-WA-L	2208-K-TVH-C3	22208-E1-K	H308	FE80/2	1	6X5X145	1	2,5
F508-WB-L	2208-K-TVH-C3	22208-E1-K	H308	FE80/2	1	6X5X145	2	2,5
F509-A-L	1209-K-TVH-C3	20209-K-TVP-C3	H209	FE85/2	1	6X5X160	1	3,6
F509-B-L	1209-K-TVH-C3	20209-K-TVP-C3	H209	FE85/2	1	6X5X160	2	3,6
F509-WA-L	2209-K-TVH-C3	22209-E1-K	H309	FE85/2	1	6X5X160	1	3,6
F509-WB-L	2209-K-TVH-C3	22209-E1-K	H309	FE85/2	1	6X5X160	2	3,6
F510-A-L	1210-K-TVH-C3	20210-K-TVP-C3	H210	FE90/2	1	6X5X175	1	3,8
F510-B-L	1210-K-TVH-C3	20210-K-TVP-C3	H210	FE90/2	1	6X5X175	2	3,8
F510-WA-L	2210-K-TVH-C3	22210-E1-K	H310	FE90/2	1	6X5X175	1	3,8
F510-WB-L	2210-K-TVH-C3	22210-E1-K	H310	FE90/2	1	6X5X175	2	3,8
F511-A-L	1211-K-TVH-C3	20211-K-TVP-C3	H211	FE100/2	1	8X6,5X200	1	4,1
F511-B-L	1211-K-TVH-C3	20211-K-TVP-C3	H211	FE100/2	1	8X6,5X200	2	4,1
F511-WA-L	2211-K-TVH-C3	22211-E1-K	H311	FE100/2	1	8X6,5X200	1	4,1
F511-WB-L	2211-K-TVH-C3	22211-E1-K	H311	FE100/2	1	8X6,5X200	2	4,1
F512-A-L	1212-K-TVH-C3	20212-K-TVP-C3	H212	FE110/2	1	8X6,5X215	1	4,6
F512-B-L	1212-K-TVH-C3	20212-K-TVP-C3	H212	FE110/2	1	8X6,5X215	2	4,6
F512-WA-L	2212-K-TVH-C3	22212-E1-K	H312	FE110/2	1	8X6,5X215	1	4,6
F512-WB-L	2212-K-TVH-C3	22212-E1-K	H312	FE110/2	1	8X6,5X215	2	4,6
F513-A-L	1213-K-TVH-C3	20213-K-TVP-C3	H213	FE120/2	1	8X6,5X230	1	5,4
F513-B-L	1213-K-TVH-C3	20213-K-TVP-C3	H213	FE120/2	1	8X6,5X230	2	5,4
F513-WA-L	2213-K-TVH-C3	22213-E1-K	H313	FE120/2	1	8X6,5X230	1	5,4
F513-WB-L	2213-K-TVH-C3	22213-E1-K	H313	FE120/2	1	8X6,5X230	2	5,4



Design A

- ① Locating bearing
- ② Non-locating bearing

Design B

- ① Locating bearing
- ② Non-locating bearing

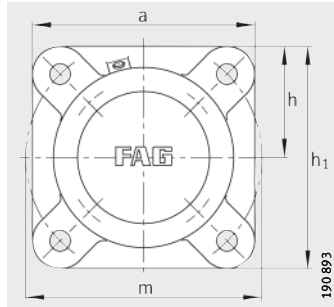
Dimensions

d <sub>1</sub>	a	g <sub>2</sub>	h <sub>1</sub>	c	D	g <sub>1</sub>	g <sub>3</sub>	g <sub>4</sub>	h	m	s	
											mm	inch
20	110	–	100	10	52	50	4	16	38	96	M10	3/8
20	110	55	100	10	52	–	–	16	38	96	M10	3/8
20	110	–	100	10	52	50	4	14,5	38	96	M10	3/8
20	110	55	100	10	52	–	–	14,5	38	96	M10	3/8
25	130	–	117	12	62	55	4	18	44	116	M10	3/8
25	130	57	117	12	62	–	–	18	44	116	M10	3/8
25	130	–	117	12	62	55	4	16	44	116	M10	3/8
25	130	57	117	12	62	–	–	16	44	116	M10	3/8
30	145	–	130	12	72	57	5	17	48,5	130	M12	1/2
30	145	60	130	12	72	–	–	17	48,5	130	M12	1/2
30	145	–	130	12	72	63	5	17	48,5	130	M12	1/2
30	145	66	130	12	72	–	–	17	48,5	130	M12	1/2
35	160	–	143	12	80	65	5	22	54	140	M12	1/2
35	160	66	143	12	80	–	–	22	54	140	M12	1/2
35	160	–	143	12	80	70	5	22	54	140	M12	1/2
35	160	71	143	12	80	–	–	22	54	140	M12	1/2
40	180	–	160	15	85	65	5	22	60	160	M12	1/2
40	180	70	160	15	85	–	–	22	60	160	M12	1/2
40	180	–	160	15	85	69	5	22	60	160	M12	1/2
40	180	74	160	15	85	–	–	22	60	160	M12	1/2
45	180	–	160	15	90	65	5	20	60	160	M12	1/2
45	180	70	160	15	90	–	–	20	60	160	M12	1/2
45	180	–	160	15	90	71	5	23	60	160	M12	1/2
45	180	76	160	15	90	–	–	23	60	160	M12	1/2
50	190	–	170	16	100	71	6	23	65	170	M12	1/2
50	190	76	170	16	100	–	–	23	65	170	M12	1/2
50	190	–	170	16	100	77	6	25	65	170	M12	1/2
50	190	82	170	16	100	–	–	25	65	170	M12	1/2
55	206	–	185	16	110	73	6	24	70	180	M12	1/2
55	206	78	185	16	110	–	–	24	70	180	M12	1/2
55	206	–	185	16	110	79	6	24	70	180	M12	1/2
55	206	84	185	16	110	–	–	24	70	180	M12	1/2
60	219	–	198	16	120	75	6	24	75	190	M12	1/2
60	219	79	198	16	120	–	–	24	75	190	M12	1/2
60	219	–	198	16	120	83	6	24	75	190	M12	1/2
60	219	87	198	16	120	–	–	24	75	190	M12	1/2

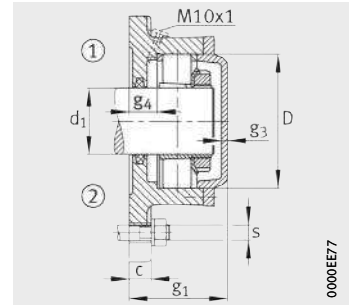


# Flanged housings

F5, unsplit  
For bearings with tapered bore and adapter sleeve



F515 to F522



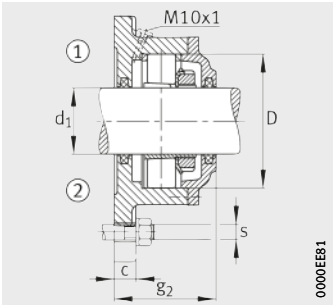
Design A

- ① Locating bearing
- ② Non-locating bearing

**Dimension table** (continued) · Dimensions in mm

Designation								Mass m
Housing	Bearing		Adapter sleeve	Locating ring		Felt strips		Housing ≈kg
					Pieces	aXbXl	Pieces	
<b>F515-A-L</b>	1215-K-TVH-C3	20215-K-TVP-C3	H215	FRM130/8	2	8X6,5X245	1	9,5
<b>F515-A-L</b>	2215-K-TVH-C3	22215-E1-K	H315	FRM130/10	1	8X6,5X245	1	9,5
<b>F515-B-L</b>	1215-K-TVH-C3	20215-K-TVP-C3	H215	FRM130/8	2	8X6,5X245	2	9,5
<b>F515-B-L</b>	2215-K-TVH-C3	22215-E1-K	H315	FRM130/10	1	8X6,5X245	2	9,5
<b>F516-A-L</b>	1216-K-TVH-C3	20216-K-TVP-C3	H216	FRM140/8,5	2	9X7,5X270	1	10
<b>F516-A-L</b>	2216-K-TVH-C3	22216-E1-K	H316	FRM140/10	1	9X7,5X270	1	10
<b>F516-B-L</b>	1216-K-TVH-C3	20216-K-TVP-C3	H216	FRM140/8,5	2	9X7,5X270	2	10
<b>F516-B-L</b>	2216-K-TVH-C3	22216-E1-K	H316	FRM140/10	1	9X7,5X270	2	10
<b>F517-A-L</b>	1217-K-TVH-C3	20217-K-MB-C3	H217	FRM150/9	2	9X7,5X285	1	12
<b>F517-A-L</b>	2217-K-M-C3	22217-E1-K	H317	FRM150/10	1	9X7,5X285	1	12
<b>F517-B-L</b>	1217-K-TVH-C3	20217-K-MB-C3	H217	FRM150/9	2	9X7,5X285	2	12
<b>F517-B-L</b>	2217-K-M-C3	22217-E1-K	H317	FRM150/10	1	9X7,5X285	2	12
<b>F518-A-L</b>	1218-K-TVH-C3	20218-K-MB-C3	H218	FRM160/10	2	9X7,5X300	1	13
<b>F518-A-L</b>	2218-K-TVH-C3	22218-E1-K	H318	FRM160/10	1	9X7,5X300	1	13
<b>F518-B-L</b>	1218-K-TVH-C3	20218-K-MB-C3	H218	FRM160/10	2	9X7,5X300	2	13
<b>F518-B-L</b>	2218-K-TVH-C3	22218-E1-K	H318	FRM160/10	1	9X7,5X300	2	13
<b>F520-A-L</b>	1220-K-M-C3	20220-K-MB-C3	H220	FRM180/10 + FRM180/12	1 1	10X8,5X335	1	18
<b>F520-A-L</b>	2220-K-M-C3	22220-E1-K	H320	FRM180/10	1	10X8,5X335	1	18
<b>F520-B-L</b>	1220-K-M-C3	20220-K-MB-C3	H220	FRM180/10 + FRM180/12	1 1	10X8,5X335	2	18
<b>F520-B-L</b>	2220-K-M-C3	22220-E1-K	H320	FRM180/10	1	10X8,5X335	2	18
<b>F522-A-L</b>	1222-K-M-C3	20222-K-MB-C3	H222	FRM200/13,5	2	12X10X375	1	22
<b>F522-B-L</b>	1222-K-M-C3	20222-K-MB-C3	H222	FRM200/13,5	2	12X10X375	2	22
<b>F522-WA-L</b>	2222-K-M-C3	22222-E1-K	H322	FRM200/10	1	12X10X375	1	22
<b>F522-WB-L</b>	2222-K-M-C3	22222-E1-K	H322	FRM200/10	1	12X10X375	2	22





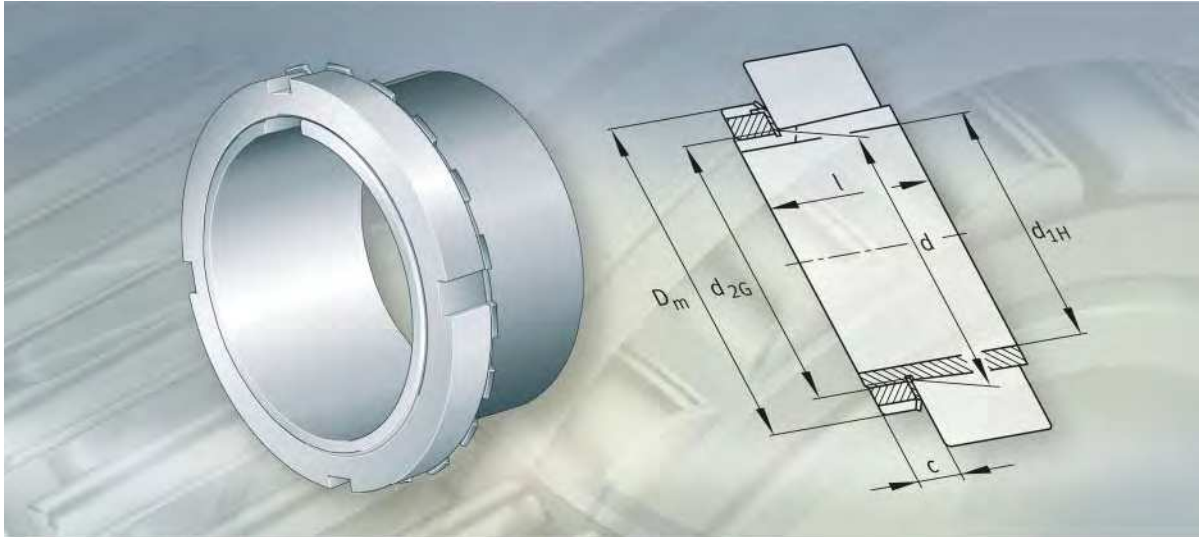
Design B

- ① Locating bearing
- ② Non-locating bearing

Dimensions

d <sub>1</sub>	a	g <sub>2</sub>	h <sub>1</sub>	c	D	g <sub>1</sub>	g <sub>3</sub>	g <sub>4</sub>	h	m	s	
											mm	inch
65	190	–	190	25	130	97	6	30	95	215	M16	5/8
65	190	–	190	25	130	97	6	30	95	215	M16	5/8
65	190	104	190	25	130	–	–	30	95	215	M16	5/8
65	190	104	190	25	130	–	–	30	95	215	M16	5/8
70	196	–	196	25	140	101	6	32	98	215	M16	5/8
70	196	–	196	25	140	101	6	32	98	215	M16	5/8
70	196	110	196	25	140	–	–	32	98	215	M16	5/8
70	196	110	196	25	140	–	–	32	98	215	M16	5/8
75	210	–	210	25	150	106	7	31	105	240	M16	5/8
75	210	–	210	25	150	106	7	31	105	240	M16	5/8
75	210	114	210	25	150	–	–	31	105	240	M16	5/8
75	210	114	210	25	150	–	–	31	105	240	M16	5/8
80	210	–	210	25	160	110	7	29	105	240	M16	5/8
80	210	–	210	25	160	110	7	29	105	240	M16	5/8
80	210	118	210	25	160	–	–	29	105	240	M16	5/8
80	210	118	210	25	160	–	–	29	105	240	M16	5/8
90	250	–	250	30	180	119	8	29	125	280	M20	3/4
90	250	–	250	30	180	119	8	29	125	280	M20	3/4
90	250	127	250	30	180	–	–	29	125	280	M20	3/4
90	250	127	250	30	180	–	–	29	125	280	M20	3/4
100	270	–	270	30	200	128	8	30	135	310	M20	3/4
100	270	137	270	30	200	–	–	30	135	310	M20	3/4
100	270	–	270	30	200	128	8	30	135	310	M20	3/4
100	270	137	270	30	200	–	–	30	135	310	M20	3/4





## Fasteners and retainers

- Adapter sleeves
- Withdrawal sleeves
- Locknuts
- Shaft nuts
- Tab washers
- Retaining brackets

# Fasteners and retainers

	Page
<b>Product overview</b>	Fasteners and retainers ..... 1452
<b>Features</b>	Adapter sleeves..... 1453
	Withdrawal sleeves ..... 1454
	Locknuts ..... 1454
	Shaft nuts ..... 1455
	Tab washers ..... 1456
	Retaining brackets..... 1456
	Suffixes..... 1456
<b>Design and safety guidelines</b>	Shaft tolerances ..... 1457
<b>Accuracy</b>	Adapter sleeves..... 1457
	Withdrawal sleeves ..... 1457
	Locknuts and shaft nuts ..... 1457
<b>Dimension tables</b>	Adapter sleeves..... 1458
	Withdrawal sleeves ..... 1472
	Locknuts ..... 1496
	Shaft nuts ..... 1500
	Tab washers ..... 1502
	Retaining brackets..... 1504

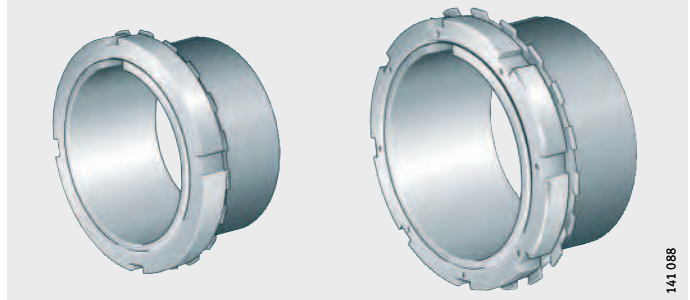


# Product overview Fasteners and retainers

## Adapter sleeves

With nut and retainer  
Taper 1:12 or 1:30

H2, H3, H23, H30, H31, H32, H33, H39, H240, H241



## Withdrawal sleeves

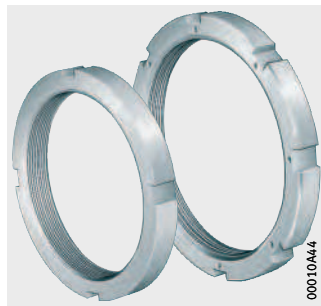
Taper 1:12 or 1:30

AH2, AH(X)3, AH22, AH(X)23, AH(X)30, AH(X)31, AH(X)32, AH33, AH39, AH240, AH241



## Locknuts Shaft nuts

KM, KML, HM, HM30, HM31

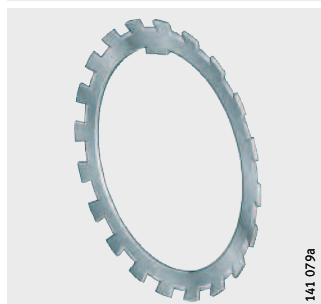


HMZ, HMZ30



## Tab washers Retaining brackets with screw

MB, MBL



MS30, MS31



# Fasteners and retainers

**Features** The location of bearings with a tapered bore on cylindrical shaft studs can be carried out using easy-to-fit, reliable adapter and withdrawal sleeves.

Locknuts or shaft nuts can be used to locate bearings on shafts or adapter sleeves. Gradual loosening of nuts can be prevented using tab washers or retaining brackets. Shaft nuts are secured by means of force locking.

## Adapter sleeves

### For smooth and stepped shafts

Adapter sleeves are suitable where bearings with a tapered bore are to be located on cylindrical shafts. They do not need to be secured on the shaft by any additional means. The bearings can be positioned at any point on smooth shafts.

If adapter sleeves are used with a support ring on stepped shafts, the bearings can be axially located to high accuracy. In addition, this gives simpler dismantling of the bearings.

Adapter sleeves comprise slotted adapter sleeves, locknuts and tab washers. For larger sizes, retaining brackets are used instead of tab washers.

The tensile strength of the material is at least  $430 \text{ N/mm}^2$ . The outside surface of the sleeves has a taper of 1:12, in series H240 and H241 the taper is 1:30.

The dimension tables describe adapter sleeves for metric shafts. Sleeves for inch size shafts are available by agreement.

### For hydraulic method

Fitting and dismantling of large bearings requires high mounting forces and is made easier by using the hydraulic method. There are adapter sleeves with oil slots on the tapered outside surface and a pump connector on the thread side. These adapter sleeves have the suffix HG. The dimension tables describe the threads for the pump connector.



# Fasteners and retainers

- Withdrawal sleeves** Withdrawal sleeves are suitable where bearings with a tapered bore are to be located on cylindrical shafts. The tapered sleeve is pressed into the bearing bore until the required reduction in radial internal clearance is achieved. The bearing is abutted, for example, against a shoulder on the shaft.
- Retainers are not included in the delivery.
- The tensile strength of the material is at least  $430 \text{ N/mm}^2$ .
- The outside surface of the slotted steel sleeves has a taper of 1:12, in series AH240 and AH241 the taper is 1:30.
- For hydraulic method** Fitting and dismantling of large bearings requires high mounting forces and is made easier by using the hydraulic method. There are withdrawal sleeves with oil slots on the tapered outside surface and two pump connectors offset to each other by  $90^\circ$ . These withdrawal sleeves have the suffix H. The dimension tables give the mounting dimensions for the pump connector.
- Locknuts** Locknuts can be used to locate bearings on shafts or adapter sleeves. They also give easier mounting of bearings with a tapered shaft seat and the fitting and dismantling of bearings on withdrawal sleeves.
- The locknuts are made from steel and the tensile strength of the material is at least  $350 \text{ N/mm}^2$ .
- They have four or eight evenly spaced slots on the circumference, into which hook wrenches or striking-face wrenches can be fitted.
- By agreement, locknuts of series HM30..-H and HM31..-H with threaded holes for mounting screws are available.
- Precision locknuts are described in the section Bearings for screw drives.

## Shaft nuts

Shaft nuts HMZ allow precise and secure axial location of bearings on cylindrical and tapered shafts or on adapter sleeves.

The shaft nuts are made from steel and the tensile strength is at least  $350 \text{ N/mm}^2$ .

HMZ nuts are interchangeable with conventional locknuts HM and KM. They are secured, however, not by means of washers or brackets but by force locking. Four or eight axial clamping screws allow uniform clamping on the circumference, *Figure 1*.

For screw mounting on the shaft thread, the circumference of the nut has four or eight threaded blind holes into which the threaded rod also supplied is screwed. There is no need either for slots on the outside diameter of the nut or for any retainers. Since the shaft does not have a retaining slot, it has higher strength and is more economical to manufacture.

Shaft nuts HMZ are described in TPI WL 91-8.



*Figure 1*

Clamping screws for generating a force locking connection between the nut and shaft thread

00010A7D



# Fasteners and retainers

## Tab washers

Tab washers MB and MBL are simple, reliable elements for securing smaller locknuts (nuts of series KM and KML).

They have an inner tab and several outer tabs evenly spaced around the circumference. The inner tab grips in the slot on the adapter sleeve or shaft, one of the outer tabs is bent into a slot in the nut for location.

The washers are made from steel and the tensile strength of the material is at least 300 N/mm<sup>2</sup>.

## Retaining brackets

Retaining brackets of series MS are fixed to the locknut using a hexagonal screw. They engage in a slot in the nut and in the adapter sleeve or shaft.

The fixing screw has a self-locking thread up to M16, for sizes from M20 a standardised hexagonal screw with a retainer is used.

Retaining brackets are used with locknuts of series HM30 and HM31.

## Suffixes

Suffixes for available designs: see table.

## Available designs

Suffix	Description	Design
H	Hydraulic withdrawal sleeve	Standard
HG	Hydraulic adapter sleeve	



## **Design and safety guidelines**

### **Shaft tolerances**

Adapter and withdrawal sleeves adapt themselves to the shaft. Larger diameter tolerances are therefore permissible for shafts than in the case of a direct cylindrical seat for a bearing on the shaft. For general applications, bearing seats toleranced to h9 are sufficient.

The geometrical tolerances must be tighter than the diameter tolerances since the geometrical accuracy affects the running accuracy of the bearing arrangement. The cylindricity tolerance of the bearing seat should be within IT5/2 or IT6/2.

### **Accuracy Adapter sleeves**

The dimensions and material conform to DIN 5 415/ISO 2 982-1.

The bore tolerance of the adapter sleeves, before splitting, for a taper 1:12 is in tolerance zone JS9, for a taper 1:30 in tolerance zone JS7.

Up to M200, the thread is a metric precision thread with a tolerance grade 6g to DIN/ISO 965-3, over M200 trapezoidal threads are used.

### **Withdrawal sleeves**

The dimensions and material conform to DIN 5 416/ISO 2 982-1.

The bore tolerance of the withdrawal sleeves before splitting for a taper 1:12 is in tolerance zone JS9, for a taper 1:30 in tolerance zone JS7.

Up to M200, the thread is a metric precision thread with a tolerance grade 6g to DIN/ISO 965-3, over M200 trapezoidal threads are used.

Designs with a modified thread  $d_{2G}$  have the suffix G.

### **Locknuts and shaft nuts**

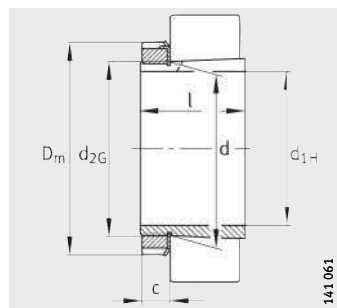
The dimensions and material conform to DIN 981/ISO 2 982-2. Deviations are indicated in the dimension tables.

Up to a thread diameter 200 mm, the thread is a metric precision thread, larger locknuts and shaft nuts have trapezoidal threads.



# Adapter sleeves

With nut and retainer



Taper 1:12  
(taper 1:30 for H240, H241)  
Tab washer MB

**Dimension table** - Dimensions in mm

Designation			Mass m ≈kg	Dimensions					
Adapter sleeve Complete	Nut	Retainer		d <sub>1H</sub>	d	D <sub>m</sub> ≈	l	c ≈	d <sub>2G</sub>
<b>H203</b>	KM3	MB3	0,03	<b>14</b>	17	28	21	6	M17X1
<b>H204</b>	KM4	MB4	0,04	<b>17</b>	20	32	24	7	M20X1
<b>H304</b>	KM4	MB4	0,04	<b>17</b>	20	32	28	7	M20X1
<b>H2304</b>	KM4	MB4	0,05	<b>17</b>	20	32	31	7	M20X1
<b>H205</b>	KM5	MB5	0,07	<b>20</b>	25	38	26	9	M25X1,5
<b>H305</b>	KM5	MB5	0,07	<b>20</b>	25	38	29	9	M25X1,5
<b>H2305</b>	KM5	MB5	0,09	<b>20</b>	25	38	35	9	M25X1,5
<b>H206</b>	KM6	MB6	0,1	<b>25</b>	30	45	27	9	M30X1,5
<b>H306</b>	KM6	MB6	0,11	<b>25</b>	30	45	31	9	M30X1,5
<b>H2306</b>	KM6	MB6	0,13	<b>25</b>	30	45	38	9	M30X1,5
<b>H207</b>	KM7	MB7	0,12	<b>30</b>	35	52	29	10	M35X1,5
<b>H307</b>	KM7	MB7	0,14	<b>30</b>	35	52	35	10	M35X1,5
<b>H2307</b>	KM7	MB7	0,16	<b>30</b>	35	52	43	10	M35X1,5
<b>H208</b>	KM8	MB8	0,18	<b>35</b>	40	58	31	11	M40X1,5
<b>H308</b>	KM8	MB8	0,19	<b>35</b>	40	58	36	11	M40X1,5
<b>H2308</b>	KM8	MB8	0,23	<b>35</b>	40	58	46	11	M40X1,5
<b>H3308</b>	KM8	MB8	0,24	<b>35</b>	40	58	50	11	M40X1,5
<b>H209</b>	KM9	MB9	0,22	<b>40</b>	45	65	33	12	M45X1,5
<b>H309</b>	KM9	MB9	0,25	<b>40</b>	45	65	39	12	M45X1,5
<b>H2309</b>	KM9	MB9	0,29	<b>40</b>	45	65	50	12	M45X1,5
<b>H3309</b>	KM9	MB9	0,31	<b>40</b>	45	65	54	12	M45X1,5
<b>H210</b>	KM10	MB10	0,27	<b>45</b>	50	70	35	13	M50X1,5
<b>H310</b>	KM10	MB10	0,3	<b>45</b>	50	70	42	13	M50X1,5
<b>H2310</b>	KM10	MB10	0,36	<b>45</b>	50	70	55	13	M50X1,5
<b>H3310</b>	KM10	MB10	0,39	<b>45</b>	50	70	60	13	M50X1,5
<b>H211</b>	KM11	MB11	0,31	<b>50</b>	55	75	37	13	M55X2
<b>H311</b>	KM11	MB11	0,35	<b>50</b>	55	75	45	13	M55X2
<b>H2311</b>	KM11	MB11	0,42	<b>50</b>	55	75	59	13	M55X2
<b>H3311</b>	KM11	MB11	0,46	<b>50</b>	55	75	65	13	M55X2
<b>H212</b>	KM12	MB12	0,35	<b>55</b>	60	80	38	13	M60X2
<b>H312</b>	KM12	MB12	0,4	<b>55</b>	60	80	47	13	M60X2
<b>H2312</b>	KM12	MB12	0,49	<b>55</b>	60	80	62	13	M60X2
<b>H3312</b>	KM12	MB12	0,54	<b>55</b>	60	80	70	13	M60X2

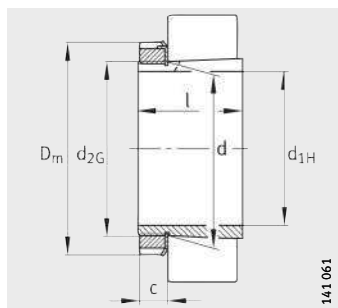
**Dimension table** (continued) - Dimensions in mm

Designation			Mass m ≈kg	Dimensions					
Adapter sleeve Complete	Nut	Retainer		d <sub>1H</sub>	d	D <sub>m</sub> ≈	l	c ≈	d <sub>2G</sub>
<b>H213</b>	KM13	MB13	0,4	<b>60</b>	65	85	40	14	M65X2
<b>H313</b>	KM13	MB13	0,46	<b>60</b>	65	85	50	14	M65X2
<b>H2313</b>	KM13	MB13	0,56	<b>60</b>	65	85	65	14	M65X2
<b>H3313</b>	KM13	MB13	0,63	<b>60</b>	65	85	75	14	M65X2
<b>H214</b>	KM14	MB14	0,63	<b>60</b>	70	92	41	14	M70X2
<b>H314</b>	KM14	MB14	0,74	<b>60</b>	70	92	52	14	M70X2
<b>H2314</b>	KM14	MB14	0,92	<b>60</b>	70	92	68	14	M70X2
<b>H3314</b>	KM14	MB14	1,08	<b>60</b>	70	92	81	14	M70X2
<b>H215</b>	KM15	MB15	0,71	<b>65</b>	75	98	43	15	M75X2
<b>H315</b>	KM15	MB15	0,84	<b>65</b>	75	98	55	15	M75X2
<b>H2315</b>	KM15	MB15	1,06	<b>65</b>	75	98	73	15	M75X2
<b>H3315</b>	KM15	MB15	1,25	<b>65</b>	75	98	87	15	M75X2
<b>H216</b>	KM16	MB16	0,89	<b>70</b>	80	105	46	17	M80X2
<b>H316</b>	KM16	MB16	1,04	<b>70</b>	80	105	59	17	M80X2
<b>H2316</b>	KM16	MB16	1,3	<b>70</b>	80	105	78	17	M80X2
<b>H3316</b>	KM16	MB16	1,46	<b>70</b>	80	105	89	17	M80X2
<b>H217</b>	KM17	MB17	1,03	<b>75</b>	85	110	50	18	M85X2
<b>H317</b>	KM17	MB17	1,19	<b>75</b>	85	110	63	18	M85X2
<b>H2317</b>	KM17	MB17	1,47	<b>75</b>	85	110	82	18	M85X2
<b>H3317</b>	KM17	MB17	1,68	<b>75</b>	85	110	95	18	M85X2
<b>H218</b>	KM18	MB18	1,21	<b>80</b>	90	120	52	18	M90X2
<b>H318</b>	KM18	MB18	1,39	<b>80</b>	90	120	65	18	M90X2
<b>H2318</b>	KM18	MB18	1,71	<b>80</b>	90	120	86	18	M90X2
<b>H3318</b>	KM18	MB18	1,87	<b>80</b>	90	120	95	18	M90X2
<b>H219</b>	KM19	MB19	1,39	<b>85</b>	95	125	55	19	M95X2
<b>H319</b>	KM19	MB19	1,58	<b>85</b>	95	125	68	19	M95X2
<b>H2319</b>	KM19	MB19	1,95	<b>85</b>	95	125	90	19	M95X2
<b>H3319</b>	KM19	MB19	2,16	<b>85</b>	95	125	101	19	M95X2
<b>H220</b>	KM20	MB20	1,52	<b>90</b>	100	130	58	20	M100X2
<b>H320</b>	KM20	MB20	1,73	<b>90</b>	100	130	71	20	M100X2
<b>H3120</b>	KM20	MB20	1,81	<b>90</b>	100	130	76	20	M100X2
<b>H24020</b>	KM20	MB20	1,77	<b>90</b>	100	130	80	20	M100X2
<b>H24120</b>	KM20	MB20	1,97	<b>90</b>	100	130	94	20	M100X2
<b>H2320</b>	KM20	MB20	2,2	<b>90</b>	100	130	97	20	M100X2
<b>H3320</b>	KM20	MB20	2,38	<b>90</b>	100	130	106	20	M100X2

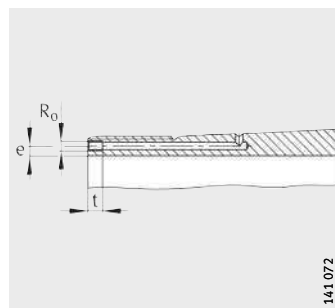


# Adapter sleeves

With nut and retainer



Taper 1:12  
(taper 1:30 for H240, H241)  
Tab washer MB, MBL



Hydraulic adapter sleeve  
(suffix HG)  
Mounting dimensions

Dimension table (continued) · Dimensions in mm									
Designation			Mass m ≈ kg	Dimensions					
Adapter sleeve Complete	Nut	Retainer		d <sub>1H</sub>	d	D <sub>m</sub> ≈	l	c ≈	d <sub>2G</sub>
<b>H221</b>	KM21	MB21	1,74	<b>95</b>	105	140	60	20	M105X2
<b>H321</b>	KM21	MB21	1,97	<b>95</b>	105	140	74	20	M105X2
<b>H3121</b>	KM21	MB21	2,09	<b>95</b>	105	140	80	20	M105X2
<b>H2321</b>	KM21	MB21	2,5	<b>95</b>	105	140	101	20	M105X2
<b>H3321</b>	KM21	MB21	2,71	<b>95</b>	105	140	111	20	M105X2
<b>H222</b>	KM22	MB22	1,95	<b>100</b>	110	145	63	21	M110X2
<b>H322</b>	KM22	MB22	2,21	<b>100</b>	110	145	77	21	M110X2
<b>H3122</b>	KM22	MB22	2,28	<b>100</b>	110	145	81	21	M110X2
<b>H24022</b>	KM22	MB22	2,3	<b>100</b>	110	145	90	21	M110X2
<b>H24122</b>	KM22	MB22	2,45	<b>100</b>	110	145	99	21	M110X2
<b>H2322</b>	KM22	MB22	2,78	<b>100</b>	110	145	105	21	M110X2
<b>H3322</b>	KM22	MB22	3,06	<b>100</b>	110	145	117	21	M110X2
<b>H3924</b>	KML24	MBL24	1,78	<b>110</b>	120	145	60	22	M120X2
<b>H3024</b>	KML24	MBL24	2,01	<b>110</b>	120	145	72	22	M120X2
<b>H24024</b>	KML24	MBL24	2,24	<b>110</b>	120	145	91	22	M120X2
<b>H3124</b>	KM24	MB24	2,67	<b>110</b>	120	155	88	22	M120X2
<b>H24124</b>	KM24	MB24	2,92	<b>110</b>	120	155	111	22	M120X2
<b>H2324</b>	KM24	MB24	3,24	<b>110</b>	120	155	112	22	M120X2
<b>H3324</b>	KM24	MB24	3,77	<b>110</b>	120	155	132	22	M120X2
<b>H3926</b>	KML26	MBL26	2,53	<b>115</b>	130	155	65	23	M130X2
<b>H3026</b>	KML26	MBL26	2,96	<b>115</b>	130	155	80	23	M130X2
<b>H24026</b>	KML26	MBL26	3,4	<b>115</b>	130	155	102	23	M130X2
<b>H3126</b>	KM26	MB26	3,72	<b>115</b>	130	165	92	23	M130X2
<b>H24126</b>	KM26	MB26	4,08	<b>115</b>	130	165	113	23	M130X2
<b>H2326</b>	KM26	MB26	4,69	<b>115</b>	130	165	121	23	M130X2
<b>H3326</b>	KM26	MB26	5,35	<b>115</b>	130	165	139	23	M130X2
<b>H3928</b>	KML28	MBL28	2,81	<b>125</b>	140	165	66	24	M140X2
<b>H3028</b>	KML28	MBL28	3,3	<b>125</b>	140	165	82	24	M140X2
<b>H24028</b>	KML28	MBL28	3,75	<b>125</b>	140	165	103	24	M140X2
<b>H3128</b>	KM28	MB28	4,4	<b>125</b>	140	180	97	24	M140X2
<b>H24128</b>	KM28	MB28	4,81	<b>125</b>	140	180	119	24	M140X2
<b>H2328</b>	KM28	MB28	5,66	<b>125</b>	140	180	131	24	M140X2
<b>H3328</b>	KM28	MB28	6,32	<b>125</b>	140	180	147	24	M140X2

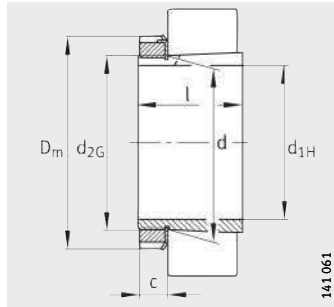
**Dimension table** (continued) - Dimensions in mm

Designation			Mass	Dimensions						Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d <sub>1H</sub>	d	D <sub>m</sub> ≈	l	c ≈	d <sub>2G</sub>	R <sub>0</sub>	e	t
<b>H3930</b>	KML30	MBL30	3,64	<b>135</b>	150	180	76	26	M150X2	–	–	–
<b>H3030</b>	KML30	MBL30	4,02	<b>135</b>	150	180	87	26	M150X2	–	–	–
<b>H24030</b>	KML30	MBL30	4,61	<b>135</b>	150	180	112	26	M150X2	–	–	–
<b>H3130</b>	KM30	MB30	5,6	<b>135</b>	150	195	111	26	M150X2	–	–	–
<b>H24130</b>	KM30	MB30	6,1	<b>135</b>	150	195	137	26	M150X2	–	–	–
<b>H2330</b>	KM30	MB30	6,76	<b>135</b>	150	195	139	26	M150X2	–	–	–
<b>H3330</b>	KM30	MB30	7,66	<b>135</b>	150	195	159	26	M150X2	–	–	–
<b>H3932</b>	KML32	MBL32	4,75	<b>140</b>	160	190	78	28	M160X3	–	–	–
<b>H3932-HG</b>	KML32	MBL32	4,75	<b>140</b>	160	190	78	28	M160X3	M6	4,2	7
<b>H3032</b>	KML32	MBL32	5,44	<b>140</b>	160	190	93	28	M160X3	–	–	–
<b>H3032-HG</b>	KML32	MBL32	5,44	<b>140</b>	160	190	93	28	M160X3	M6	4,2	7
<b>H24032</b>	KML32	MBL32	6,27	<b>140</b>	160	190	118	28	M160X3	–	–	–
<b>H24032-HG</b>	KML32	MBL32	6,27	<b>140</b>	160	190	118	28	M160X3	M6	4,2	7
<b>H3132</b>	KM32	MB32	7,81	<b>140</b>	160	210	119	28	M160X3	–	–	–
<b>H3132-HG</b>	KM32	MB32	7,81	<b>140</b>	160	210	119	28	M160X3	M6	4,2	7
<b>H2332</b>	KM32	MB32	9,32	<b>140</b>	160	210	147	28	M160X3	–	–	–
<b>H2332-HG</b>	KM32	MB32	9,32	<b>140</b>	160	210	147	28	M160X3	M6	4,2	7
<b>H24132</b>	KM32	MB32	8,66	<b>140</b>	160	210	148	28	M160X3	–	–	–
<b>H24132-HG</b>	KM32	MB32	8,66	<b>140</b>	160	210	148	28	M160X3	M6	4,2	7
<b>H3332</b>	KM32	MB32	10,7	<b>140</b>	160	210	170	28	M160X3	–	–	–
<b>H3332-HG</b>	KM32	MB32	10,7	<b>140</b>	160	210	170	28	M160X3	M6	4,2	7
<b>H3934</b>	KML34	MBL34	5,16	<b>150</b>	170	200	79	29	M170X3	–	–	–
<b>H3934-HG</b>	KML34	MBL34	5,16	<b>150</b>	170	200	79	29	M170X3	M6	4,2	7
<b>H3034</b>	KML34	MBL34	6,25	<b>150</b>	170	200	101	29	M170X3	–	–	–
<b>H3034-HG</b>	KML34	MBL34	6,25	<b>150</b>	170	200	101	29	M170X3	M6	4,2	7
<b>H24034</b>	KML34	MBL34	7,28	<b>150</b>	170	200	130	29	M170X3	–	–	–
<b>H24034-HG</b>	KML34	MBL34	7,28	<b>150</b>	170	200	130	29	M170X3	M6	4,2	7
<b>H3134</b>	KM34	MB34	8,52	<b>150</b>	170	220	122	29	M170X3	–	–	–
<b>H3134-HG</b>	KM34	MB34	8,52	<b>150</b>	170	220	122	29	M170X3	M6	4,2	7
<b>H24134</b>	KM34	MB34	9,32	<b>150</b>	170	220	149	29	M170X3	–	–	–
<b>H24134-HG</b>	KM34	MB34	9,32	<b>150</b>	170	220	149	29	M170X3	M6	4,2	7
<b>H2334</b>	KM34	MB34	10,4	<b>150</b>	170	220	154	29	M170X3	–	–	–
<b>H2334-HG</b>	KM34	MB34	10,4	<b>150</b>	170	220	154	29	M170X3	M6	4,2	7
<b>H3334</b>	KM34	MB34	11,7	<b>150</b>	170	220	175	29	M170X3	–	–	–
<b>H3334-HG</b>	KM34	MB34	11,7	<b>150</b>	170	220	175	29	M170X3	M6	4,2	7

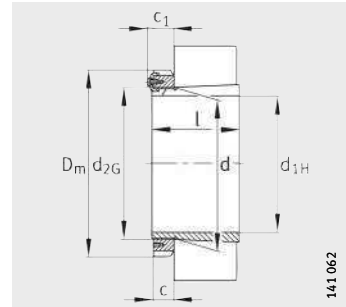


# Adapter sleeves

With nut and retainer



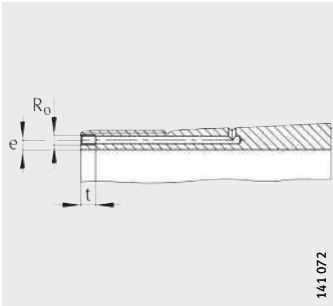
Taper 1:12  
(taper 1:30 for H240, H241)  
Tab washer MB, MBL



Taper 1:12  
(taper 1:30 for H240)  
Retaining bracket MS30

**Dimension table** (continued) · Dimensions in mm

Designation			Mass m ≈kg	Dimensions						Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d <sub>1H</sub>	d	D <sub>m</sub> ≈	l	c ≈	d <sub>2G</sub>	R <sub>0</sub>	e	t
<b>H3936</b>	KML36	MBL36	6,01	<b>160</b>	180	210	87	30	M180X3	-	-	-
<b>H3936-HG</b>	KML36	MBL36	6,01	<b>160</b>	180	210	87	30	M180X3	M6	4,2	7
<b>H3036</b>	KML36	MBL36	7,18	<b>160</b>	180	210	109	30	M180X3	-	-	-
<b>H3036-HG</b>	KML36	MBL36	7,18	<b>160</b>	180	210	109	30	M180X3	M6	4,2	7
<b>H24036</b>	KML36	MBL36	8,33	<b>160</b>	180	210	140	30	M180X3	-	-	-
<b>H24036-HG</b>	KML36	MBL36	8,33	<b>160</b>	180	210	140	30	M180X3	M6	4,2	7
<b>H3136</b>	KM36	MB36	9,67	<b>160</b>	180	230	131	30	M180X3	-	-	-
<b>H3136-HG</b>	KM36	MB36	9,67	<b>160</b>	180	230	131	30	M180X3	M6	4,2	7
<b>H24136</b>	KM36	MB36	10,5	<b>160</b>	180	230	159	30	M180X3	-	-	-
<b>H24136-HG</b>	KM36	MB36	10,5	<b>160</b>	180	230	159	30	M180X3	M6	4,2	7
<b>H2336</b>	KM36	MB36	11,6	<b>160</b>	180	230	161	30	M180X3	-	-	-
<b>H2336-HG</b>	KM36	MB36	11,6	<b>160</b>	180	230	161	30	M180X3	M6	4,2	7
<b>H3336</b>	KM36	MB36	13,3	<b>160</b>	180	230	186	30	M180X3	-	-	-
<b>H3336-HG</b>	KM36	MB36	13,3	<b>160</b>	180	230	186	30	M180X3	M6	4,2	7
<b>H3938</b>	KML38	MBL38	6,49	<b>170</b>	190	220	89	31	M190X3	-	-	-
<b>H3938-HG</b>	KML38	MBL38	6,49	<b>170</b>	190	220	89	31	M190X3	M6	4,2	7
<b>H3038</b>	KML38	MBL38	7,8	<b>170</b>	190	220	112	31	M190X3	-	-	-
<b>H3038-HG</b>	KML38	MBL38	7,8	<b>170</b>	190	220	112	31	M190X3	M6	4,2	7
<b>H24038</b>	KML38	MBL38	9	<b>170</b>	190	220	143	31	M190X3	-	-	-
<b>H24038-HG</b>	KML38	MBL38	9	<b>170</b>	190	220	143	31	M190X3	M6	4,2	7
<b>H3138</b>	KM38	MB38	11	<b>170</b>	190	240	141	31	M190X3	-	-	-
<b>H3138-HG</b>	KM38	MB38	11	<b>170</b>	190	240	141	31	M190X3	M6	4,2	7
<b>H2338</b>	KM38	MB38	12,9	<b>170</b>	190	240	169	31	M190X3	-	-	-
<b>H2338-HG</b>	KM38	MB38	12,9	<b>170</b>	190	240	169	31	M190X3	M6	4,2	7
<b>H24138</b>	KM38	MB38	11,9	<b>170</b>	190	240	172	31	M190X3	-	-	-
<b>H24138-HG</b>	KM38	MB38	11,9	<b>170</b>	190	240	172	31	M190X3	M6	4,2	7
<b>H3338</b>	KM38	MB38	14,7	<b>170</b>	190	240	193	31	M190X3	-	-	-
<b>H3338-HG</b>	KM38	MB38	14,7	<b>170</b>	190	240	193	31	M190X3	M6	4,2	7



141.072

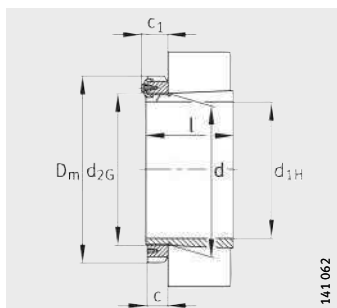
Hydraulic adapter sleeve  
 Suffix HG  
 Mounting dimensions

Dimension table (continued) - Dimensions in mm													
Designation			Mass m ≈ kg	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d <sub>1H</sub>	d	D <sub>m</sub>	l	c ≈	c <sub>1</sub> ≈	d <sub>2G</sub>	R <sub>0</sub>	e	t
<b>H3940</b>	KML40	MBL40	8,14	<b>180</b>	200	240	98	32	–	M200X3	–	–	–
<b>H3940-HG</b>	KML40	MBL40	8,14	<b>180</b>	200	240	98	32	–	M200X3	M6	4,2	7
<b>H3040</b>	KML40	MBL40	9,5	<b>180</b>	200	240	120	32	–	M200X3	–	–	–
<b>H3040-HG</b>	KML40	MBL40	9,5	<b>180</b>	200	240	120	32	–	M200X3	M6	4,2	7
<b>H24040</b>	KML40	MBL40	10,8	<b>180</b>	200	240	153	32	–	M200X3	–	–	–
<b>H24040-HG</b>	KML40	MBL40	10,8	<b>180</b>	200	240	153	32	–	M200X3	M6	4,2	7
<b>H3140</b>	KM40	MB40	12,3	<b>180</b>	200	250	150	32	–	M200X3	–	–	–
<b>H3140-HG</b>	KM40	MB40	12,3	<b>180</b>	200	250	150	32	–	M200X3	M6	4,2	7
<b>H2340</b>	KM40	MB40	14,2	<b>180</b>	200	250	176	32	–	M200X3	–	–	–
<b>H2340-HG</b>	KM40	MB40	14,2	<b>180</b>	200	250	176	32	–	M200X3	M6	4,2	7
<b>H24140</b>	KM40	MB40	13,4	<b>180</b>	200	250	185	32	–	M200X3	–	–	–
<b>H24140-HG</b>	KM40	MB40	13,4	<b>180</b>	200	250	185	32	–	M200X3	M6	4,2	7
<b>H3340</b>	KM40	MB40	16,4	<b>180</b>	200	250	204	32	–	M200X3	–	–	–
<b>H3340-HG</b>	KM40	MB40	16,4	<b>180</b>	200	250	204	32	–	M200X3	M6	4,2	7
<b>H3944</b>	HM3044	MS3044	8,45	<b>200</b>	220	260	96	30	40	Tr220X4	–	–	–
<b>H3944-HG</b>	HM3044	MS3044	8,45	<b>200</b>	220	260	96	30	40	Tr220X4	M6	4,2	7
<b>H3044X</b>	HM3044	MS3044	10,5	<b>200</b>	220	260	126	30	40	Tr220X4	–	–	–
<b>H3044X-HG</b>	HM3044	MS3044	10,5	<b>200</b>	220	260	126	30	40	Tr220X4	M6	4,2	7
<b>H24044</b>	HM3044	MS3044	12,1	<b>200</b>	220	260	162	30	40	Tr220X4	–	–	–
<b>H24044-HG</b>	HM3044	MS3044	12,1	<b>200</b>	220	260	162	30	40	Tr220X4	M6	4,2	7
<b>H3144X</b>	HM44T	MB44	15,7	<b>200</b>	220	280	161	35	–	Tr220X4	–	–	–
<b>H3144X-HG</b>	HM44T	MB44	15,7	<b>200</b>	220	280	161	35	–	Tr220X4	M6	4,2	7
<b>H2344X</b>	HM44T	MB44	17,8	<b>200</b>	220	280	186	35	–	Tr220X4	–	–	–
<b>H2344X-HG</b>	HM44T	MB44	17,8	<b>200</b>	220	280	186	35	–	Tr220X4	M6	4,2	7
<b>H24144</b>	HM44T	MB44	17,1	<b>200</b>	220	280	199	35	–	Tr220X4	–	–	–
<b>H24144-HG</b>	HM44T	MB44	17,1	<b>200</b>	220	280	199	35	–	Tr220X4	M6	4,2	7
<b>H3344</b>	HM44T	MB44	21,1	<b>200</b>	220	280	223	35	–	Tr220X4	–	–	–
<b>H3344-HG</b>	HM44T	MB44	21,1	<b>200</b>	220	280	223	35	–	Tr220X4	M6	4,2	7

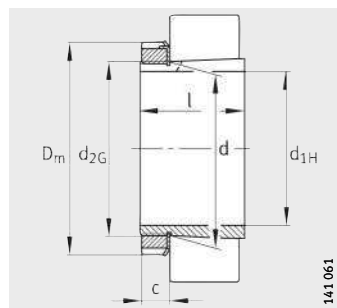


# Adapter sleeves

With nut and retainer



Taper 1:12  
(taper 1:30 for H240, H241)  
Retaining bracket MS30, MS31

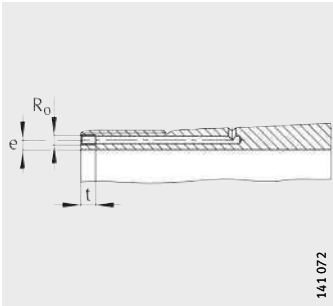


Taper 1:12  
(taper 1:30 for H241)  
Tab washer MB

**Dimension table** (continued) · Dimensions in mm

Designation			Mass m ≈ kg	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d <sub>1H</sub>	d	D <sub>m</sub>	l	c	c <sub>1</sub>	d <sub>2G</sub>	R <sub>0</sub>	e	t
<b>H3948</b>	HM3048	MS3048	11,3	<b>220</b>	240	290	101	34	45	Tr240X4	-	-	-
<b>H3948-HG</b>	HM3048	MS3048	11,3	<b>220</b>	240	290	101	34	45	Tr240X4	M6	4,2	7
<b>H3048</b>	HM3048	MS3048	13,8	<b>220</b>	240	290	133	34	45	Tr240X4	-	-	-
<b>H3048-HG</b>	HM3048	MS3048	13,8	<b>220</b>	240	290	133	34	45	Tr240X4	M6	4,2	7
<b>H24048</b>	HM3048	MS3048	15,3	<b>220</b>	240	290	167	34	45	Tr240X4	-	-	-
<b>H24048-HG</b>	HM3048	MS3048	15,3	<b>220</b>	240	290	167	34	45	Tr240X4	M6	4,2	7
<b>H3148X</b>	HM48T	MB48	18,4	<b>220</b>	240	300	172	37	-	Tr240X4	-	-	-
<b>H3148X-HG</b>	HM48T	MB48	18,4	<b>220</b>	240	300	172	37	-	Tr240X4	M6	4,2	7
<b>H2348X</b>	HM48T	MB48	20,9	<b>220</b>	240	300	199	37	-	Tr240X4	-	-	-
<b>H2348X-HG</b>	HM48T	MB48	20,9	<b>220</b>	240	300	199	37	-	Tr240X4	M6	4,2	7
<b>H24148</b>	HM48T	MB48	19,9	<b>220</b>	240	300	212	37	-	Tr240X4	-	-	-
<b>H24148-HG</b>	HM48T	MB48	19,9	<b>220</b>	240	300	212	37	-	Tr240X4	M6	4,2	7
<b>H3348</b>	HM48T	MB48	25,1	<b>220</b>	240	300	240	37	-	Tr240X4	-	-	-
<b>H3348-HG</b>	HM48T	MB48	25,1	<b>220</b>	240	300	240	37	-	Tr240X4	M6	4,2	7
<b>H3952</b>	HM3052	MS3048	13,6	<b>240</b>	260	310	116	34	45	Tr260X4	-	-	-
<b>H3952-HG</b>	HM3052	MS3048	13,6	<b>240</b>	260	310	116	34	45	Tr260X4	M6	4,2	7
<b>H3052X</b>	HM3052	MS3048	16	<b>240</b>	260	310	145	34	45	Tr260X4	-	-	-
<b>H3052X-HG</b>	HM3052	MS3048	16	<b>240</b>	260	310	145	34	45	Tr260X4	M6	4,2	7
<b>H24052</b>	HM3052	MS3048	18,4	<b>240</b>	260	310	190	34	45	Tr260X4	-	-	-
<b>H24052-HG</b>	HM3052	MS3048	18,4	<b>240</b>	260	310	190	34	45	Tr260X4	M6	4,2	7
<b>H3152X</b>	HM52T	MB52	23,5	<b>240</b>	260	330	190	38	-	Tr260X4	-	-	-
<b>H3152X-HG</b>	HM52T	MB52	23,5	<b>240</b>	260	330	190	38	-	Tr260X4	M6	4,2	7
<b>H2352X</b>	HM52T	MB52	25,7	<b>240</b>	260	330	211	38	-	Tr260X4	-	-	-
<b>H2352X-HG</b>	HM52T	MB52	25,7	<b>240</b>	260	330	211	38	-	Tr260X4	M6	4,2	7
<b>H24152</b>	HM52T	MB52	25,2	<b>240</b>	260	330	235	38	-	Tr260X4	-	-	-
<b>H24152-HG</b>	HM52T	MB52	25,2	<b>240</b>	260	330	235	38	-	Tr260X4	M6	4,2	7
<b>H3352</b>	HM52T	MB52	30,5	<b>240</b>	260	330	253	38	-	Tr260X4	-	-	-
<b>H3352-HG</b>	HM52T	MB52	30,5	<b>240</b>	260	330	253	38	-	Tr260X4	M6	4,2	7





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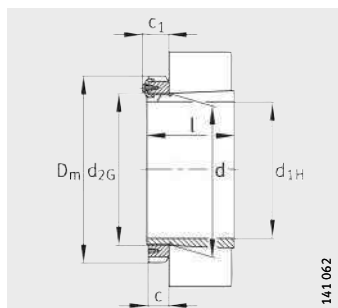
Hydraulic adapter sleeve  
(suffix HG)  
Mounting dimensions

Dimension table (continued) - Dimensions in mm													
Designation			Mass m ≈kg	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d <sub>1H</sub>	d	D <sub>m</sub>	l	c ≈	c <sub>1</sub> ≈	d <sub>2G</sub>	R <sub>0</sub>	e	t
<b>H3956</b>	HM3056	MS3056	15,6	<b>260</b>	280	330	121	38	49	Tr280X4	–	–	–
<b>H3956-HG</b>	HM3056	MS3056	15,6	<b>260</b>	280	330	121	38	49	Tr280X4	M6	4,2	7
<b>H3056</b>	HM3056	MS3056	18,5	<b>260</b>	280	330	152	38	49	Tr280X4	–	–	–
<b>H3056-HG</b>	HM3056	MS3056	18,5	<b>260</b>	280	330	152	38	49	Tr280X4	M6	4,2	7
<b>H24056</b>	HM3056	MS3056	20,9	<b>260</b>	280	330	195	38	49	Tr280X4	–	–	–
<b>H24056-HG</b>	HM3056	MS3056	20,9	<b>260</b>	280	330	195	38	49	Tr280X4	M6	4,2	7
<b>H3156X</b>	HM56T	MB56	26,4	<b>260</b>	280	350	195	39	–	Tr280X4	–	–	–
<b>H3156X-HG</b>	HM56T	MB56	26,4	<b>260</b>	280	350	195	39	–	Tr280X4	M6	4,2	7
<b>H2356X</b>	HM56T	MB56	29,8	<b>260</b>	280	350	224	39	–	Tr280X4	–	–	–
<b>H2356X-HG</b>	HM56T	MB56	29,8	<b>260</b>	280	350	224	39	–	Tr280X4	M6	4,2	7
<b>H24156</b>	HM56T	MB56	28	<b>260</b>	280	350	238	39	–	Tr280X4	–	–	–
<b>H24156-HG</b>	HM56T	MB56	28	<b>260</b>	280	350	238	39	–	Tr280X4	M6	4,2	7
<b>H3356</b>	HM56T	MB56	36	<b>260</b>	280	350	273	39	–	Tr280X4	–	–	–
<b>H3356-HG</b>	HM56T	MB56	36	<b>260</b>	280	350	273	39	–	Tr280X4	M6	4,2	7
<b>H3960</b>	HM3060	MS3060	20,9	<b>280</b>	300	360	140	42	53	Tr300X4	–	–	–
<b>H3960-HG</b>	HM3060	MS3060	20,9	<b>280</b>	300	360	140	42	53	Tr300X4	M6	4,2	7
<b>H3060</b>	HM3060	MS3060	23,8	<b>280</b>	300	360	168	42	53	Tr300X4	–	–	–
<b>H3060-HG</b>	HM3060	MS3060	23,8	<b>280</b>	300	360	168	42	53	Tr300X4	M6	4,2	7
<b>H24060</b>	HM3060	MS3060	26,9	<b>280</b>	300	360	220	42	53	Tr300X4	–	–	–
<b>H24060-HG</b>	HM3060	MS3060	26,9	<b>280</b>	300	360	220	42	53	Tr300X4	M6	4,2	7
<b>H3160</b>	HM3160	MS3160	30,6	<b>280</b>	300	380	208	40	53	Tr300X4	–	–	–
<b>H3160-HG</b>	HM3160	MS3160	30,6	<b>280</b>	300	380	208	40	53	Tr300X4	M6	4,2	7
<b>H3260</b>	HM3160	MS3160	34,7	<b>280</b>	300	380	240	40	53	Tr300X4	–	–	–
<b>H3260-HG</b>	HM3160	MS3160	34,7	<b>280</b>	300	380	240	40	53	Tr300X4	M6	4,2	7
<b>H24160</b>	HM3160	MS3160	32,7	<b>280</b>	300	380	258	40	53	Tr300X4	–	–	–
<b>H24160-HG</b>	HM3160	MS3160	32,7	<b>280</b>	300	380	258	40	53	Tr300X4	M6	4,2	7
<b>H3360</b>	HM3160	MS3160	40,8	<b>280</b>	300	380	284	40	53	Tr300X4	–	–	–
<b>H3360-HG</b>	HM3160	MS3160	40,8	<b>280</b>	300	380	284	40	53	Tr300X4	M6	4,2	7
<b>H3964-HG</b>	HM3064	MS3064	22	<b>300</b>	320	380	140	42	56	Tr320X5	M6	3,5	7
<b>H3064-HG</b>	HM3064	MS3064	25,4	<b>300</b>	320	380	171	42	56	Tr320X5	M6	3,5	7
<b>H24064-HG</b>	HM3064	MS3064	28,4	<b>300</b>	320	380	220	42	56	Tr320X5	M6	3,5	7
<b>H3164-HG</b>	HM3164	MS3164	35,4	<b>300</b>	320	400	226	42	56	Tr320X5	M6	3,5	7
<b>H3264-HG</b>	HM3164	MS3164	40	<b>300</b>	320	400	258	42	56	Tr320X5	M6	3,5	7
<b>H24164-HG</b>	HM3164	MS3164	37,4	<b>300</b>	320	400	278	42	56	Tr320X5	M6	3,5	7
<b>H3364-HG</b>	HM3164	MS3164	47,8	<b>300</b>	320	400	308	42	56	Tr320X5	M6	3,5	7

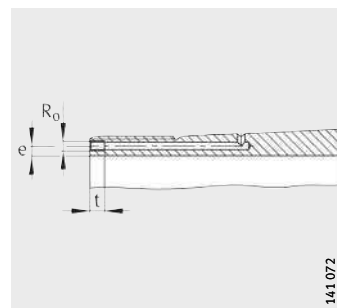


# Adapter sleeves

With nut and retainer



Taper 1:12  
(taper 1:30 for H240, H241)



Hydraulic adapter sleeve  
Mounting dimensions

Dimension table (continued) · Dimensions in mm														
Designation			Mass m ≈ kg	Dimensions								Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d <sub>1H</sub>	d	D <sub>m</sub>	l	c	c <sub>1</sub>	d <sub>2G</sub>	R <sub>0</sub>	e	t	
<b>H3968-HG</b>	HM3068	MS3064	24,8	<b>320</b>	340	400	144	45	57	Tr340X5	M6	3,5	7	
<b>H3068-HG</b>	HM3068	MS3064	30	<b>320</b>	340	400	187	45	57	Tr340X5	M6	3,5	7	
<b>H24068-HG</b>	HM3068	MS3064	33,8	<b>320</b>	340	400	244	45	57	Tr340X5	M6	3,5	7	
<b>H3168-HG</b>	HM3168	MS3168	50,1	<b>320</b>	340	440	254	55	70	Tr340X5	M6	3,5	7	
<b>H3268-HG</b>	HM3168	MS3168	55,4	<b>320</b>	340	440	288	55	70	Tr340X5	M6	3,5	7	
<b>H24168-HG</b>	HM3168	MS3168	53	<b>320</b>	340	440	317	55	70	Tr340X5	M6	3,5	7	
<b>H3368-HG</b>	HM3168	MS3168	63,6	<b>320</b>	340	440	336	55	70	Tr340X5	M6	3,5	7	
<b>H3972-HG</b>	HM3072	MS3072	25,9	<b>340</b>	360	420	144	45	57	Tr360X5	M6	3,5	7	
<b>H3072-HG</b>	HM3072	MS3072	31,6	<b>340</b>	360	420	188	45	57	Tr360X5	M6	3,5	7	
<b>H24072-HG</b>	HM3072	MS3072	35,5	<b>340</b>	360	420	244	45	57	Tr360X5	M6	3,5	7	
<b>H3172-HG</b>	HM3172	MS3168	54,3	<b>340</b>	360	460	259	58	73	Tr360X5	M6	3,5	7	
<b>H3272-HG</b>	HM3172	MS3168	61	<b>340</b>	360	460	299	58	73	Tr360X5	M6	3,5	7	
<b>H24172-HG</b>	HM3172	MS3168	57,1	<b>340</b>	360	460	321	58	73	Tr360X5	M6	3,5	7	
<b>H3372-HG</b>	HM3172	MS3168	71,8	<b>340</b>	360	460	357	58	73	Tr360X5	M6	3,5	7	
<b>H3976-HG</b>	HM3076	MS3076	32,1	<b>360</b>	380	450	164	48	62	Tr380X5	M6	3,5	7	
<b>H3076-HG</b>	HM3076	MS3076	36,2	<b>360</b>	380	450	193	48	62	Tr380X5	M6	3,5	7	
<b>H24076-HG</b>	HM3076	MS3076	40,1	<b>360</b>	380	450	248	48	62	Tr380X5	M6	3,5	7	
<b>H3176-HG</b>	HM3176	MS3176	62,4	<b>360</b>	380	490	264	60	75	Tr380X5	M6	3,5	7	
<b>H3276-HG</b>	HM3176	MS3176	70,7	<b>360</b>	380	490	310	60	75	Tr380X5	M6	3,5	7	
<b>H24176-HG</b>	HM3176	MS3176	64,9	<b>360</b>	380	490	323	60	75	Tr380X5	M6	3,5	7	
<b>H3376-HG</b>	HM3176	MS3176	82,8	<b>360</b>	380	490	370	60	75	Tr380X5	M6	3,5	7	
<b>H3980-HG</b>	HM3080	MS3076	35,4	<b>380</b>	400	470	168	52	66	Tr400X5	M6	3,5	7	
<b>H3080-HG</b>	HM3080	MS3076	41,7	<b>380</b>	400	470	210	52	66	Tr400X5	M6	3,5	7	
<b>H24080-HG</b>	HM3080	MS3076	46,4	<b>380</b>	400	470	272	52	66	Tr400X5	M6	3,5	7	
<b>H3180-HG</b>	HM3180	MS3180	71,3	<b>380</b>	400	520	272	62	81	Tr400X5	M6	3,5	7	
<b>H3280-HG</b>	HM3180	MS3180	82,1	<b>380</b>	400	520	328	62	81	Tr400X5	M6	3,5	7	
<b>H24180-HG</b>	HM3180	MS3180	73,8	<b>380</b>	400	520	332	62	81	Tr400X5	M6	3,5	7	
<b>H3380-HG</b>	HM3180	MS3180	93,4	<b>380</b>	400	520	380	62	81	Tr400X5	M6	3,5	7	
<b>H3984-HG</b>	HM3084	MS3084	36,9	<b>400</b>	420	490	168	52	66	Tr420X5	M6	3,5	7	
<b>H3084X-HG</b>	HM3084	MS3084	43,8	<b>400</b>	420	490	212	52	66	Tr420X5	M6	3,5	7	
<b>H24084-HG</b>	HM3084	MS3084	48,6	<b>400</b>	420	490	274	52	66	Tr420X5	M6	3,5	7	
<b>H3184-HG</b>	HM3184	MS3180	85,1	<b>400</b>	420	540	304	70	89	Tr420X5	M6	3,5	7	
<b>H3284-HG</b>	HM3184	MS3180	95,3	<b>400</b>	420	540	352	70	89	Tr420X5	M6	3,5	7	
<b>H24184-HG</b>	HM3184	MS3180	87,8	<b>400</b>	420	540	372	70	89	Tr420X5	M6	3,5	7	
<b>H3384-HG</b>	HM3184	MS3180	105	<b>400</b>	420	540	395	70	89	Tr420X5	M6	3,5	7	

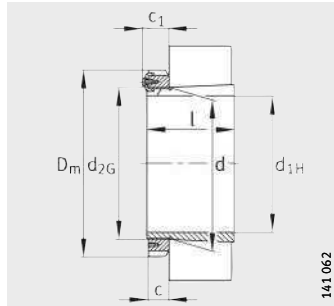
**Dimension table (continued) - Dimensions in mm**

Designation			Mass	Dimensions								Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer	m ≈kg	d <sub>1H</sub>	d	D <sub>m</sub>	l	c ≈	c <sub>1</sub> ≈	d <sub>2G</sub>	R <sub>0</sub>	e	t	
<b>H3988-HG</b>	HM3088	MS3088	59	<b>410</b>	440	520	189	60	75	Tr440X5	M8	6,5	12	
<b>H3088-HG</b>	HM3088	MS3088	67,7	<b>410</b>	440	520	228	60	75	Tr440X5	M8	6,5	12	
<b>H24088-HG</b>	HM3088	MS3088	76,4	<b>410</b>	440	520	294	60	75	Tr440X5	M8	6,5	12	
<b>H3188-HG</b>	HM3188	MS3188	105	<b>410</b>	440	560	307	70	89	Tr440X5	M8	6,5	12	
<b>H3288-HG</b>	HM3188	MS3188	120	<b>410</b>	440	560	361	70	89	Tr440X5	M8	6,5	12	
<b>H24188-HG</b>	HM3188	MS3188	111	<b>410</b>	440	560	372	70	89	Tr440X5	M8	6,5	12	
<b>H3388-HG</b>	HM3188	MS3188	140	<b>410</b>	440	560	426	70	89	Tr440X5	M8	6,5	12	
<b>H3992-HG</b>	HM3092	MS3088	61,4	<b>430</b>	460	540	189	60	75	Tr460X5	M8	6,5	12	
<b>H3092-HG</b>	HM3092	MS3088	71,8	<b>430</b>	460	540	234	60	75	Tr460X5	M8	6,5	12	
<b>H24092-HG</b>	HM3092	MS3088	80,8	<b>430</b>	460	540	300	60	75	Tr460X5	M8	6,5	12	
<b>H3192-HG</b>	HM3192	MS3188	118	<b>430</b>	460	580	326	75	94	Tr460X5	M8	6,5	12	
<b>H3292-HG</b>	HM3192	MS3188	134	<b>430</b>	460	580	382	75	94	Tr460X5	M8	6,5	12	
<b>H24192-HG</b>	HM3192	MS3188	124	<b>430</b>	460	580	398	75	94	Tr460X5	M8	6,5	12	
<b>H3392-HG</b>	HM3192	MS3188	157	<b>430</b>	460	580	451	75	94	Tr460X5	M8	6,5	12	
<b>H3996-HG</b>	HM3096	MS3096	66,8	<b>450</b>	480	560	200	60	75	Tr480X5	M8	6,5	12	
<b>H3096-HG</b>	HM3096	MS3096	75,9	<b>450</b>	480	560	237	60	75	Tr480X5	M8	6,5	12	
<b>H24096-HG</b>	HM3096	MS3096	84,7	<b>450</b>	480	560	301	60	75	Tr480X5	M8	6,5	12	
<b>H3196-HG</b>	HM3196	MS3196	135	<b>450</b>	480	620	335	75	94	Tr480X5	M8	6,5	12	
<b>H3296-HG</b>	HM3196	MS3196	155	<b>450</b>	480	620	397	75	94	Tr480X5	M8	6,5	12	
<b>H24196-HG</b>	HM3196	MS3196	142	<b>450</b>	480	620	408	75	94	Tr480X5	M8	6,5	12	
<b>H3396-HG</b>	HM3196	MS3196	177	<b>450</b>	480	620	462	75	94	Tr480X5	M8	6,5	12	
<b>H39/500-HG</b>	HM30/500	MS3096	75,2	<b>470</b>	500	580	208	68	83	Tr500X5	M8	6,5	12	
<b>H30/500-HG</b>	HM30/500	MS3096	85,2	<b>470</b>	500	580	247	68	83	Tr500X5	M8	6,5	12	
<b>H240/500-HG</b>	HM30/500	MS3096	93,8	<b>470</b>	500	580	309	68	83	Tr500X5	M8	6,5	12	
<b>H31/500-HG</b>	HM31/500	MS31/500	145	<b>470</b>	500	630	356	80	99	Tr500X5	M8	6,5	12	
<b>H32/500-HG</b>	HM31/500	MS31/500	170	<b>470</b>	500	630	428	80	99	Tr500X5	M8	6,5	12	
<b>H241/500-HG</b>	HM31/500	MS31/500	151	<b>470</b>	500	630	430	80	99	Tr500X5	M8	6,5	12	
<b>H33/500-HG</b>	HM31/500	MS31/500	189	<b>470</b>	500	630	480	80	99	Tr500X5	M8	6,5	12	
<b>H39/530-HG</b>	HM30/530	MS30/530	89	<b>500</b>	530	630	216	68	89	Tr530X6	M8	6	12	
<b>H30/530-HG</b>	HM30/530	MS30/530	103	<b>500</b>	530	630	265	68	89	Tr530X6	M8	6	12	
<b>H240/530-HG</b>	HM30/530	MS30/530	115	<b>500</b>	530	630	343	68	89	Tr530X6	M8	6	12	
<b>H31/530-HG</b>	HM31/530	MS31/530	161	<b>500</b>	530	670	364	80	102	Tr530X6	M8	6	12	
<b>H241/530-HG</b>	HM31/530	MS31/530	167	<b>500</b>	530	670	440	80	102	Tr530X6	M8	6	12	
<b>H32/530-HG</b>	HM31/530	MS31/530	192	<b>500</b>	530	670	447	80	102	Tr530X6	M8	6	12	
<b>H33/530-HG</b>	HM31/530	MS31/530	215	<b>500</b>	530	670	504	80	102	Tr530X5	M8	6	12	

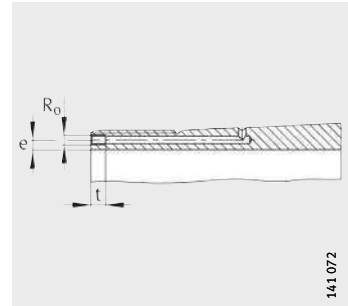


# Adapter sleeves

With nut and retainer



Taper 1:12  
(taper 1:30 for H240, H241)



Hydraulic adapter sleeve  
Mounting dimensions

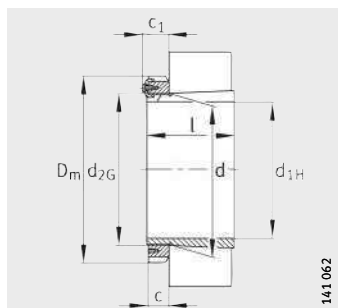
Dimension table (continued) · Dimensions in mm													
Designation			Mass m ≈kg	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d <sub>1H</sub>	d	D <sub>m</sub>	l	c ≈	c <sub>1</sub> ≈	d <sub>2G</sub>	R <sub>0</sub>	e	t
<b>H39/560-HG</b>	HM30/560	MS30/560	95,6	<b>530</b>	560	650	227	75	96	Tr560X6	M8	6	12
<b>H30/560-HG</b>	HM30/560	MS30/560	112	<b>530</b>	560	650	282	75	96	Tr560X6	M8	6	12
<b>H240/560-HG</b>	HM30/560	MS30/560	124	<b>530</b>	560	650	358	75	96	Tr560X6	M8	6	12
<b>H31/560-HG</b>	HM31/560	MS31/560	184	<b>530</b>	560	710	377	85	107	Tr560X6	M8	6	12
<b>H32/560-HG</b>	HM31/560	MS31/560	218	<b>530</b>	560	710	462	85	107	Tr560X6	M8	6	12
<b>H241/560-HG</b>	HM31/560	MS31/560	195	<b>530</b>	560	710	468	85	107	Tr560X6	M8	6	12
<b>H33/560-HG</b>	HM31/560	MS31/560	250	<b>530</b>	560	710	535	85	107	Tr560X6	M8	6	12
<b>H39/600-HG</b>	HM30/600	MS30/530	129	<b>560</b>	600	700	239	75	96	Tr600X6	G1/8	8	12
<b>H30/600-HG</b>	HM30/600	MS30/530	149	<b>560</b>	600	700	289	75	96	Tr600X6	G1/8	8	12
<b>H240/600-HG</b>	HM30/600	MS30/530	171	<b>560</b>	600	700	377	75	96	Tr600X6	G1/8	8	12
<b>H31/600-HG</b>	HM31/600	MS31/560	234	<b>560</b>	600	750	399	85	107	Tr600X6	G1/8	8	12
<b>H32/600-HG</b>	HM31/600	MS31/560	279	<b>560</b>	600	750	487	85	107	Tr600X6	G1/8	8	12
<b>H241/600-HG</b>	HM31/600	MS31/560	249	<b>560</b>	600	750	490	85	107	Tr600X6	G1/8	8	12
<b>H33/600-HG</b>	HM31/600	MS31/560	320	<b>560</b>	600	750	561	85	107	Tr600X6	G1/8	8	12
<b>H39/630-HG</b>	HM30/630	MS30/630	123	<b>600</b>	630	730	254	75	96	Tr630X6	M8	6	12
<b>H30/630-HG</b>	HM30/630	MS30/630	139	<b>600</b>	630	730	301	75	96	Tr630X6	M8	6	12
<b>H240/630-HG</b>	HM30/630	MS30/630	157	<b>600</b>	630	730	395	75	96	Tr630X6	M8	6	12
<b>H31/630-HG</b>	HM31/630	MS31/630	251	<b>600</b>	630	800	424	95	117	Tr630X6	M8	6	12
<b>H32/630-HG</b>	HM31/630	MS31/630	297	<b>600</b>	630	800	521	95	117	Tr630X6	M8	6	12
<b>H241/630-HG</b>	HM31/630	MS31/630	263	<b>600</b>	630	800	525	95	117	Tr630X6	M8	6	12
<b>H33/630-HG</b>	HM31/630	MS31/630	338	<b>600</b>	630	800	597	95	117	Tr630X6	M8	6	12
<b>H39/670-HG</b>	HM30/670	MS30/670	166	<b>630</b>	670	780	264	80	101	Tr670X6	G1/8	8	12
<b>H30/670-HG</b>	HM30/670	MS30/670	194	<b>630</b>	670	780	324	80	101	Tr670X6	G1/8	8	12
<b>H240/670-HG</b>	HM30/670	MS30/670	218	<b>630</b>	670	780	418	80	101	Tr670X6	G1/8	8	12
<b>H31/670-HG</b>	HM31/670	MS31/670	341	<b>630</b>	670	850	456	106	128	Tr670X6	G1/8	8	12
<b>H241/670-HG</b>	HM31/670	MS31/670	355	<b>630</b>	670	850	548	106	128	Tr670X6	G1/8	8	12
<b>H32/670-HG</b>	HM31/670	MS31/670	402	<b>630</b>	670	850	558	106	128	Tr670X6	G1/8	8	12
<b>H33/670-HG</b>	HM31/670	MS31/670	453	<b>630</b>	670	850	635	106	128	Tr670X6	G1/8	8	12
<b>H39/710-HG</b>	HM30/710	MS30/710	200	<b>670</b>	710	830	286	90	111	Tr710X7	G1/8	8	12
<b>H30/710-HG</b>	HM30/710	MS30/710	228	<b>670</b>	710	830	342	90	111	Tr710X7	G1/8	8	12
<b>H240/710-HG</b>	HM30/710	MS30/710	254	<b>670</b>	710	830	438	90	111	Tr710X7	G1/8	8	12
<b>H31/710-HG</b>	HM31/710	MS31/710	376	<b>670</b>	710	900	467	106	131	Tr710X7	G1/8	8	12
<b>H32/710-HG</b>	HM31/710	MS31/710	444	<b>670</b>	710	900	572	106	131	Tr710X7	G1/8	8	12
<b>H241/710-HG</b>	HM31/710	MS31/710	397	<b>670</b>	710	900	577	106	131	Tr710X7	G1/8	8	12
<b>H33/710-HG</b>	HM31/710	MS31/710	501	<b>670</b>	710	900	652	106	131	Tr710X7	G1/8	8	12

Dimension table (continued) - Dimensions in mm													
Designation			Mass m ≈kg	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d <sub>1H</sub>	d	D <sub>m</sub>	l	c ≈	c <sub>1</sub> ≈	d <sub>2G</sub>	R <sub>0</sub>	e	t
<b>H39/750-HG</b>	HM30/750	MS30/750	213	<b>710</b>	750	870	291	90	111	Tr750X7	G1/8	8	12
<b>H30/750-HG</b>	HM30/750	MS30/750	248	<b>710</b>	750	870	356	90	111	Tr750X7	G1/8	8	12
<b>H240/750-HG</b>	HM30/750	MS30/750	278	<b>710</b>	750	870	460	90	111	Tr750X7	G1/8	8	12
<b>H31/750-HG</b>	HM31/750	MS31/750	432	<b>710</b>	750	950	493	112	137	Tr750X7	G1/8	8	12
<b>H32/750-HG</b>	HM31/750	MS31/750	508	<b>710</b>	750	950	603	112	137	Tr750X7	G1/8	8	12
<b>H241/750-HG</b>	HM31/750	MS31/750	461	<b>710</b>	750	950	622	112	137	Tr750X7	G1/8	8	12
<b>H33/750-HG</b>	HM31/750	MS31/750	574	<b>710</b>	750	950	688	112	137	Tr750X7	G1/8	8	12
<b>H39/800-HG</b>	HM30/800	MS30/750	263	<b>750</b>	800	920	303	90	111	Tr800X7	G1/8	10	12
<b>H30/800-HG</b>	HM30/800	MS30/750	305	<b>750</b>	800	920	366	90	111	Tr800X7	G1/8	10	12
<b>H240/800-HG</b>	HM30/800	MS30/750	349	<b>750</b>	800	920	475	90	111	Tr800X7	G1/8	10	12
<b>H31/800-HG</b>	HM31/800	MS31/750	515	<b>750</b>	800	1000	505	112	137	Tr800X7	G1/8	10	12
<b>H32/800-HG</b>	HM31/800	MS31/750	611	<b>750</b>	800	1000	618	112	137	Tr800X7	G1/8	10	12
<b>H241/800-HG</b>	HM31/800	MS31/750	552	<b>750</b>	800	1000	627	112	137	Tr800X7	G1/8	10	12
<b>H33/800-HG</b>	HM31/800	MS31/750	716	<b>750</b>	800	1000	730	112	137	Tr800X7	G1/8	10	12
<b>H39/850-HG</b>	HM30/850	MS30/850	292	<b>800</b>	850	980	308	90	115	Tr850X7	G1/8	10	12
<b>H30/850-HG</b>	HM30/850	MS30/850	344	<b>800</b>	850	980	380	90	115	Tr850X7	G1/8	10	12
<b>H240/850-HG</b>	HM30/850	MS30/850	393	<b>800</b>	850	980	495	90	115	Tr850X7	G1/8	10	12
<b>H31/850-HG</b>	HM31/850	MS31/850	590	<b>800</b>	850	1060	536	118	143	Tr850X7	G1/8	10	12
<b>H32/850-HG</b>	HM31/850	MS31/850	696	<b>800</b>	850	1060	651	118	143	Tr850X7	G1/8	10	12
<b>H241/850-HG</b>	HM31/850	MS31/850	624	<b>800</b>	850	1060	658	118	143	Tr850X7	G1/8	10	12
<b>H33/850-HG</b>	HM31/850	MS31/850	814	<b>800</b>	850	1060	766	118	143	Tr850X7	G1/8	10	12
<b>H39/900-HG</b>	HM30/900	MS30/850	335	<b>850</b>	900	1030	326	100	122	Tr900X7	G1/8	10	12
<b>H30/900-HG</b>	HM30/900	MS30/850	392	<b>850</b>	900	1030	400	100	122	Tr900X7	G1/8	10	12
<b>H240/900-HG</b>	HM30/900	MS30/850	446	<b>850</b>	900	1030	520	100	122	Tr900X7	G1/8	10	12
<b>H31/900-HG</b>	HM31/900	MS31/900	674	<b>850</b>	900	1120	557	125	150	Tr900X7	G1/8	10	12
<b>H32/900-HG</b>	HM31/900	MS31/900	775	<b>850</b>	900	1120	660	125	150	Tr900X7	G1/8	10	12
<b>H241/900-HG</b>	HM31/900	MS31/900	712	<b>850</b>	900	1120	685	125	150	Tr900X7	G1/8	10	12
<b>H33/900-HG</b>	HM31/900	MS31/900	923	<b>850</b>	900	1120	795	125	150	Tr900X7	G1/8	10	12
<b>H39/950-HG</b>	HM30/950	MS30/950	369	<b>900</b>	950	1080	344	100	122	Tr950X8	G1/8	10	12
<b>H30/950-HG</b>	HM30/950	MS30/950	432	<b>900</b>	950	1080	420	100	122	Tr950X8	G1/8	10	12
<b>H240/950-HG</b>	HM30/950	MS30/950	499	<b>900</b>	950	1080	557	100	122	Tr950X8	G1/8	10	12
<b>H31/950-HG</b>	HM31/950	MS31/950	738	<b>900</b>	950	1170	583	125	150	Tr950X8	G1/8	10	12
<b>H32/950-HG</b>	HM31/950	MS31/950	835	<b>900</b>	950	1170	675	125	150	Tr950X8	G1/8	10	12
<b>H241/950-HG</b>	HM31/950	MS31/950	776	<b>900</b>	950	1170	715	125	150	Tr950X8	G1/8	10	12
<b>H33/950-HG</b>	HM31/950	MS31/950	1000	<b>900</b>	950	1170	815	125	150	Tr950X8	G1/8	10	12

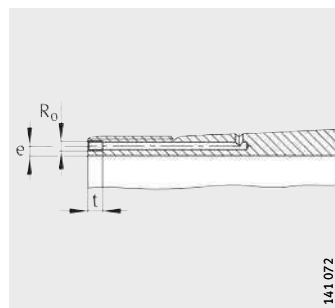


# Adapter sleeves

With nut and retainer



Taper 1:12  
(taper 1:30 for H240, H241)



Hydraulic adapter sleeve  
Mounting dimensions

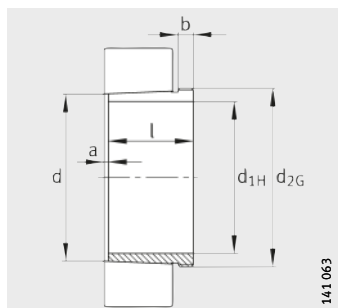
Dimension table (continued) · Dimensions in mm													
Designation			Mass m ≈ kg	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d <sub>1H</sub>	d	D <sub>m</sub>	l	c ≈	c <sub>1</sub> ≈	d <sub>2G</sub>	R <sub>0</sub>	e	t
<b>H39/1000-HG</b>	HM30/1000	MS30/1000	410	<b>950</b>	1 000	1 140	358	100	122	Tr1000X8	G1/8	10	12
<b>H30/1000-HG</b>	HM30/1000	MS30/1000	474	<b>950</b>	1 000	1 140	430	100	122	Tr1000X8	G1/8	10	12
<b>H240/1000-HG</b>	HM30/1000	MS30/1000	539	<b>950</b>	1 000	1 140	562	100	122	Tr1000X8	G1/8	10	12
<b>H31/1000-HG</b>	HM31/1000	MS31/1000	840	<b>950</b>	1 000	1 240	609	125	150	Tr1000X8	G1/8	10	12
<b>H32/1000-HG</b>	HM31/1000	MS31/1000	952	<b>950</b>	1 000	1 240	707	125	150	Tr1000X8	G1/8	10	12
<b>H241/1000-HG</b>	HM31/1000	MS31/1000	886	<b>950</b>	1 000	1 240	755	125	150	Tr1000X8	G1/8	10	12
<b>H33/1000-HG</b>	HM31/1000	MS31/1000	1 144	<b>950</b>	1 000	1 240	857	125	150	Tr1000X8	G1/8	10	12
<b>H39/1060-HG</b>	HM30/1060	MS30/1000	493	<b>1 000</b>	1 060	1 200	372	100	122	Tr1060X8	G1/4	12	15
<b>H30/1060-HG</b>	HM30/1060	MS30/1000	574	<b>1 000</b>	1 060	1 200	447	100	122	Tr1060X8	G1/4	12	15
<b>H240/1060-HG</b>	HM30/1060	MS30/1000	665	<b>1 000</b>	1 060	1 200	588	100	122	Tr1060X8	G1/4	12	15
<b>H31/1060-HG</b>	HM31/1060	MS31/1000	985	<b>1 000</b>	1 060	1 300	622	125	150	Tr1060X8	G1/4	12	15
<b>H241/1060-HG</b>	HM31/1060	MS31/1000	1 056	<b>1 000</b>	1 060	1 300	775	125	150	Tr1060X8	G1/4	12	15
<b>H39/1120-HG</b>	HM30/1120	MS30/1000	521	<b>1 060</b>	1 120	1 260	372	100	122	Tr1120X8	G1/4	12	15
<b>H30/1120-HG</b>	HM30/1120	MS30/1000	631	<b>1 060</b>	1 120	1 260	467	100	122	Tr1120X8	G1/4	12	15
<b>H240/1120-HG</b>	HM30/1120	MS30/1000	728	<b>1 060</b>	1 120	1 260	612	100	122	Tr1120X8	G1/4	12	15
<b>H31/1120-HG</b>	HM31/1120	MS31/1000	1 060	<b>1 060</b>	1 120	1 360	622	125	150	Tr1120X8	G1/4	12	15
<b>H241/1120-HG</b>	HM31/1120	MS31/1000	1 168	<b>1 060</b>	1 120	1 360	805	125	150	Tr1120X8	G1/4	13	15
<b>H39/1180-HG</b>	HM30/1180	MS30/1000	576	<b>1 120</b>	1 180	1 320	394	100	122	Tr1180X8	G1/4	12	15
<b>H30/1180-HG</b>	HM30/1180	MS30/1000	682	<b>1 120</b>	1 180	1 320	479	100	122	Tr1180X8	G1/4	12	15
<b>H240/1180-HG</b>	HM30/1180	MS30/1000	782	<b>1 120</b>	1 180	1 320	625	100	122	Tr1180X8	G1/4	12	15
<b>H31/1180-HG</b>	HM31/1180	MS31/1000	1 163	<b>1 120</b>	1 180	1 420	647	125	150	Tr1180X8	G1/4	12	15
<b>H241/1180-HG</b>	HM31/1180	MS31/1000	1 287	<b>1 120</b>	1 180	1 420	845	125	150	Tr1180X8	G1/4	13	15
<b>H39/1250-HG</b>	HM30/1250	MS30/1000	708	<b>1 180</b>	1 250	1 390	407	110	132	Tr1250X8	G1/4	14	15
<b>H30/1250-HG</b>	HM30/1250	MS30/1000	858	<b>1 180</b>	1 250	1 390	509	110	132	Tr1250X8	G1/4	15	15
<b>H240/1250-HG</b>	HM30/1250	MS30/1000	988	<b>1 180</b>	1 250	1 390	660	110	132	Tr1250X8	G1/4	14	15
<b>H31/1250-HG</b>	HM31/1250	MS31/1000	1 377	<b>1 180</b>	1 250	1 490	677	125	150	Tr1250X8	G1/4	14	15
<b>H241/1250-HG</b>	HM31/1250	MS31/1000	1 542	<b>1 180</b>	1 250	1 490	885	125	150	Tr1250X8	G1/4	14	15
<b>H39/1320-HG</b>	HM30/1320	MS30/1000	781	<b>1 250</b>	1 320	1 460	430	110	132	Tr1320X8	G1/4	14	15
<b>H30/1320-HG</b>	HM30/1320	MS30/1000	946	<b>1 250</b>	1 320	1 460	534	110	132	Tr1320X8	G1/4	15	15
<b>H240/1320-HG</b>	HM30/1320	MS30/1000	1 085	<b>1 250</b>	1 320	1 460	690	110	132	Tr1320X8	G1/4	14	15
<b>H31/1320-HG</b>	HM31/1320	MS31/1000	1 515	<b>1 250</b>	1 320	1 560	710	125	150	Tr1320X8	G1/4	14	15
<b>H241/1320-HG</b>	HM31/1320	MS31/1000	1 703	<b>1 250</b>	1 320	1 560	935	125	150	Tr1320X8	G1/4	14	15

**Dimension table** (continued) - Dimensions in mm

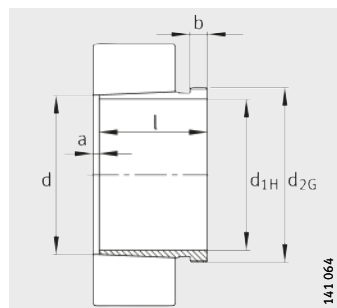
Designation			Mass m ≈kg	Dimensions							Mounting dimensions		
Adapter sleeve Complete	Nut	Retainer		d <sub>1H</sub>	d	D <sub>m</sub>	l	c ≈	c <sub>1</sub> ≈	d <sub>2G</sub>	R <sub>0</sub>	e	t
<b>H39/1400-HG</b>	HM30/1400	MS30/1000	924	<b>1 320</b>	1 400	1 540	445	110	132	Tr1400X8	G1/4	15	15
<b>H30/1400-HG</b>	HM30/1400	MS30/1000	1 113	<b>1 320</b>	1 400	1 540	546	110	132	Tr1400X8	G1/4	15	15
<b>H240/1400-HG</b>	HM30/1400	MS30/1000	1 287	<b>1 320</b>	1 400	1 540	705	110	132	Tr1400X8	G1/4	14	15
<b>H31/1400-HG</b>	HM31/1400	MS31/1000	1 792	<b>1 320</b>	1 400	1 640	735	130	155	Tr1400X8	G1/4	15	15
<b>H241/1400-HG</b>	HM31/1400	MS31/1000	2 030	<b>1 320</b>	1 400	1 640	965	130	155	Tr1400X8	G1/4	15	15
<b>H39/1500-HG</b>	HM30/1500	MS30/1500	1 210	<b>1 400</b>	1 500	1 650	465	110	132	Tr1500X8	G1/4	15	15
<b>H30/1500-HG</b>	HM30/1500	MS30/1500	1 534	<b>1 400</b>	1 500	1 650	600	110	132	Tr1500X8	G1/4	15	15
<b>H240/1500-HG</b>	HM30/1500	MS30/1500	1 791	<b>1 400</b>	1 500	1 650	775	110	132	Tr1500X8	G1/4	14	15
<b>H31/1500-HG</b>	HM31/1500	MS31/1000	2 227	<b>1 400</b>	1 500	1 740	755	130	155	Tr1500X8	G1/4	15	15
<b>H241/1500-HG</b>	HM31/1500	MS31/1000	2 564	<b>1 400</b>	1 500	1 740	990	130	155	Tr1500X8	G1/4	15	15
<b>H39/1600-HG</b>	MU-195 077A	MS30/850	2 481	<b>1 500</b>	1 600	1 730	465	100	112	Tr1600X8	G1/4	15	15
<b>H39/1700-HG</b>	MU-195 078A	MS30/850	2 619	<b>1 600</b>	1 700	1 830	475	100	112	Tr1700X8	G1/4	15	15



# Withdrawal sleeves



Taper 1:12



AH240, AH241  
Taper 1:30

**Dimension table** - Dimensions in mm

Designation	Mass m ≈kg	Dimensions					
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>
AH208	0,08	35	40	25	2	6	M45X1,5
AH308	0,09	35	40	29	3	6	M45X1,5
AH2308	0,13	35	40	40	3	7	M45X1,5
AH3308	0,15	35	40	44	3	7	M45X1,5
AH209	0,09	40	45	26	3	6	M50X1,5
AH309	0,11	40	45	31	3	6	M50X1,5
AH2309	0,17	40	45	44	3	7	M50X1,5
AH3309	0,18	40	45	47	3	7	M50X1,5
AH210	0,12	45	50	28	3	7	M55X2
AHX310	0,14	45	50	35	3	7	M55X2
AHX2310	0,22	45	50	50	3	9	M55X2
AH3310	0,24	45	50	54	3	9	M55X2
AH211	0,13	50	55	29	3	7	M60X2
AHX311	0,17	50	55	37	3	7	M60X2
AHX2311	0,26	50	55	54	3	10	M60X2
AH3311	0,3	50	55	60	3	10	M60X2
AH212	0,16	55	60	32	3	8	M65X2
AHX312	0,2	55	60	40	3	8	M65X2
AHX2312	0,32	55	60	58	3	11	M65X2
AH3312	0,41	55	60	65	3	11	M70X2
AH213	0,21	60	65	32,5	3,5	8	M75X2
AH213G	0,18	60	65	32,5	3,5	8	M70X2
AH313	0,27	60	65	42	3	8	M75X2
AH313G	0,23	60	65	42	3	8	M70X2
AH2313	0,42	60	65	61	3	12	M75X2
AH2313G	0,36	60	65	61	3	12	M70X2
AH3313	0,49	60	65	71	3	12	M75X2
AH214	0,23	65	70	33,5	3,5	8	M80X2
AH214G	0,2	65	70	33,5	3,5	8	M75X2
AH314	0,29	65	70	43	4	8	M80X2
AH314G	0,26	65	70	43	4	8	M75X2
AHX2314	0,47	65	70	64	4	12	M80X2
AHX2314G	0,42	65	70	64	4	12	M75X2
AH3314	0,57	65	70	76	4	12	M80X2

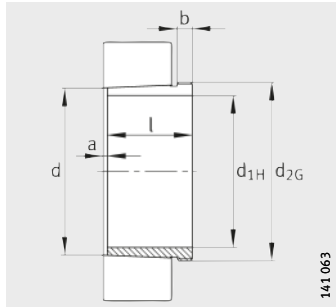


**Dimension table (continued) - Dimensions in mm**

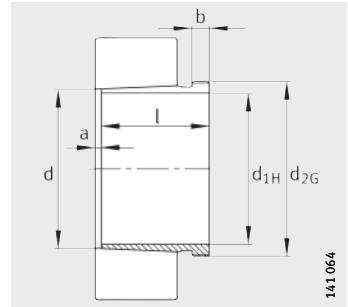
Designation	Mass m ≈kg	Dimensions					
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>
AH215	0,26	70	75	34,5	3,5	8	M85X2
AH215G	0,22	70	75	34,5	3,5	8	M80X2
AH315	0,33	70	75	45	4	8	M85X2
AH315G	0,29	70	75	45	4	8	M80X2
AHX2315	0,54	70	75	68	4	12	M85X2
AHX2315G	0,48	70	75	68	4	12	M80X2
AH3315	0,66	70	75	81	4	12	M85X2
AH216	0,28	75	80	35,5	3,5	8	M90X2
AH316	0,38	75	80	48	4	8	M90X2
AHX2316	0,61	75	80	71	4	12	M90X2
AH3316	0,71	75	80	81	4	12	M90X2
AH217	0,33	80	85	38,5	3,5	9	M95X2
AHX317	0,44	80	85	52	4	9	M95X2
AH3217	0,52	80	85	60	4	10	M95X2
AHX2317	0,68	80	85	74	4	13	M95X2
AH3317	0,81	80	85	86	4	13	M95X2
AH218	0,36	85	90	40	4	9	M100X2
AHX318	0,48	85	90	53	4	9	M100X2
AHX3218	0,58	85	90	63	4	10	M100X2
AHX2318	0,78	85	90	79	4	14	M100X2
AH3318	0,88	85	90	87	4	14	M100X2
AH219	0,42	90	95	43	4	10	M105X2
AHX319	0,55	90	95	57	4	10	M105X2
AHX3219	0,67	90	95	67	4	11	M105X2
AHX2319	0,91	90	95	85	4	16	M105X2
AH3319	1,03	90	95	94	4	16	M105X2
AH220	0,46	95	100	45	4	10	M110X2
AHX320	0,6	95	100	59	4	10	M110X2
AH24020	0,5	95	100	62	9	12	M105X2
AHX3120	0,67	95	100	64	4	11	M110X2
AHX3220	0,78	95	100	73	4	11	M110X2
AH24120	0,63	95	100	78	9	13	M105X2
AHX2320	1,03	95	100	90	4	16	M110X2
AH3320	1,16	95	100	99	4	16	M110X2



# Withdrawal sleeves



Taper 1:12



AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

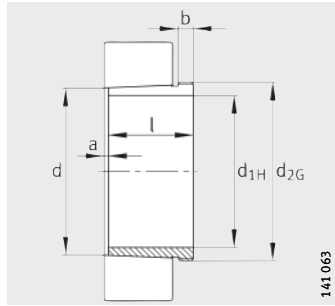
Designation	Mass m ≈kg	Dimensions					
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>
AH222	0,57	105	110	50	4	11	M120X2
AHX322	0,73	105	110	63	4	12	M120X2
AHX3122	0,79	105	110	68	4	11	M120X2
AH24022	0,65	105	110	73	9	13	M115X2
AH24122	0,73	105	110	82	9	13	M115X2
AHX3222A	0,98	105	110	82	4	11	M120X2
AHX2322	1,38	105	110	98	4	16	M125X2
AHX2322G	1,26	105	110	98	4	16	M120X2
AH3322	1,54	105	110	108	4	16	M125X2
AH224	0,67	115	120	53	4	12	M130X2
AHX3024	0,77	115	120	60	4	13	M130X2
AHX324	0,89	115	120	69	4	13	M130X2
AH24024	0,71	115	120	73	9	13	M125X2
AHX3124	0,97	115	120	75	4	12	M130X2
AHX3224A	1,22	115	120	90	4	13	M130X2
AH24124	1,02	115	120	93	9	13	M130X2
AHX2324	1,64	115	120	105	4	17	M135X2
AHX2324G	1,5	115	120	105	4	17	M130X2
AH3324	1,99	115	120	123	4	17	M135X2
AH226	0,72	125	130	53	4	12	M140X2
AHX3026	0,94	125	130	67	4	14	M140X2
AHX326	1,05	125	130	74	4	14	M140X2
AHX3126	1,1	125	130	78	4	12	M140X2
AH24026	0,89	125	130	83	10	14	M135X2
AH24126	1,13	125	130	94	10	14	M140X2
AHX3226	1,61	125	130	98	4	15	M145X2
AHX3226G	1,48	125	130	98	4	15	M140X2
AHX2326	2	125	130	115	4	19	M145X2
AHX2326G	1,84	125	130	115	4	19	M140X2
AH3326	2,36	125	130	131	4	19	M145X2

**Dimension table** (continued) - Dimensions in mm

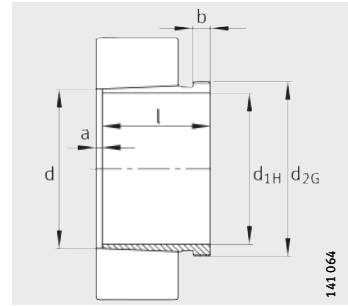
Designation	Mass m ≈kg	Dimensions					
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>
AH228	0,83	135	140	56	5	13	M150X2
AHX3028	1,03	135	140	68	5	14	M150X2
AHX328	1,18	135	140	77	5	14	M150X2
AH24028	0,96	135	140	83	10	14	M145X2
AHX3128	1,29	135	140	83	5	14	M150X2
AH24128	1,29	135	140	99	10	14	M150X2
AHX3228	1,86	135	140	104	5	15	M155X3
AHX3228G	1,72	135	140	104	5	15	M150X2
AHX2328	2,4	135	140	125	5	20	M155X3
AHX2328G	2,21	135	140	125	5	20	M150X2
AH3328	2,72	135	140	138	5	20	M155X3
AH230	0,97	145	150	60	5	14	M160X3
AHX3030	1,18	145	150	72	5	15	M160X3
AHX330	1,54	145	150	83	5	15	M165X3
AHX330G	1,39	145	150	83	5	15	M160X3
AH24030	1,12	145	150	90	11	15	M155X3
AHX3130	1,81	145	150	96	5	15	M165X3
AHX3130G	1,66	145	150	96	5	15	M160X3
AHX3230	2,25	145	150	114	5	17	M165X3
AHX3230G	2,09	145	150	114	5	17	M160X3
AH24130	1,63	145	150	115	11	15	M160X3
AHX2330	2,88	145	150	135	5	24	M165X3
AHX2330G	2,64	145	150	135	5	24	M160X3
AH3330	3,36	145	150	152	5	24	M165X3



# Withdrawal sleeves



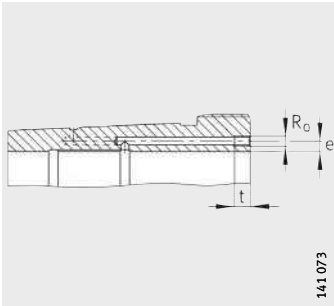
Taper 1:12



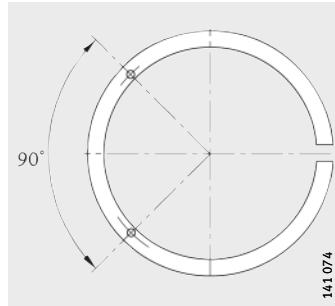
AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH232	1,71	150	160	64	5	15	M170X3	–	–	–
AH3032	2,09	150	160	77	5	16	M170X3	–	–	–
AH3032-H	2,09	150	160	77	5	16	M170X3	M6	4,2	7
AH332	2,76	150	160	88	5	16	M180X3	–	–	–
AH332G	2,42	150	160	88	5	16	M170X3	–	–	–
AH24032	2,31	150	160	95	11	15	M170X3	–	–	–
AH3132A	2,9	150	160	103	5	16	M170X3	–	–	–
AH3132A-H	2,9	150	160	103	5	16	M170X3	M6	4,5	7
AH24132	3,04	150	160	124	11	15	M170X3	–	–	–
AH3232	4,08	150	160	124	6	20	M180X3	–	–	–
AH3232G	3,65	150	160	124	6	20	M170X3	–	–	–
AH3232G-H	3,65	150	160	124	6	20	M170X3	M6	4,5	7
AH3232-H	4,08	150	160	124	6	20	M180X3	M6	4,5	7
AH2332	4,77	150	160	140	6	24	M180X3	–	–	–
AH2332G	4,26	150	160	140	6	24	M170X3	–	–	–
AH2332G-H	4,26	150	160	140	6	24	M170X3	M6	4,5	7
AH2332-H	4,77	150	160	140	6	24	M180X3	M6	4,5	7
AH3332	5,58	150	160	160	6	24	M180X3	–	–	–
AH3332-H	5,58	150	160	160	6	24	M180X3	M6	4,5	7



Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions



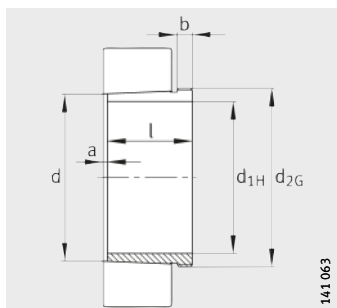
Pump connectors for  
hydraulic withdrawal sleeve

**Dimension table** (continued) - Dimensions in mm

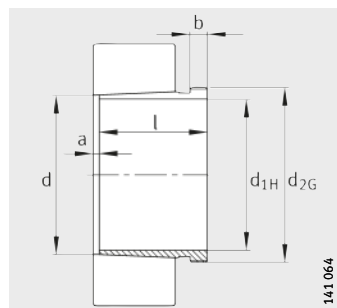
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH3934A	1,65	160	170	59	5	13	M180X3	–	–	–
AH234	1,98	160	170	69	5	16	M180X3	–	–	–
AH3034	2,48	160	170	85	5	17	M180X3	–	–	–
AH3034-H	2,48	160	170	85	5	17	M180X3	M6	4,2	7
AH334	3,13	160	170	93	5	17	M190X3	–	–	–
AH334G	2,75	160	170	93	5	17	M180X3	–	–	–
AH3134A	3,12	160	170	104	5	16	M180X3	–	–	–
AH3134A-H	3,12	160	170	104	5	16	M180X3	M6	4,5	7
AH24034	2,76	160	170	106	11	16	M180X3	–	–	–
AH24134	3,27	160	170	125	11	16	M180X3	–	–	–
AH3234	4,83	160	170	134	6	24	M190X3	–	–	–
AH3234G	4,29	160	170	134	6	24	M180X3	–	–	–
AH3234G-H	4,29	160	170	134	6	24	M180X3	M6	4,5	7
AH3234-H	4,83	160	170	134	6	24	M190X3	M6	4,5	7
AH2334	5,32	160	170	146	6	24	M190X3	–	–	–
AH2334G	4,78	160	170	146	6	24	M180X3	–	–	–
AH2334G-H	4,78	160	170	146	6	24	M180X3	M6	4,5	7
AH2334-H	5,32	160	170	146	6	24	M190X3	M6	4,5	7
AH3334	6,11	160	170	164	6	24	M190X3	–	–	–
AH3334-H	6,11	160	170	164	6	24	M190X3	M6	4,5	7



# Withdrawal sleeves



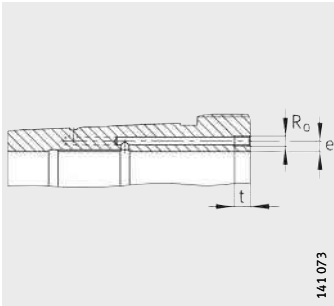
Taper 1:12



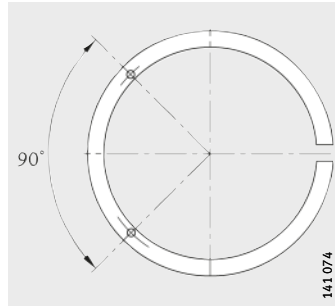
AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH3936	1,96	170	180	66	5	13	M190X3	-	-	-
AH236	2,1	170	180	69	5	16	M190X3	-	-	-
AH3036	2,87	170	180	92	6	17	M190X3	-	-	-
AH3036-H	2,87	170	180	92	6	17	M190X3	M6	4,2	7
AH2236G	3,35	170	180	105	5	17	M190X3	-	-	-
AH2236G-H	3,28	170	180	105	5	17	M190X3	M6	4,5	7
AH2236-H	3,68	170	180	105	5	17	M200X3	M6	4,5	7
AH3236	5,39	170	180	140	6	25	M200X3	-	-	-
AH24036	3,21	170	180	116	11	16	M190X3	-	-	-
AH3136A	3,79	170	180	116	6	19	M190X3	-	-	-
AH3136A-H	3,79	170	180	116	6	19	M190X3	M6	4,5	7
AH24136	3,74	170	180	134	11	16	M190X3	-	-	-
AH2236	3,76	170	180	105	5	17	M200X3	-	-	-
AH3236G	4,8	170	180	140	6	25	M190X3	-	-	-
AH3236G-H	4,8	170	180	140	6	25	M190X3	M6	4,5	7
AH3236-H	5,39	170	180	140	6	25	M200X3	M6	4,5	7
AH2336	6,04	170	180	154	6	26	M200X3	-	-	-
AH2336G	5,42	170	180	154	6	26	M190X3	-	-	-
AH2336G-H	5,42	170	180	154	6	26	M190X3	M6	4,5	7
AH2336-H	6,04	170	180	154	6	26	M200X3	M6	4,5	7
AH3336	7,1	170	180	176	6	26	M200X3	-	-	-
AH3336-H	7,1	170	180	176	6	26	M200X3	M6	4,5	7



141.073



141.074

Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

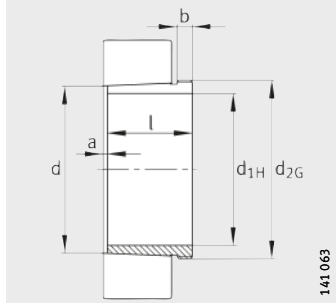
Pump connectors for  
hydraulic withdrawal sleeve

**Dimension table** (continued) - Dimensions in mm

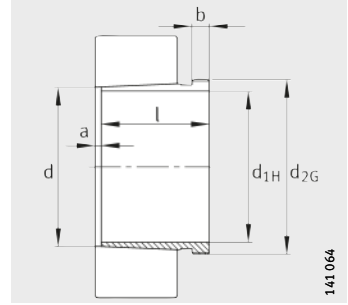
Designation	Mass m ≈ kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH3938	2,07	180	190	66	5	13	M200X3	–	–	–
AH238	2,57	180	190	73	5	17	Tr205X4	–	–	–
AH238G	2,36	180	190	73	5	17	M200X3	–	–	–
AH3038	3,42	180	190	96	6	18	Tr205X4	–	–	–
AH3038G	3,19	180	190	96	6	18	M200X3	–	–	–
AH3038G-H	3,19	180	190	96	6	18	M200X3	M6	4,2	7
AH3038-H	3,42	180	190	96	6	18	Tr205X4	M6	4,2	7
AH2238	4,28	180	190	112	5	18	Tr210X4	–	–	–
AH2238G	3,83	180	190	112	5	18	M200X3	–	–	–
AH2238G-H	3,75	180	190	112	5	18	M200X3	M6	4,5	7
AH2238-H	4,19	180	190	112	5	18	Tr210X4	M6	4,5	7
AH24038	3,48	180	190	118	13	18	M200X3	–	–	–
AH3138	4,89	180	190	125	6	20	Tr210X4	–	–	–
AH3138G	4,39	180	190	125	6	20	M200X3	–	–	–
AH3138G-H	4,39	180	190	125	6	20	M200X3	M6	4,5	7
AH3138-H	4,89	180	190	125	6	20	Tr210X4	M6	4,5	7
AH3238	5,92	180	190	145	7	25	Tr210X4	–	–	–
AH3238G	5,3	180	190	145	7	25	M200X3	–	–	–
AH3238G-H	5,3	180	190	145	7	25	M200X3	M6	4,5	7
AH3238-H	5,92	180	190	145	7	25	Tr210X4	M6	4,5	7
AH24138	4,37	180	190	146	13	18	M200X3	–	–	–
AH2338	6,67	180	190	160	7	26	Tr210X4	–	–	–
AH2338G	6,02	180	190	160	7	26	M200X3	–	–	–
AH2338G-H	6,02	180	190	160	7	26	M200X3	M6	4,5	7
AH2338-H	6,67	180	190	160	7	26	Tr210X4	M6	4,5	7
AH3338	7,76	180	190	181	7	26	Tr210X4	–	–	–
AH3338-H	7,76	180	190	181	7	26	Tr210X4	M6	4,5	7



# Withdrawal sleeves



Taper 1:12

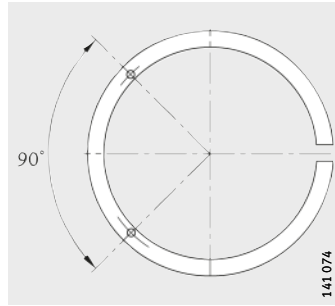
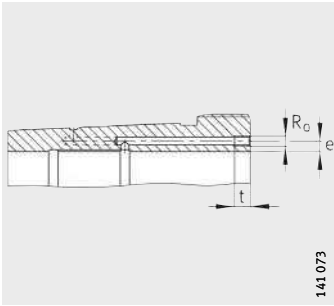


AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH240	2,88	190	200	77	5	18	Tr215X4	-	-	-
AH240G	2,43	190	200	77	5	18	Tr210X4	-	-	-
AH3940	2,62	190	200	77	6	16	Tr210X4	-	-	-
AH3040	3,86	190	200	102	6	19	Tr215X4	-	-	-
AH3040G	3,62	190	200	102	6	19	Tr210X4	-	-	-
AH3040G-H	3,62	190	200	102	6	19	Tr210X4	M6	4,2	7
AH3040-H	3,86	190	200	102	6	19	Tr215X4	M6	4,2	7
AH2240	4,8	190	200	118	5	19	Tr220X4	-	-	-
AH2240-H	4,7	190	200	118	5	19	Tr220X4	M6	4,5	7
AH24040	3,96	190	200	127	13	18	Tr210X4	-	-	-
AH3140	5,6	190	200	134	6	21	Tr220X4	-	-	-
AH3140-H	5,6	190	200	134	6	21	Tr220X4	M6	4,5	7
AH3240	6,61	190	200	153	7	24	Tr220X4	-	-	-
AH3240-H	6,61	190	200	153	7	24	Tr220X4	M6	4,5	7
AH24140	5,02	190	200	158	13	18	Tr210X4	-	-	-
AH2340	7,64	190	200	170	7	30	Tr220X4	-	-	-
AH2340-H	7,64	190	200	170	7	30	Tr220X4	M6	4,5	7
AH3340	9,04	190	200	195	7	30	Tr220X4	-	-	-
AH3340-H	9,04	190	200	195	7	30	Tr220X4	M6	4,5	7





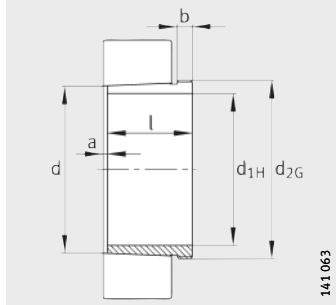
Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

Pump connectors for  
hydraulic withdrawal sleeve

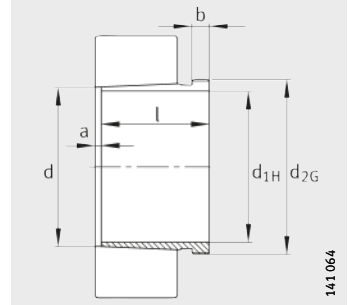
Dimension table (continued) - Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH3944	4,81	200	220	77	6	16	Tr230X4	–	–	–
AH3944-H	4,81	200	220	77	6	16	Tr230X4	M8	7,5	12
AH244	5,62	200	220	85	6	18	Tr235X4	–	–	–
AH244G	5,36	200	220	85	6	18	Tr230X4	–	–	–
AH3044	7,47	200	220	111	6	20	Tr235X4	–	–	–
AH3044G	7,18	200	220	111	6	20	Tr230X4	–	–	–
AH3044G-H	7,18	200	220	111	6	20	Tr230X4	G1/8	6,5	12
AH3044-H	7,47	200	220	111	6	20	Tr235X4	G1/8	8,5	12
AH2244	9,17	200	220	130	6	20	Tr240X4	–	–	–
AH2244-H	8,99	200	220	130	6	20	Tr240X4	G1/8	8,5	12
AH24044	8,22	200	220	138	14	18	Tr230X4	–	–	–
AH24044-H	8,22	200	220	138	14	18	Tr230X4	M6	8	7
AH3144	10,4	200	220	145	6	23	Tr240X4	–	–	–
AH3144-H	10,4	200	220	145	6	23	Tr240X4	G1/8	8,5	12
AH24144	10,3	200	220	170	14	20	Tr230X4	–	–	–
AH24144-H	10,3	200	220	170	14	20	Tr230X4	M6	8	7
AH2344	13,6	200	220	181	8	30	Tr240X4	–	–	–
AH2344-H	13,6	200	220	181	8	30	Tr240X4	G1/8	8,5	12
AH3344	16,2	200	220	210	8	30	Tr240X4	–	–	–
AH3344-H	16,2	200	220	210	8	30	Tr240X4	G1/8	8,5	12



# Withdrawal sleeves



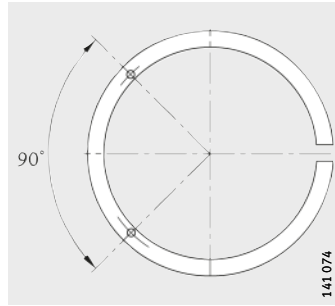
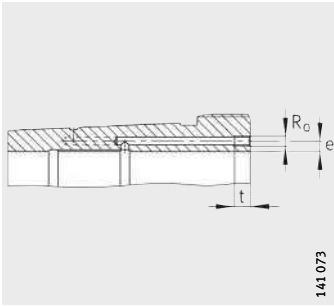
Taper 1:12



AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH3948	5,26	220	240	77	6	16	Tr250X4	–	–	–
AH3948-H	5,26	220	240	77	6	16	Tr250X4	M8	7,5	12
AH248	7,41	220	240	96	6	22	Tr260X4	–	–	–
AH3048	8,92	220	240	116	7	21	Tr260X4	–	–	–
AH3048-H	8,92	220	240	116	7	21	Tr260X4	G1/8	8,5	12
AH24048	9,03	220	240	138	15	20	Tr250X4	–	–	–
AH24048-H	9,03	220	240	138	15	20	Tr250X4	M6	8	7
AH2248	11,3	220	240	144	6	21	Tr260X4	–	–	–
AH2248-H	11,0	220	240	144	6	21	Tr260X4	G1/8	8,5	12
AH3148	12,3	220	240	154	7	25	Tr260X4	–	–	–
AH3148-H	12,3	220	240	154	7	25	Tr260X4	G1/8	8,5	12
AH24148	12,6	220	240	180	15	20	Tr260X4	–	–	–
AH24148-H	12,6	220	240	180	15	20	Tr260X4	G1/8	8,5	12
AH2348	15,6	220	240	189	8	30	Tr260X4	–	–	–
AH2348-H	15,6	220	240	189	8	30	Tr260X4	G1/8	8,5	12
AH3348	19,3	220	240	225	8	30	Tr260X4	–	–	–
AH3348-H	19,3	220	240	225	8	30	Tr260X4	G1/8	8,5	12



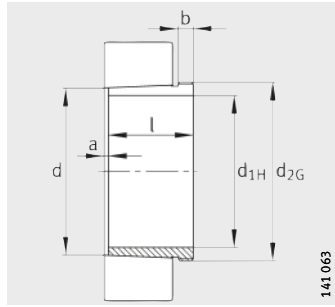
Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

Pump connectors for  
hydraulic withdrawal sleeve

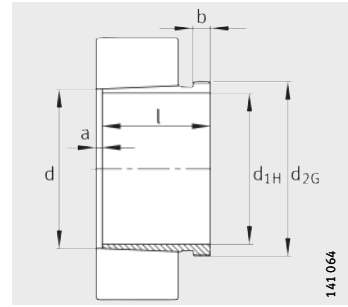
**Dimension table** (continued) - Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH3952	7,39	240	260	94	6	18	Tr275X4	–	–	–
AH3952G	7,7	240	260	94	6	18	Tr280X4	–	–	–
AH3952G-H	7,7	240	260	94	6	18	Tr280X4	M8	7,5	12
AH3952-H	7,39	240	260	94	6	18	Tr275X4	M8	7,5	12
AH252	8,83	240	260	105	6	23	Tr280X4	–	–	–
AH3052	10,8	240	260	128	7	23	Tr280X4	–	–	–
AH3052-H	10,8	240	260	128	7	23	Tr280X4	G1/8	8,5	12
AH2252	14,1	240	260	155	6	23	Tr290X4	–	–	–
AH2252G	13,3	240	260	155	6	23	Tr280X4	–	–	–
AH2252G-H	13,1	240	260	155	6	23	Tr280X4	G1/8	8,5	12
AH2252-H	13,8	240	260	155	6	23	Tr290X4	G1/8	8,5	12
AH24052	11,6	240	260	162	16	20	Tr270X4	–	–	–
AH24052G	12,3	240	260	162	16	20	Tr280X4	–	–	–
AH24052G-H	12,3	240	260	162	16	20	Tr280X4	M6	8	7
AH24052-H	11,6	240	260	162	16	20	Tr270X4	M6	8	7
AH3152	16	240	260	172	7	26	Tr290X4	–	–	–
AH3152G	15,1	240	260	172	7	26	Tr280X4	–	–	–
AH3152G-H	15,1	240	260	172	7	26	Tr280X4	G1/8	7	12
AH3152-H	16	240	260	172	7	26	Tr290X4	G1/8	7	12
AH24152	15,5	240	260	202	16	22	Tr280X4	–	–	–
AH24152-H	15,5	240	260	202	16	22	Tr280X4	G1/8	8,5	12
AH2352	19,7	240	260	205	8	30	Tr290X4	–	–	–
AH2352G	18,7	240	260	205	8	30	Tr280X4	–	–	–
AH2352G-H	18,7	240	260	205	8	30	Tr280X4	G1/8	8,5	12
AH2352-H	19,7	240	260	205	8	30	Tr290X4	G1/8	8,5	12
AH3352	23,2	240	260	236	8	30	Tr290X4	–	–	–
AH3352-H	23,2	240	260	236	8	30	Tr290X4	G1/8	8,5	12

# Withdrawal sleeves



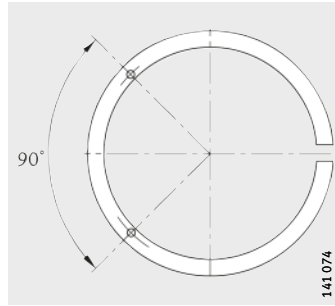
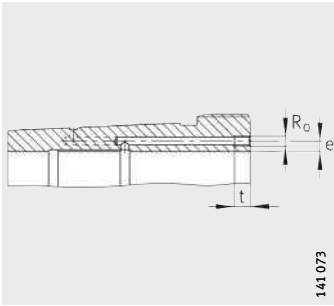
Taper 1:12



AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH3956	7,98	260	280	94	6	18	Tr295X4	—	—	—
AH3956G	8,3	260	280	94	6	18	Tr300X4	—	—	—
AH3956G-H	8,3	260	280	94	6	18	Tr300X4	M8	7,5	12
AH3956-H	7,98	260	280	94	6	18	Tr295X4	M8	7,5	12
AH256	9,52	260	280	105	8	23	Tr300X4	—	—	—
AH3056	12	260	280	131	8	24	Tr300X4	—	—	—
AH3056-H	12	260	280	131	8	24	Tr300X4	G1/8	8,5	12
AH2256	15,3	260	280	155	8	24	Tr310X4	—	—	—
AH2256G	14,4	260	280	155	8	24	Tr300X4	—	—	—
AH2256G-H	14,1	260	280	155	8	24	Tr300X4	G1/8	8,5	12
AH2256-H	15	260	280	155	8	24	Tr310X4	G1/8	8,5	12
AH24056	12,6	260	280	162	17	22	Tr290X4	—	—	—
AH24056G	13,4	260	280	162	17	22	Tr300X4	—	—	—
AH24056G-H	13,4	260	280	162	17	22	Tr300X4	M6	8	7
AH24056-H	12,6	260	280	162	17	22	Tr290X4	M6	8	7
AH3156	17,7	260	280	175	8	28	Tr310X4	—	—	—
AH3156G	16,7	260	280	175	8	28	Tr300X4	—	—	—
AH3156G-H	16,7	260	280	175	8	28	Tr300X4	G1/8	8,5	12
AH3156-H	17,7	260	280	175	8	28	Tr310X4	G1/8	8,5	12
AH24156	16,7	260	280	202	17	22	Tr300X4	—	—	—
AH24156-H	16,7	260	280	202	17	22	Tr300X4	G1/8	8,5	12
AH2356	22,1	260	280	212	8	30	Tr310X4	—	—	—
AH2356G	20,9	260	280	212	8	30	Tr300X4	—	—	—
AH2356G-H	20,9	260	280	212	8	30	Tr300X4	G1/8	8,5	12
AH2356-H	22,1	260	280	212	8	30	Tr310X4	G1/8	8,5	12
AH3356	27,4	260	280	254	8	30	Tr310X4	—	—	—
AH3356-H	27,4	260	280	254	8	30	Tr310X4	G1/8	8,5	12



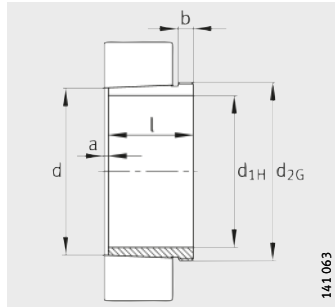
Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

Pump connectors for  
hydraulic withdrawal sleeve

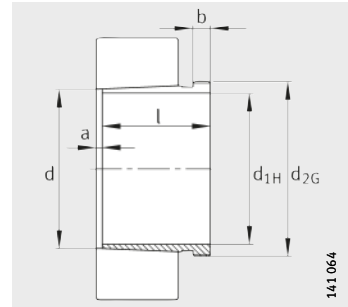
**Dimension table** (continued) - Dimensions in mm

Designation	Mass m ≈ kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH3960	10,4	280	300	112	7	21	Tr315X5	–	–	–
AH3960G	10,8	280	300	112	7	21	Tr320X5	–	–	–
AH3960G-H	10,8	280	300	112	7	21	Tr320X5	M8	7,5	12
AH3960-H	10,4	280	300	112	7	21	Tr315X5	M8	7,5	12
AH3060	14,4	280	300	145	8	26	Tr320X5	–	–	–
AH3060-H	14,4	280	300	145	8	26	Tr320X5	G1/8	8,5	12
AH2260	18,3	280	300	170	8	26	Tr330X5	–	–	–
AH2260G	17,2	280	300	170	8	26	Tr320X5	–	–	–
AH2260G-H	16,9	280	300	170	8	26	Tr320X5	G1/8	8,5	12
AH2260-H	17,9	280	300	170	8	26	Tr330X5	G1/8	8,5	12
AH24060	15,5	280	300	184	18	24	Tr310X4	–	–	–
AH24060G	16,4	280	300	184	18	24	Tr320X5	–	–	–
AH24060G-H	16,4	280	300	184	18	24	Tr320X5	M6	8	7
AH24060-H	15,5	280	300	184	18	24	Tr310X4	M6	8	7
AH3160	21,2	280	300	192	8	30	Tr330X5	–	–	–
AH3160G	20	280	300	192	8	30	Tr320X5	–	–	–
AH3160G-H	20	280	300	192	8	30	Tr320X5	G1/8	8,5	12
AH3160-H	21,2	280	300	192	8	30	Tr330X5	G1/8	8,5	12
AH24160	20,1	280	300	224	18	24	Tr320X5	–	–	–
AH24160-H	20,1	280	300	224	18	24	Tr320X5	G1/8	8,5	12
AH3260	26	280	300	228	8	34	Tr330X5	–	–	–
AH3260G	24,6	280	300	228	8	34	Tr320X5	–	–	–
AH3260G-H	24,6	280	300	228	8	34	Tr320X5	G1/8	8,5	12
AH3260-H	26	280	300	228	8	34	Tr330X5	G1/8	8,5	12
AH3360	31,8	280	300	270	8	34	Tr330X5	–	–	–
AH3360-H	31,8	280	300	270	8	34	Tr330X5	G1/8	8,5	12

# Withdrawal sleeves



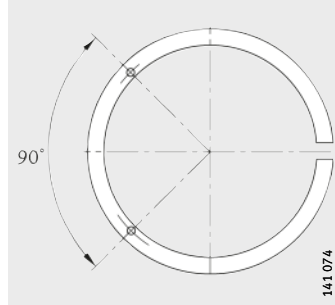
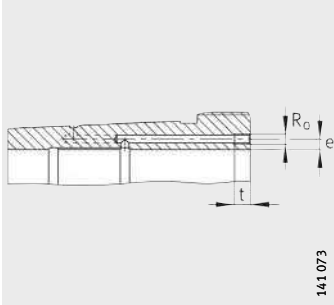
Taper 1:12



AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH3964G-H	11,5	300	320	112	7	21	Tr340X5	M8	7,5	12
AH3964-H	11,1	300	320	112	7	21	Tr335X5	M8	7,5	12
AH3064G-H	15,9	300	320	149	8	27	Tr340X5	G1/8	8,5	12
AH3064-H	16,5	300	320	149	8	27	Tr345X5	G1/8	8,5	12
AH2264G-H	19,3	300	320	180	10	27	Tr340X5	G1/8	8,5	12
AH2264-H	20,4	300	320	180	10	27	Tr350X5	G1/8	8,5	12
AH24064G-H	17,5	300	320	184	18	24	Tr340X5	M6	8	7
AH24064-H	16,6	300	320	184	18	24	Tr330X5	M6	8	7
AH3164G-H	23,6	300	320	209	8	31	Tr340X5	G1/8	8,5	12
AH3164-H	24,9	300	320	209	8	31	Tr350X5	G1/8	8,5	12
AH24164-H	23,4	300	320	242	18	24	Tr340X5	G1/8	8,5	12
AH3264G-H	28,9	300	320	246	8	36	Tr340X5	G1/8	8,5	12
AH3264-H	30,4	300	320	246	8	36	Tr350X5	G1/8	8,5	12
AH3364-H	37,9	300	320	294	8	36	Tr350X5	G1/8	8,5	12
AH3968G-H	12,3	320	340	112	7	21	Tr360X5	M8	7,5	12
AH3968-H	11,8	320	340	112	7	21	Tr355X5	M8	7,5	12
AH3068G-H	18,6	320	340	162	9	28	Tr360X5	G1/8	8,5	12
AH3068-H	19,2	320	340	162	9	28	Tr365X5	G1/8	8,5	12
AH24068-H	21,1	320	340	206	19	26	Tr360X5	G1/8	8,5	12
AH3168G-H	27,5	320	340	225	9	33	Tr360X5	G1/8	8,5	12
AH3168-H	28,9	320	340	225	9	33	Tr370X5	G1/8	8,5	12
AH3268G-H	33,6	320	340	264	9	38	Tr360X5	G1/8	8,5	12
AH3268-H	35,3	320	340	264	9	38	Tr370X5	G1/8	8,5	12
AH24168-H	28	320	340	269	19	26	Tr360X5	G1/8	8,5	12
AH3368-H	43,1	320	340	310	9	38	Tr370X5	G1/8	8,5	12



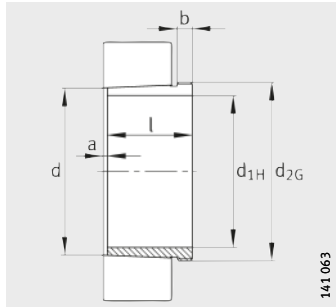
Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

Pump connectors for  
hydraulic withdrawal sleeve

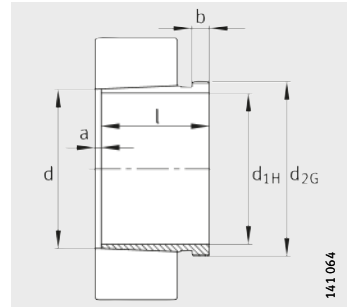
**Dimension table** (continued) - Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH3972G-H	13	340	360	112	7	21	Tr380X5	M8	7,5	12
AH3972-H	12,5	340	360	112	7	21	Tr375X5	M8	7,5	12
AH3072G-H	20,5	340	360	167	9	30	Tr380X5	G1/8	8,5	12
AH3072-H	21,2	340	360	167	9	30	Tr385X5	G1/8	8,5	12
AH24072-H	22,3	340	360	206	20	26	Tr380X5	G1/8	8,5	12
AH3172G-H	29,8	340	360	229	9	35	Tr380X5	G1/8	8,5	12
AH3172-H	33,1	340	360	229	9	35	Tr400X5	G1/8	8,5	12
AH24172-H	29,7	340	360	269	20	26	Tr380X5	G1/8	8,5	12
AH3272G-H	37,3	340	360	274	9	40	Tr380X5	G1/8	8,5	12
AH3272-H	41,1	340	360	274	9	40	Tr400X5	G1/8	8,5	12
AH3372-H	51,5	340	360	330	9	40	Tr400X5	G1/8	8,5	12
AH3976G-H	16,1	360	380	130	8	22	Tr400X5	M8	7,5	12
AH3976-H	15,6	360	380	130	8	22	Tr395X5	M8	7,5	12
AH3076G-H	22,1	360	380	170	10	31	Tr400X5	G1/8	8,5	12
AH3076-H	23,6	360	380	170	10	31	Tr410X5	G1/8	8,5	12
AH24076-H	24	360	380	208	20	28	Tr400X5	G1/8	8,5	12
AH3176G-H	32	360	380	232	10	36	Tr400X5	G1/8	8,5	12
AH3176-H	35,6	360	380	232	10	36	Tr420X5	G1/8	8,5	12
AH24176-H	31,8	360	380	271	20	28	Tr400X5	G1/8	8,5	12
AH3276G-H	41,3	360	380	284	10	42	Tr400X5	G1/8	8,5	12
AH3276-H	45,5	360	380	284	10	42	Tr420X5	G1/8	8,5	12
AH3376-H	57,1	360	380	342	10	42	Tr420X5	G1/8	8,5	12
AH3980G-H	17	380	400	130	8	22	Tr420X5	M8	7,5	12
AH3980-H	16,4	380	400	130	8	22	Tr415X5	M8	7,5	12
AH3080G-H	25,4	380	400	183	10	33	Tr420X5	G1/8	8,5	12
AH3080-H	27,1	380	400	183	10	33	Tr430X5	G1/8	8,5	12
AH24080-H	27,8	380	400	228	20	28	Tr420X5	G1/8	8,5	12
AH3180G-H	35,1	380	400	240	10	38	Tr420X5	G1/8	8,5	12
AH3180-H	39,1	380	400	240	10	38	Tr440X5	G1/8	8,5	12
AH24180-H	34,4	380	400	278	20	28	Tr420X5	G1/8	8,5	12
AH3280G-H	47,1	380	400	302	10	44	Tr420X5	G1/8	8,5	12
AH3280-H	51,7	380	400	302	10	44	Tr440X5	G1/8	8,5	12
AH3380-H	62,5	380	400	352	10	44	Tr440X5	G1/8	8,5	12

# Withdrawal sleeves



Taper 1:12

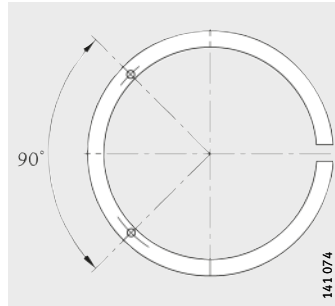
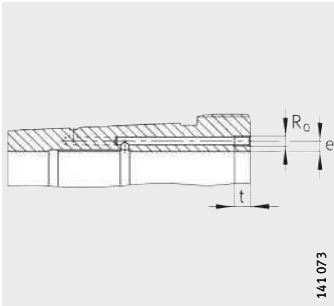


AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH3984G-H	17,8	400	420	130	8	22	Tr440X5	M8	7,5	12
AH3984-H	17,3	400	420	130	8	22	Tr435X5	M8	7,5	12
AH3084G-H	27,2	400	420	186	10	34	Tr440X5	G1/8	8,5	12
AH3084-H	29,1	400	420	186	10	34	Tr450X5	G1/8	8,5	12
AH24084-H	29,6	400	420	230	22	30	Tr440X5	G1/8	8,5	12
AH3184G-H	42	400	420	266	10	40	Tr440X5	G1/8	8,5	12
AH3184-H	46,4	400	420	266	10	40	Tr460X5	G1/8	8,5	12
AH24184-H	41	400	420	310	22	30	Tr440X5	G1/8	8,5	12
AH3284G-H	53,6	400	420	321	10	46	Tr440X5	G1/8	8,5	12
AH3284-H	58,6	400	420	321	10	46	Tr460X5	G1/8	8,5	12
AH3384-H	67,9	400	420	361	10	46	Tr460X5	G1/8	8,5	12
AH3988-H	21,2	420	440	145	8	25	Tr460X5	G1/8	8,5	12
AHX3088G-H	30	420	440	194	11	35	Tr460X5	G1/8	8,5	12
AHX3088-H	31,9	420	440	194	11	35	Tr470X5	G1/8	8,5	12
AH24088-H	32,8	420	440	242	22	30	Tr460X5	G1/8	8,5	12
AHX3188G-H	44,9	420	440	270	11	42	Tr460X5	G1/8	8,5	12
AHX3188-H	49,7	420	440	270	11	42	Tr480X5	G1/8	8,5	12
AH24188-H	42,9	420	440	310	22	30	Tr460X5	G1/8	8,5	12
AHX3288G-H	58,2	420	440	330	11	48	Tr460X5	G1/8	8,5	12
AHX3288-H	63,7	420	440	330	11	48	Tr480X5	G1/8	8,5	12
AH3388-H	79,6	420	440	393	11	48	Tr480X5	G1/8	8,5	12
AH3992-H	22,2	440	460	145	8	25	Tr480X5	G1/8	8,5	12
AHX3092G-H	32,9	440	460	202	11	37	Tr480X5	G1/8	8,5	12
AHX3092-H	35,1	440	460	202	11	37	Tr490X5	G1/8	8,5	12
AH24092-H	35,6	440	460	250	23	32	Tr480X5	G1/8	8,5	12
AHX3192G-H	50,3	440	460	285	11	43	Tr480X5	G1/8	8,5	12
AHX3192-H	58	440	460	285	11	43	Tr510X6	G1/8	8,5	12
AH24192-H	48,7	440	460	332	23	32	Tr480X5	G1/8	8,5	12
AHX3292G-H	65,6	440	460	349	11	50	Tr480X5	G1/8	8,5	12
AHX3292-H	74,6	440	460	349	11	50	Tr510X6	G1/8	8,5	12
AH3392-H	92,6	440	460	415	11	50	Tr510X6	G1/8	8,5	12



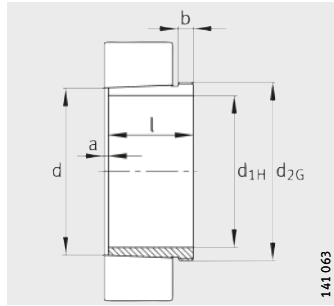


Hydraulic withdrawal sleeve  
Mounting dimensions

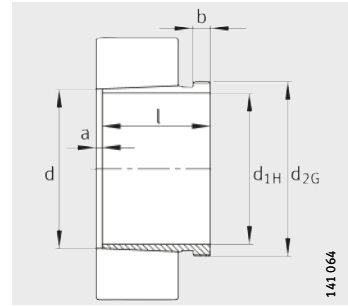
Pump connectors for  
hydraulic withdrawal sleeve

Dimension table (continued) - Dimensions in mm										
Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH3996-H	25,7	460	480	158	9	28	Tr500X5	G1/8	8,5	12
AHX3096G-H	35	460	480	205	12	38	Tr500X5	G1/8	8,5	12
AHX3096-H	39,7	460	480	205	12	38	Tr520X6	G1/8	8,5	12
AH24096-H	37,2	460	480	250	23	32	Tr500X5	G1/8	8,5	12
AHX3196G-H	54,8	460	480	295	12	45	Tr500X5	G1/8	8,5	12
AHX3196-H	63,3	460	480	295	12	45	Tr530X6	G1/8	8,5	12
AH24196G-H	52,2	460	480	340	23	32	Tr500X5	G1/8	8,5	12
AH24196-H	52,9	460	480	343	25	35	Tr500X5	G1/8	8,5	12
AHX3296G-H	72,4	460	480	364	12	52	Tr500X5	G1/8	8,5	12
AHX3296-H	82,2	460	480	364	12	52	Tr530X6	G1/8	8,5	12
AH3396-H	100	460	480	427	12	52	Tr530X6	G1/8	8,5	12
AH39/500G-H	29,8	480	500	162	10	32	Tr530X6	G1/8	8,5	12
AH39/500-H	27,7	480	500	162	10	32	Tr520X6	G1/8	8,5	12
AHX30/500G-H	39,9	480	500	209	12	40	Tr530X6	G1/8	8,5	12
AHX30/500-H	42,5	480	500	209	12	40	Tr540X6	G1/8	8,5	12
AH240/500G-H	41,7	480	500	253	23	35	Tr530X6	G1/8	8,5	12
AH240/500-H	39,5	480	500	253	23	35	Tr520X6	G1/8	8,5	12
AHX31/500G-H	64,7	480	500	313	12	47	Tr530X6	G1/8	8,5	12
AHX31/500-H	70,9	480	500	313	12	47	Tr550X6	G1/8	8,5	12
AH241/500G-H	60,5	480	500	360	23	35	Tr530X6	G1/8	8,5	12
AH241/500-H	58,8	480	500	362	25	37	Tr520X6	G1/8	8,5	12
AHX32/500G-H	87,3	480	500	393	12	54	Tr530X6	G1/8	8,5	12
AHX32/500-H	94,4	480	500	393	12	54	Tr550X6	G1/8	8,5	12
AH33/500-H	110	480	500	442	12	54	Tr550X6	G1/8	8,5	12
AH39/530G-H	45,6	500	530	175	10	37	Tr560X6	G1/4	10	15
AH39/530-H	43,1	500	530	175	10	37	Tr550X6	G1/4	10	15
AH30/530A-H	61,7	500	530	230	12	45	Tr560X6	G1/4	10	15
AH240/530G-H	67,5	500	530	285	24	35	Tr560X6	G1/4	8,5	15
AH240/530-H	66,8	500	530	290	25	40	Tr550X6	G1/4	8,5	15
AH31/530A-H	92,3	500	530	325	12	53	Tr560X6	G1/4	10	15
AH241/530G-H	89	500	530	370	24	35	Tr560X6	G1/4	10	15
AH241/530-H	88,2	500	530	375	25	40	Tr550X6	G1/4	10	15
AH32/530AG-H	124	500	530	412	12	57	Tr560X6	G1/4	10	15
AH32/530-A-H	132	500	530	412	12	57	Tr580X6	G1/4	10	15
AH33/530-H	155	500	530	469	12	57	Tr580X6	G1/4	10	15

# Withdrawal sleeves



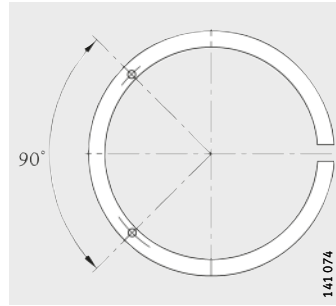
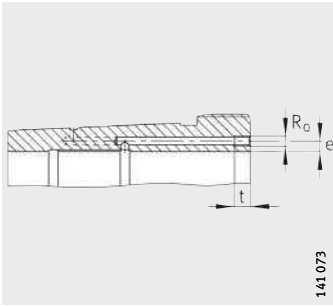
Taper 1:12



AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH39/560G-H	52,3	530	560	180	10	37	Tr600X6	G1/4	12	15
AH39/560-H	47	530	560	180	10	37	Tr580X6	G1/4	12	15
AH30/560AG-H	71,6	530	560	240	12	45	Tr600X6	G1/4	12	15
AH30/560A-H	68,4	530	560	240	12	45	Tr590X6	G1/4	12	15
AH240/560G-H	77,5	530	560	296	24	38	Tr600X6	G1/4	8,5	15
AH240/560-H	72,7	530	560	298	25	40	Tr580X6	G1/4	8,5	15
AH31/560AG-H	105	530	560	335	12	55	Tr600X6	G1/4	12	15
AH31/560A-H	101	530	560	335	12	55	Tr590X6	G1/4	12	15
AH241/560G-H	104	530	560	393	24	38	Tr600X6	G1/4	12	15
AH241/560-H	101	530	560	400	28	45	Tr580X6	G1/4	12	15
AH32/560AG-H	139	530	560	422	12	57	Tr600X6	G1/4	12	15
AH32/560A-H	144	530	560	422	12	57	Tr610X6	G1/4	12	15
AH33/560-H	166	530	560	475	12	57	Tr610X6	G1/4	12	15
AH39/600G-H	57	570	600	192	10	38	Tr630X6	G1/4	12	15
AH39/600-H	55,6	570	600	192	10	38	Tr625X6	G1/4	12	15
AH30/600A-H	75	570	600	245	14	45	Tr630X6	G1/4	12	15
AH240/600G-H	84,1	570	600	310	26	38	Tr630X6	G1/4	8,5	15
AH240/600-H	85,4	570	600	317	30	45	Tr625X6	G1/4	8,5	15
AH31/600A-H	116	570	600	355	14	55	Tr630X6	G1/4	12	15
AH241/600G-H	114	570	600	413	26	38	Tr630X6	G1/4	12	15
AH241/600-H	118	570	600	425	30	50	Tr625X6	G1/4	12	15
AH32/600AG-H	155	570	600	445	14	57	Tr630X6	G1/4	12	15
AH32/600A-H	164	570	600	445	14	57	Tr650X6	G1/4	12	15
AH33/600-H	200	570	600	519	14	57	Tr650X6	G1/4	12	15



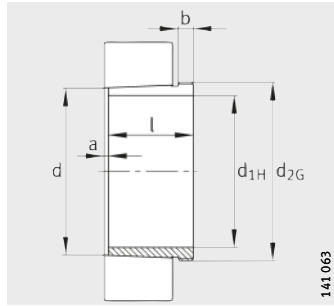
Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

Pump connectors for  
hydraulic withdrawal sleeve

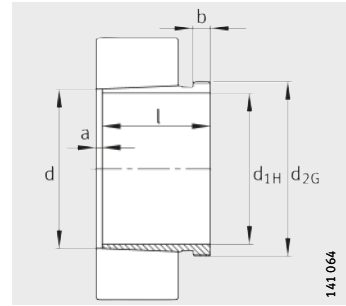
**Dimension table** (continued) - Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH39/630G-H	69,4	600	630	210	12	40	Tr670X6	G1/4	12	15
AH39/630-H	64,5	600	630	210	12	40	Tr655X6	G1/4	12	15
AH30/630A-H	87,3	600	630	258	14	46	Tr670X6	G1/4	12	15
AH240/630G-H	97,9	600	630	330	26	40	Tr670X6	G1/4	8,5	15
AH240/630-H	95,1	600	630	335	30	45	Tr655X6	G1/4	8,5	15
AH31/630A-H	136	600	630	375	14	60	Tr670X6	G1/4	12	15
AH241/630G-H	133	600	630	440	26	40	Tr670X6	G1/4	12	15
AH241/630-H	132	600	630	450	30	50	Tr655X6	G1/4	12	15
AH32/630AG-H	183	600	630	475	14	63	Tr670X6	G1/4	12	15
AH32/630A-H	188	600	630	475	14	63	Tr680X6	G1/4	12	15
AH33/630-H	227	600	630	550	14	62	Tr680X6	G1/4	12	15
AH39/670G-H	92,9	630	670	216	12	41	Tr710X7	G1/4	12	15
AH39/670-H	87,7	630	670	216	12	41	Tr695X6	G1/4	12	15
AH30/670A-H	124	630	670	280	14	50	Tr710X7	G1/4	12	15
AH240/670G-H	137	630	670	348	26	40	Tr710X7	G1/4	8,5	15
AH240/670-H	137	630	670	358	30	50	Tr695X6	G1/4	8,5	15
AH31/670A-H	185	630	670	395	14	60	Tr710X7	G1/4	12	15
AH241/670G-H	180	630	670	452	26	40	Tr710X7	G1/4	12	15
AH241/670-H	183	630	670	467	30	55	Tr695X6	G1/4	12	15
AH32/670AG-H	247	630	670	500	14	63	Tr710X7	G1/4	12	15
AH32/670A-H	252	630	670	500	14	63	Tr720X7	G1/4	12	15
AH33/670-H	303	630	670	577	14	62	Tr720X7	G1/4	12	15
AH39/710G-H	105	670	710	228	12	43	Tr750X7	G1/4	15	15
AH39/710-H	101	670	710	228	12	43	Tr740X7	G1/4	15	15
AH30/710A-H	135	670	710	286	16	50	Tr750X7	G1/4	15	15
AH240/710G-H	152	670	710	360	26	45	Tr750X7	G1/4	8,5	15
AH240/710-H	151	670	710	365	33	50	Tr740X7	G1/4	8,5	15
AH31/710A-H	202	670	710	405	16	60	Tr750X7	G1/4	15	15
AH241/710G-H	207	670	710	483	26	45	Tr750X7	G1/4	15	15
AH241/710-H	209	670	710	493	33	55	Tr740X7	G1/4	15	15
AH32/710AG-H	272	670	710	515	16	65	Tr750X7	G1/4	15	15
AH32/710A-H	278	670	710	515	16	65	Tr760X7	G1/4	15	15
AH33/710-H	334	670	710	595	16	65	Tr760X7	G1/4	15	15

# Withdrawal sleeves



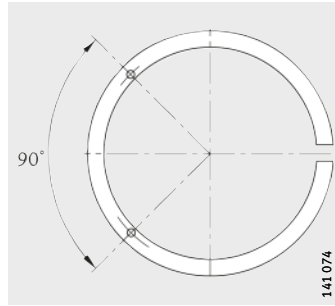
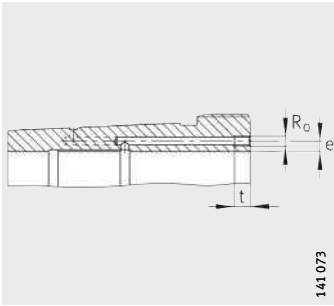
Taper 1:12



AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH39/750G-H	118	710	750	234	12	44	Tr800X7	G1/4	15	15
AH39/750-H	110	710	750	234	12	44	Tr780X7	G1/4	15	15
AH30/750A-H	155	710	750	300	16	50	Tr800X7	G1/4	15	15
AH240/750G-H	174	710	750	380	28	45	Tr800X7	G1/4	8,5	15
AH240/750-H	169	710	750	385	35	50	Tr780X7	G1/4	8,5	15
AH31/750A-H	232	710	750	425	16	60	Tr800X7	G1/4	15	15
AH241/750G-H	241	710	750	520	28	45	Tr800X7	G1/4	15	15
AH241/750-H	239	710	750	530	35	55	Tr780X7	G1/4	15	15
AH32/750A-H	312	710	750	540	16	65	Tr800X7	G1/4	15	15
AH33/750-H	377	710	750	625	16	65	Tr800X7	G1/4	15	15
AH39/800G-H	155	750	800	245	12	45	Tr850X7	G1/4	15	15
AH39/800-H	146	750	800	245	12	45	Tr830X7	G1/4	15	15
AH30/800A-H	198	750	800	308	18	50	Tr850X7	G1/4	15	15
AH240/800G-H	232	750	800	395	28	50	Tr850X7	G1/4	15	15
AH240/800-H	221	750	800	395	40	50	Tr830X7	G1/4	15	15
AH31/800A-H	297	750	800	438	18	63	Tr850X7	G1/4	15	15
AH241/800G-H	311	750	800	525	28	50	Tr850X7	G1/4	15	15
AH241/800-H	304	750	800	530	40	55	Tr830X7	G1/4	15	15
AH32/800AG-H	391	750	800	550	18	62	Tr850X7	G1/4	15	15
AH32/800A-H	396	750	800	555	18	67	Tr850X7	G1/4	15	15
AH33/800-H	500	750	800	667	18	67	Tr850X7	G1/4	15	15
AH39/850G-H	176	800	850	258	12	50	Tr900X7	G1/4	15	15
AH39/850-H	165	800	850	258	12	50	Tr880X7	G1/4	15	15
AH30/850A-H	224	800	850	325	18	53	Tr900X7	G1/4	15	15
AH240/850G-H	259	800	850	415	30	50	Tr900X7	G1/4	15	15
AH240/850-H	250	800	850	418	40	53	Tr880X7	G1/4	15	15
AH31/850A-H	336	800	850	462	18	63	Tr900X7	G1/4	15	15
AH241/850G-H	358	800	850	560	40	60	Tr900X7	G1/4	15	15
AH241/850-H	345	800	850	560	40	60	Tr880X7	G1/4	15	15
AH32/850A-H	450	800	850	585	18	70	Tr900X7	G1/4	15	15
AH33/850-H	567	800	850	700	18	70	Tr900X7	G1/4	15	15



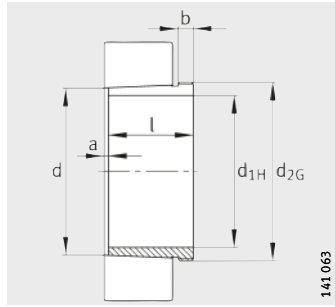
Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions

Pump connectors for  
hydraulic withdrawal sleeve

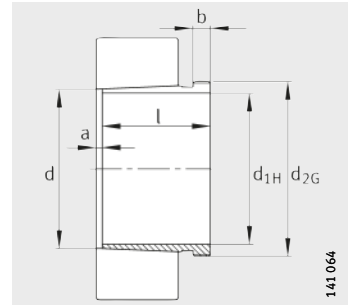
**Dimension table** (continued) - Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH39/900G-H	192	850	900	265	12	51	Tr950X8	G1/4	15	15
AH39/900-H	180	850	900	265	12	51	Tr930X8	G1/4	15	15
AH30/900A-H	246	850	900	335	20	55	Tr950X8	G1/4	15	15
AH240/900G-H	287	850	900	430	45	55	Tr950X8	G1/4	15	15
AH240/900-H	274	850	900	430	45	55	Tr930X8	G1/4	15	15
AH31/900A-H	368	850	900	475	20	63	Tr950X8	G1/4	15	15
AH241/900G-H	390	850	900	575	45	60	Tr950X8	G1/4	15	15
AH241/900-H	376	850	900	575	45	60	Tr930X8	G1/4	15	15
AH32/900A-H	476	850	900	585	20	70	Tr950X8	G1/4	15	15
AH33/900-H	623	850	900	720	20	70	Tr950X8	G1/4	15	15
AH39/950G-H	216	900	950	282	15	51	Tr1000X8	G1/4	15	15
AH39/950-H	203	900	950	282	15	51	Tr980X8	G1/4	15	15
AH30/950A-H	277	900	950	355	20	55	Tr1000X8	G1/4	15	15
AH240/950G-H	329	900	950	467	45	55	Tr1000X8	G1/4	15	15
AH240/950-H	316	900	950	467	45	55	Tr980X8	G1/4	15	15
AH31/950A-H	414	900	950	500	20	63	Tr1000X8	G1/4	15	15
AH32/950A-H	519	900	950	600	20	70	Tr1000X8	G1/4	15	15
AH241/950G-H	435	900	950	605	45	60	Tr1000X8	G1/4	15	15
AH241/950-H	421	900	950	605	45	60	Tr980X8	G1/4	15	15
AH33/950-H	683	900	950	740	20	70	Tr1000X8	G1/4	15	15
AH39/1000G-H	246	950	1000	296	15	52	Tr1060X8	G1/4	15	15
AH39/1000-H	229	950	1000	296	15	52	Tr1035X8	G1/4	15	15
AH30/1000A-H	309	950	1000	365	22	57	Tr1060X8	G1/4	15	15
AH240/1000G-H	357	950	1000	469	50	57	Tr1060X8	G1/4	15	15
AH240/1000-H	339	950	1000	469	50	57	Tr1035X8	G1/4	15	15
AH31/1000A-H	471	950	1000	525	22	63	Tr1060X8	G1/4	15	15
AH32/1000A-H	591	950	1000	630	22	70	Tr1060X8	G1/4	15	15
AH241/1000-H	502	950	1000	645	50	65	Tr1060X8	G1/4	15	15
AH33/1000-H	781	950	1000	780	22	70	Tr1060X8	G1/4	15	15
AH39/1060G-H	312	1000	1060	310	15	52	Tr1120X8	G1/4	15	15
AH39/1060-H	294	1000	1060	310	15	52	Tr1095X8	G1/4	15	15
AH30/1060A-H	396	1000	1060	385	22	60	Tr1120X8	G1/4	15	15
AH240/1060G-H	465	1000	1060	498	50	60	Tr1120X8	G1/4	15	15
AH240/1060-H	445	1000	1060	498	50	60	Tr1095X8	G1/4	15	15
AH31/1060A-H	583	1000	1060	540	22	65	Tr1120X8	G1/4	15	15
AH241/1060-H	632	1000	1060	665	50	65	Tr1120X8	G1/4	15	15

# Withdrawal sleeves



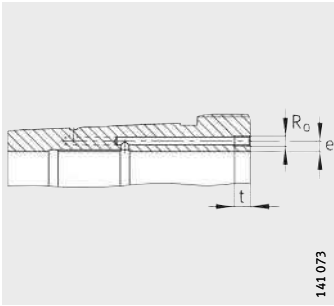
Taper 1:12



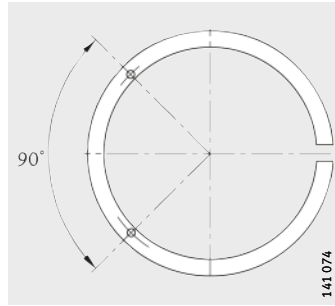
AH240, AH241  
Taper 1:30

**Dimension table** (continued) · Dimensions in mm

Designation	Mass m ≈ kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH30/1 120A-H	451	<b>1 060</b>	1 120	410	22	65	Tr1180X8	G1/4	15	15
AH240/1120G-H	524	<b>1 060</b>	1 120	527	50	65	Tr1180X8	G1/4	15	15
AH240/1120-H	501	<b>1 060</b>	1 120	527	50	65	Tr1155X8	G1/4	15	15
AH241/1120-H	717	<b>1 060</b>	1 120	705	50	75	Tr1180X8	G1/4	15	15
AH39/1120G-H	289	<b>1 070</b>	1 120	310	15	52	Tr1180X8	G1/4	15	15
AH39/1120-H	271	<b>1 070</b>	1 120	310	15	52	Tr1155X8	G1/4	15	15
AH30/1 180A-H	498	<b>1 120</b>	1 180	420	22	65	Tr1250X8	G1/4	15	15
AH240/1180G-H	577	<b>1 120</b>	1 180	540	50	65	Tr1250X8	G1/4	15	15
AH240/1180-H	543	<b>1 120</b>	1 180	540	50	65	Tr1215X8	G1/4	15	15
AH241/1180-H	824	<b>1 120</b>	1 180	750	50	80	Tr1250X8	G1/4	15	15
AH39/1180G-H	336	<b>1 130</b>	1 180	330	15	55	Tr1250X8	G1/4	15	15
AH39/1180-H	307	<b>1 130</b>	1 180	330	15	55	Tr1215X8	G1/4	15	15
AH30/1 250A-H	629	<b>1 180</b>	1 250	445	22	70	Tr1320X8	G1/4	15	15
AH240/1250G-H	733	<b>1 180</b>	1 250	570	50	70	Tr1320X8	G1/4	15	15
AH240/1250-H	694	<b>1 180</b>	1 250	570	50	70	Tr1285X8	G1/4	15	15
AH241/1250-H	1 048	<b>1 180</b>	1 250	795	50	85	Tr1320X8	G1/4	15	15
AH39/1250G-H	367	<b>1 200</b>	1 250	340	18	55	Tr1320X8	G1/4	15	15
AH39/1250-H	336	<b>1 200</b>	1 250	340	18	55	Tr1285X8	G1/4	15	15



Hydraulic withdrawal sleeve  
(suffix H)  
Mounting dimensions



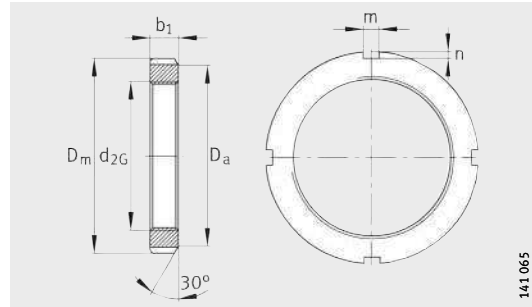
Pump connectors for  
hydraulic withdrawal sleeve

**Dimension table** (continued) - Dimensions in mm

Designation	Mass m ≈kg	Dimensions						Mounting dimensions		
		d <sub>1H</sub>	d	l	a ≈	b	d <sub>2G</sub>	R <sub>0</sub>	e	t
AH30/1 320A-H	718	<b>1 250</b>	1 320	470	22	70	Tr1400X8	G1/4	15	15
AH240/1320G-H	828	<b>1 250</b>	1 320	600	50	70	Tr1400X8	G1/4	15	15
AH240/1320-H	775	<b>1 250</b>	1 320	600	50	70	Tr1355X8	G1/4	15	15
AH241/1320-H	1 194	<b>1 250</b>	1 320	840	50	90	Tr1400X8	G1/4	15	15
AH39/1320G-H	421	<b>1 270</b>	1 320	360	18	55	Tr1400X8	G1/4	15	15
AH39/1320-H	379	<b>1 270</b>	1 320	360	18	55	Tr1355X8	G1/4	15	15
AH30/1 400A-H	902	<b>1 320</b>	1 400	487	22	75	Tr1500X8	G1/4	15	15
AH240/1400G-H	1 026	<b>1 320</b>	1 400	615	50	70	Tr1500X8	G1/4	15	15
AH240/1400-H	944	<b>1 320</b>	1 400	615	50	70	Tr1435X8	G1/4	15	15
AH241/1400-H	1 496	<b>1 320</b>	1 400	870	50	95	Tr1500X8	G1/4	15	15
AH39/1400G-H	499	<b>1 350</b>	1 400	380	20	60	Tr1500X8	G1/4	15	15
AH39/1400-H	429	<b>1 350</b>	1 400	380	20	60	Tr1435X8	G1/4	15	15
AH30/1500A-H	1 257	<b>1 400</b>	1 500	537	22	75	Tr1600X8	G1/4	15	15
AH241/1500-H	1 961	<b>1 400</b>	1 500	895	50	95	Tr1600X8	G1/4	15	15
AH39/1500G-H	563	<b>1 450</b>	1 500	400	20	60	Tr1600X8	G1/4	15	15
AH39/1500-H	494	<b>1 450</b>	1 500	400	20	60	Tr1540X8	G1/4	15	15



# Locknuts

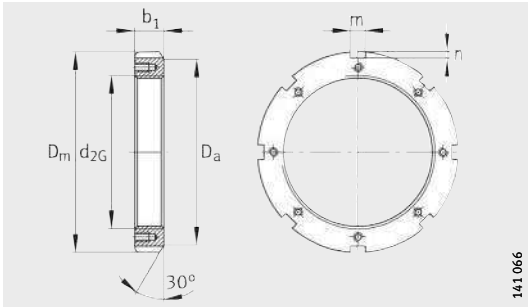


KM, KML, HM..T

141.065

Dimension table - Dimensions in mm								
Designation		Mass m ≈kg	Dimensions			Mounting dimensions		
Nut	Suitable retainer		d <sub>2G</sub>	D <sub>m</sub>	b <sub>1</sub>	D <sub>a</sub>	m	n
<b>KM0</b>	MB0	0,005	<b>M10X0,75</b>	18	4	13,5	3	2
<b>KM1</b>	MB1	0,007	<b>M12X1</b>	22	4	17	3	2
<b>KM2</b>	MB2	0,01	<b>M15X1</b>	25	5	21	4	2
<b>KM3</b>	MB3	0,02	<b>M17X1</b>	28	5	24	4	2
<b>KM4</b>	MB4	0,019	<b>M20X1</b>	32	6	26	4	2
<b>KM5</b>	MB5	0,025	<b>M25X1,5</b>	38	7	32	5	2
<b>KM6</b>	MB6	0,043	<b>M30X1,5</b>	45	7	38	5	2
<b>KM7</b>	MB7	0,07	<b>M35X1,5</b>	52	8	44	5	2
<b>KM8</b>	MB8	0,085	<b>M40X1,5</b>	58	9	50	6	2,5
<b>KM9</b>	MB9	0,119	<b>M45X1,5</b>	65	10	56	6	2,5
<b>KM10</b>	MB10	0,148	<b>M50X1,5</b>	70	11	61	6	2,5
<b>KM11</b>	MB11	0,158	<b>M55X2</b>	75	11	67	7	3
<b>KM12</b>	MB12	0,18	<b>M60X2</b>	80	11	73	7	3
<b>KM13</b>	MB13	0,22	<b>M65X2</b>	85	12	79	7	3
<b>KM14</b>	MB14	0,26	<b>M70X2</b>	92	12	85	8	3,5
<b>KM15</b>	MB15	0,3	<b>M75X2</b>	98	13	90	8	3,5
<b>KM16</b>	MB16	0,4	<b>M80X2</b>	105	15	95	8	3,5
<b>KM17</b>	MB17	0,46	<b>M85X2</b>	110	16	102	8	3,5
<b>KM18</b>	MB18	0,6	<b>M90X2</b>	120	16	108	10	4
<b>KM19</b>	MB19	0,658	<b>M95X2</b>	125	17	113	10	4
<b>KM20</b>	MB20	0,73	<b>M100X2</b>	130	18	120	10	4
<b>KM21</b>	MB21	0,87	<b>M105X2</b>	140	18	126	12	5
<b>KM22</b>	MB22	0,965	<b>M110X2</b>	145	19	133	12	5
<b>KM23</b>	MB23	1,01	<b>M115X2</b>	150	19	137	12	5
<b>KML24</b>	MBL24	0,79	<b>M120X2</b>	145	20	135	12	5
<b>KM24</b>	MB24	1,08	<b>M120X2</b>	155	20	138	12	5
<b>KM25</b>	MB25	1,22	<b>M125X2</b>	160	21	148	12	5
<b>KML26</b>	MBL26	0,9	<b>M130X2</b>	155	21	145	12	5
<b>KM26</b>	MB26	1,24	<b>M130X2</b>	165	21	149	12	5
<b>KM27</b>	MB27	1,55	<b>M135X2</b>	175	22	160	14	6
<b>KML28</b>	MBL28	1,01	<b>M140X2</b>	165	22	155	12	5
<b>KM28</b>	MB28	1,56	<b>M140X2</b>	180	22	160	14	6
<b>KM29</b>	MB29	2,05	<b>M145X2</b>	190	24	171	14	6

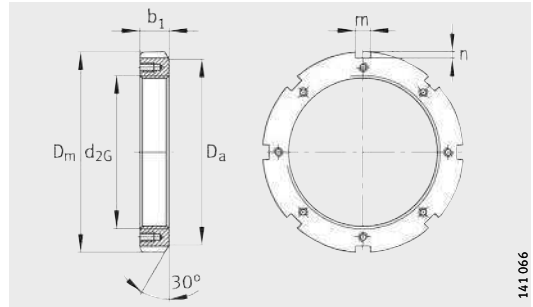




HM30, HM31

Dimension table (continued) - Dimensions in mm								
Designation		Mass m ≈kg	Dimensions			Mounting dimensions		
Nut	Suitable retainer		d <sub>2G</sub>	D <sub>m</sub>	b <sub>1</sub>	D <sub>a</sub>	m	n
<b>KML30</b>	MBL30	1,44	<b>M150X2</b>	180	24	170	14	5
<b>KM30</b>	MB30	2,06	<b>M150X2</b>	195	24	171	14	6
<b>KM31</b>	MB31	2,27	<b>M155X3</b>	200	25	182	16	7
<b>KML32</b>	MBL32	1,62	<b>M160X3</b>	190	25	180	14	5
<b>KM32</b>	MB32	2,52	<b>M160X3</b>	210	25	182	16	7
<b>KM33</b>	MB33	2,7	<b>M165X3</b>	210	26	193	16	7
<b>KML34</b>	MBL34	1,72	<b>M170X3</b>	200	26	190	16	5
<b>KM34</b>	MB34	2,8	<b>M170X3</b>	220	26	193	16	7
<b>KML36</b>	MBL36	1,96	<b>M180X3</b>	210	27	200	16	5
<b>KM36</b>	MB36	3,04	<b>M180X3</b>	230	27	203	18	8
<b>KML38</b>	MBL38	2,13	<b>M190X3</b>	220	28	210	16	5
<b>KM38</b>	MB38	3,34	<b>M190X3</b>	240	28	214	18	8
<b>KML40</b>	MBL40	2,9	<b>M200X3</b>	240	29	220	18	8
<b>KM40</b>	MB40	3,69	<b>M200X3</b>	250	29	226	18	8
<b>HM3044</b>	MS3044	3,21	<b>Tr220X4</b>	260	30	242	20	9
<b>HM44T</b>	MB44	5,3	<b>Tr220X4</b>	280	32	250	20	10
<b>HM3144</b>	MS3144	4,93	<b>Tr220X4</b>	280	32	250	20	10
<b>HM3048</b>	MS3048	5,12	<b>Tr240X4</b>	290	34	270	20	10
<b>HM48T</b>	MB48	6,15	<b>Tr240X4</b>	300	34	270	20	10
<b>HM3148</b>	MS3144	5,75	<b>Tr240X4</b>	300	34	270	20	10
<b>HM3052</b>	MS3048	5,54	<b>Tr260X4</b>	310	34	290	20	10
<b>HM52T</b>	MB52	8,05	<b>Tr260X4</b>	330	35	300	24	12
<b>HM3152</b>	MS3152	7,43	<b>Tr260X4</b>	330	36	300	24	12
<b>HM3056</b>	MS3056	6,61	<b>Tr280X4</b>	330	38	310	24	10
<b>HM56T</b>	MB56	8,9	<b>Tr280X4</b>	350	36	320	24	12
<b>HM3156</b>	MS3152	8,26	<b>Tr280X4</b>	350	38	320	24	12
<b>HM3060</b>	MS3060	9,48	<b>Tr300X4</b>	360	42	336	24	12
<b>HM3160</b>	MS3160	11,4	<b>Tr300X4</b>	380	40	340	24	12
<b>HM3064</b>	MS3064	10,1	<b>Tr320X5</b>	380	42	356	24	12
<b>HM3164</b>	MS3164	12,8	<b>Tr320X5</b>	400	42	360	24	12
<b>HM3068</b>	MS3064	11,5	<b>Tr340X5</b>	400	45	376	24	12
<b>HM3168</b>	MS3168	23	<b>Tr340X5</b>	440	55	400	28	15
<b>HM3072</b>	MS3072	11,9	<b>Tr360X5</b>	420	45	394	28	13
<b>HM3172</b>	MS3168	25,7	<b>Tr360X5</b>	460	58	420	28	15
<b>HM3076</b>	MS3076	15,9	<b>Tr380X5</b>	450	48	422	28	14
<b>HM3176</b>	MS3176	30	<b>Tr380X5</b>	490	60	440	32	18

# Locknuts



HM30, HM31

141.066

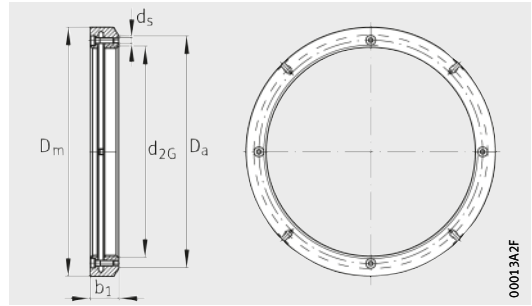
Dimension table (continued) · Dimensions in mm								
Designation		Mass m ≈kg	Dimensions			Mounting dimensions		
Nut	Suitable retainer		$d_{2G}$	$D_m$	$b_1$	$D_a$	m	n
<b>HM3080</b>	MS3076	18,2	<b>Tr400X5</b>	470	52	442	28	14
<b>HM3180</b>	MS3180	35,7	<b>Tr400X5</b>	520	62	460	32	18
<b>HM3084</b>	MS3084	18,9	<b>Tr420X5</b>	490	52	462	32	14
<b>HM3184</b>	MS3180	43,4	<b>Tr420X5</b>	540	70	490	32	18
<b>HM3088</b>	MS3088	26,5	<b>Tr440X5</b>	520	60	490	32	15
<b>HM3188</b>	MS3188	44,3	<b>Tr440X5</b>	560	70	510	36	20
<b>HM3092</b>	MS3088	27,7	<b>Tr460X5</b>	540	60	510	32	15
<b>HM3192</b>	MS3188	53,8	<b>Tr460X5</b>	580	75	540	36	20
<b>HM3096</b>	MS3096	28,7	<b>Tr480X5</b>	560	60	530	36	15
<b>HM3196</b>	MS3196	62,2	<b>Tr480X5</b>	620	75	560	36	20
<b>HM30/500</b>	MS3096	34	<b>Tr500X5</b>	580	68	550	36	15
<b>HM31/500</b>	MS31/500	62,1	<b>Tr500X5</b>	630	80	580	40	23
<b>HM30/530</b>	MS30/530	44,7	<b>Tr530X6</b>	630	68	590	40	20
<b>HM31/530</b>	MS31/530	71,2	<b>Tr530X6</b>	670	80	610	40	23
<b>HM30/560</b>	MS30/560	46,2	<b>Tr560X6</b>	650	75	610	40	20
<b>HM31/560</b>	MS31/560	85,6	<b>Tr560X6</b>	710	85	650	45	25
<b>HM30/600</b>	MS30/530	55,9	<b>Tr600X6</b>	700	75	660	40	20
<b>HM31/600</b>	MS31/560	91,7	<b>Tr600X6</b>	750	85	690	45	25
<b>HM30/630</b>	MS30/630	58,3	<b>Tr630X6</b>	730	75	690	45	20
<b>HM31/630</b>	MS31/630	122	<b>Tr630X6</b>	800	95	730	50	28
<b>HM30/670</b>	MS30/670	73,8	<b>Tr670X6</b>	780	80	740	45	20
<b>HM31/670</b>	MS31/670	156	<b>Tr670X6</b>	850	106	775	50	28
<b>HM30/710</b>	MS30/710	94,8	<b>Tr710X7</b>	830	90	780	50	25
<b>HM31/710</b>	MS31/710	173	<b>Tr710X7</b>	900	106	825	55	30
<b>HM30/750</b>	MS30/750	99,5	<b>Tr750X7</b>	870	90	820	55	25
<b>HM31/750</b>	MS31/750	202	<b>Tr750X7</b>	950	112	875	60	34
<b>HM30/800</b>	MS30/750	106	<b>Tr800X7</b>	920	90	870	55	25
<b>HM31/800</b>	MS31/750	215	<b>Tr800X7</b>	1000	112	925	60	34
<b>HM30/850</b>	MS30/850	113	<b>Tr850X7</b>	980	90	925	60	25
<b>HM31/850</b>	MS31/850	246	<b>Tr850X7</b>	1060	118	975	70	38
<b>HM30/900</b>	MS30/850	135	<b>Tr900X7</b>	1030	100	975	60	25
<b>HM31/900</b>	MS31/900	293	<b>Tr900X7</b>	1120	125	1030	70	38
<b>HM30/950</b>	MS30/950	143	<b>Tr950X8</b>	1080	100	1025	60	25
<b>HM31/950</b>	MS31/950	310	<b>Tr950X8</b>	1170	125	1080	70	38

**Dimension table** (continued) - Dimensions in mm

Designation		Mass m ≈kg	Dimensions			Mounting dimensions		
Nut	Suitable retainer		d <sub>2G</sub>	D <sub>m</sub>	b <sub>1</sub>	D <sub>a</sub>	m	n
<b>HM30/1000</b>	MS30/1000	165	<b>Tr1000X8</b>	1 140	100	1 085	60	25
<b>HM31/1000</b>	MS31/1000	361	<b>Tr1000X8</b>	1 240	125	1 140	70	38
<b>HM30/1060</b>	MS30/1000	175	<b>Tr1060X8</b>	1 200	100	1 145	60	25
<b>HM31/1060</b>	MS31/1000	386	<b>Tr1060X8</b>	1 300	125	1 210	70	38
<b>HM30/1120</b>	MS30/1000	185	<b>Tr1120X8</b>	1 260	100	1 205	60	25
<b>HM31/1120</b>	MS31/1000	427	<b>Tr1120X8</b>	1 360	125	1 270	70	38
<b>HM30/1180</b>	MS30/1000	196	<b>Tr1180X8</b>	1 320	100	1 265	60	25
<b>HM31/1180</b>	MS31/1000	459	<b>Tr1180X8</b>	1 420	125	1 330	70	38
<b>HM30/1250</b>	MS30/1000	233	<b>Tr1250X8</b>	1 390	110	1 335	60	25
<b>HM31/1250</b>	MS31/1000	485	<b>Tr1250X8</b>	1 490	125	1 400	70	38
<b>HM30/1320</b>	MS30/1000	245	<b>Tr1320X8</b>	1 460	110	1 405	60	25
<b>HM31/1320</b>	MS31/1000	511	<b>Tr1320X8</b>	1 560	125	1 470	70	38
<b>HM30/1400</b>	MS30/1000	259	<b>Tr1400X8</b>	1 540	110	1 485	60	25
<b>HM31/1400</b>	MS31/1000	562	<b>Tr1400X8</b>	1 640	130	1 550	70	38
<b>HM30/1500</b>	MS30/1500	297	<b>Tr1500X8</b>	1 650	110	1 595	60	25
<b>HM31/1500</b>	MS31/1000	601	<b>Tr1500X8</b>	1 740	130	1 650	70	38



# Shaft nuts



HMZ, HMZ30

**Dimension table** - Dimensions in mm

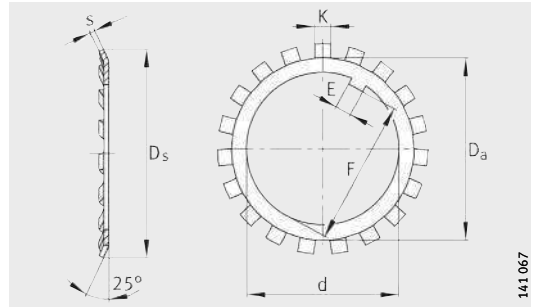
Designation	Mass m ≈kg	Dimensions					Clamping screw Quantity	Tightening torque per clamping screw M <sub>aL</sub> Nm
		d <sub>2G</sub>	D <sub>m</sub>	b <sub>1</sub>	D <sub>a</sub>	d <sub>s</sub>		
HMZ18	0,6	M90x2	120	16	108	M5	4	6
HMZ19	0,7	M95x2	125	17	113	M5	4	6
HMZ20	0,8	M100x2	130	18	120	M6	4	11
HMZ21	0,9	M105x2	140	18	126	M6	4	11
HMZ22	1	M110x2	145	19	133	M6	4	11
HMZ23	1,1	M115x2	150	19	137	M6	4	11
HMZ24	1,1	M120x2	155	20	138	M6	4	11
HMZ25	1,3	M125x2	160	21	148	M6	4	11
HMZ26	1,3	M130x2	165	21	149	M6	4	11
HMZ27	1,6	M135x2	175	22	160	M6	4	11
HMZ28	1,6	M140x2	180	22	160	M6	4	11
HMZ29	2,2	M145x2	190	24	171	M6	4	11
HMZ30	2,2	M150x2	195	24	171	M6	4	11
HMZ31	2,4	M155x3	200	25	182	M6	4	11
HMZ32	2,6	M160x3	210	25	182	M6	4	11
HMZ33	2,8	M165x3	210	26	193	M8	4	27
HMZ34	2,9	M170x3	220	26	193	M8	4	27
HMZ36	3,2	M180x3	230	27	203	M8	4	27
HMZ38	3,5	M190x3	240	28	214	M8	4	27
HMZ40	3,9	M200x3	250	29	226	M8	4	27
HMZ3044	3,4	Tr220x4	260	30	242	M8	4	27
HMZ3048	5,4	Tr240x4	290	34	270	M10	4	54
HMZ3052	5,8	Tr260x4	310	34	290	M10	4	54
HMZ3056	6,9	Tr280x4	330	38	310	M10	4	54
HMZ3060	10	Tr300x4	360	42	336	M10	4	54
HMZ3064	10,6	Tr320x5	380	42	356	M10	4	54
HMZ3068	12,1	Tr340x5	400	45	376	M12	4	93
HMZ3072	12,5	Tr360x5	420	45	394	M12	4	93
HMZ3076	16,7	Tr380x5	450	48	422	M12	4	93
HMZ3080	19,1	Tr400x5	470	52	442	M16	4	230
HMZ3084	19,8	Tr420x5	490	52	462	M16	4	230
HMZ3088	27,8	Tr440x5	520	60	490	M16	4	230
HMZ3092	29,1	Tr460x5	540	60	510	M16	4	230
HMZ3096	30,1	Tr480x5	560	60	530	M16	4	230
HMZ30/500	35,7	Tr500x5	580	68	550	M20	4	464

**Dimension table** (continued) - Dimensions in mm

Designation	Mass m ≈kg	Dimensions					Clamping screw Quantity	Tightening torque per clamping screw M <sub>aL</sub> Nm
		d <sub>2G</sub>	D <sub>m</sub>	b <sub>1</sub>	D <sub>a</sub>	d <sub>s</sub>		
<b>HMZ30/530</b>	46,9	<b>Tr530x6</b>	630	68	590	M20	4	464
<b>HMZ30/560</b>	48,5	<b>Tr560x6</b>	650	75	610	M20	4	464
<b>HMZ30/600</b>	58,7	<b>Tr600x6</b>	700	75	660	M20	4	464
<b>HMZ30/630</b>	61,2	<b>Tr630x6</b>	730	75	690	M20	4	464
<b>HMZ30/670</b>	77,5	<b>Tr670x6</b>	780	80	740	M20	4	464
<b>HMZ30/710</b>	99,5	<b>Tr710x7</b>	830	90	780	M20	4	464
<b>HMZ30/750</b>	105	<b>Tr750x7</b>	870	90	820	M20	4	464
<b>HMZ30/800</b>	111	<b>Tr800x7</b>	920	90	870	M20	4	464
<b>HMZ30/850</b>	119	<b>Tr850x7</b>	980	90	925	M20	4	464
<b>HMZ30/900</b>	142	<b>Tr900x7</b>	1 030	100	975	M24	8	798
<b>HMZ30/950</b>	150	<b>Tr950x8</b>	1 080	100	1 025	M24	8	798
<b>HMZ30/1000</b>	173	<b>Tr1000x8</b>	1 140	100	1 085	M24	8	798
<b>HMZ30/1060</b>	184	<b>Tr1060x8</b>	1 200	100	1 145	M24	8	798
<b>HMZ30/1120</b>	194	<b>Tr1120x8</b>	1 260	100	1 205	M24	8	798
<b>HMZ30/1180</b>	206	<b>Tr1180x8</b>	1 320	100	1 265	M24	8	798
<b>HMZ30/1250</b>	245	<b>Tr1250x8</b>	1 390	110	1 335	M24	8	798
<b>HMZ30/1320</b>	257	<b>Tr1320x8</b>	1 460	110	1 405	M24	8	798
<b>HMZ30/1400</b>	272	<b>Tr1400x8</b>	1 540	110	1 485	M24	8	798
<b>HMZ30/1500</b>	312	<b>Tr1500x8</b>	1 650	110	1 595	M24	8	798



# Tab washers



MB, MBL

1411067

**Dimension table** - Dimensions in mm

Designation	Mass m 100 piece ≈kg	Dimensions			Mounting dimensions			
		d	D <sub>s</sub> ≈	s	D <sub>a</sub>	E <sup>1)</sup>	F	K
<b>MB0</b>	0,13	<b>10</b>	21	1	13,5	3	8,5	3
<b>MB1</b>	0,192	<b>12</b>	25	1	17	3	10,5	3
<b>MB2</b>	0,253	<b>15</b>	28	1	21	4	13,5	4
<b>MB3</b>	0,313	<b>17</b>	32	1	24	4	15,5	4
<b>MB4</b>	0,35	<b>20</b>	36	1	26	4	18,5	4
<b>MB5</b>	0,64	<b>25</b>	42	1,25	32	5	23	5
<b>MB6</b>	0,78	<b>30</b>	49	1,25	38	5	27,5	5
<b>MB7</b>	1,04	<b>35</b>	57	1,04	44	6	32,5	5
<b>MB8</b>	1,23	<b>40</b>	62	1,25	50	6	37,5	6
<b>MB9</b>	1,52	<b>45</b>	69	1,25	56	6	42,5	6
<b>MB10</b>	1,6	<b>50</b>	74	1,25	61	6	47,5	6
<b>MB11</b>	1,96	<b>55</b>	81	1	67	8	52,5	7
<b>MB12</b>	2,53	<b>60</b>	86	1	73	8	57,5	7
<b>MB13</b>	2,9	<b>65</b>	92	1	79	8	62,5	7
<b>MB14</b>	3,34	<b>70</b>	98	1	85	8	66,5	8
<b>MB15</b>	3,6	<b>75</b>	104	1	90	8	71,5	8
<b>MB16</b>	4,64	<b>80</b>	112	1,8	95	10	76,5	8
<b>MB17</b>	5,24	<b>85</b>	119	1,8	102	10	81,5	8
<b>MB18</b>	6,23	<b>90</b>	126	1,8	108	10	86,5	10
<b>MB19</b>	6,7	<b>95</b>	133	1,8	113	10	91,5	10
<b>MB20</b>	7,65	<b>100</b>	142	1,8	120	12	96,5	10
<b>MB21</b>	8,26	<b>105</b>	145	1,75	126	12	100,5	12
<b>MB22</b>	9,4	<b>110</b>	154	1,75	133	12	105,5	12
<b>MB23</b>	10,8	<b>115</b>	159	2	137	12	110,5	12
<b>MBL24</b>	7,7	<b>120</b>	151	2	135	14	115	12
<b>MB24</b>	10,5	<b>120</b>	164	2	138	14	115	12
<b>MB25</b>	11,8	<b>125</b>	170	2	148	14	120	12
<b>MBL26</b>	8,7	<b>130</b>	161	2	145	14	125	12
<b>MB26</b>	11,3	<b>130</b>	175	2	149	14	125	12
<b>MB27</b>	14,4	<b>135</b>	185	2	160	14	130	14

<sup>1)</sup> The dimension E can be used as a minimum dimension for the slot width in shafts.

**Dimension table** (continued) - Dimensions in mm

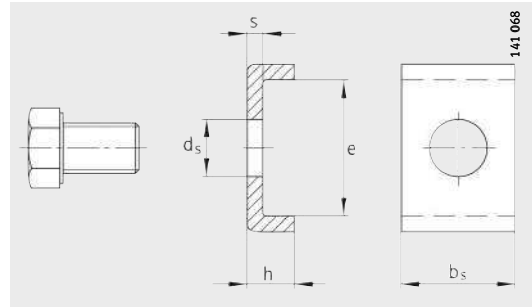
Designation	Mass m 100 piece ≈kg	Dimensions			Mounting dimensions			
		d	D <sub>s</sub> ≈	s	D <sub>a</sub>	E <sup>1)</sup>	F	K
<b>MBL28</b>	10,9	<b>140</b>	171	2	155	16	135	12
<b>MB28</b>	14,2	<b>140</b>	192	2	160	16	135	14
<b>MB29</b>	16,8	<b>145</b>	202	2	171	16	140	14
<b>MBL30</b>	11,3	<b>150</b>	188	2	170	16	145	14
<b>MB30</b>	15,5	<b>150</b>	205	2	171	16	145	14
<b>MB31</b>	20,9	<b>155</b>	212	2,5	182	16	147,5	16
<b>MBL32</b>	16,2	<b>160</b>	199	2,5	180	18	154	14
<b>MB32</b>	22,2	<b>160</b>	217	2,5	182	18	154	16
<b>MB33</b>	24,1	<b>165</b>	222	2,5	193	18	157,5	16
<b>MBL34</b>	17	<b>170</b>	211	2,5	190	18	164	16
<b>MB34</b>	24,7	<b>170</b>	232	2,5	193	18	164	16
<b>MBL36</b>	18	<b>180</b>	221	2,5	200	20	174	16
<b>MB36</b>	26,8	<b>180</b>	242	2,5	203	20	174	18
<b>MBL38</b>	20,5	<b>190</b>	231	2,5	210	20	184	16
<b>MB38</b>	27,8	<b>190</b>	252	2,5	214	20	184	18
<b>MBL40</b>	21,4	<b>200</b>	248	2,5	222	20	194	18
<b>MB40</b>	29,3	<b>200</b>	262	2,5	226	20	194	18
<b>MB44</b>	40	<b>220</b>	292	3	250	24	213	20
<b>MB48</b>	40	<b>240</b>	312	3	270	24	233	20
<b>MB52</b>	60	<b>260</b>	342	3	300	28	253	24
<b>MB56</b>	62	<b>280</b>	362	3	320	28	273	24

1) The dimension E can be used as a minimum dimension for the slot width in shafts.



# Retaining brackets

With hexagon head cap screw

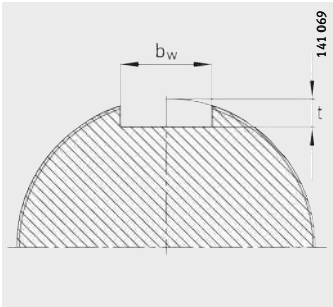


**Dimension table** - Dimensions in mm

Designation		Tightening torque Nm	Mass m ≈kg	Dimensions					Mounting dimensions Shaft slot	
Retaining bracket Complete	Hexagon head cap screw <sup>1)</sup>			s	b <sub>s</sub>	h	d <sub>s</sub>	e	b <sub>w</sub>	t
<b>MS3044</b>	M6X10	10	0,026	4	20	12	7	13,5	22	9
<b>MS3144</b>	M8X16	25	0,038	4	20	12	9	22,5	22	9
<b>MS3048</b>	M8X16	25	0,035	4	20	12	9	17,5	22	9
<b>MS3152</b>	M10X20	51	0,056	4	24	12	11	25,5	26	9
<b>MS3056</b>	M8X16	25	0,04	4	24	12	9	17,5	26	9
<b>MS3060</b>	M8X16	25	0,043	4	24	12	9	20,5	26	9
<b>MS3160</b>	M10X20	51	0,059	4	24	12	12	30,5	26	9
<b>MS3064</b>	M8X16	25	0,057	5	24	15	9	21	26	10
<b>MS3164</b>	M10X20	51	0,074	5	24	15	12	31	26	10
<b>MS3168</b>	M12X22	87	0,115	5	28	15	14	38	30	10
<b>MS3072</b>	M8X16	25	0,064	5	28	15	9	20	30	10
<b>MS3076</b>	M10X20	51	0,076	5	28	15	12	24	30	10
<b>MS3176</b>	M12X22	87	0,115	5	32	15	14	40	34	10
<b>MS3180</b>	M16X25	215	0,154	5	32	15	18	45	34	10
<b>MS3084</b>	M10X20	51	0,085	5	32	15	12	24	34	10
<b>MS3088</b>	M12X22	87	0,1	5	32	15	14	28	34	10
<b>MS3188</b>	M16X25	215	0,163	5	36	15	18	43	38	10
<b>MS3096</b>	M12X22	87	0,109	5	36	15	14	28	38	12
<b>MS3196</b>	M16X25	215	0,177	5	36	15	18	53	38	12
<b>MS31/500</b>	M16X25	215	0,178	5	40	15	18	45	42	12

<sup>1)</sup> Up to thread M16: self-retaining screw.





Shaft

**Dimension table** (continued) - Dimensions in mm

Designation		Tightening torque Nm	Mass m ≈kg	Dimensions					Mounting dimensions Shaft slot	
Retaining bracket Complete	Hexagon head cap screw <sup>1)</sup>			s	b <sub>s</sub>	h	d <sub>s</sub>	e	b <sub>w</sub>	t
<b>MS30/530</b>	M16X25	215	0,223	7	40	21	18	34	42	14
<b>MS31/530</b>	M20X40	430	0,347	7	40	21	22	51	42	14
<b>MS30/560</b>	M16X25	215	0,212	7	40	21	18	29	42	14
<b>MS31/560</b>	M20X40	430	0,38	7	45	21	22	54	47	14
<b>MS30/630</b>	M16X25	215	0,244	7	45	21	18	34	47	14
<b>MS31/630</b>	M20X40	430	0,426	7	50	21	22	61	52	14
<b>MS30/670</b>	M16X25	215	0,257	7	45	21	18	39	47	14
<b>MS31/670</b>	M20X40	430	0,439	7	50	21	22	66	52	15
<b>MS30/710</b>	M16X25	215	0,279	7	50	21	18	39	52	15
<b>MS31/710</b>	M24X45	740	0,58	7	55	21	26	69	57	15
<b>MS30/750</b>	M16X25	215	0,301	7	55	21	18	39	57	15
<b>MS31/750</b>	M24X45	740	0,614	7	60	21	26	70	62	15
<b>MS30/850</b>	M20X40	430	0,426	7	60	21	22	44	62	15
<b>MS31/850</b>	M24X45	740	0,679	7	70	21	26	71	72	16
<b>MS31/900</b>	M24X45	740	0,698	7	70	21	26	76	72	16
<b>MS30/950</b>	M20X40	430	0,433	7	60	21	22	46	62	16
<b>MS31/950</b>	M24X45	740	0,706	7	70	21	26	78	72	16
<b>MS30/1000</b>	M20X40	430	0,449	7	60	21	22	51	62	16
<b>MS31/1000</b>	M24X45	740	0,744	7	70	21	26	88	72	16
<b>MS30/1500</b>	M20X40	430	0,466	7	60	21	22	56	62	16

<sup>1)</sup> Up to thread M16: self-retaining screw.  
Up to thread M20: standardised hexagon head cap screw with retainer.







**FAG**



## Rolling elements

Steel balls  
Cylindrical rollers  
Needle rollers



# Rolling elements

## **Steel balls** ..... **1510**

Balls conform to DIN 5 401-1/ISO 3 290.  
They are made from through hardened rolling bearing steel and have a surface hardness of at least 740 HV10.

Steel balls are used where moderate to high speeds occur and moderate to high axial forces and radial forces must be supported.

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## **Cylindrical rollers** ..... **1518**

Cylindrical rollers conform to DIN 5 402-1.  
They are made from through hardened rolling bearing steel and have a surface hardness of at least 670 HV.  
The rollers are designed with profiled ends and a cylindrical portion.

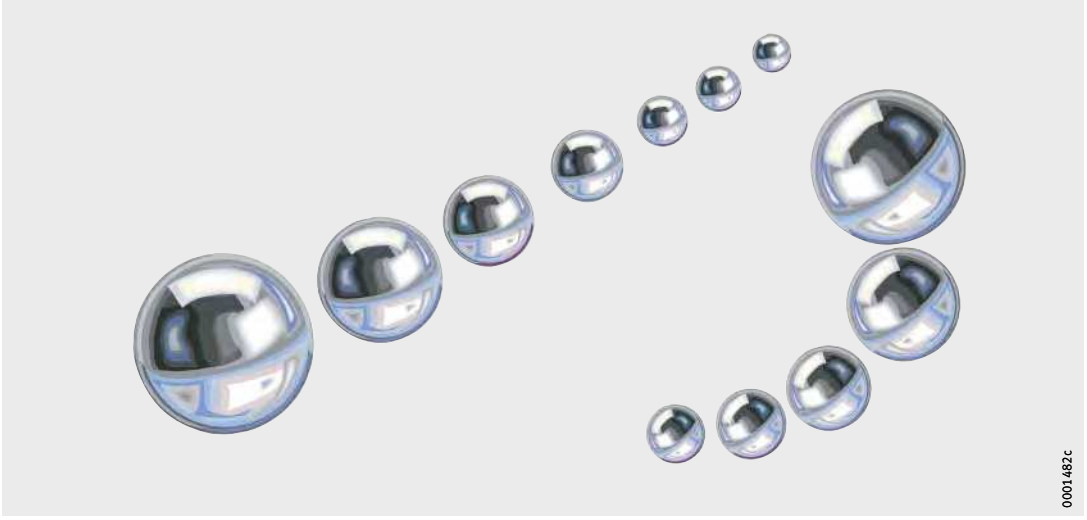
Cylindrical rollers are used where bearing arrangements are subjected to very high loads.

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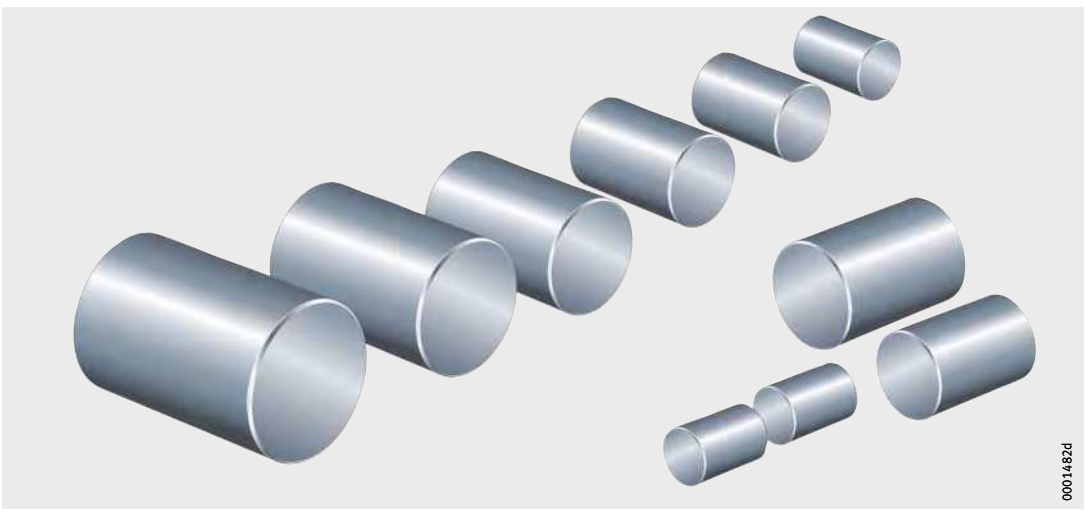
## **Needle rollers** ..... **1528**

Needle rollers conform to DIN 5 402-3/ISO 3 096, type B with flat end faces.  
They are made from through hardened rolling bearing steel, have a surface hardness of at least 670 HV and are designed with profiled ends.

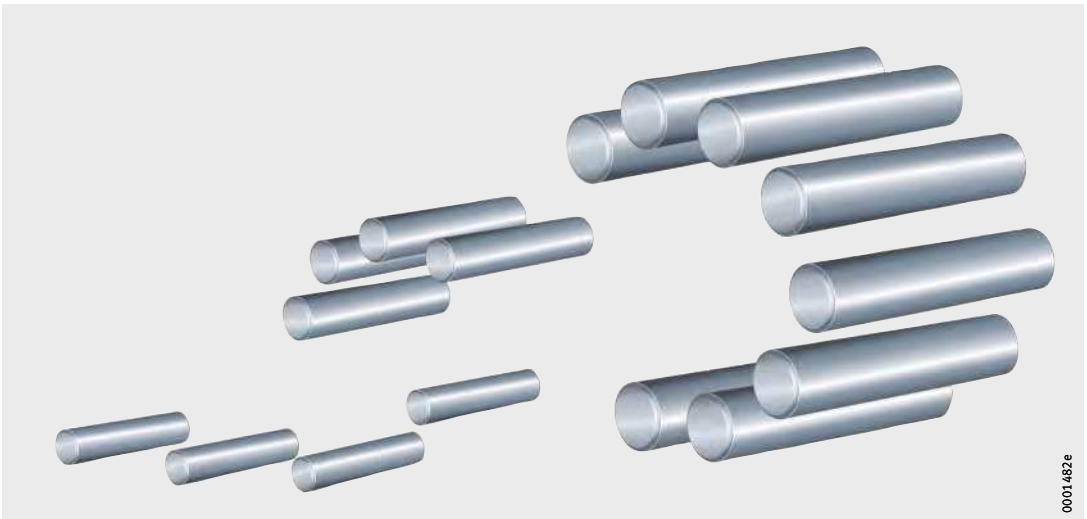
Needle rollers are used where the radial design envelope is restricted and the loads are lower than those in bearing arrangements with cylindrical rollers.



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0001452d

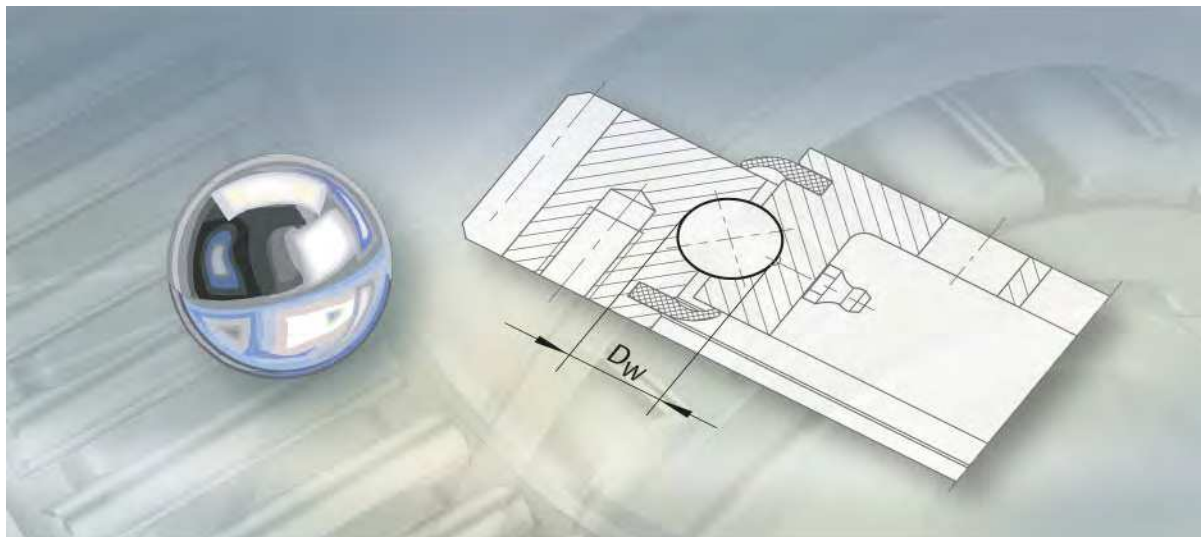


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**FAG**



**Steel balls**

# Steel balls

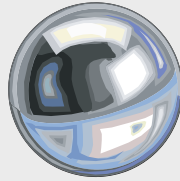
	Page
<b>Product overview</b> Steel balls .....	1512
<b>Features</b> Classes and sorts .....	1513
Applications .....	1514
Suffixes .....	1514
<b>Accuracy</b> .....	1515
<b>Dimension tables</b> Steel balls .....	1516



## Product overview **Steel balls**

### Steel balls

KUG



00010A57



# Steel balls

**Features** Steel balls are the basic elements of ball bearings. They are made from through hardened rolling bearing steel in accordance with DIN 17 230 and have a hardness of at least 740 HV10. The dimensions and tolerances conform to DIN 5 401/ISO 3 290.

**Classes and sorts** The balls are available in the grades G5, G10, G16, G20, G28, G40. The largest and smallest deviation and the geometrical tolerance are defined as a function of the diameter. The suffixes correspond to the class designations. Balls manufactured under identical conditions (batches) are sorted within a class into ball sorts with a very small diameter tolerance according to the mean batch diameter  $D_{wML}$ . Each sort is packed separately and the mean deviation is marked on the packaging. One pack contains balls of one sort only. In a delivery of balls of the same nominal dimension and class comprising several packs, the sort may differ from one pack to another. Preferred sort range in grades G10 to G40: +6 to -6.

**Designation of sorts** The sort designation is printed on the packaging:

- N for zero
- P for a positive value (stating the value)
- M for a negative value (stating the value).



Balls of only one sort should be used in one bearing arrangement.

**Mass** The mass in the dimension tables is calculated on the basis of  $\rho = 7,85 \text{ kg/dm}^3$  (DIN 5 401).

**Special designs** Balls are available by agreement in other sizes and made from other materials, such as special steels and ceramic.



# Steel balls

## Applications

Balls are used:

- in rolling bearings where moderate to high speeds occur and moderate to high axial forces and radial forces must be supported, for example in deep groove ball bearings, slewing rings, rotor bearings and linear guidance systems
- in the automotive industry, in machine building, in the electrical, DIY and household appliances industries as well as in toys and games
- in constant velocity joints and as valve balls.

## Suffixes

Suffixes for available grades: see table.

## Available designs

Suffix	Description	Design
G5	Grade G5	Standard
G10	Grade G10	
G16	Grade G16	
G20	Grade G20	
G28	Grade G28	
G40	Grade G40	
–	Made from special steels or ceramic	Special design, available by agreement

**Accuracy** The dimensional and geometrical tolerances conform to DIN 5 401/ISO 3 290.

**Grades and tolerances**

Grade	Diameter  $D_w$ mm  incl.	Ball tolerance in batch	
		Dimensional and geometrical tolerance  $V_{Dws}; t_{Dws}$ $\mu m$  max.	Roughness  $R_a$ $\mu m$ DIN  max.
G5	12,7	0,13	0,014
G10	25,4	0,25	0,02
G16	38,1	0,35	0,025
G20	50,8	0,5	0,032
G28	50,8	0,7	0,05
G40	100	1	0,06

**Grades, tolerances, sort limits**

Grade	Tolerance		Sort limit	
	of one batch  $V_{DWL}$ $\mu m$  max.	Sort interval  $I_G$ $\mu m$	$\mu m$	
			lower	upper
G5	0,25	1	-5	+5
G10	0,5	1	-9	+9
G16	0,8	1	-10	+10
G20	1	2	-10	+10
G28	1,4	2	-12	+12
G40	2	4	-16	+16

$D_w$  mm  
Nominal ball diameter

$V_{Dws}$   $\mu m$   
Variation of ball diameter;  
difference between the largest and smallest individual diameter  $D_{ws}$   
of one ball

$t_{Dws}$   $\mu m$   
Deviation from spherical form

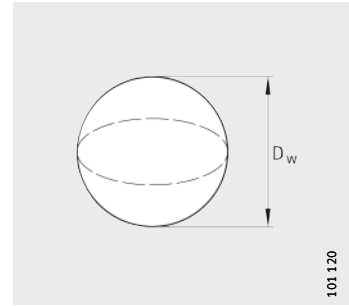
$R_a$   $\mu m$   
Mean roughness value to DIN 4 768

$V_{DWL}$   $\mu m$   
Variation of ball diameters in one batch;  
difference between the largest and smallest mean diameter  $D_{wm}$   
in one batch (G3)

$I_G$   $\mu m$   
Sort interval;  
the amount into which the permissible deviation of the balls is uniformly divided.



# Steel balls



KUG

101120

**Dimension table** · Dimensions in mm and *inch*

Designation	Mass <sup>1)</sup> m ≈kg	Dimensions	
		$D_w$ mm	inch
<b>KUG-2</b>	0,033	<b>2</b>	–
<b>KUG-2,381</b>	0,055	<b>2,381</b>	$\frac{3}{32}$
<b>KUG-2,5</b>	0,064	<b>2,5</b>	–
<b>KUG-2,778</b>	0,088	<b>2,778</b>	$\frac{7}{32}$
<b>KUG-2,778</b>	0,088	<b>2,778</b>	–
<b>KUG-3</b>	0,111	<b>3</b>	–
<b>KUG-3,175</b>	0,132	<b>3,175</b>	$\frac{1}{8}$
<b>KUG-3,5</b>	0,176	<b>3,5</b>	–
<b>KUG-3,969</b>	0,257	<b>3,969</b>	$\frac{5}{32}$
<b>KUG-4</b>	0,263	<b>4</b>	–
<b>KUG-4,5</b>	0,375	<b>4,5</b>	–
<b>KUG-4,762</b>	0,444	<b>4,762</b>	$\frac{3}{16}$
<b>KUG-5</b>	0,514	<b>5</b>	–
<b>KUG-5,5</b>	0,684	<b>5</b>	–
<b>KUG-5,556</b>	0,705	<b>5,556</b>	$\frac{7}{32}$
<b>KUG-5,953</b>	0,867	<b>5,953</b>	$\frac{15}{64}$
<b>KUG-6</b>	0,888	<b>6</b>	–
<b>KUG-6,35</b>	1,05	<b>6,350</b>	$\frac{1}{4}$
<b>KUG-6,5</b>	1,13	<b>6,5</b>	–
<b>KUG-6,747</b>	1,26	<b>6,747</b>	$\frac{17}{64}$
<b>KUG-7</b>	1,41	<b>7</b>	–
<b>KUG-7,144</b>	1,5	<b>7,144</b>	$\frac{9}{32}$
<b>KUG-7,5</b>	1,73	<b>7,5</b>	–
<b>KUG-7,938</b>	2,06	<b>7,938</b>	$\frac{5}{16}$
<b>KUG-8</b>	2,1	<b>8</b>	–
<b>KUG-8,731</b>	2,74	<b>8,731</b>	$\frac{11}{32}$
<b>KUG-9</b>	3	<b>9</b>	–
<b>KUG-9,525</b>	3,55	<b>9,525</b>	$\frac{3}{8}$

<sup>1)</sup> In each case for 1 000 pieces.

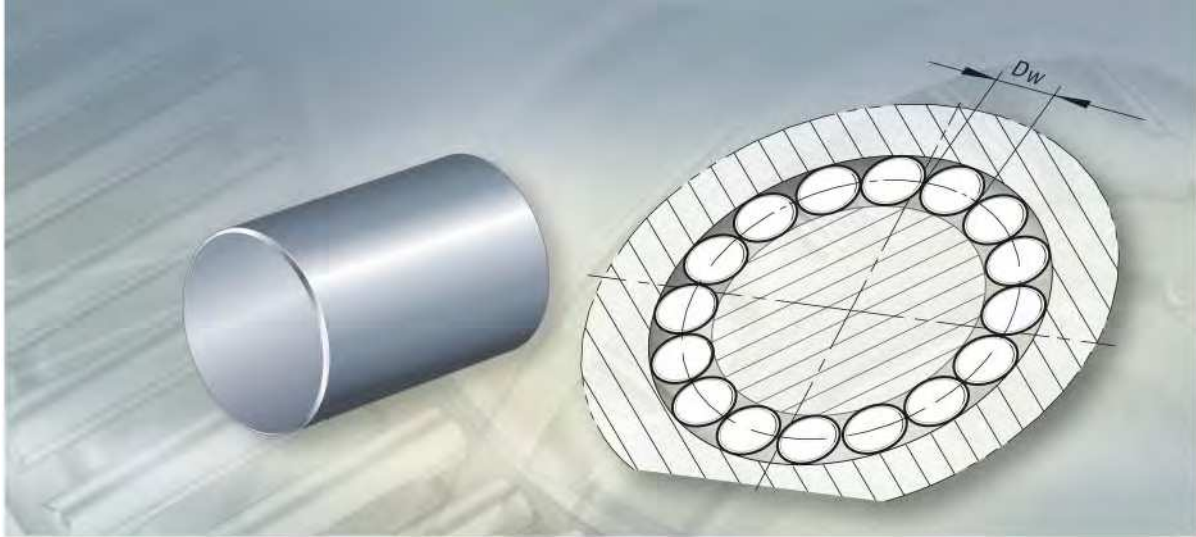
**Dimension table** (continued) · Dimensions in mm and *inch*

Designation	Mass <sup>1)</sup> m ≈kg	Dimensions	
		$D_w$ mm	inch
<b>KUG-10</b>	4,11	<b>10</b>	–
<b>KUG-10,319</b>	4,52	<b>10,319</b>	$\frac{13}{32}$
<b>KUG-10,5</b>	4,76	<b>10,5</b>	–
<b>KUG-11</b>	5,47	<b>11</b>	–
<b>KUG-11,112</b>	5,64	<b>11,112</b>	$\frac{7}{16}$
<b>KUG-11,5</b>	6,25	<b>11,5</b>	–
<b>KUG-11,906</b>	6,94	<b>11,906</b>	$\frac{15}{32}$
<b>KUG-12</b>	7,1	<b>12</b>	–
<b>KUG-12,5</b>	8,03	<b>12,5</b>	–
<b>KUG-12,7</b>	8,42	<b>12,7</b>	$\frac{1}{2}$
<b>KUG-13</b>	9,03	<b>13</b>	–
<b>KUG-13,494</b>	10,1	<b>13,494</b>	$\frac{17}{32}$
<b>KUG-14</b>	11,3	<b>14</b>	–
<b>KUG-14,288</b>	12	<b>14,288</b>	$\frac{9}{16}$
<b>KUG-15,081</b>	14,1	<b>15,081</b>	$\frac{19}{32}$
<b>KUG-15,875</b>	16,4	<b>15,875</b>	$\frac{5}{8}$
<b>KUG-16</b>	16,8	<b>16</b>	–
<b>KUG-16,669</b>	19	<b>16,669</b>	$\frac{21}{32}$
<b>KUG-17,462</b>	21,9	<b>17,462</b>	$\frac{11}{16}$
<b>KUG-17,691</b>	22,8	<b>17,691</b>	–
<b>KUG-18</b>	24	<b>18</b>	–
<b>KUG-18,256</b>	25	<b>18,256</b>	$\frac{23}{32}$
<b>KUG-19,05</b>	28,4	<b>19,05</b>	$\frac{3}{4}$
<b>KUG-19,844</b>	32,1	<b>19,844</b>	$\frac{25}{32}$
<b>KUG-20</b>	32,9	<b>20</b>	–
<b>KUG-20,638</b>	36,1	<b>20,638</b>	$\frac{13}{16}$
<b>KUG-21,431</b>	40,5	<b>21,431</b>	$\frac{27}{32}$
<b>KUG-22,225</b>	45,1	<b>22,225</b>	$\frac{7}{8}$
<b>KUG-23</b>	50	<b>23</b>	–





**FAG**



**Cylindrical rollers**

# Cylindrical rollers

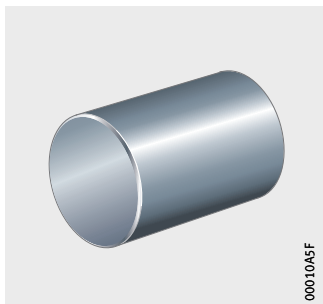
	Page
<b>Product overview</b> Cylindrical rollers.....	1520
<b>Features</b> Sorts .....	1521
Applications .....	1521
<b>Accuracy</b> .....	1522
<b>Dimension tables</b> Cylindrical rollers.....	1524



## Product overview Cylindrical rollers

### Cylindrical rollers

ZRB





# Cylindrical rollers

**Features** Cylindrical rollers are the basic elements of cylindrical roller bearings. They are made from through hardened rolling bearing steel in accordance with ISO 683-17 and have a hardness of at least 670 HV. The dimensions and tolerances conform to DIN 5 402-1. Depending on the application, the profile has either a standard or logarithmic curve. The profile, in conjunction with the profiling of the raceways, prevents edge stresses.

**Sorts** Cylindrical rollers are divided into sorts with very small diameter and length tolerances. Each sort is packed separately and the mean deviation is marked on the packaging.

One pack contains cylindrical rollers of one sort only. In a delivery comprising several packs, the sort may differ from one pack to another.

**Designation of sorts** The sort designation is printed on the packaging:

- 0 for zero
- + for a positive value (stating the value)
- – for a negative value (stating the value).



Cylindrical rollers of only one sort should be used in one bearing arrangement.

**Mass** The mass in the dimension tables is calculated on the basis of DIN 5 402.

**Special designs** Cylindrical rollers are available by agreement in other diameters and in grade G1.

**Applications** Cylindrical rollers are used:

- where bearing arrangements are subjected to very high loads
- in the automotive industry as well as in machine and gearbox building
- in linear guidance systems.



# Cylindrical rollers

## Accuracy

The standard grade conforms to GN to DIN 5 402-1.

### Chamfer dimensions of cylindrical rollers

Diameter $D_w$ mm		Chamfer dimension		
		$r_{1 \text{ min}}, r_{2 \text{ min}}^{1)}$ mm	$r_{1 \text{ max}}$ mm	$r_{2 \text{ max}}$ mm
over	incl.			
–	4	0,2	0,4	0,7
4	8	0,2	0,6	0,7
8	12	0,3	0,7	1
12	16	0,4	0,8	1,2
16	20	0,4	1	1,2
20	26	0,8	1,1	1,3
26	34	0,6	1,4	1,4
34	42	0,7	1,7	1,7
42	56	0,9	2,1	2,1
56	64	1,2	2,4	2,4
64	75	1,4	2,6	2,6
75	80	1,8	3,2	3,2

1) See dimension tables.

### Length tolerance of cylindrical rollers

Length $L_w$ mm		Deviation		Sort interval $l_G$ $\mu\text{m}$	Mean deviations Sort range and sort classifications $\mu\text{m}$					Variation of roller length of one sort $L_{WA}$ $\mu\text{m}$ max.
		upper $\mu\text{m}$	lower $\mu\text{m}$							
over	incl.									
–	48	+10	–22	6	+6	0	–6	–12	–18	8
48	–	+15	–35	10	+10	0	–10	–20	–30	10

**Diameter tolerances  
of cylindrical rollers**

Diameter $D_w$ mm		Diameter tolerance of one sort $V_{D_{wA}}$ $\mu\text{m}$	Roundness tolerance $t_{D_w}$ $\mu\text{m}$	Sort interval $I_G$ $\mu\text{m}$
over	incl.	max.	max.	
–	13,99	2	1	1
13,99	26	2	1	1
26	48	3	1,2	1,5
48	75	3	2	1,5
75	100	5	2,5	2,5

**Diameter tolerances  
of cylindrical rollers  
continued**

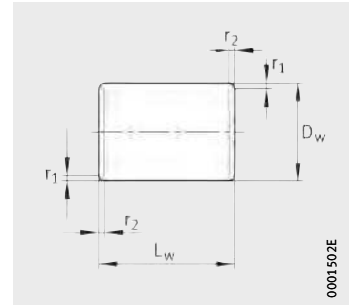
Diameter $D_w$ mm		Mean value of individual preferred sorts $\mu\text{m}$			
over	incl.				
–	13,99	–	–	–	–
13,99	26	+4	+3	+2	+1
26	48	–	+4,5	+3	+1,5
48	75	–	+4,5	+3	+1,5
75	100	–	–	+5	+2,5

**Diameter tolerances  
of cylindrical rollers  
continued**

Diameter $D_w$ mm		Mean value of individual preferred sorts $\mu\text{m}$						
over	incl.							
–	13,99	0	–1	–2	–3	–4	–5	–6
13,99	26	0	–1	–2	–3	–4	–	–
26	48	0	–1,5	–3	–4,5	–	–	–
48	75	0	–1,5	–3	–4,5	–	–	–
75	100	0	–2,5	–5	–	–	–	–



# Cylindrical rollers



ZRB

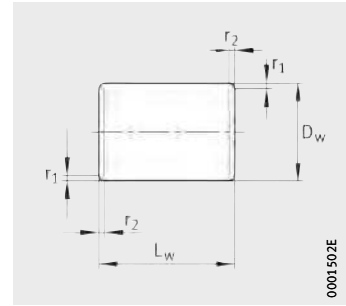
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Dimension table · Dimensions in mm			
Designation	Mass <sup>1)</sup> m ≈kg	Dimensions	
		D <sub>w</sub>	L <sub>w</sub>
ZRB3X5	0,272	3	5
ZRB4X4	0,394	4	4
ZRB4X6	0,58	4	6
ZRB4X8	0,78	4	8
ZRB5X5	0,75	5	5
ZRB5X7	1,08	5	7
ZRB5X8	1,21	5	8
ZRB5X10	1,52	5	10
ZRB5,5X5,5	1	5,5	5,5
ZRB5,5X6	1,10	5,5	6
ZRB5,5X8	1,46	5,5	8
ZRB5,5X9	1,65	5,5	9
ZRB6X6	1,3	6	6
ZRB6X8	1,78	6	8
ZRB6X9	2	6	9
ZRB6X10	2,22	6	10
ZRB6X12	2,61	6	12
ZRB6,5X6,5	1,66	6,5	6,5
ZRB6,5X7	1,79	6,5	7
ZRB6,5X9	2,3	6,5	9
ZRB6,5X10	2,56	6,5	10
ZRB7X7	2,06	7	7
ZRB7X10	2,96	7	10
ZRB7X12	3,62	7	12
ZRB7X14	4,17	7	14
ZRB7,5X7,5	2,54	7,5	7,5
ZRB7,5X9	3,12	7,5	9
ZRB7,5X11	3,74	7,5	11
ZRB8X8	3,08	8	8
ZRB8X9	3,47	8	9
ZRB8X12	4,65	8	12
ZRB8X14	5,52	8	14

<sup>1)</sup> In each case for 1000 pieces.

Dimension table (continued) · Dimensions in mm			
Designation	Mass <sup>1)</sup> m ≈kg	Dimensions	
		D <sub>w</sub>	L <sub>w</sub>
ZRB9X9	4,4	9	9
ZRB9X10	5	9	10
ZRB9X13	6,3	9	13
ZRB9X14	6,8	9	14
ZRB10X10	6	10	10
ZRB10X11	6,8	10	11
ZRB10X14	8,5	10	14
ZRB10X16	9,7	10	16
ZRB11X11	8,1	11	11
ZRB11X12	8,9	11	12
ZRB11X15	11	11	15
ZRB11X18	13,4	11	18
ZRB12X12	10,4	12	12
ZRB12X14	12,3	12	14
ZRB12X17	14,9	12	17
ZRB12X18	15,7	12	18
ZRB12X21	18,3	12	21
ZRB13X13	13,6	13	13
ZRB13X18	18,8	13	18
ZRB13X20	20,4	13	20
ZRB14X14	16,6	14	14
ZRB14X15	17,8	14	15
ZRB14X20	23,8	14	20
ZRB14X22	26,2	14	22
ZRB15X15	20,4	15	15
ZRB15X16	21,8	15	16
ZRB15X17	23,1	15	17
ZRB15X22	30	15	22
ZRB15X24	32,7	15	24
ZRB16X16	24,8	16	16
ZRB16X17	26,8	16	17
ZRB16X24	37,3	16	24
ZRB16X27	42	16	27
ZRB17X17	29,7	17	17
ZRB17X24	42	17	24

# Cylindrical rollers



ZRB

000150ZE

**Dimension table** (continued) · Dimensions in mm

Designation	Mass <sup>1)</sup> m ≈kg	Dimensions	
		D <sub>w</sub>	L <sub>w</sub>
ZRB18X18	35,7	18	18
ZRB18X19	37,7	18	19
ZRB18X26	51	18	26
ZRB18X30	59,5	18	30
ZRB19X19	41,6	19	19
ZRB19X20	43,7	19	20
ZRB19X28	61	19	28
ZRB19X32	70	19	32
ZRB20X20	48,5	20	20
ZRB20X35	85	20	35
ZRB20X40	97	20	40
ZRB21X21	56	21	21
ZRB21X22	59	21	22
ZRB21X30	80	21	30
ZRB21X32	85	21	32
ZRB22X22	64	22	22
ZRB22X24	72	22	24
ZRB22X34	100	22	34
ZRB23X23	74	23	23
ZRB23X24	77	23	24
ZRB23X32	103	23	32
ZRB23X34	112	23	34
ZRB23X36	116	23	36
ZRB24X24	84	24	24
ZRB24X26	91	24	26
ZRB24X36	126	24	36
ZRB24X38	133	24	38
ZRB25X25	95	25	25
ZRB25X27	103	25	27
ZRB25X30	114	25	30
ZRB25X36	137	25	36
ZRB25X40	152	25	40
ZRB25X52	198	25	52

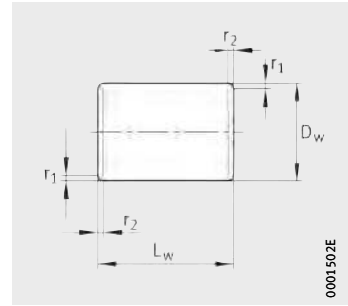
<sup>1)</sup> In each case for 1000 pieces.

**Dimension table** (continued) · Dimensions in mm

Designation	Mass <sup>1)</sup> m ≈kg	Dimensions	
		D <sub>w</sub>	L <sub>w</sub>
ZRB26X26	107	26	26
ZRB26X28	116	26	28
ZRB26X40	164	26	40
ZRB27X48	212	27	48
ZRB28X28	133	28	28
ZRB28X30	143	28	30
ZRB28X40	190	28	40
ZRB28X44	210	28	44
ZRB30X30	163	30	30
ZRB30X34	185	30	34
ZRB30X48	262	30	48
ZRB30X64	348	30	64
ZRB32X32	199	32	32
ZRB32X40	249	32	40
ZRB32X52	324	32	52
ZRB34X34	239	34	34
ZRB34X55	387	34	55
ZRB34X75	527	34	75
ZRB36X36	283	36	36
ZRB36X58	457	36	58
ZRB38X38	333	38	38
ZRB38X42	368	38	42
ZRB38X60	526	38	60
ZRB38X62	550	38	62
ZRB40X40	389	40	40
ZRB40X65	630	40	65
ZRB40X70	678	40	70
ZRB40X87	843	40	87
ZRB42X42	450	42	42
ZRB42X70	750	42	70
ZRB42X75	804	42	75
ZRB42X80	857	42	80
ZRB42X82	878	42	82
ZRB42X84	900	42	84



# Cylindrical rollers



ZRB

000150ZE

**Dimension table (continued) · Dimensions in mm**

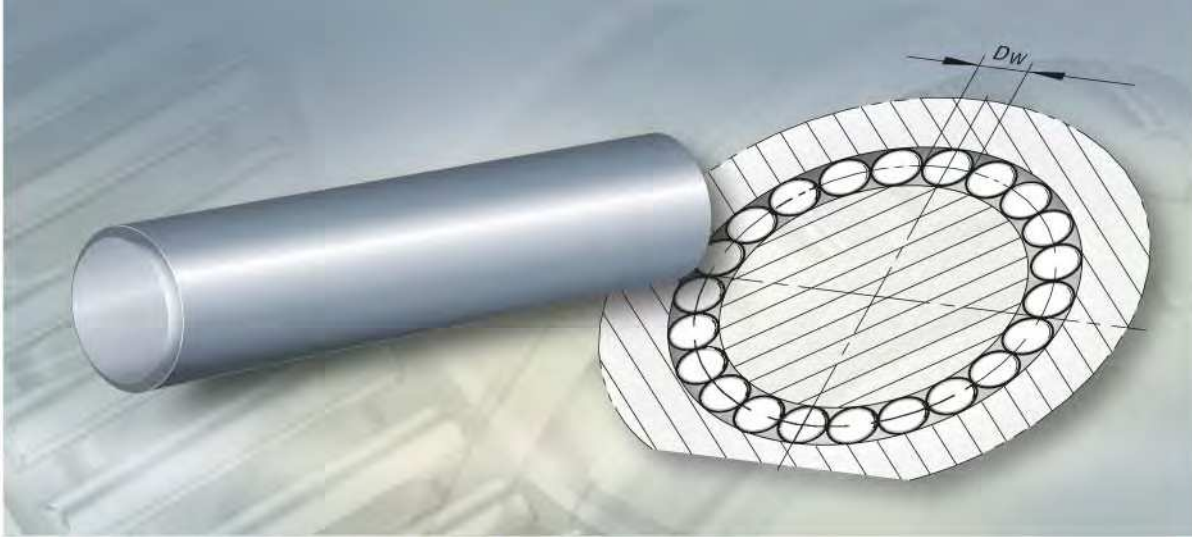
Designation	Mass <sup>1)</sup> m ≈kg	Dimensions	
		D <sub>w</sub>	L <sub>w</sub>
ZRB45X45	553	45	45
ZRB45X65	799	45	65
ZRB45X70	860	45	70
ZRB45X75	922	45	75
ZRB45X98	1 200	45	98
ZRB48X48	670	48	48
ZRB48X65	907	48	65
ZRB48X75	1 050	48	75
ZRB48X80	1 120	48	80
ZRB50X50	759	50	50
ZRB50X75	1 140	50	75
ZRB50X85	1 290	50	85
ZRB50X88	1 330	50	88
ZRB50X100	1 520	50	100
ZRB50X110	1 670	50	110
ZRB52X52	853	52	52
ZRB52X90	1 480	52	90
ZRB54X54	956	54	54
ZRB54X80	1 420	54	80
ZRB54X85	1 500	54	85
ZRB54X90	1 590	54	90
ZRB54X95	1 680	54	95
ZRB54X120	2 130	54	120
ZRB56X56	1 070	56	56
ZRB56X70	1 340	56	70
ZRB56X90	1 720	56	90
ZRB56X112	2 140	56	112
ZRB58X100	2 040	58	100
ZRB60X60	1 310	60	60
ZRB60X90	1 970	60	90
ZRB60X95	2 070	60	95
ZRB60X100	2 180	60	100
ZRB62X62	1 450	62	62
ZRB62X80	1 870	62	80

<sup>1)</sup> In each case for 1 000 pieces.

**Dimension table (continued) · Dimensions in mm**

Designation	Mass <sup>1)</sup> m ≈kg	Dimensions	
		D <sub>w</sub>	L <sub>w</sub>
ZRB64X64	1 590	64	64
ZRB64X70	1 740	64	70
ZRB64X75	1 860	64	75
ZRB64X100	2 480	64	100
ZRB64X105	2 610	64	105
ZRB64X128	3 180	64	128
ZRB64X135	3 350	64	135
ZRB68X68	1 900	68	68
ZRB68X75	2 100	68	75
ZRB68X110	3 070	68	110
ZRB70X70	2 080	70	70
ZRB70X110	3 270	70	110
ZRB72X100	3 150	72	100
ZRB75X75	2 560	75	75
ZRB75X80	2 730	75	80
ZRB75X110	3 750	75	110
ZRB75X115	3 930	75	115
ZRB75X120	4 100	75	120
ZRB75X125	4 270	75	125
ZRB75X155	5 290	75	155
ZRB80X80	3 110	80	80
ZRB80X85	3 300	80	85
ZRB80X90	3 500	80	90
ZRB80X115	4 470	80	115
ZRB80X120	4 670	80	120
ZRB80X130	5 050	80	130
ZRB80X160	6 220	80	160





## Needle rollers



# Needle rollers

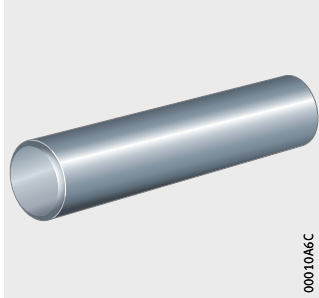
	Page
<b>Product overview</b> Needle rollers.....	1530
<b>Features</b> Sorts .....	1531
Applications.....	1531
<b>Accuracy</b> .....	1531
<b>Dimension tables</b> Needle rollers.....	1532



## Product overview Needle rollers

### Needle rollers

NRB



00010A6C

# Needle rollers

**Features** Needle rollers are the basic elements of needle roller bearings. They are made from through hardened rolling bearing steel 100Cr6 to DIN 17 230, have a hardness of at least 670 HV and conform to DIN 5 402-3/ISO 3 096-B with flat end faces.

The ends of the needle rollers are profiled. Due to this profiling, the outside surfaces have a curved transition to the end faces. This reduces the edge stresses at the ends of the rolling elements. Needle rollers are available in the diameter range from 1 mm to 6 mm, in lengths from 2 mm to 43,8 mm and in grade G2.

**Sorts** Needle rollers are divided into sorts with very small diameter tolerances. Each sort is packed separately and the mean deviation is marked on the packaging.

One pack contains needle rollers of one sort only. In a delivery comprising several packs, the sort may differ from one pack to another.



Needle rollers of only one sort should be used in one bearing arrangement.

Special designs are available by agreement.

**Applications** Needle rollers are used:

- for full complement needle roller arrangements
- in the automotive industry, in the electrical, toys and games, DIY and household appliances industries as well as in machine building.

**Accuracy** The dimensional and geometrical accuracy conforms to DIN 5 402-3/ISO 3 096.

**Dimensional and geometrical accuracy, sorts, roughness**

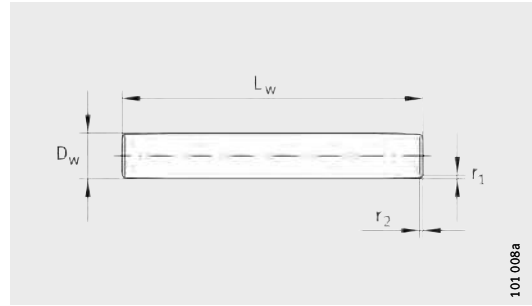
Grade	Deviations and tolerances for diameter $D_w$ <sup>1)</sup>						Roundness $t_{Dw}$ $\mu\text{m}$ max.	Roughness $R_a$ $\mu\text{m}$ max.	Length tolerance
	Deviation $\mu\text{m}$	Tolerance of one sort $\mu\text{m}$ max.	Sorts <sup>2)</sup> $\mu\text{m}$						
G2	0 – 10	2	<b>0</b> – <b>2</b>	<b>-1</b> – <b>-3</b>	<b>-2</b> – <b>-4</b>	1	0,1	h13	
			<b>-3</b> – <b>-5</b>	<b>-4</b> – <b>-6</b>	<b>-5</b> – <b>-7</b>				
			<b>-6</b> – <b>-8</b>	<b>-7</b> – <b>-9</b>	<b>-8</b> – <b>-10</b>				

<sup>1)</sup> The tolerance values apply at the centre of the needle rollers.

<sup>2)</sup> Preferred sorts are printed bold.



# Needle rollers



NRB

**Dimension table** - Dimensions in mm

Designation	Mass <sup>1)</sup> m ≈kg	Dimensions				
		D <sub>w</sub>	L <sub>w</sub>	r <sub>1</sub> r <sub>2</sub> <sup>2)</sup>		
				min.	max.	max.
<b>NRB1X7,8-G2</b>	0,048	<b>1</b>	7,8	0,1	0,4	0,6
<b>NRB1,5X5,8-G2</b>	0,081	<b>1,5</b>	5,8	0,1	0,4	0,6
<b>NRB1,5X6,8-G2</b>	0,094	<b>1,5</b>	6,8	0,1	0,4	0,6
<b>NRB1,5X7,8-G2</b>	0,108	<b>1,5</b>	7,8	0,1	0,4	0,6
<b>NRB1,5X9,8-G2</b>	0,136	<b>1,5</b>	9,8	0,1	0,4	0,6
<b>NRB1,5X11,8-G2</b>	0,164	<b>1,5</b>	11,8	0,1	0,4	0,6
<b>NRB1,5X13,8-G2</b>	0,191	<b>1,5</b>	13,8	0,1	0,4	0,6
<b>NRB2X6,3-G2</b>	0,16	<b>2</b>	6,3	0,2	0,6	0,8
<b>NRB2X7,8-G2</b>	0,19	<b>2</b>	7,8	0,2	0,6	0,8
<b>NRB2X9,8-G2</b>	0,24	<b>2</b>	9,8	0,2	0,6	0,8
<b>NRB2X11,8-G2</b>	0,29	<b>2</b>	11,8	0,2	0,6	0,8
<b>NRB2X13,8-G2</b>	0,34	<b>2</b>	13,8	0,2	0,6	0,8
<b>NRB2X15,8-G2</b>	0,39	<b>2</b>	15,8	0,2	0,6	0,8
<b>NRB2X17,8-G2</b>	0,44	<b>2</b>	17,8	0,2	0,6	0,8
<b>NRB2X19,8-G2</b>	0,49	<b>2</b>	19,8	0,2	0,6	0,8
<b>NRB2X21,8-G2</b>	0,54	<b>2</b>	21,8	0,2	0,6	0,8
<b>NRB2,5X7,8-G2</b>	0,3	<b>2,5</b>	7,8	0,2	0,6	0,8
<b>NRB2,5X9,8-G2</b>	0,38	<b>2,5</b>	9,8	0,2	0,6	0,8
<b>NRB2,5X11,8-G2</b>	0,45	<b>2,5</b>	11,8	0,2	0,6	0,8
<b>NRB2,5X13,8-G2</b>	0,53	<b>2,5</b>	13,8	0,2	0,6	0,8
<b>NRB2,5X15,8-G2</b>	0,61	<b>2,5</b>	15,8	0,2	0,6	0,8
<b>NRB2,5X17,8-G2</b>	0,69	<b>2,5</b>	17,8	0,2	0,6	0,8
<b>NRB2,5X19,8-G2</b>	0,76	<b>2,5</b>	19,8	0,2	0,6	0,8
<b>NRB2,5X21,8-G2</b>	0,84	<b>2,5</b>	21,8	0,2	0,6	0,8
<b>NRB2,5X23,8-G2</b>	0,92	<b>2,5</b>	23,8	0,2	0,6	0,8
<b>NRB3X9,8-G2</b>	0,54	<b>3</b>	9,8	0,2	0,6	0,8
<b>NRB3X11,8-G2</b>	0,65	<b>3</b>	11,8	0,2	0,6	0,8
<b>NRB3X13,8-G2</b>	0,77	<b>3</b>	13,8	0,2	0,6	0,8
<b>NRB3X15,8-G2</b>	0,88	<b>3</b>	15,8	0,2	0,6	0,8
<b>NRB3X17,8-G2</b>	0,99	<b>3</b>	17,8	0,2	0,6	0,8
<b>NRB3X19,8-G2</b>	1,1	<b>3</b>	19,8	0,2	0,6	0,8
<b>NRB3X21,8-G2</b>	1,21	<b>3</b>	21,8	0,2	0,6	0,8
<b>NRB3X23,8-G2</b>	1,32	<b>3</b>	23,8	0,2	0,6	0,8

<sup>1)</sup> In each case for 1000 pieces.

<sup>2)</sup> Mean values; the transition to the profiled outside surface can only be estimated.

**Dimension table** - Dimensions in mm

Designation	Mass <sup>1)</sup> m ≈kg	Dimensions				
		D <sub>w</sub>	L <sub>w</sub>	r <sub>1</sub> r <sub>2</sub> <sup>2)</sup>		
				min.	max.	max.
<b>NRB3,5X11,8-G2</b>	0,89	<b>3,5</b>	11,8	0,3	0,8	1
<b>NRB3,5X13,8-G2</b>	1,04	<b>3,5</b>	13,8	0,3	0,8	1
<b>NRB3,5X15,8-G2</b>	1,19	<b>3,5</b>	15,8	0,3	0,8	1
<b>NRB3,5X17,8-G2</b>	1,34	<b>3,5</b>	17,8	0,3	0,8	1
<b>NRB3,5X19,8-G2</b>	1,5	<b>3,5</b>	19,8	0,3	0,8	1
<b>NRB3,5X21,8-G2</b>	1,65	<b>3,5</b>	21,8	0,3	0,8	1
<b>NRB3,5X29,8-G2</b>	2,25	<b>3,5</b>	29,8	0,3	0,8	1
<b>NRB3,5X34,8-G2</b>	2,63	<b>3,5</b>	34,8	0,3	0,8	1
<b>NRB4X11,8-G2</b>	1,16	<b>4</b>	11,8	0,3	0,8	1
<b>NRB4X13,8-G2</b>	1,36	<b>4</b>	13,8	0,3	0,8	1
<b>NRB4X15,8-G2</b>	1,56	<b>4</b>	15,8	0,3	0,8	1
<b>NRB4X17,8-G2</b>	1,76	<b>4</b>	17,8	0,3	0,8	1
<b>NRB4X19,8-G2</b>	1,95	<b>4</b>	19,8	0,3	0,8	1
<b>NRB4X21,8-G2</b>	2,15	<b>4</b>	21,8	0,3	0,8	1
<b>NRB4X23,8-G2</b>	2,35	<b>4</b>	23,8	0,3	0,8	1
<b>NRB4X25,8-G2</b>	2,55	<b>4</b>	25,8	0,3	0,8	1
<b>NRB4X27,8-G2</b>	2,74	<b>4</b>	27,8	0,3	0,8	1
<b>NRB4X29,8-G2</b>	2,94	<b>4</b>	29,8	0,3	0,8	1
<b>NRB4X34,8-G2</b>	3,43	<b>4</b>	34,8	0,3	0,8	1
<b>NRB4X39,8-G2</b>	3,93	<b>4</b>	39,8	0,3	0,8	1
<b>NRB5X15,8-G2</b>	2,44	<b>5</b>	15,8	0,3	0,8	1
<b>NRB5X19,8-G2</b>	3,05	<b>5</b>	19,8	0,3	0,8	1
<b>NRB5X21,8-G2</b>	3,36	<b>5</b>	21,8	0,3	0,8	1
<b>NRB5X23,8-G2</b>	3,67	<b>5</b>	23,8	0,3	0,8	1
<b>NRB5X25,8-G2</b>	3,98	<b>5</b>	25,8	0,3	0,8	1
<b>NRB5X27,8-G2</b>	4,28	<b>5</b>	27,8	0,3	0,8	1
<b>NRB5X29,8-G2</b>	4,59	<b>5</b>	29,8	0,3	0,8	1
<b>NRB5X34,8-G2</b>	5,36	<b>5</b>	34,8	0,3	0,8	1
<b>NRB5X39,8-G2</b>	6,13	<b>5</b>	39,8	0,3	0,8	1
<b>NRB6X17,8-G2</b>	3,95	<b>6</b>	17,8	0,3	0,8	1



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## Arcanol rolling bearing greases

# Arcanol rolling bearing greases

	Page
<b>Product overview</b> Arcanol rolling bearing greases.....	1536
<b>Features</b> Containers.....	1537
Arcanol greases.....	1538



## Product overview Arcanol rolling bearing greases

### Arcanol rolling bearing greases



155 253



# Arcanol rolling bearing greases

**Features** Schaeffler Group Industrial developed the range of Arcanol rolling bearing greases from a large number of lubricants. These greases offer very good preconditions for favourable running behaviour of bearings and a long life and high operational reliability of the bearing arrangement.

The areas of application of Arcanol greases were determined under widely differing operating conditions and with rolling bearings of all types by means of modern testing methods and testing systems.

**Finely graduated range** The range is graduated such that almost all areas of application can be covered to an optimum extent using these rolling bearing greases.

**Variants for automatic or manual grease lubrication** For grease lubrication, we supply the automatic lubricators CHAMPION and CONCEPT8, filled with Arcanol greases from FAG. For manual lubrication, we supply a grease gun, comprising a manual grease gun ARCA-GREASE-GUN and the matching armoured tube ARCA-GREASE-GUN.HOSE.

**Containers** Arcanol rolling bearing greases are available in tubes, cartridges, cans, buckets, hobbocks and drums. The following table shows which grease grades are supplied in which containers.

## Grease container sizes

Arcanol grease <sup>1)</sup>	Tube			Cartridge 400 g	Can 1 kg	Bucket		Hobcock		Drum 180 kg
	20 g	70 g	250 g			5 kg	10 kg	25 kg	50 kg	
MULTITOP	–	–	●	●	●	●	●	●	–	●
MULTI2	●	–	●	●	●	●	●	●	–	●
MULTI3	–	–	●	●	●	●	●	●	–	–
LOAD150	–	–	–	●	●	–	●	–	–	–
LOAD220	–	–	–	–	●	–	●	●	–	●
LOAD400	–	–	–	●	●	●	●	●	●	●
LOAD1000	–	–	–	–	–	●	–	●	–	●
TEMP90	●	–	–	●	●	●	–	●	–	●
TEMP110	–	–	–	●	●	–	–	–	●	–
TEMP120	–	–	–	–	●	●	–	●	–	–
TEMP200	–	●	–	–	●	–	–	–	–	–
SPEED2,6	–	–	●	–	●	–	–	●	–	–
VIB3	–	–	–	●	●	●	–	●	●	–
BIO2	–	–	–	●	●	–	●	●	–	●
FOOD2	–	–	–	●	●	–	●	●	–	●

<sup>1)</sup> Other container sizes by agreement.



# Arcanol rolling bearing greases

## Arcanol greases

The chemical/physical characteristics of the greases, their principal characteristics and application examples are shown in the table. Ordering examples for the greases are listed below.

### Arcanol rolling bearing greases

Designation	Designation to DIN 51825	Thickener	Base oil viscosity at +40 °C mm <sup>2</sup> /s	Consistency NLGI class
<b>MULTITOP</b>	KP2N-40	Lithium soap	≅ ISO VG 68	2
<b>MULTI2</b>	KP2K-30	Lithium soap	≅ ISO VG 68	2
<b>MULTI3</b>	KP3K-30	Lithium soap	≅ ISO VG 68	3
<b>LOAD150</b>	KP2N-20	Lithium complex	≅ ISO VG 150	2
<b>LOAD220</b>	KP2N-20	Mixed thickener	ISO VG 220	1 to 2
<b>LOAD400</b>	KP2N-20	Mixed thickener	≅ 400	2
<b>LOAD1000</b>	KP2N-20	Mixed thickener	ISO VG 1000	2
<b>TEMP90</b>	KP2N-30	Mixed thickener	≅ ISO VG 100	2
<b>TEMP110</b>	KPE2P-40	Lithium complex	≅ ISO VG 68	2 to 3
<b>TEMP120</b>	KPHC2R-30	Polycarbamide	ISO VG 460	2
<b>TEMP200</b>	KFK2U-30	PTFE	ISO VG 220 to ISO VG 460	2
<b>SPEED2,6</b>	KE3K-30	Polycarbamide	≅ ISO VG 22	2 to 3
<b>VIB3</b>	KP3N-30	Lithium complex	≅ ISO VG 150	3
<b>BIO2</b>	KPE2K-30	Mixed thickener	≅ ISO VG 68	2
<b>FOOD2</b>	KPF2K-30	Aluminium complex	≅ ISO VG 100	1 to 2

#### Ordering examples

- ARCANOL-MULTITOP-5KG
- ARCANOL-MULTI2-20G
- ARCANOL-MULTI3-25KG
- ARCANOL-LOAD150-10KG
- ARCANOL-LOAD220-1KG
- ARCANOL-LOAD400-400G
- ARCANOL-LOAD1000-5KG

Operating temperature °C	Continuous limit temperature °C	Principal characteristics	Application examples
-40 +140	+80	Universal grease for ball and roller bearings at increased speeds, high loads, low and high temperatures	Rolling mills, construction machinery, automotive, spinning and grinding spindles
-30 +120	+75	Universal grease for ball bearings D ≤ 62 mm	Small electric motors, agricultural and construction machinery, household appliances
-30 +120	+75	Universal grease for ball bearings D > 62 mm	Large electric motors, agricultural and construction machinery, fans
-20 +140	+90	Special grease for ball, roller and needle roller bearings, linear guidance systems at high loads, wide speed range, swivel motion	Machine tools
-20 +140	+80	Special grease for ball and roller bearings at high loads, wide speed range, high humidity	Rolling mill plant, rail vehicles
-20 +140	+80	Special grease for ball and roller bearings at very high loads, moderate temperature, low speed	Mining machinery, construction machinery, wind turbines
-20 +140	+80	Special grease for ball and roller bearings at very high loads, moderate temperature, low speed	Mining machinery, construction machinery preferably under shock load and in large bearings
-30 +140	+90	Special grease for ball and roller bearings at high temperature, high loads	Couplings, electric motors, automotive
-40 +160	+110	Special grease for ball and roller bearings at high temperature, high speeds	Electric motors, automotive
-30 +180	+120	Special grease for ball and roller bearings at high temperature, high loads	Continuous casting plant
-30 +250	+200	Special grease for ball and roller bearings at very high temperature, for chemically aggressive environments	Track rollers in baking machinery, piston pins in compressors, kiln trucks, chemical plant
-30 +120	+80	Special grease for ball bearings at very high speed, low temperature	Machine tools, instruments
-30 +150	+90	Special grease for ball and roller bearings at high temperature, high loads, oscillating motion	Blade adjusters in wind turbine rotors, packaging machinery, rail vehicles
-30 +120	+80	Special grease for ball and roller bearings	In environmentally hazardous applications
-30 +120	+70	Special grease for ball and roller bearings	In applications with food contact; H1 to USDA

**Ordering examples** – continued

- ARCANOL-TEMP90-180KG
- ARCANOL-TEMP110-400G
- ARCANOL-TEMP120-25KG
- ARCANOL-TEMP200-70G
- ARCANOL-SPEED2,6-250G
- ARCANOL-VIB3-25KG
- ARCANOL-BIO2-1KG
- ARCANOL-FOOD2-10KG





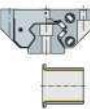


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## Other products

- Slewing rings
- Thin section bearings
- Metal/polymer composite plain bearings
- Spherical plain bearings, plain bushes, rod ends
- Linear guidance systems
- Mounting and maintenance of rolling bearings





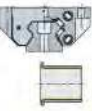
## Slewing rings

Four point contact bearings

Crossed roller bearings

# Slewing rings

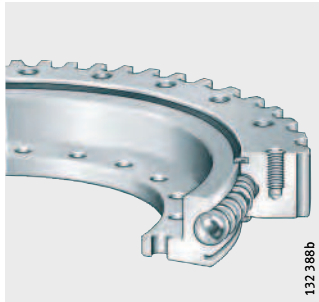
	Page
<b>Product overview</b> Slewing rings.....	1544
<b>Features</b> Four point contact bearings .....	1545
Crossed roller bearings.....	1545



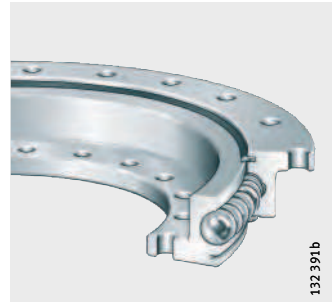
# Product overview Slewing rings

## Four point contact bearings Light series 20

VLA20

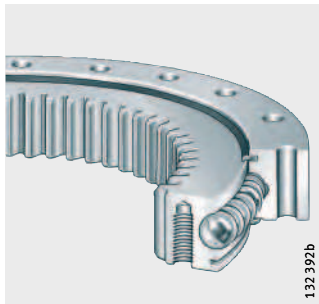


VLU20

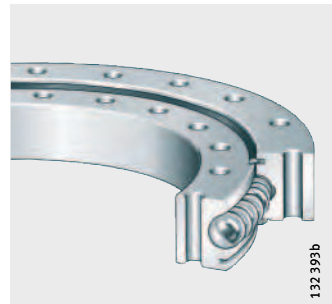


## Standard series 20, 25

VSI20, VSI25

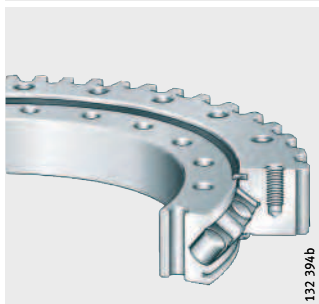


VSU20, VSU25

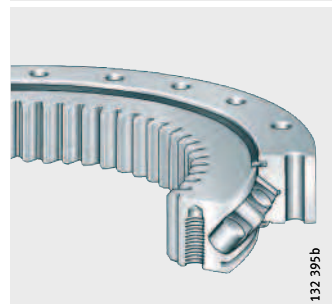


## Crossed roller bearings Standard series 14

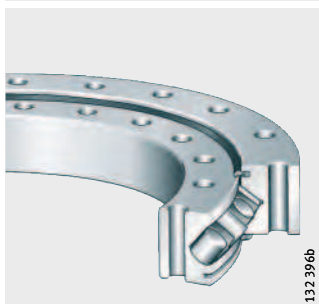
XSA14



XSI14



XSU14





# Slewing rings

**Features** INA slewing rings are known worldwide as premium products in the field of rolling bearing technology. These machine elements have proved themselves many times over; they have high load carrying capacity, a versatile range of applications and are highly cost-effective. Due to their design, a single bearing can reliably support radial, axial and tilting moment loads. It is therefore possible in many cases to replace bearing arrangements comprising a combination of radial and axial bearings by a single bearing. This reduces, in some cases considerably, the costs and work required in the design of the adjacent construction and the fitting of bearings.

Slewing rings are sealed on both sides, lubricated with a high quality grease, can be relubricated via lubrication nipples and are particularly easy to fit. The bearing rings are supplied without gear teeth or, in order to achieve simple drive solutions, are available with external or internal gear teeth.

INA slewing rings are designed as four point contact bearings and crossed roller bearings.

## Four point contact bearings

Four point contact bearings are available with external teeth, internal teeth or without teeth as well as in the light series 20 and the standard series 20 and 25.

These slewing rings without preload are robust and proven under very demanding operation; they place only slight demands on the flatness and perpendicularity of the adjacent construction.

They are suitable for applications with low requirements for accuracy and rigidity of the bearing arrangement, for example in simple metalworking machines, wind turbines and construction machinery.

## Crossed roller bearings

Crossed roller bearings are available with external teeth, internal teeth and without teeth in the standard series 14 as well as in the series XA, XI, XU.

These preloaded slewing rings can support higher loads than four point contact bearings. They have proved themselves particularly where bearings are subjected to high radial forces and moderate axial and tilting moment loads.

They are suitable for applications with uniform running free from stick-slip, low rotational resistance and high requirements for axial and radial runout accuracy and rigidity, for example in robots, handling systems and machine tools.

## Catalogue: Slewing rings

The standard range is described comprehensively in Catalogue 404 and the online version of **medias<sup>®</sup> professional**.





## Thin section bearings

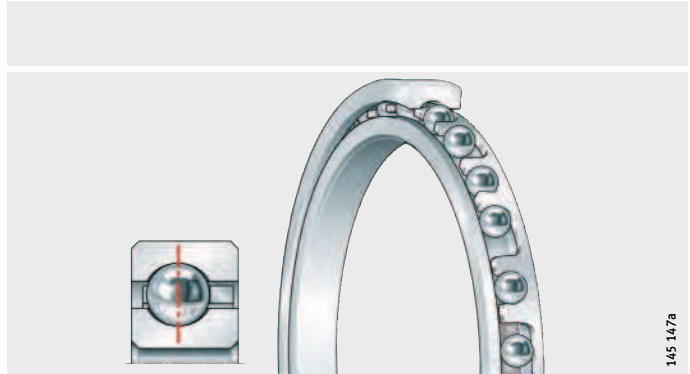
# Thin section bearings

	Page
<b>Product overview</b> Thin section bearings .....	1548
<b>Features</b> Deep groove ball bearings, four point contact bearings, angular contact ball bearings.....	1549



# Product overview Thin section bearings

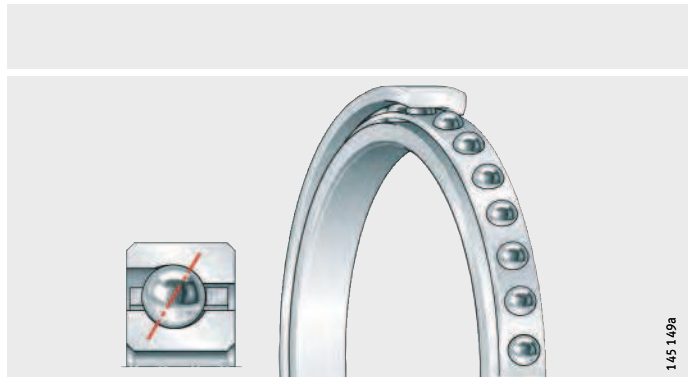
**Deep groove ball bearings**  
Type C



**Four point contact bearings**  
Type X



**Angular contact ball bearings**  
Type E



# Thin section bearings

**Features** Thin section bearings are high precision products with very little running noise and high load carrying capacity. These bearings are available in three different designs with extremely small, predominantly square cross-sections. Within each series, the cross-section remains constant even in the case of larger shaft and housing bore diameters. The bearings are therefore also described as Constant Section (CS) bearings. This feature distinguishes thin section bearings from the conventional bearings that are described in standardised ISO series.

In this way, a larger cross-section can be selected in a graduated way and thus a bearing with high load carrying capacity can be used without the need to increase the shaft diameter. Thin section bearings can thus be used to achieve extremely light and compact designs.

## Deep groove ball bearings, four point contact bearings, angular contact ball bearings

Thin section bearings are available as deep groove ball bearings (C), four point contact bearings (X) and as angular contact ball bearings (E). Each of these designs is available in various series. The series correspond to the cross-section sizes. The balls are matched to the series.

Deep groove ball bearings can support axial loads in both directions as well as radial loads; under axial load, a contact angle  $\alpha > 0^\circ$  is adopted.

Four point contact bearings can support axial loads in both directions as well as radial loads; they thus act as double row angular contact ball bearings.

Angular contact ball bearings can be filled with an optimised number of balls and have a contact angle of  $30^\circ$ . They can support considerably higher radial loads than deep groove ball bearings or four point contact bearings and can support axial loads in one direction. For particular requirements, angular contact ball bearings are also available as matched pairs of bearings. These combinations then have significantly higher rigidity and load carrying capacity than individual bearing solutions.

Thin section bearings are available in designs that are either open or sealed on both sides. The seals are made from synthetic rubber (NBR) with a steel insert.

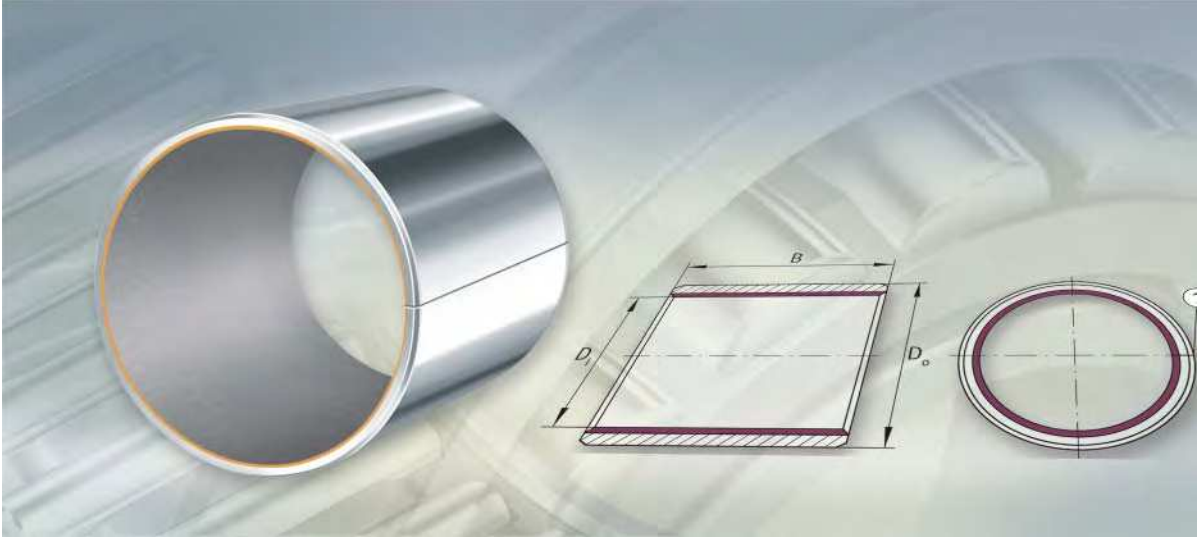
Sealed bearings are greased. For extreme operating conditions, special lubricants are available. Cages are made from brass or plastic.

In addition to the standard tolerance class PL1, classes PL3 and PL6 are also available (with increasingly tighter tolerances).

## Catalogue: Thin section bearings

The standard range is described comprehensively in Catalogue 575.





## Metal/polymer composite plain bearings

Maintenance-free plain bearing material E40

Low-maintenance plain bearing material E50

Bushes

Flanged bushes

Thrust washers

Strips

# Metal/polymer composite plain bearings

	Page
<b>Product overview</b> Metal/polymer composite plain bearings .....	1552
<b>Features</b> Maintenance-free plain bearing material E40 .....	1554
Low-maintenance plain bearing material E50 .....	1556
Special designs .....	1558
Special materials.....	1560

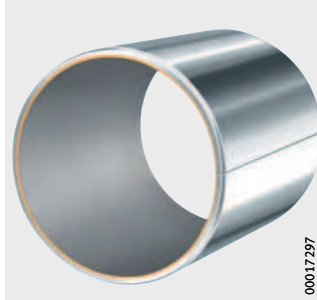


# Product overview Metal/polymer composite plain bearings

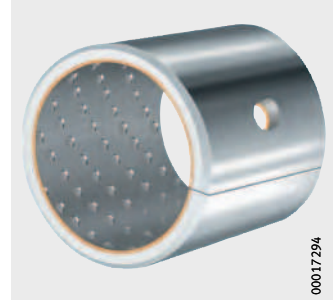
## Bushes

E40 maintenance-free  
E50 low-maintenance

EGB..-E40, EGBZ..-E40,  
EGB..-E40-B



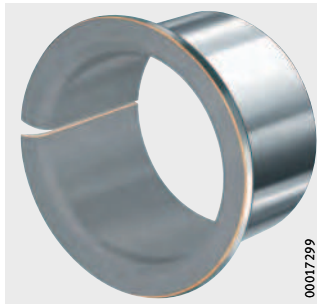
EGB..-E50



## Flanged bushes

E40 maintenance-free

EGF..-E40, EGF..-E40-B



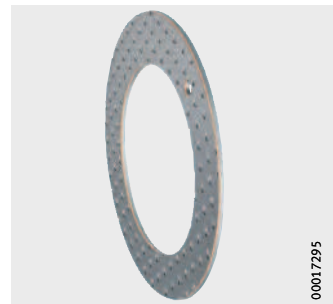
## Thrust washers

E40 maintenance-free  
E50 low-maintenance

EGW..-E40, EGW..-E40-B



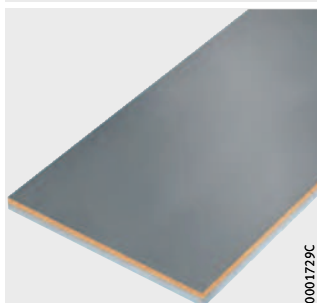
EGW..-E50



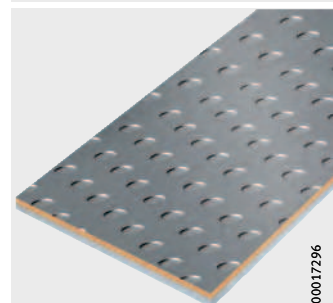
## Strips

E40 maintenance-free  
E50 low-maintenance

EGS..-E40



EGS..-E50





# Metal/polymer composite plain bearings

**Features** These plain bearings are bearings for very small radial or axial design envelopes. These products are available as bushes, flanged bushes, thrust washers and strips. The bushes are available in metric sizes and in inch sizes.

The plain bearings are supplied with either steel backing or bronze backing. Bearings with a bronze backing have high corrosion resistance and thermal conductivity and are antimagnetic.

There are different materials for metal/polymer composite plain bearings, the maintenance-free E40 and E40-B or the low-maintenance E50.

The maintenance-free and low-maintenance materials conform to the regulations for lead-free plain bearings. They thus comply with Directive 2000/53/EC (End of Life Vehicles Directive) as well as the Directive 2011/65/EU (RoHS-II) for the restriction of hazardous substances.



If the plain bearings are to be used in the medical or aerospace sectors or in the food or pharmaceuticals industry, please contact the Schaeffler engineering service.

**Maintenance-free** The maintenance-free plain bearing material E40 is, due to the dry lubricant PTFE, intended for dry running. These bearings are thus particularly suitable where the bearing position must be maintenance-free, there is a risk of lubricant starvation or where lubricant is unacceptable or undesirable. The material E40 can be used not only for rotary and oscillating motion but also for short stroke linear motion.

Typical areas of application can be found, for example, in fluid technology, in sports gear, in medical or electrical equipment as well as in automotive engineering.

**Low-maintenance** The low-maintenance plain bearing material E50 is a low-wear material with good damping characteristics and long relubrication intervals. The bearings have a sliding layer made from polyoxymethylene POM. E50 can be used for rotary and oscillating motion and is recommended for long stroke linear motion. It is only slightly sensitive to edge loads and is insensitive to shocks.

Application examples can be found in particular in the area of production machinery, construction and agricultural equipment as well as commercial vehicles.

**Product catalogue** The complete standard range of metal/polymer composite plain bearings is described comprehensively in TPI 211 and the online version of **medias**<sup>®</sup> *professional*.



# Metal/polymer composite plain bearings

## Maintenance-free plain bearing material E40

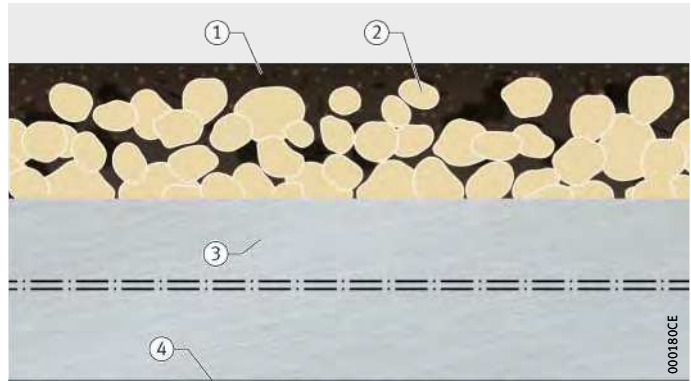
For maintenance-free metal/polymer composite plain bearings from Schaeffler, the sliding materials E40 and E40-B are used. The basis of the dry lubricant is polytetrafluoroethylene PTFE with embedded chemically non-reactive additives.

### Material E40, structure

In the three-layered material, the steel backing has a sintered porous tin/bronze sliding layer whose pores are filled with the super-imposed running-in layer, *Figure 1*. The running-in layer is a plastic composite material comprising PTFE and additives.

- ① Running-in layer
- ② Sliding layer
- ③ Steel backing
- ④ Tin layer as surface protection

*Figure 1*  
Maintenance-free plain bearing material E40

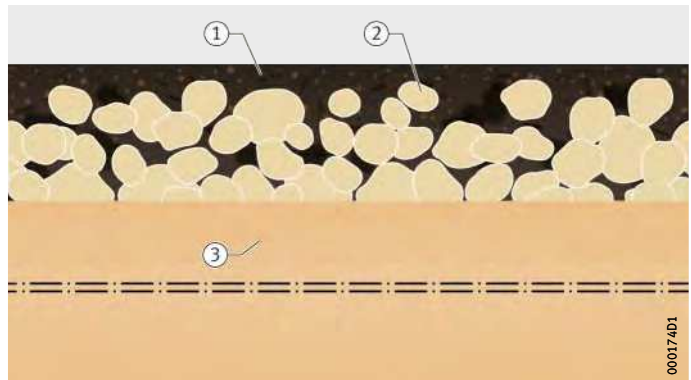


### Material E40-B, structure

In the three-layered material, the bronze backing has a sintered porous tin/bronze sliding layer whose pores are filled with the super-imposed running-in layer, *Figure 2*. The running-in layer is a plastic composite material comprising PTFE and additives.

- ① Running-in layer
- ② Sliding layer
- ③ Bronze backing

*Figure 2*  
Maintenance-free plain bearing material E40-B



**Technical data** The sliding layer E40 is maintenance-free. It can be used for rotary and oscillating motion as well as for short stroke linear motion. The low-wear material has good sliding characteristics (no stick-slip), a low coefficient of friction and high resistance to chemicals. It does not absorb water (highly resistant to swelling), does not tend to weld to metal and is also suitable for hydrodynamic operation. The maintenance-free plain bearing materials are available in the variants E40 and E40-B with the following mechanical and physical characteristics, see table.

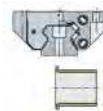
### Characteristics of E40 and E40-B

Characteristic	Loading		
	Maximum pv value for dry running	Continuous operation	pv
For short periods		3,6 N/mm <sup>2</sup> · m/s	
Permissible specific bearing load	Static	p <sub>max</sub>	250 N/mm <sup>2</sup>
	Rotary, oscillating		140 N/mm <sup>2</sup>
Permissible sliding speed	Dry running	v <sub>max</sub>	2,5 m/s
	Hydrodynamic operation		>2,5 m/s
Permissible operating temperature		ϑ	-200 °C to +280 °C
Coefficient of thermal expansion	Steel backing	α <sub>St</sub>	11 · 10 <sup>-6</sup> K <sup>-1</sup>
	Bronze backing	α <sub>Bz</sub>	17 · 10 <sup>-6</sup> K <sup>-1</sup>
Coefficient of thermal conductivity	Steel backing	λ <sub>St</sub>	>42 Wm <sup>-1</sup> K <sup>-1</sup>
	Bronze backing	λ <sub>Bz</sub>	>70 Wm <sup>-1</sup> K <sup>-1</sup>
Relative electrical resistance after running-in		R <sub>rel min</sub>	>1 Ω · cm <sup>2</sup>

**Available designs** For the available standard dimension ranges for bushes, washers and strips with E40 material, see table.

### Product and size range

Plain bearings made from material E40	Designation	For shafts with the following dimensions
Bushes	EGB..-E40	3 mm to 300 mm
	EGBZ..-E40	3/16" to 2"
	EGB..-E40-B	4 mm to 100 mm
Flanged bushes	EGF..-E40	6 mm to 40 mm
	EGF..-E40-B	6 mm to 40 mm
Thrust washers	EGW..-E40	10 mm to 62 mm
	EGW..-E40-B	10 mm to 62 mm
Strips	EGS..-E40-S3E	Length 500 mm, width 260 mm, thickness from 1,5 mm to 3,06 mm



# Metal/polymer composite plain bearings

## Low-maintenance plain bearing material E50

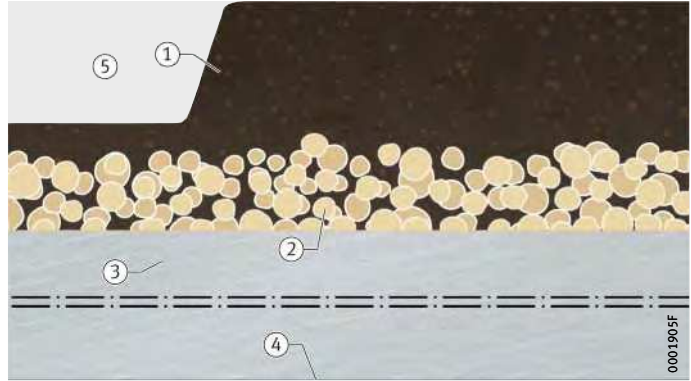
For low-maintenance metal/polymer composite plain bearings from Schaeffler, the sliding material E50 is used. The basis of the sliding layer is polyoxymethylene POM.

### Material E50, structure

In the three-layered material, the steel backing has a sintered porous tin/bronze intermediate layer whose pores are filled with the superimposed sliding layer, *Figure 3*.

- ① Sliding layer
- ② Intermediate layer
- ③ Steel backing
- ④ Tin layer as surface protection
- ⑤ Lubrication pocket

*Figure 3*  
Low-maintenance plain bearing material E50



**Technical data** The sliding layer E50 is a low-maintenance, low-wear material with good damping characteristics and long relubrication intervals. It can be used for rotary and oscillating motion and for long stroke linear motion, is only slightly sensitive to edge loads and is insensitive to shocks.

For the important mechanical and physical characteristics of the low-maintenance plain bearing material, see table.

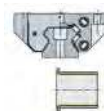
**Characteristics of E50**

Characteristics	Load		
Maximum pv value		pv	3 N/mm <sup>2</sup> · m/s
Permissible specific bearing load	Static	p <sub>max</sub>	140 N/mm <sup>2</sup>
	Rotary, oscillating		70 N/mm <sup>2</sup>
Permissible sliding speed		v <sub>max</sub>	2,5 m/s
Permissible operating temperature		ϑ	-40 °C to +110 °C
Coefficient of thermal expansion	Steel backing	α <sub>St</sub>	11 · 10 <sup>-6</sup> K <sup>-1</sup>
Coefficient of thermal conductivity	Steel backing	λ <sub>St</sub>	<4 Wm <sup>-1</sup> K <sup>-1</sup>
Coefficient of friction		μ	0,02 to 0,2

**Available designs** For the available standard dimension ranges for bushes, washers and strips with E50 material, see table.

**Product and size range**

Plain bearings made from material E50	Designation	For shafts with the following dimensions
Bushes	EGB...E50	8 mm to 100 mm
Thrust washers	EGW...E50	12 mm to 52 mm
Strips	EGS...E50	Length 500 mm, width from 80 mm to 200 mm, thickness from 0,99 mm to 2,46 mm



# Metal/polymer composite plain bearings

## Special designs

In addition to the catalogue range of metal/polymer composite plain bearings, there are numerous special designs which are run in either a predominantly rotary direction or a predominantly linear direction. Schaeffler can produce further special designs by agreement.

In addition to the materials named, there are further materials such as the sliding material E60 for film bearings.

For special designs or special materials, please contact the Schaeffler engineering service.

## Examples

A small selection of special designs already produced is shown below, *Figure 4*, page 1559 to *Figure 6*, page 1559.

The following special designs are possible:

- made from any plain bearing material
- with different dimensions from the catalogue products
- as combined components
  - pressed into rings
  - with plastic moulded parts
- in different shapes
  - bushes with windows and holes
  - bushes with stamped oil grooves
  - blanked components
  - ball cups
  - bearing shells
- with the sliding layer on the outside
- with different butt joint geometries.

## Linear plain bearings

- Linear plain bearings PAB comprise an outer ring with a pressed-in plain bearing bushes EGB..-E50. The design PABO has a segment cut out for supported shafts.
- Linear plain bearing units PAGH and PAGBA consist of a housing and a pressed-in linear plain bearing PAB or PABO.

- ① Bush with external coating
- ② Pivoting cradle bearing



*Figure 4*  
Special designs  
with external coating

- ① Maintenance-free
- ② Low-maintenance



*Figure 5*  
Ball cups

- ① Linear plain bearing  
PAB...-PP-AS
- ② Linear plain bearing unit  
PAGBAO...-PP-AS



*Figure 6*  
Linear plain bearings

**Possible special designs**



The feasibility of special designs should be checked as early as possible. This applies to the geometry and also to the costs.



# Metal/polymer composite plain bearings

## Special materials

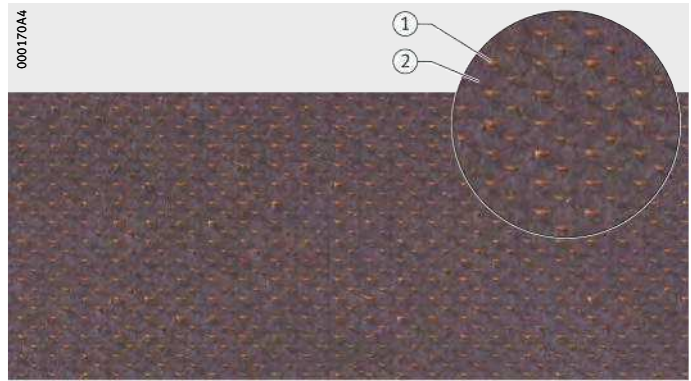
By agreement, Schaeffler can supply film bearings with the material E60. This maintenance-free special material also conforms to the stated regulations for lead-free plain bearings, see page 1553.

## Film bearings E60

E60 is the new plain bearing material from Schaeffler for maintenance-free film bearings. The metal/polymer composite consists of a bronze rib mesh that is filled with a dry lubricant made from polytetrafluoroethylene PTFE with embedded chemically non-reactive additives.

## Structure

The material consists of a rib mesh and a sliding layer, *Figure 7*. A sliding layer made from PTFE is rolled into and sintered into the rib mesh. The mesh thus functions as both a carrier and a sliding layer.



- ① Rib mesh
- ② Sliding layer

*Figure 7*  
Maintenance-free  
plain bearing material E60

## Rib mesh and sliding layer

Chemical element	Proportion of mass w %	
	Rib mesh	Sliding layer
Tin Sn	6	–
Copper Cu	94	–
Polytetrafluoroethylene PTFE	–	86
Fillers	–	14

## Film thickness

The plain bearing material is available in a film thickness of 0,5 mm.

## Technical data for E60

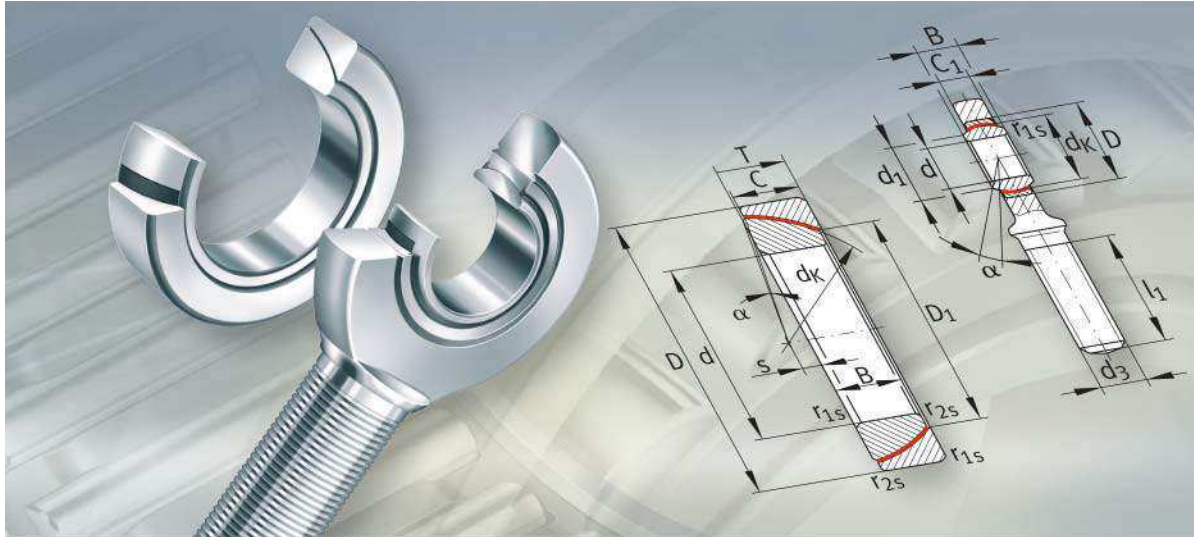
For the important mechanical and physical characteristics of the maintenance-free plain bearing material E60, see table.

## Data

Characteristics	Loads		
	Permissible specific bearing load	Static	p
Dynamic		p	80 N/mm <sup>2</sup>
Permissible sliding speed	v <sub>max</sub>		1 m/s
Permissible operating temperature	ϑ		–200 °C to +260 °C



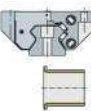




**Spherical plain bearings,  
plain bushes,  
rod ends**

# Spherical plain bearings, plain bushes, rod ends

		Page
<b>Product overview</b>	Maintenance-free spherical plain bearings, cylindrical plain bushes .....	1564
<b>Features</b>	Sliding layers .....	1565
	Radial spherical plain bearings	
	 radial large spherical plain bearings .....	1567
	Angular contact spherical plain bearings .....	1567
	Axial spherical plain bearings	
	 axial large spherical plain bearings .....	1567
	Cylindrical plain bushes .....	1567
<b>Product overview</b>	Spherical plain bearings requiring maintenance .....	1568
<b>Features</b>	Radial spherical plain bearings .....	1569
	Angular contact spherical plain bearings .....	1569
	Axial spherical plain bearings .....	1569
<b>Product overview</b>	Maintenance-free rod ends .....	1570
<b>Features</b>	Rod ends with internal thread .....	1571
	Rod ends with external thread .....	1571
<b>Product overview</b>	Rod ends requiring maintenance .....	1572
<b>Features</b>	Rod ends with internal thread .....	1573
	Rod ends with external thread .....	1573
<b>Product overview</b>	Hydraulic rod ends .....	1574
<b>Features</b>	Hydraulic rod ends with thread clamping .....	1575
	Hydraulic rod ends with welding face .....	1575



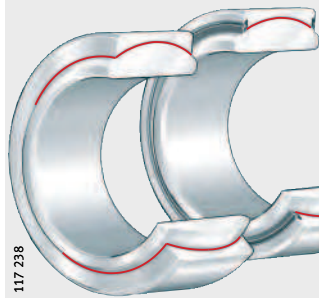
## Product overview

## Maintenance-free spherical plain bearings, cylindrical plain bushes

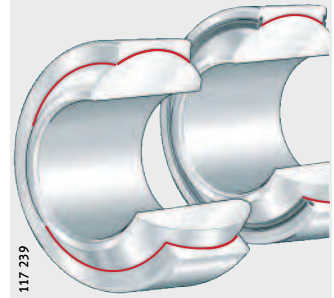
### Radial spherical plain bearings

Open or with lip seals on both sides

GE..-UK, GE..-UK-2RS



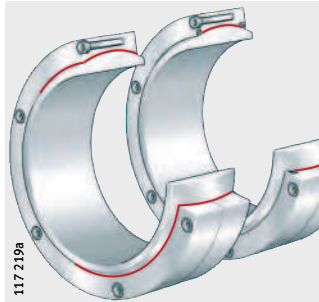
GE..-FW, GE..-FW-2RS



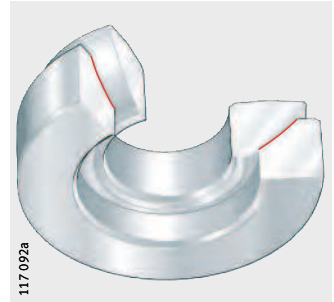
### X-life radial and axial large spherical plain bearings

Open or with lip seals on both sides

GE..-DW, GE..-DW-2RS2



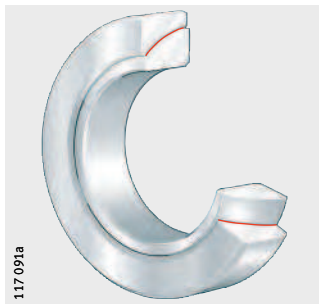
GE..-AW



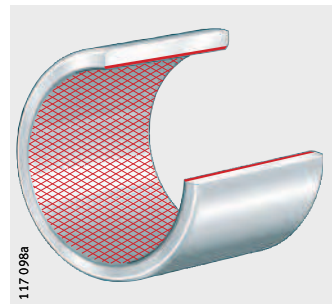
### Angular contact spherical plain bearings, cylindrical plain bushes

Open

GE..-SW



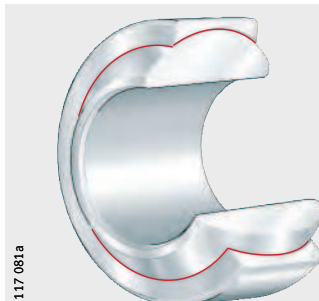
ZGB



### Radial spherical plain bearings

Dimension series K, open

GE..-PW



# Maintenance-free spherical plain bearings, cylindrical plain bushes

## Features

Maintenance-free spherical plain bearings are used where:

- there are particular requirements on bearing life under maintenance-free operation
- for reasons of lubrication, bearings with a metallic sliding contact surface are not suitable, e.g. under unilateral load.

Spherical plain bearings allow spatial adjustment movements and, depending on the bearing type, are preferably used to support radial, combined or axial loads.

## Product catalogue

The complete range is described in detail in Catalogue 238 and the online version of **medias**<sup>®</sup> *professional*.

## Sliding layers

Maintenance-free spherical plain bearings have special sliding layers based on PTFE (polytetrafluorethylene).

In descending order of performance, these are:

- ELGOGLIDE<sup>®</sup> – the highest performance sliding layer, *Figure 1*
- PTFE composite, *Figure 2*, page 1566
- PTFE-bronze film, *Figure 3*, page 1566.

These materials form the slideway of the outer ring or the housing locating washer. They transmit the forces occurring and provide lubrication – the bearings must not be lubricated in any other way.

## ELGOGLIDE<sup>®</sup>

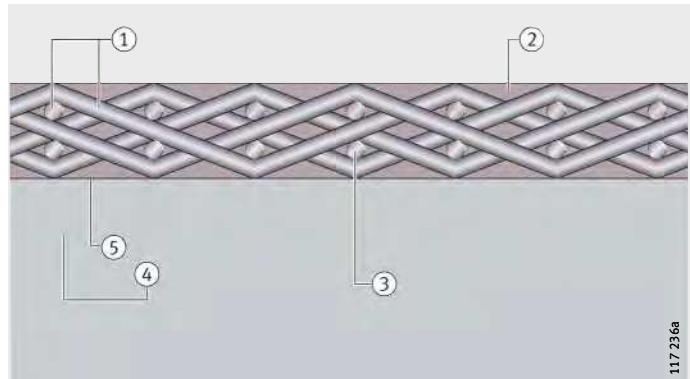
The sliding layer comprises 0,5 mm thick ELGOGLIDE<sup>®</sup>, is embedded in synthetic resin and attached by a high strength bond to the support body, *Figure 1*.

The flow behaviour of the sliding layer is, in combination with the support body, almost negligible even under very high load.

The adhesive bond is resistant to moisture and does not undergo swelling.

- ① PTFE fabric, comprising PTFE and supporting fibres
- ② Resin matrix
- ③ Supporting fibres
- ④ Steel substrate
- ⑤ Adhesive bond

*Figure 1*  
ELGOGLIDE<sup>®</sup>, cross-section

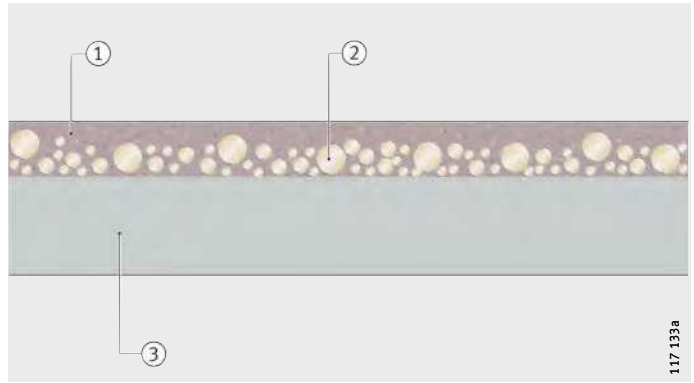


# Maintenance-free spherical plain bearings, cylindrical plain bushes

## PTFE composite

PTFE composite comprises sheet steel with bronze attached by sintering and embedded PTFE compound, *Figure 2*.

- ① PTFE compound
- ② Sintered bronze
- ③ Sheet steel

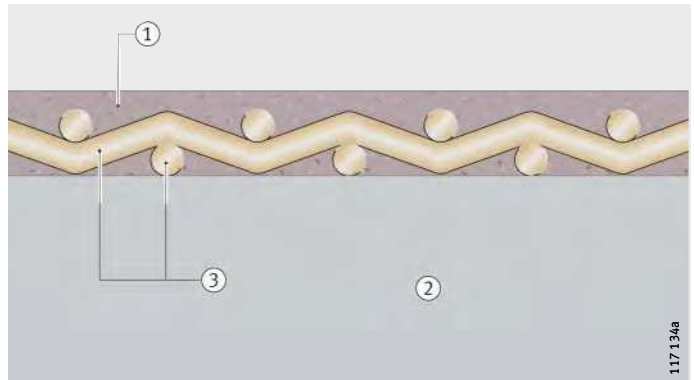


*Figure 2*  
PTFE composite, cross-section

## PTFE-bronze film

PTFE-bronze film (metal lattice material) is made from high strength bronze and acts as a stabiliser for the sintered PTFE compound, *Figure 3*.

- ① PTFE compound
- ② Substrate
- ③ Bronze



*Figure 3*  
PTFE-bronze film, cross-section

**Radial spherical plain bearings**  
**X-life radial large spherical plain bearings**

Radial spherical plain bearings comprise inner and outer rings with maintenance-free sliding layers made from ELGOGLIDE®, PTFE composite or PTFE-bronze film.

Sealed spherical plain bearings are protected by lip seals against contamination and water spray.

These bearings have the suffix 2RS or 2RS2.

Radial large spherical plain bearings from d = 320 mm are X-life bearings.

**Series, sliding layer, standard**

Series	Sliding layer	Standard DIN ISO 12 240-1	Shaft diameter	
			from mm	to mm
GE..-UK	Composite	Dimension series E	6	30
GE..-UK-2RS	ELGOGLIDE®	Dimension series E	17	300
GE..-FW	Composite	Dimension series G	6	25
GE..-FW-2RS	ELGOGLIDE®	Dimension series G	30	280
GE..-DW	ELGOGLIDE®	Dimension series C	320	1 000
GE..-DW-2RS2	ELGOGLIDE®	Dimension series C	320	1 000
GE..-PW	PTFE-bronze film	Dimension series K	5	30

**Angular contact spherical plain bearings**

Angular contact spherical plain bearings comprise inner and outer rings with ELGOGLIDE®. In addition to radial forces, they can also support axial forces and are suitable for alternating dynamic loads.

**Series, sliding layer, standard**

Series	Sliding layer	Standard	Shaft diameter	
			from mm	to mm
GE..-SW	ELGOGLIDE®	DIN ISO 12 240-2	25	200

**Axial spherical plain bearings**  
**X-life axial large spherical plain bearings**

Axial spherical plain bearings comprise shaft locating and housing locating washers with ELGOGLIDE®. They are preferably used to support axial forces and are suitable as support or base bearings.

Axial large spherical plain bearings from d = 220 mm are X-life bearings.

**Series, sliding layer, standard**

Series	Sliding layer	Standard	Shaft diameter	
			from mm	to mm
GE..-AW	ELGOGLIDE®	DIN ISO 12 240-3	10	360

**Cylindrical plain bushes**

Cylindrical plain bushes comprise a steel support body with ELGOGLIDE®. They allow not only swivel movements but also axial movements and can support higher forces than conventional plain bearings.

**Series, sliding layer, standard**

Series	Sliding layer	Standard	Shaft diameter	
			from mm	to mm
ZGB	ELGOGLIDE®	DIN ISO 4 379 <sup>1)</sup>	30	200

<sup>1)</sup> Main dimensions only.



## Product overview

## Spherical plain bearings requiring maintenance

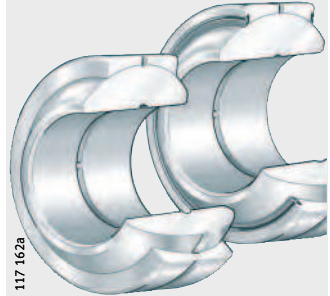
### Radial spherical plain bearings

Open or with lip seals on both sides

GE..-DO, GE..-DO-2RS



GE..-FO, GE..-FO-2RS



GE..-LO



GE..-HO-2RS



Open, inch dimensions or dimension series K

GE..-ZO



GE..-PB



### Angular contact spherical plain bearings, axial spherical plain bearings

Open

GE..-SX



GE..-AX





# Spherical plain bearings requiring maintenance

## Features

### Radial spherical plain bearings

Radial spherical plain bearings comprise inner and outer rings with steel/steel or steel/bronze sliding contact surfaces and are lubricated via the inner and outer ring. They can support radial forces, transmit motion and loads with low moment levels and thus keep bending stresses away from the adjacent structure.

The bearings are particularly suitable for alternating loads with impact and shock type stresses and support axial loads in both directions.

Sealed spherical plain bearings are protected against contamination and water spray by lip seals and have the suffix 2RS.

### Series, sliding contact surface, standard

Series	Sliding contact surface	Standard DIN ISO 12 240-1	Shaft diameter	
			from mm	to mm
GE..-DO	Steel/steel	Dimension series E	6	200
GE..-DO-2RS	Steel/steel	Dimension series E	17	300
GE..-DO	Steel/steel	Dimension series C	320	1 000
GE..-FO	Steel/steel	Dimension series G	6	12
GE..-FO-2RS	Steel/steel	Dimension series G	15	280
GE..-LO	Steel/steel	Dimension series W	12	320
GE..-HO-2RS	Steel/steel	–	20	80
GE..-ZO	Steel/steel	–	19,05	76,2
GE..-PB	Steel/bronze	Dimension series K	5	30

### Angular contact spherical plain bearings

Angular contact spherical plain bearings GE..-SX correspond to DIN ISO 12 240-2 and comprise inner and outer rings with steel/steel sliding contact surfaces.

In addition to radial forces, they can also support axial forces, are suitable for alternating dynamic loads and are used, for example, as an alternative to tapered roller bearings 320X to DIN 720 where loads in conjunction with small swivel angles would damage rolling bearings.

Angular contact spherical plain bearings transmit motion and loads with low moment levels and thus keep bending stresses away from the adjacent structure.

### Axial spherical plain bearings

Axial spherical plain bearings GE..-AX correspond to DIN ISO 12 240-3 and comprise shaft and housing locating washers with steel/steel sliding contact surfaces.

They can support axial forces and transmit support forces with low moment levels into the adjacent construction; in order to support radial forces, they can be combined with radial spherical plain bearings of dimension series E to DIN ISO 12 240-1.

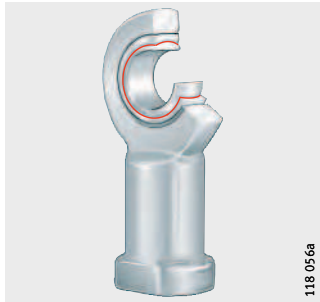
The bearings are lubricated via the housing locating washer.



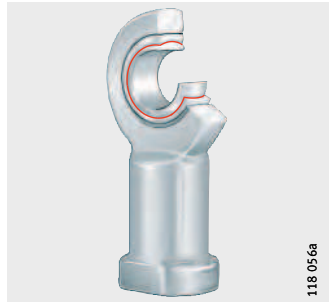
# Product overview Maintenance-free rod ends

**With internal thread**  
Open or  
with lip seals on both sides

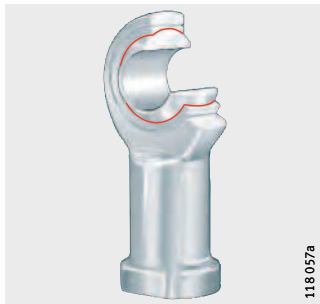
GIR...-UK, GIR...-UK-2RS



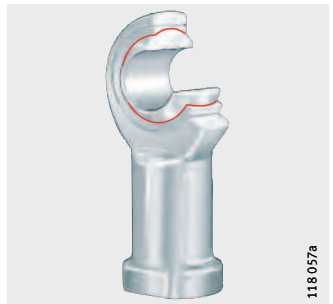
GIL...-UK, GIL...-UK-2RS



GIKR...-PW, GIKPR...-PW

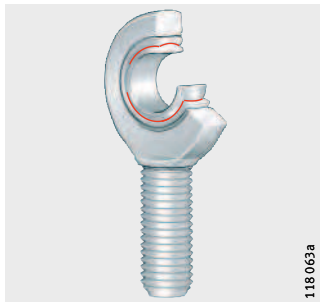


GIKL...-PW

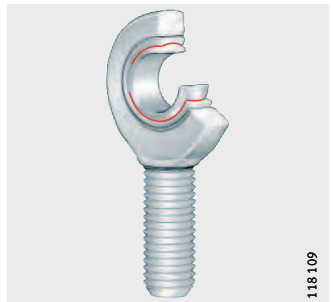


**With external thread**  
Open or  
with lip seals on both sides

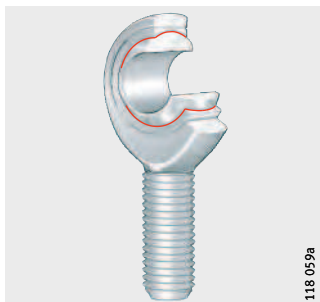
GAR...-UK, GAR...-UK-2RS



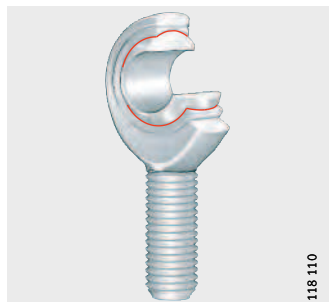
GAL...-UK, GAL...-UK-2RS



GAKR...-PW



GAKL...-PW



# Maintenance-free rod ends

**Features** Maintenance-free rod ends comprise a housing with integral shank and a maintenance-free spherical plain bearing. The integral shank has an internal or external thread. The spherical plain bearing is firmly seated and located in the housing. The housings and shanks are protected against corrosion by zinc plating.

The rod ends can support radial loads in a tensile or compressive direction. They are suitable for slow movements with small to moderate swivel angles, for unilateral load and under certain conditions for alternating loads (suitable for alternating loads with GE..-UK-2RS).

Sealed rod ends have lip seals on both sides and are thus protected against contamination and water spray. This variant has the suffix 2RS.

Rod ends to DIN ISO 12 240-4, dimension series E contain radial spherical plain bearings GE..-UK or GE..-UK-2RS with sliding contact surfaces comprising hard chromium/PTFE composite or hard chromium/ELGOGLIDE® and a right hand or left hand internal or external thread. The thin-walled design of the eye housing allows compact adjacent constructions.

Rod ends to DIN ISO 12 240-4, dimension series K contain radial spherical plain bearings GE..-PW with sliding contact surfaces comprising steel/PTFE-bronze film and a right hand or left hand internal or external thread.

## Rod ends with internal thread

Rod ends with an internal thread, see table.

Series, thread type, standard

Series	Thread type	Standard DIN ISO 12 240-4	Shaft diameter	
			from mm	to mm
GIR..-UK	Right hand thread	Dimension series E, type F	6	30
GIL..-UK	Left hand thread	Dimension series E, type F	6	30
GIR..-UK-2RS	Right hand thread	Dimension series E, type F	35	80
GIL..-UK-2RS	Left hand thread	Dimension series E, type F	35	80
GIKR..-PW	Right hand thread	Dimension series K, type F	5	30
GIKL..-PW	Left hand thread	Dimension series K, type F	5	30
GIKPR..-PW	Right hand thread	Dimension series K, type F	5	30

## Rod ends with external thread

Rod ends with an external thread, see table.

Series, thread type, standard

Series	Thread type	Standard DIN ISO 12 240-4	Shaft diameter	
			from mm	to mm
GAR..-UK	Right hand thread	Dimension series E, type M	6	30
GAL..-UK	Left hand thread	Dimension series E, type M	6	30
GAR..-UK-2RS	Right hand thread	Dimension series E, type M	35	80
GAL..-UK-2RS	Left hand thread	Dimension series E, type M	35	80
GAKR..-PW	Right hand thread	Dimension series K, type M	5	30
GAKL..-PW	Left hand thread	Dimension series K, type M	5	30

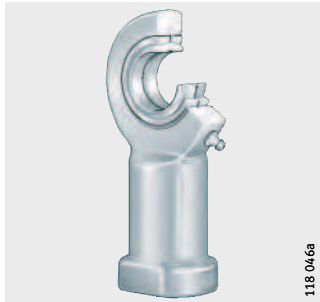


# Product overview Rod ends requiring maintenance

## With internal thread

Open or lip seals on both sides

GIR...-DO, GIR...-DO-2RS



GIL...-DO, GIL...-DO-2RS



GIKR...-PB



GIKL...-PB



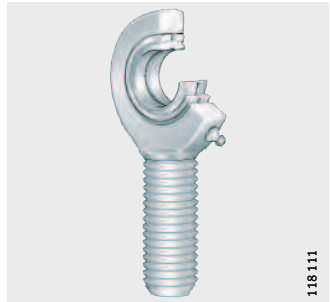
## With external thread

Open or lip seals on both sides

GAR...-DO, GAR...-DO-2RS



GAL...-DO, GAL...-DO-2RS



GAKR...-PB



GAKL...-PB



# Rod ends requiring maintenance

## Features

These rod ends comprise a housing with integral shank and a spherical plain bearing requiring maintenance. The shank has an internal or external thread, the spherical plain bearing is firmly seated and located in the housing.

The rod ends can support radial forces in a tensile or compressive direction, transmit movements and forces at low moment levels and are suitable for alternating loads and, under certain conditions, unilateral loads.

Protection against corrosion is provided by zinc plating, the thin-walled design of the eye housing allows compact adjacent constructions.

Sealed rod ends are protected against contamination and water spray by lip seals. These bearings have the suffix 2RS.

Rod ends to DIN ISO 12 240-4, dimension series E contain radial spherical plain bearings GE..-DO or GE..-DO-2RS with steel/steel sliding contact surfaces, a right or left hand internal or external thread and tapered lubrication nipples to DIN 71412. They can be relubricated via the lubrication nipple or the housing bore.

Rod ends to DIN ISO 12 240-4-dimension series K have a right or left hand internal or external thread and funnel type lubrication nipples to DIN 3 405 on the rod end eye housing.

## Rod ends with internal thread

Dimension series E, type F has a steel/steel sliding contact surface, while dimension series K, type F has a steel/bronze sliding contact surface.

### Series, thread type, standard

Series	Thread type	Standard DIN ISO 12 240-4	Shaft diameter	
			from mm	to mm
GIR..-DO	Right hand thread	Dimension series E, type F	6	30
GIL..-DO	Left hand thread	Dimension series E, type F	6	30
GIR..-DO-2RS	Right hand thread	Dimension series E, type F	35	80
GIL..-DO-2RS	Left hand thread	Dimension series E, type F	35	80
GIKR..-PB	Right hand thread	Dimension series K, type F	5	30
GIKL..-PB	Left hand thread	Dimension series K, type F	5	30

## Rod ends with external thread

Dimension series E, type M has a steel/steel sliding contact surface, while dimension series K, type M has a steel/bronze sliding contact surface.

### Series, thread type, standard

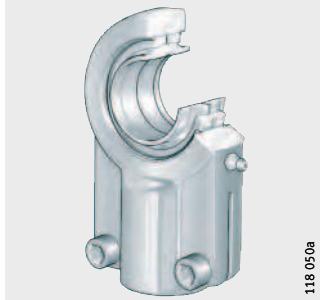
Series	Thread type	Standard DIN ISO 12 240-4	Shaft diameter	
			from mm	to mm
GAR..-DO	Right hand thread	Dimension series E, type M	6	30
GAL..-DO	Left hand thread	Dimension series E, type M	6	30
GAR..-DO-2RS	Right hand thread	Dimension series E, type M	35	80
GAL..-DO-2RS	Left hand thread	Dimension series E, type M	35	80
GAKR..-PB	Right hand thread	Dimension series K, type M	5	30
GAKL..-PB	Left hand thread	Dimension series K, type M	5	30



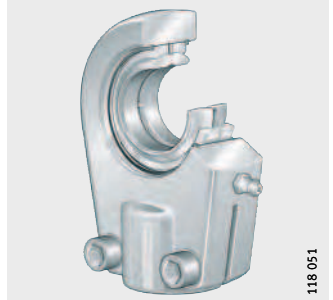
# Product overview Hydraulic rod ends

## Hydraulic rod ends

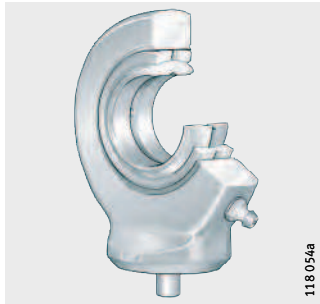
GIHNRK..-LO



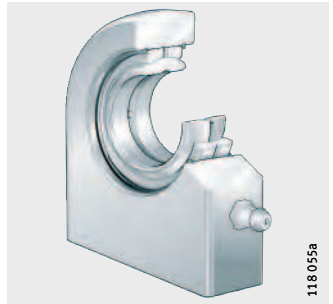
GIHRK..-DO



GK..-DO



GF..-DO



# Hydraulic rod ends

## Features

Hydraulic rod ends are fitted with radial spherical plain bearings GE...-LO or GE...-DO. They have steel/steel sliding contact surfaces, can support radial forces in a tensile or compressive direction, transmit movements and forces at low moment levels and are suitable for alternating loads.

The shanks can be screw mounted using a thread in the shank or welded in place by means of circular or rectangular welding faces.

Rod ends with a circular welding face have a 45° weld chamfer and a centring facility by means of a concentric locating pin. They are particularly suitable for piston rods. Hydraulic rod ends with a rectangular cross-section are particularly suitable for cylinder bases.

The rod ends are slotted on both sides up to  $d \leq 50$  mm and on one side from  $d > 50$  mm; they can be relubricated via tapered lubrication nipples.

## Hydraulic rod ends with thread clamping

Rod ends GIHNRK...-LO conform to DIN 24 338, ISO 6 982 for standard hydraulic cylinders to CETOP recommendation RP 58 H, DIN 24 333, DIN 24 336, ISO/DIS 6 020 I and ISO/DIS 6 022.

The spherical plain bearings are located in the housing by retaining rings. The thread clamping facility comprises two hexagonal socket head screws to DIN EN ISO 4 762.

Rod ends GIHRK...-DO are particularly suitable for hydraulic cylinders. They have very small linkage distances while allowing maximum stroke utilisation. These rod ends are also available with maintenance-free spherical plain bearings GE...-UK-2RS and GE...-FW-2RS.

## Series, thread type, standard

Series	Thread type	Standard	Shaft diameter	
			from mm	to mm
GIHNRK...-LO	Right hand thread	DIN ISO 6 982	12	200
GIHRK...-DO	Right hand thread	–	20	120
GIHLK...-DO	Left hand thread	–	20	120

## Hydraulic rod ends with welding face

GK...-DO is designed in accordance with DIN ISO 12 240-4, dimension series E, type S with a circular welding face, a centring pin on the shank base and 45° welding chamfer. They are suitable for fixing to piston rod ends and cylinder bases.

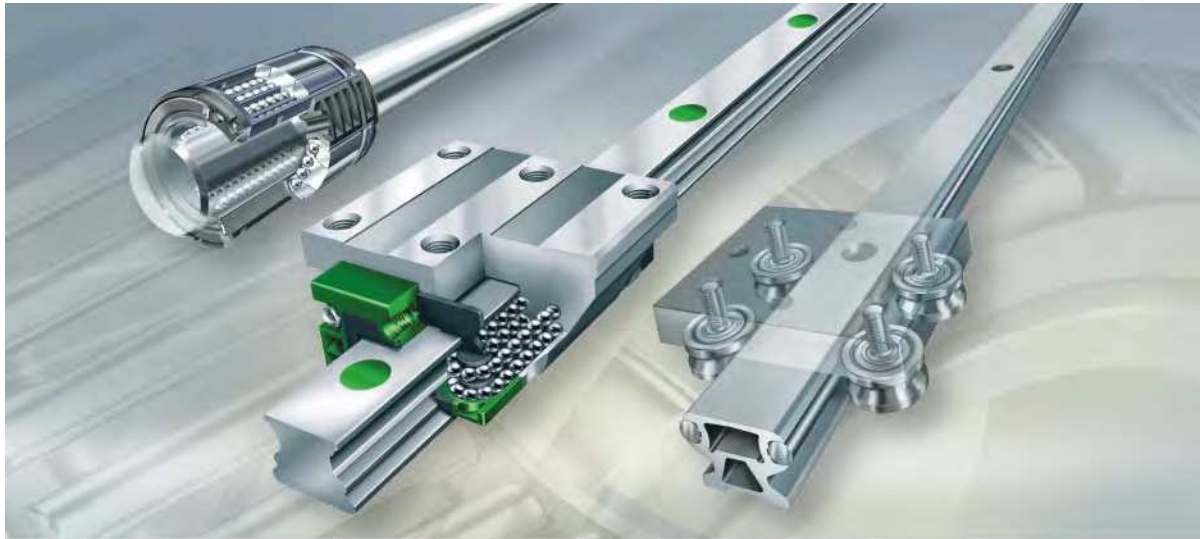
The spherical plain bearings are located in the housing by staking on both sides.

GF...-DO is available in a heavy-duty design with a rectangular welding face. The spherical plain bearings are located in the housing by retaining rings and can be dismantled. These rod ends are suitable for fixing to hydraulic cylinder bases.

## Series, welding face, standard

Series	Welding face	Standard DIN ISO 12 240-4	Shaft diameter	
			from mm	to mm
GK...-DO	Circular	Dimension series E, type S	10	80
GF...-DO	Rectangular	–	20	120





## Linear guidance systems

Monorail guidance systems

Shaft and track roller guidance systems

Flat cage and recirculating roller guidance systems

Miniature guidance systems

Driven linear units



# Linear guidance systems

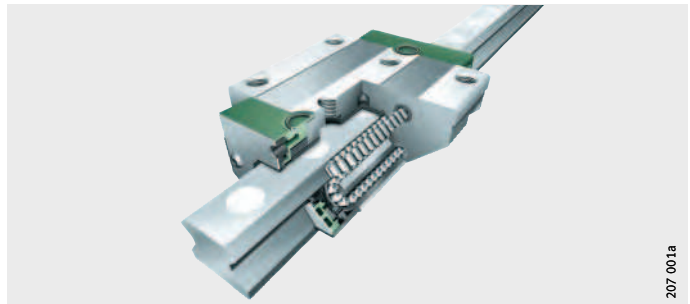
	Page
<b>Product overview</b>	Monorail guidance systems ..... 1578
<b>Features</b>	Linear recirculating roller bearing and guideway assemblies..... 1579
	Six-row linear recirculating ball bearing and guideway assemblies..... 1580
	Four-row linear recirculating ball bearing and guideway assemblies..... 1580
	Two-row linear recirculating ball bearing and guideway assemblies..... 1580
<b>Product overview</b>	Shaft and track roller guidance systems ..... 1582
<b>Features</b>	Shaft guidance systems ..... 1583
	Track roller guidance systems ..... 1583
<b>Product overview</b>	Flat cage and recirculating roller guidance systems ..... 1584
<b>Features</b>	Flat cage guidance systems ..... 1585
	Linear recirculating roller guidance systems ..... 1585
<b>Product overview</b>	Miniature guidance systems ..... 1586
<b>Features</b>	Two-row miniature linear recirculating ball bearing and guideway assemblies..... 1587
	Four-row miniature linear recirculating ball bearing and guideway assemblies..... 1587
	Miniature carriage units ..... 1587
	Miniature linear guidance sets ..... 1587
<b>Product overview</b>	Driven linear units ..... 1588
<b>Features</b>	Linear actuators ..... 1589
	Linear tables ..... 1589



# Product overview Monorail guidance systems

**Linear recirculating roller bearing and guideway assemblies**

RUE

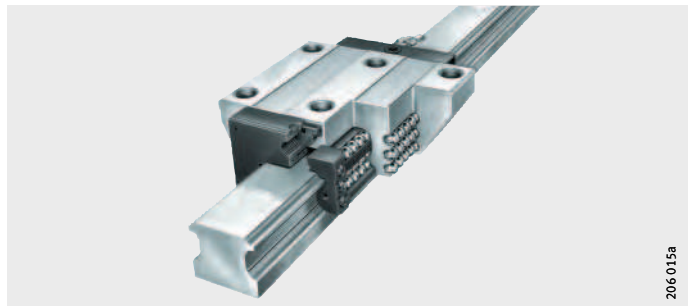


207 001a

**Linear recirculating ball bearing and guideway assemblies**

Six-row

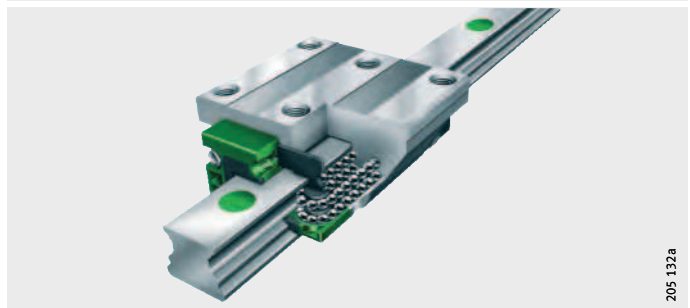
KUSE



206 015a

Four-row

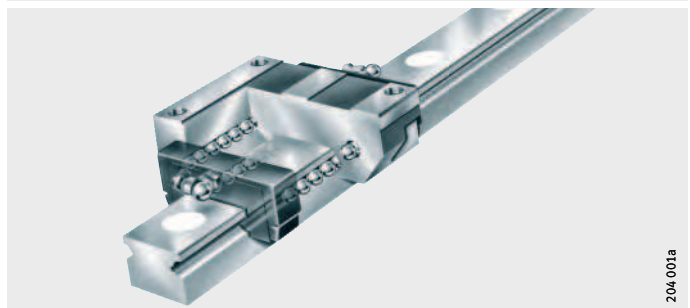
KUVE



205 132a

Two-row

KUE



204 001a

# Monorail guidance systems

**Features** Monorail guidance systems from the Schaeffler Group are compact linear guidance systems based on roller or balls and have high rigidity and high load carrying capacity. These guidance systems can support forces from all directions, except for the direction of motion, and moments about all axes.

They are available in various accuracy and preload classes and are therefore also suitable for applications with high guidance and positioning requirements.

Monorail guidance systems are based on a modular concept, i. e. guideways can be combined with all carriage types within each size. This gives more economical stockholding, simpler fitting and more rapid spare parts procurement.

In order to reduce maintenance intervals and maintenance costs, monorail guidance systems have a lubricant reservoir.

Sealing of the carriages on all sides protects the rolling element systems against contamination even under critical operating conditions.

**Product catalogue** The complete standard range of monorail guidance systems is described in detail in Catalogue PF 1, Monorail Guidance Systems and on the online version of **medias<sup>®</sup> professional**.

**Linear recirculating roller bearing and guideway assemblies** Linear recirculating roller bearing and guideway assemblies RUE are, due to the cylindrical rollers, the monorail guidance systems with the highest load carrying capacity and rigidity available from the Schaeffler Group. They comprise at least one carriage with a full complement roller system, a guideway, integral elastic wipers on the end faces of the carriage, sealing strips on the upper and lower sides of the carriage and closing plugs to close off the fixing holes in the guideway.

The carriage and guideway of a linear recirculating roller bearing and guideway assembly are matched to each other due to their closely toleranced preload. It may be possible, after consultation, to use carriages and guideways in different combinations.

Linear recirculating roller bearing and guideway assemblies are suitable for accelerations up to  $100 \text{ m/s}^2$ , speeds up to  $180 \text{ m/min}$  and operating temperatures from  $-10 \text{ °C}$  to  $+100 \text{ °C}$ . They are used in applications with long unrestricted strokes, high and very high loads and high to very high rigidity.

The units are also available in a variant with optimised noise characteristics and in X-life quality.



# Monorail guidance systems

## Six-row linear recirculating ball bearing and guideway assemblies

Six-row linear recirculating ball bearing and guideway assemblies KUSE are the guidance systems based on balls with the highest load carrying capacity and rigidity. They comprise at least one carriage with a full complement ball system, a guideway, integral elastic wipers on the end faces of the carriage, sealing strips on the lower side of the carriage and plastic closing plugs.

Linear recirculating ball bearing and guideway assemblies KUSE are suitable for accelerations up to  $150 \text{ m/s}^2$ , speeds up to 300 m/min and operating temperatures from  $-10 \text{ }^\circ\text{C}$  to  $+100 \text{ }^\circ\text{C}$ . They are used in applications with long unrestricted strokes, high and very high loads and high to very high rigidity.

## Four-row linear recirculating ball bearing and guideway assemblies

Four-row linear recirculating ball bearing and guideway assemblies KUBE are the most versatile and most extensively developed range of monorail guidance systems available from the Schaeffler Group. These units comprise at least one carriage with a full complement ball system, a guideway, integral elastic wipers on the end faces of the carriage, sealing strips on the upper and lower sides of the carriage and plastic closing plugs.

Linear recirculating ball bearing and guideway assemblies KUBE are suitable for accelerations up to  $150 \text{ m/s}^2$ , speeds up to 300 m/min and operating temperatures from  $-10 \text{ }^\circ\text{C}$  to  $+100 \text{ }^\circ\text{C}$ . They are used in applications with long unrestricted strokes, high loads, high rigidity and low friction.

The units are also available in a variant with optimised noise characteristics and in X-life quality.

## Two-row linear recirculating ball bearing and guideway assemblies

Two-row linear recirculating ball bearing and guideway assemblies KUE are the economical alternative where guidance systems with moderate load capacity are required. The units comprise at least one carriage with a full complement ball system, a guideway, integral elastic wipers on the end faces of the carriage, sealing strips on the lower side of the carriage and plastic closing plugs.

Linear recirculating ball bearing and guideway assemblies KUE are suitable for accelerations up to  $150 \text{ m/s}^2$ , speeds up to 180 m/min and operating temperatures from  $-10 \text{ }^\circ\text{C}$  to  $+100 \text{ }^\circ\text{C}$ . They are used for long unrestricted strokes, moderate loads, moderate rigidity and low friction.



# Product overview Shaft and track roller guidance systems

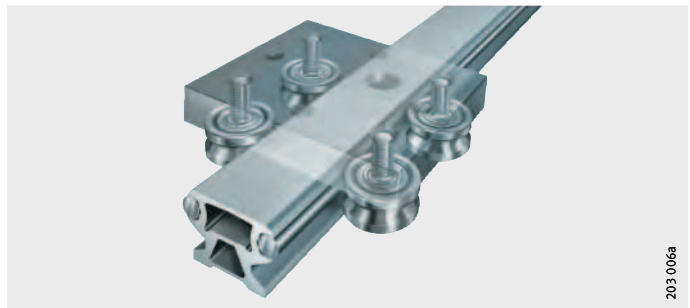
## Shaft guidance systems

WF



## Track roller guidance systems

LF



# Shaft and track roller guidance systems

## Features

### Shaft guidance systems

Shaft guidance systems from the Schaeffler Group are linear guidance systems based on ball bearings or plain bearings for various areas of use and applications. Linear ball bearings are available as a light range, compact range and machined range. The mating tracks may be in the form of solid shafts, hollow shafts or supported shaft and support rail units.

The range is rounded off by a large selection of linear ball bearing and housing units and linear plain bearing units. In this case, the linear ball bearings or linear plain bearings are already mounted in ready-to-fit housings.

A large number of shafts (with and without machined features), shaft and support rail units and a versatile range of accessories allow a wide spectrum of applications.

### Track roller guidance systems

Track roller guidance systems from the Schaeffler Group are linear guidance systems that can be configured on a modular basis for an extremely wide variety of applications. Due to their lightweight construction, they are highly suitable for use in handling systems. They are characterised in particular by quiet running, high traverse speeds, long travel distances and the modular concept.

Track roller guidance systems comprise one or more carriages made from aluminium, profiled track rollers and a straight or curved guideway. The carriages are available as hollow section carriages, open carriages, compact carriages and bogie carriages for curved, oval and circular guidance systems.

The guideways are made from aluminium with rolled-in raceway shafts made from rolling bearing steel. The guideways are available in numerous different designs, including a solid profile guideway, hollow section guideway, flat guideway, guideway with slot etc. They are selected as appropriate to the intended purpose of the track roller guidance system.

### Product catalogues

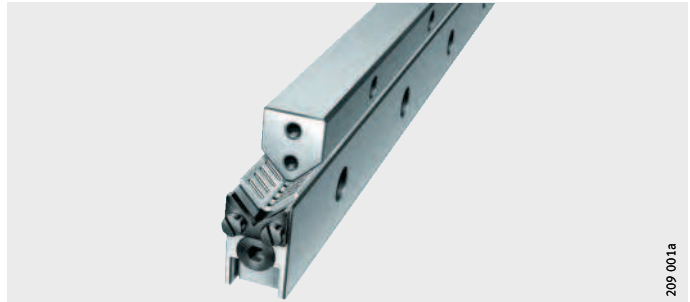
The standard range is described in detail in the catalogues LF 1, Track Roller Guidance Systems, WF 1, Shaft Guidance Systems and on the online version of **medias**<sup>®</sup> *professional*.



# Product overview Flat cage and recirculating roller guidance systems

## Flat cage guidance systems

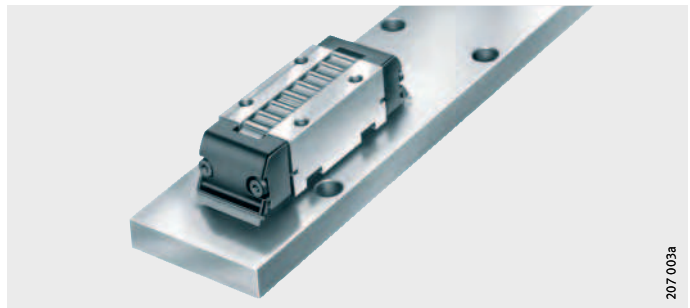
M/V, ML/V, MVZ, J/S



209 001a

## Linear recirculating roller guidance systems

RUS, RUS..-KS, PR, RUSW



207 003a



# Flat cage and recirculating roller guidance systems

## Features

### Flat cage guidance systems

Where linear locating or non-locating bearings with extremely high load carrying capacity, very smooth running and low, uniform friction are required for limited stroke lengths, flat cage guidance systems are used. These guidance systems comprise a guideway arrangement separated by needle or cylindrical roller flat cages. The guidance systems have particularly high rigidity, high accuracy and low friction and require significantly less space than other linear guidance systems.

### Linear recirculating roller guidance systems

Linear recirculating roller guidance systems comprise a bearing arrangement system for linear motion with unlimited stroke. Since the guidance elements have a versatile range of possible arrangements, linear recirculating roller guidance systems are suitable for numerous applications in general machine building, especially for linear guidance systems in machine tools where high guidance and positioning accuracies are required over long traverse distances.

The range of recirculating guidance systems is complemented by:

- adjusting gibs for precise setting of preload
- setting devices for measuring the deformation of the adjacent construction where preload forces must be supported
- adapters for easy fitting of linear recirculating roller bearings in 45° arrangements.

### Product catalogue

The standard range is described in detail in Catalogue FR 1, Flat Cage Guidance Systems and Linear Recirculating Roller Guidance Systems and on the online version of **medias<sup>®</sup> professional**.

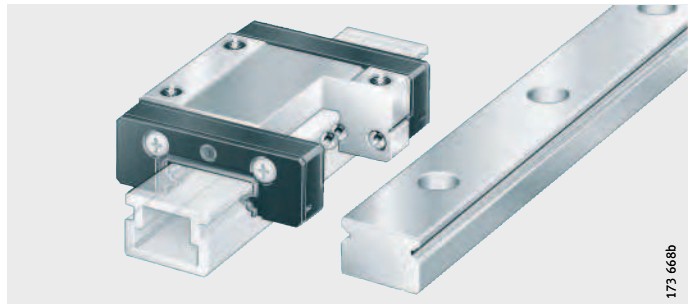


# Product overview **Miniature guidance systems**

## **Miniature linear recirculating ball bearing and guideway assemblies**

Two-row

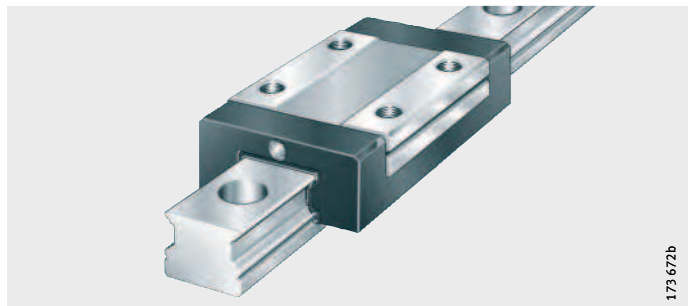
KWEM, TKDM



173 668b

Four-row

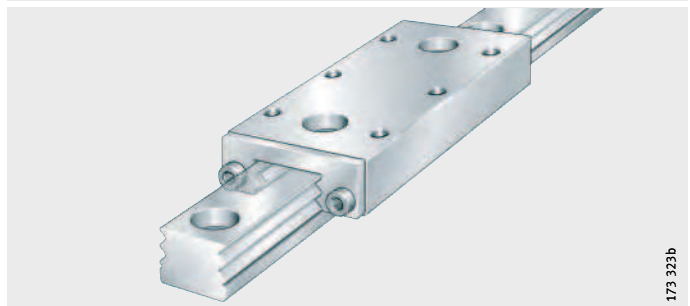
KUME...-C



173 672b

## **Miniature carriage units**

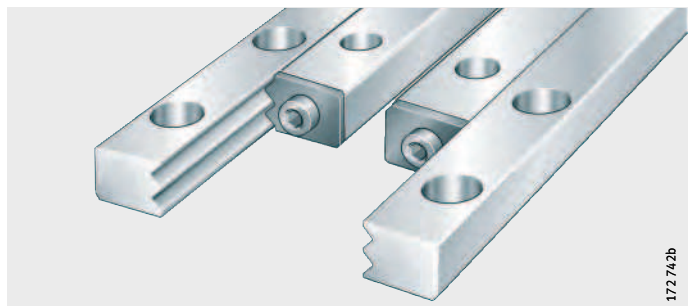
RMWE...-VA



173 323b

## **Miniature linear guidance sets**

RWS



172 742b

# Miniature guidance systems

## Features

Miniature guidance systems from the Schaeffler Group are not standard linear guidance systems that have simply been reduced in size but have been specially developed for very small design envelopes. Due to their compact design, they can often be used to replace bearing arrangements that require significantly more space. The guidance systems are preloaded linear locating bearings for limited and unlimited stroke lengths.

## Two-row miniature linear recirculating ball bearing and guideway assemblies

These units have moderate load carrying capacity and moderate to high moment load carrying capacity. Due to their modular concept, guideways and carriages can be interchanged within each interchangeability and accuracy class. This simplifies the fitting of guidance systems, gives easier spare parts procurement and allows very economical stockholding. The saddle plates and guideways are corrosion-resistant. Seals on the end faces of the carriages protect the rolling element system against contamination. The carriages are greased and can be relubricated. The guideways and carriages are also available in a wide version. Information on the units is given in TPI 163, Corrosion-resistant Miniature Linear Recirculating Ball Bearing and Guideway Assemblies.

## Four-row miniature linear recirculating ball bearing and guideway assemblies

Four-row miniature linear recirculating ball bearing and guideway assemblies are ready-to-fit guidance systems for unlimited stroke lengths. They have high to very high load carrying capacity and rigidity. Due to the lubricant reservoir, the relubrication intervals can be extended. The saddle plates and guideways are corrosion-resistant. Seals on the end faces of the carriages protect the rolling element system against contamination. The carriages are greased and can be relubricated. Information on the units is given in TPI 163, Corrosion-resistant Miniature Linear Recirculating Ball Bearing and Guideway Assemblies.

## Miniature carriage units

Miniature carriage units with cylindrical roller flat cages are corrosion-resistant, ready-to-fit cage guidance systems for limited stroke lengths. They have a high load carrying capacity, high rigidity and high accuracy whilst requiring very little space. Information on the units is given in TPI 160, Corrosion-resistant Miniature Carriage Units.

## Miniature linear guidance sets

Miniature linear guidance sets with cylindrical roller flat cages are corrosion-resistant, ready-to-fit locating bearings for limited stroke lengths and are preloaded during fitting. These linear guidance systems have high load carrying capacity, high rigidity and high accuracy while requiring very little space. Since the layout of the guidance system can be varied, the elements can be easily matched to predetermined adjacent constructions. The sets are particularly suitable for short stroke lengths, low-friction and oscillating motion and high loads with very high rigidity. Information on the sets is given in TPI 162, Miniature Linear Guidance Sets.

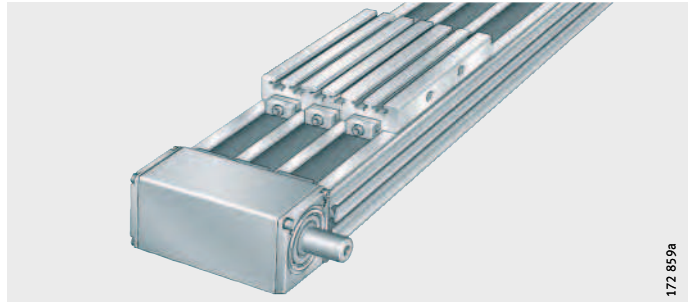


# Product overview **Driven linear units**

## **Linear actuators**

with linear recirculating ball bearing and guideway assemblies and toothed belt drive

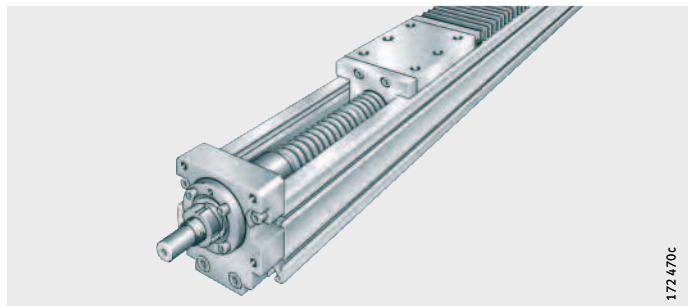
MKU..-ZR



172 859a

with linear recirculating ball bearing and guideway assemblies and ball screw drive

MKU..-KGT



172 470c

with linear recirculating ball bearing and guideway assemblies and direct drive

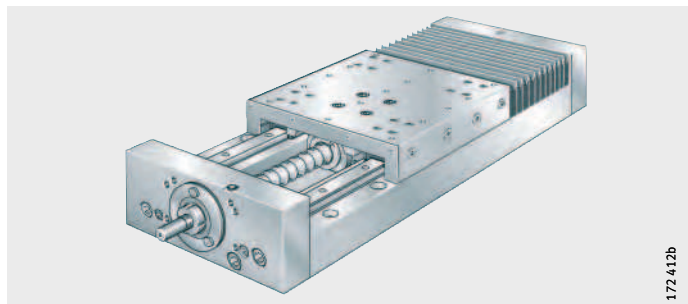
MKUVS42LM



211 059a

**Linear tables**  
with and without drive

LT



172 412b

# Driven linear units

**Features** Rapid progress in the automation of production and assembly processes has pushed forward the development of complete, driven assemblies. These comprise a high precision guidance system, a rigid support rail, a wear-free drive unit and a user-friendly controller.

**Linear actuators** Linear actuators from the Schaeffler Group are integrated modular systems containing all the components required for operation. The linear actuators are guided by linear recirculating ball bearing and guideway assemblies of series KUE, KUVE or KUSE, by track roller guidance systems LF or plain guidance systems. The drive function is carried out by a ball screw drive, toothed belt or direct drive.

**Linear tables** Linear tables from the Schaeffler Group are used to move larger masses in one or more axes. Due to the large distances between support points, linear tables are also capable of supporting high torques. The guidance systems used are linear ball bearings or linear recirculating ball bearing and guideway assemblies. Linear tables are available without a drive mechanism, with a ball screw drive, with a trapezoidal lead screw drive or a direct drive. The INA range of driven linear units is complemented by suitable controllers, motors and gearboxes that are matched to each other for optimum performance.

**Product catalogue** Detailed information on these units is given in Catalogue AL 1, Driven Linear Units, information on units with direct drives is given in MAI 105, Linear Actuator with Linear Recirculating Ball Bearing and Guideway Assembly and Direct Drive.





**FAG**



## Mounting and maintenance of rolling bearings

# Mounting and maintenance of rolling bearings

	Page
<b>Products and services</b>	
Competence in maintenance.....	1592
Services to industry.....	1592
Products for mounting and repair.....	1593
Products for lubrication .....	1595
Products for alignment .....	1596
Products for condition monitoring.....	1597
Mounting service.....	1598
Condition Monitoring.....	1598
Rolling bearing reconditioning .....	1599
Lubrication as a service .....	1601
Corrective maintenance .....	1601
Training.....	1601



# Mounting and maintenance of rolling bearings

## Products and services Competence in maintenance

The service arm of Schaeffler is the specialist contact for the maintenance of rotating components.

The aim is to help customers save on maintenance costs, optimise plant availability and avoid unforeseen machine downtime. The services are provided irrespective of the brand of the machine components used.

In order to ensure rapid, competent supply of maintenance products and services to customers worldwide, Schaeffler has centres of competence all over the world. All service employees undergo a comprehensive training programme and are audited regularly. This ensures that all services throughout the world conform to a uniformly high standard of quality. Since each customer has a different set of requirements, Schaeffler offers concepts individually tailored to the customer.

## Services to industry

The service function has undertaken ongoing expansion of its range in recent years. A small excerpt from the extensive range of products and services can be seen in the following sections.

Detailed information on the products and services available can be found in Catalogue IS1, Mounting and Maintenance of Rolling Bearings.

## Enquiries

If you have any questions on products and services, please address these directly to the service function:

- E-mail: [industrial-services@schaeffler.com](mailto:industrial-services@schaeffler.com)
- Internet: [www.schaeffler.com/services](http://www.schaeffler.com/services)
- Telephone: +49 2407 9149-66



## Products for mounting and repair

The product range comprises tools for the mechanical, hydraulic and thermal mounting and dismantling of rolling bearings. Mechanical tools are used predominantly for smaller bearings. Medium-sized and large rolling bearings are mainly mounted and dismantled using hydraulic or thermal tools. The range is logically rounded off by measuring equipment and accessories (such as transport tools and gloves).

## Products for mechanical mounting and dismantling

For the mechanical mounting and dismantling of small and medium-sized rolling bearings, Schaeffler offers mounting tool sets, various wrenches and mechanical extractors. Hydraulic extractors are used where higher extraction forces are required.

The following products are available:

- mounting tool sets
- adapters
- hook and pin wrenches
- mechanical extractors
- hydraulic extractors, *Figure 1*
- three-section extraction plates.



*Figure 1*  
Dismounting of a bearing  
using a hydraulic extractor



# Mounting and maintenance of rolling bearings

## Products for hydraulic mounting and dismantling

In order to give easier mounting and dismantling of bearings with a tapered bore, hydraulic nuts are often used. Pressure generation devices available include oil injectors, hand pump sets and high pressure pumps. Selection is aided by the software Mounting Manager.

There is a comprehensive range of accessories, such as manometers, adapters and reduction nipples, high pressure hoses and sleeve connectors:

- hydraulic nuts
- oil injectors
- hand pump sets
- high pressure pumps
- hydraulic systems and units
- connectors, accessories.

## Products for thermal mounting and dismantling

Devices for thermal mounting and dismantling are used to heat rolling bearings and other components with a cylindrical bore where a tight fit on the shaft or in the housing is intended.

These products include:

- electric heating plates
- heating rings
- heat conducting paste
- induction heating devices HEATER with mains frequency technology
- induction units with medium frequency technology.

## Products for measurement and inspection

Feeler gauges and measuring devices can be used to check the production of bearing seats and the mounting of bearings:

- feeler gauges
- taper ring gauges and taper gauges
- snap gauges
- enveloping circle gauges.

## Accessories for mounting and dismantling

Accessories provide assistance in the storage, transport and mounting of rolling bearings:

- transport and mounting tools
- gloves
- mounting paste
- anti-corrosion oil.

## Products for lubrication

The lubricants available from Schaeffler are designed and tested for bearing arrangement engineering.

### Lubricants

- Arcanol rolling bearing greases, *Figure 2*.

### Lubrication systems

- Electromechanical single-point lubrication: Motion Guard CHAMPION
- Electromechanical multi-point lubrication: CONCEPT8
- Metering devices
- Grease gun.



*Figure 2*  
Lubricants

000192B4



# Mounting and maintenance of rolling bearings

## Products for alignment

These products assist in the alignment of shafts and belt pulleys and the checking of belt tension.

### Belt and chain drives

- Belt pulley alignment device Top-Laser SMARTY2
- Belt tension measuring device Top-Laser TRUMMY2.

### Shaft couplings and alignment accessories

- Shaft alignment device Top-Laser EQUILIGN, *Figure 3*
- Shims Top-Laser SHIM.



*Figure 3*  
Shaft alignment device  
Top-Laser EQUILIGN

## Products for condition monitoring

Condition monitoring helps to achieve high availability and long service life of machinery and plant. FAG products help in planning maintenance work and reducing costs. The range includes devices for the alignment of shafts and belt pulleys. Temperature measuring and sonar devices make it possible to check the operating condition. An important element of the range comprises measuring systems that monitor vibration, torque and lubricants.

## Monitoring of operating condition

These devices can be used to manually check the temperature and speed of rolling bearing arrangements:

- temperature measuring devices
- digital hand tachometer.

## Vibration diagnosis

Devices for vibration diagnosis:

- Detector III, *Figure 4*
- SmartCheck
- DTECT X1 s
- WiPro s
- ProCheck.



*Figure 4*  
Condition monitoring



# Mounting and maintenance of rolling bearings

## Mounting service

The Schaeffler industrial service experts offer mounting services for rolling bearings that are applicable across industrial sectors. They have detailed knowledge and extensive experience in all industrial sectors, *Figure 5*.

The mounting personnel in the Industrial Service function are trained and skilled personnel who can provide reliable, rapid and competent assistance. The services are provided either at the customer's location or in the Schaeffler workshop facilities.



*Figure 5*  
Mounting of a large rolling bearing

## Condition Monitoring

The malfunction-free and optimised operation of complex machinery and plant can only be achieved by means of condition-based maintenance. Schaeffler uses vibration diagnosis as a preferred method here, *Figure 6*.

This method makes it possible to detect damage in machinery at a very early stage. This means that, for example, damaged components can be replaced as part of planned downtime. Unscheduled downtime is avoided.



*Figure 6*  
Vibration diagnosis as a service

## Rolling bearing reconditioning

During the maintenance of machinery and plant, many rolling bearings are taken out of service and replaced by new ones as a precaution. In some cases, this safety-conscious approach blocks any appreciation of the potential cost savings. The fact is: reconditioned bearings generally give the same performance as new ones.

The reconditioning of rolling bearings and rolling bearing units is one of the core competences of the service arm of Schaeffler and is offered at several certified locations worldwide. Our services for rolling bearings of all types apply irrespective of manufacturer and are not restricted to Schaeffler products.

Schaeffler is in a position to recondition and modify rolling bearings with an outside diameter of up to 4 250 mm, *Figure 7*. It is thus an expert partner for customers from a very wide range of industrial sectors such as general and special machine building, steel and aluminium, pulp and paper production, wind power, shipbuilding, private and public railways and mining. Reconditioning of rolling bearings has also proved effective for large bearings in machine tools.

- ① Before reconditioning
- ② After reconditioning



*Figure 7*

Rolling bearing raceway and rollers  
before and after reconditioning



# Mounting and maintenance of rolling bearings

**Dimensions**      Reconditioning and modification can be carried out on rolling bearings with an outside diameter D of up to 4 250 mm. Bearings and bearing units are divided into three diameter groups:

- D < 425 mm
- 425 mm < D < 1 250 mm
- 1 250 mm < D < 4 250 mm.

If reconditioning or modification of other bearings is required, please contact Schaeffler.

**Reconditioning levels**      Before reconditioning, the bearing is dismantled, cleaned and examined. The processing steps required are established and a proposal is prepared. Levels of rolling bearing reconditioning, see table.

**Level I to Level IV**

Processing steps	Level			
	I	II	III	IV
Removal of fretting corrosion	■	■	■	■
Polishing of raceways	–	■	–	–
Regrinding of raceways	–	–	■	■
Manufacture of rolling elements	–	–	■	■
Replacement of cage	–	–	■	■
Replacement or rework of rolling bearing rings	–	–	–	■
Assembly	■	■	■	■
Preservation or greasing	■	■	■	■
Packing	■	■	■	■
Despatch	■	■	■	■

**Further information**      Further information on the reconditioning of rolling bearings is given in Technical Product Information TPI 207, Reconditioning of Rolling Bearings.



### Lubrication as a service

In more than half of all cases, inadequate lubrication is the cause of unplanned machine downtime. The use of suitable greases makes it possible to significantly extend the life of rotating machine parts.

Our services include the selection and installation of lubricants and lubrication systems, the lubrication of bearing positions, the preparation of lubrication and maintenance plans, lubrication point management, lubrication consultancy and lubricant investigations and tests.

### Corrective maintenance

Incorrect alignment of belts and shafts is among the most common causes of unplanned machine downtime.

In addition to detailed analysis of causes, our service includes alignment of belts and shafts on pumps, ventilators, compressors, electrical machinery etc. as well as the detection and correction of positional deviations in belts and shafts using vibration and laser measurement devices.

### Training

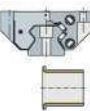
Schaeffler offers, in relation to the product and service range, both standard training and customer-specific training, *Figure 8*.

The individual training units are based on a modular concept with the result that customers can compile their own customised training course on the basis of these training components.

The training courses are offered both at Schaeffler locations and also on site at our customers. The current training offer including dates for the standard training courses can be found at [www.schaeffler.com](http://www.schaeffler.com) in the section Training.



*Figure 8*  
Training





**FAG**



## Market sectors

Production Machinery  
Power Transmission and Railway  
Heavy Industry  
Consumer Products

## Market sectors

	Page
<b>Production Machinery</b>	
Bearings for machine tools .....	1604
Bearings for printing machinery .....	1605
Bearings for textile machinery.....	1607
Bearings for the food and packaging industry.....	1609
Bearings for woodworking machinery.....	1609
<b>Power Transmission and Railway</b>	
Bearings for rail vehicles.....	1610
Bearings for power transmission.....	1612
Bearing arrangements in construction machinery .....	1613
Bearing arrangements in industrial conveying trucks.....	1613
Bearing arrangements in wind turbines.....	1614
<b>Heavy Industry</b>	
Bearing arrangements for the steel industry .....	1615
Bearing arrangements for the paper industry.....	1618
Bearing arrangements in deep and surface mining .....	1621
Bearings for materials processing .....	1623
Bearing arrangements and components in the fluid technology sector.....	1626
Bearing arrangements in the air handling sector.....	1628
<b>Consumer Products</b>	
.....	1630



## Market sectors

Schaeffler Group Industrial develops, manufactures and supplies ball bearings, roller bearings, bearing units, housings and accessories worldwide for almost all machinery, plant, vehicles and equipment. We also provide a comprehensive range of services for advice, maintenance and fitting.

Our customers come from the areas of Production Machinery, Power Transmission and Railway, Heavy Industry and Consumer Products.

### **Production Machinery**

High performance production machinery is a precondition for, and a driving force of, technical progress.

High precision bearings set standards both in their main application sector in machine tools and also in equipment for the textile industry, in printing machinery, woodworking machinery and machines for the food industry. They fulfil very high requirements for reliability, high running accuracy and high speeds. Comprehensive information is given in Catalogue SP 1, Super Precision Bearings.

### **Bearings for machine tools**

Hybrid spindle bearings with steel rings and ceramic balls are finding increasing usage due to their particular speed capacity, robust characteristics and reliability as well as their significantly longer operating life. For very high requirements in terms of load carrying capacity and speed capacity, special X-life ultra bearings with rings made from high performance steel and ceramic balls have been developed.

Single and double row cylindrical roller bearings of high precision design are ideal for use as non-locating bearings, since they allow length compensation without constraining forces between the rollers and raceways. They give bearing arrangements with high radial rigidity, high load carrying capacity and high accuracy.

Double direction axial angular contact ball bearings of series 2344 are used as particularly rigid axial bearings when cylindrical roller bearings of series NN30 support the radial forces.

## **Bearings for printing machinery**

Printing machinery bearings are used in the bearing arrangements of the main cylinders in sheetfed and webfed printing machines, *Figure 1*, page 1606. Due to their load carrying capacity, rigidity, accuracy and precise adjustability, they provide excellent support for the central requirement in printing machinery, namely the highest possible print quality.

The bearings are specially designed in close partnership between printing machinery manufacturers and our Application Engineering functions. As a result, the bearings are precisely matched to the requirements of the customer. This matching of design to the specific machine concept is particularly important, since exceeding requirements is a drain on resources and failing to meet requirements impairs performance. Finding the optimum solution, however, is not always easy. Due to its considerable experience in the development, design and manufacture of bearings, Schaeffler Group Industrial has the know-how necessary to always offer the best solution for an application in this complex bearing sector. Furthermore, it is able to do so in both technical and economic terms.



## Market sectors

Due to the wide range of requirements, standardisation of printing machinery bearings is only possible to a limited extent. The range therefore comprises a large number of types and sizes.

In addition to the classic multi-row, high precision cylindrical roller bearings NN, NNU, N4N, N4U, use is also made of non-locating bearing units without and with eccentric geometries, locating bearing units, polygon bearings, linear bearing units, rotary bearing units and tapered roller bearing units. Bearings are available with and without seals. The bearing seat for the cylindrical stud can be of a cylindrical or tapered design.

INA printing machinery bearings are cost-effective bearing arrangement systems that can be used to achieve the demands of the print industry for high productivity, low maintenance costs and excellent print quality.



*Figure 1*  
Printing machine bearing unit with  
eccentric outer ring  
Non-locating bearing

### Special publications

TPI 222  
Publication PDM

High precision bearings for printing machinery  
Bearings solutions for printing machinery.

## Bearings for textile machinery

Whether they are used for spinning or weaving, finishing or processing, modern textile machines are highly automated and must run with high material throughput and without malfunctions, right around the clock. There is no question that the right bearing components play a crucial role here. “Right” in this context means low friction, high accuracy, clearance-free, easy to fit, low maintenance, long service life, low noise and reliable.

In order to fulfil these requirements, Schaeffler Group Industrial has a comprehensive range of precision products for the reliable and cost-effective support of rotary and linear motion in textile machinery. We also have a range of system components that are precisely matched as complete systems to the specific application. Every one of these solutions has been achieved with the aid of years of experience in product development and the design of bearing arrangements.

Tape tension pulleys for gripper drives in weaving machines are renowned for their long life, *Figure 2*. These pulleys can be easily lubricated and have a very low moment of inertia. As a result, they run up to operating speed very quickly. In addition, the pulleys carry out up to 600 alternating rotary movements per minute in continuous operation with very low energy consumption. This gives a considerable increase in the productivity and cost-efficiency of the machine while achieving a uniformly high fabric quality.



*Figure 2*  
Energy-saving tape tension pulley  
for the gripper drive



## Market sectors

We also have ready-to-fit tension pulleys with reduced running noise, *Figure 3*. Due to design measures, for example, the imbalance of these components has been reduced by 50%. As a result, it is no longer necessary to balance the pulleys separately.



*Figure 3*  
Tape tension pulley with  
optimised noise characteristics  
for twisting machines

Such ready-to-fit units are used in single and multi-head embroidery machines and are simply screw mounted on the adjacent construction. This eliminates the matching of individual components to each other and reduces errors involved in mounting. This solution also gives a simplified adjacent construction since the gearbox that was previously required can be completely eliminated.

The system comprises a lever, eccentric, connecting rod and the corresponding bearing units. The assembly converts the rotary motion of the drive shaft into the stroke motion for the embroidery operation. Due to the smooth-running, high accuracy running of the bearings, the unit can achieve more than 1 000 strokes per minute. Highly effective seals ensure long life and low maintenance requirements.

**Special publications**    Publication TMB    Rolling bearings for textile machinery.



## **Bearing for the food and packaging industry**

Food production must proceed economically and with high efficiency. In general, the processes run fully automatically and often take place under extreme operating conditions. This requires a high degree of security and reliability. High quality machine components designed for continuous performance are an indispensable element here.

Our contribution in this field: robust bearings with anti-corrosion protection, effective sealing and in many cases lubricated for life, for reliable round-the-clock operation. Modern materials and surface coatings, which we are continually working to develop further, give our bearing arrangements the necessary advantages in rating life.



*Figure 4*  
Open and sealed  
deep groove ball bearings

In the case of insert bearings, track rollers, slewing rings or the entire range of linear motion products, catalogue products or specifically designed units, the focus of our development efforts on all these Schaeffler Group products is the benefit to the customer: reducing the presence of interfaces by functional integration, compact construction, freedom from maintenance, reliable operating life, effective matching of components and subsystems to each other.

### **Special publications**

Publication PVP    Bearing arrangements in food and packaging machinery.

### **Bearings for woodworking machinery**

In many cases, deep groove ball bearings are adequate for the high speeds and relatively low loads in bearing arrangements for wood shapers. Very high speeds, however, normally require the use of spindle bearings.



## Market sectors

### Power Transmission and Railway

People and goods are being moved from one place to another with increasing speed and over increasing distances. Motors and transmissions must operate with increasing efficiency. In power transmission, construction machinery and railway engineering, therefore, high demands are being placed on the quality and life of rolling bearings.

### Bearings for rail vehicles

In mainline and local trains, the dominant requirements are for higher speeds and smoother running. Bearings and housings for wheelsets, transmissions and motors are selected by the Application Engineering specialists so that they are ideally matched to the customer requirements, *Figure 5*.

Wheelset bearings are subjected to extreme loads and must fulfil very high safety requirements.

For wheelsets, cylindrical roller bearings with smooth running, low friction and high speed suitability are frequently used in specially developed wheelset bearing housings.

Wheelset bearings with spherical roller bearings are available for rigid housings connected to the vehicle or bogie.

Tapered roller bearing units TAROL are suitable for high running speeds and high axial loads. The ready-to-fit units can be mounted in a single operation, are sealed, lubricated and have a specially adjusted axial internal clearance. They are supplied in metric sizes (UIC range) or to the AAR specification in inch sizes.

Increasingly, wheelset bearing units with integrated sensors (for speed, temperature, direction of rotation etc.) are being used.



*Figure 5*  
Tapered roller bearing unit  
for passenger train carriages

In hydrodynamic and mechanical railway transmissions with oil lubrication, radial bearings of practically all types are used to guide the pinion shafts, intermediate shafts and ring gear shafts.

In the axle suspension drive, which is normally lubricated by grease, cylindrical roller bearings, tapered roller bearings or spherical roller bearings are used.

For large gear bearing arrangements (gear hub), tapered roller bearings in an O arrangement matched by means of intermediate rings are predominantly used.

In the bearing positions of the traction motors, cylindrical roller bearings and deep groove ball bearings have proved successful.

For rail vehicles, there are also support and guide rollers, bearings in ancillary equipment, wheelset bearings with adapters, current-insulated deep groove ball bearings and cylindrical roller bearings to DIN/ISO dimensions, special Arcanol rolling bearing greases and mounting tools.

<b>Special publications</b>	WL 07174	Expertise in bearing technology and service for rail vehicles
	TPI 158	Products for railway applications.



## Market sectors

### Bearings for power transmission

Modern gearboxes transmit high power levels within a small space. This requires careful selection of rolling bearings with high performance capacity. In addition to load carrying capacity, appropriate design of the adjacent parts, lubrication and sealing is a precondition for reliable and cost-effective bearing arrangements. In order to take account of these influences, it is particularly advantageous to use the expanded life calculation method.

Depending on the gearbox design and tooth set type, almost all types of rolling bearings are used in power transmission.

The input shafts of cylindrical gear units are often supported by spherical roller bearings or tapered roller bearings, *Figure 6*. For particularly high speeds, combinations of cylindrical roller bearings supporting radial loads and four point contact bearings under axial load are suitable. For intermediate and output shafts, spherical roller bearings in a floating arrangement are often selected.



*Figure 6*  
Rolling bearings  
in a cylindrical gear unit

### Special publications

PKI

Expertise for bearing arrangements in industrial gearboxes.

In bevel gear pairs, a narrow axial guidance is often required in order to ensure tooth mesh. A solution here is to use axially adjusted or matched tapered roller bearings or angular contact ball bearings.

The high axial forces in the worm shaft of worm gear units can be transmitted using matched or adjusted tapered roller bearings. For worm gear shafts, adjustability and narrow axial guidance of the tooth set are required. Deep groove ball bearings or adjusted tapered roller bearings are often used.

In order to support planet gears in planetary gearboxes, single or multiple row cylindrical roller bearings are used, with spherical roller bearings being fitted in special cases. Thicker planet gear studs can be achieved with direct bearing arrangements. The rolling elements then run directly on the planet gear stud. The hardness curve and surface quality of the raceway must be produced to particular specifications in order to ensure the load carrying capacity and operating life of the planet gear bearing arrangement.

### **Bearing arrangements in construction machinery**

Among the wide range of rolling bearing arrangements in construction machinery, the excitation shaft bearing arrangement in vibratory equipment deserves particular mention.

Road rollers, plate compactors, vibratory motors, vibratory piledrivers or vibrator frames work with mechanical vibrations. The exciter shafts and their eccentrically mounted weights run at high speeds. Deep groove ball bearings (for small vibratory equipment), spherical roller bearings and cylindrical roller bearings (N, NU design) have proved successful here.

In order to compensate for misalignments and shaft deflections, the rollers and inner ring raceways of the cylindrical roller bearings have a logarithmic transverse profile. This allows tilting of up to 4 angular minutes without impairing the life. For greater tilting, the transverse profile can be adapted.

### **Special publications**

PLB      Expertise for bearing arrangements  
in construction machinery.

### **Bearing arrangements in industrial conveying trucks**

Examples of special bearing designs can be found in fork lift trucks. Sensor bearings combine proven rolling bearing technology and modern sensor technology for drive, control and monitoring. This ready-to-fit system solution offers numerous cost and performance advantages.



## Market sectors

### Bearing arrangements in wind turbines

Wind turbines can now generate power levels of more than 3 MW. The bearings must be able to support moderate to high loads, oscillation and vibration. Low friction standard rolling bearings are normally suitable here. The bearings are mounted in standard or special housings. For particular cases, special rolling bearings can also be used.

Rolling bearings for wind turbines must in many cases fulfil high quality requirements involving the presentation of appropriate evidence (German Lloyd certification guidelines).

The rotor bearing arrangement can be in the form of a shaft or hub bearing arrangement, *Figure 7*. Locating/non-locating bearing arrangements with spherical, cylindrical or tapered roller bearings have proved successful.

In the hub bearing arrangement, two tapered roller bearings are adjusted against each other. An alternative solution comprises a matched pair of tapered roller bearings as a locating bearing and a cylindrical roller bearing as a non-locating bearing.

For single bearing designs, support of forces and moments is combined in a multiple-row rolling bearing.



*Figure 7*  
Self-aligning  
FAG spherical roller bearings  
for rotor bearing arrangements

Small swivel movements in the adjustment of the rotor blade as well as high loads and tilting moments are normally supported by four point contact bearings.

As tower bearings, four point contact bearings support the high weights and wind forces.

In wind turbine gearboxes, all types of rolling bearings normally found in gearbox construction are used.

### Special publications

WL 01206 Expertise in bearing technology and service for wind energy installations.

## Heavy Industry

The difficult operating and environmental conditions in all areas of heavy industry require rolling bearings that are proven even in critical applications. This applies to mining, crude oil and natural gas gathering, materials processing, the steel industry, the paper industry and conveying equipment.

## Bearing arrangements for the steel industry

The bearing arrangements in steelworks and rolling mills are generally subjected to very high loads and in many cases also to high temperatures and heavy contamination. In addition to standard rolling bearings, bearings specially designed for these conditions are required.

The rolling bearings for converters must support not only heavy weights but also severe shocks. Large spherical roller bearings of split or unsplit design fulfil these requirements.

The swivel arms of the turret in continuous casting plants are supported in large rolling bearings. Axial spherical roller bearings are often used to support the weights involved, with cylindrical roller bearings to support the tilting moment.

At the inner support point of driven guide rollers, split roller bearings are used. In order to protect the bearings from the high slab temperatures as well as scale and coolant water, the housings are cooled using water. The seals comprise lamellar sealing rings and labyrinth seals.

For the support of non-driven guide rollers and the outer support of driven guide rollers, unsplit bearings are used.

Sealed spherical roller bearings reduce the consumption of lubricant and thus the environmental impact, *Figure 8*.



*Figure 8*  
Sealed spherical roller bearing  
for strand guide rollers



## Market sectors

In order to support the high radial forces in rolling mills, cylindrical roller bearings with two or four rows are often selected, together with axial bearings in the form of deep groove ball bearings, angular contact ball bearings, double row tapered roller bearings, axial tapered roller bearings or axial spherical roller bearings. If tapered roller bearings with two or four rows are used as radial bearings, an additional axial bearing is not normally necessary.

Spherical roller bearings are common as roll bearings where high axial guidance accuracy is not required and speeds are low.

Sealed multi-row tapered roller bearings for work rolls reduce the consumption of lubricant and thus the environmental impact, *Figure 9*.

Axial tapered roller bearings for pressure spindles ensure low adjustment forces due to their low friction.



*Figure 9*  
Sealed four row tapered  
roller bearing for work rolls



Single row cylindrical roller bearings as well as single and double row angular contact ball bearings are found predominantly in high speed rolling mills for wire and fine iron production lines.

The drive shafts in heavy duty rolling mills have a considerable mass. They were previously normally supported in plain bearings. Now, wear and lubricant requirements are considerably reduced due to the use of special cylindrical roller bearings of split design.

Spherical roller bearings are frequently used in gearboxes for rolling mills. In newer designs, the shafts are supported in double row cylindrical roller bearings as non-locating bearings and in double row tapered roller bearings as locating bearings. This bearing arrangement gives particularly accurate radial and axial guidance of the shafts.

Split cylindrical roller bearings are frequently used in the crankshafts of cold pilger machines.

For the bearing arrangement of work rolls in cold pilger machines, spherical roller bearings with a tapered bore and a special internal construction are used that are matched to the particular load conditions in these machines.

The roll bearing arrangement of cluster type cold rolling mills must ensure high surface quality and uniform thickness of the rolled strips. Multi-row cylindrical roller bearings or tapered roller bearings fulfil these requirements as back-up rollers.

<b>Special publications</b>	TPI 148	Rolling bearing arrangements for converters
	TPI 157	Split cylindrical roller bearings for the bearing arrangements of rolling mill drive shafts
	WL 17114	Sealed FAG spherical roller bearings
	WL 17115	Bearings and Service – Productivity and Reliability for Metal Production
	WL 17200	FAG rolling bearings in rolling mills
	WL 41140	FAG rolling bearings for rolling mills.



## Market sectors

### Bearing arrangements for the paper industry

Modern large paper machines contain a large number of rolling bearings of various types and sizes. Very high operational reliability is demanded of all bearings in order to prevent expensive downtime. In many cases, monitoring is carried out using the FAG Diagnostic Service, *Figure 10*.

Attention must also be paid to ensuring ease of mounting. There are also special requirements depending on the type of paper machinery and the subassemblies involved. In the wet end section, the emphasis is on preventing corrosion, while the bearings in the dry section must also be designed for high temperatures.

For suction box rolls in the wet end section, spherical roller bearings with a conical or cylindrical bore and increased running accuracy are normally used.

Spherical roller bearings with lubrication holes in the inner ring are used if the outer ring rotates.

For very high speeds, spherical roller bearings with increased running accuracy and increased internal clearance are installed.



*Figure 10*  
Condition-based  
rolling bearing monitoring  
using FAG VibroCheck

An angular adjustment facility and high load carrying capacity are required in central press rolls, so spherical roller bearings are used, *Figure 11*. Sophisticated labyrinth seals are required in the wet section in order to avoid ingress of water spray.

In anti-deflection rolls, the roll sleeve rotates about the stationary roll axis. The roll sleeve is guided by spherical roller bearings, which may have special features including increased running accuracy, increased internal clearance and lubrication holes in the inner ring.

For driven rolls, three-ring bearings are sometimes used. The axis is supported in the bearing inner ring. The rotating intermediate ring connects the drive to the roll sleeve.



*Figure 11*  
Spherical roller bearings E1  
of X-life quality.  
With superior  
load carrying capacity,  
reduced operating temperature  
and very long operating life

213 058



## Market sectors

The operating conditions in the dry section are characterised by high temperature and thermal expansion of the dryer roll. Spherical roller bearings are normally used as locating bearings. Up to a working width of approx. 5 m, spherical roller bearings are also used as non-locating bearings; these can be displaced axially in the housing in response to changes in the length of the dryer roll. For larger working widths, preference is given to self-aligning double row cylindrical roller bearings in normal plummer block housings, *Figure 12*. The spherical roller bearings have an increased internal clearance to C4, the cylindrical roller bearings have a radial internal clearance to C5.

For guide rollers in the dry section too, significant changes in length due to high ambient temperatures must be taken into consideration. The bearings are connected to the oil loop of the dryer rolls.

Calender thermo rolls in the end section are normally fitted with spherical roller bearings. Due to the high temperature, they have increased internal clearance and in some cases a conical bore. Heat is dissipated by means of high oil flow quantities. In large, high speed machines, the bearing inner rings with a conical bore are mounted directly on the tapered roll journals in order to achieve smooth running. The spherical roller bearings normally used have the increased radial internal clearance C3.

In spreader rolls running at high speeds, the use of hybrid deep groove ball bearings with steel rings and ceramic balls has proved effective. Since these bearings have only half the usual number of balls, the risk of slippage is reduced.



*Figure 12*  
Self-aligning  
double row cylindrical roller bearing

### Special publications

WL 13103	Rolling bearing arrangements for the paper industry
Publication PPL	Optimum paper production
TPI 147	Self-Aligning FAG Cylindrical Roller Bearings: The Ideal Non-Locating Bearing Concept
TPI WL 13-3	PD housings for dryer rolls in paper machinery
TPI WL 13-4	Hybrid deep groove ball bearings for expander rollers.

## Bearing arrangements in deep and surface mining

The machines used in deep and surface mining perform extremely arduous work.

The high load carrying capacity of the drill head bearing arrangement in tunnel-driving machines is ensured by cylindrical roller bearings and spherical roller bearings. The mass and tilting forces resulting from the offset drilling pressure are supported by single or double row radial cylindrical roller bearings or spherical roller bearings. The drilling pressure is supported by axial roller bearings.

In larger, compact machines, the drill head bearing arrangement is a ready-to-fit unit. It comprises either a double row tapered roller bearing or a three-ring axial/radial cylindrical roller bearing in which the crown gear can be integrated, *Figure 13*. The bearing unit can withstand all load combinations of axial force, radial force and tilting moment.



*Figure 13*  
Axial/radial  
cylindrical roller bearing  
with integrated crown gear

The forces acting on the drive pinions of tunnel-driving machines are securely supported by one spherical roller bearing and one cylindrical roller bearing.

In conveying and lifting equipment, the main requirement is for standardised rolling bearings of all types, sizes and designs. Some applications require large or split bearings.



## Market sectors

The bucket wheel in bucket wheel excavators is supported by large spherical roller bearings (unsplit in the original equipment version, split in the replacement bearing version), *Figure 14*. These bearings support high loads and compensate, without constraining forces, the substantial misalignments that result from the large spacing between the locating and non-locating bearings.

Other demands placed on the bearing arrangement include:

- handling large fluctuations in operating temperature
- long life
- sealing against slurry, moisture, contamination and sand
- simple maintenance as well as low time and cost outlay in mounting and dismantling.



*Figure 14*  
Split spherical roller bearing

For gearbox bearing arrangements and for the bearing arrangement between the main gear and the hollow shaft flange, split cylindrical roller bearings are best suited due to the difficulty of access for bearing replacement.

One of many different drums in a belt installation is the drive drum. Spherical roller bearings allow compensation without constraining forces of the misalignments resulting from shaft deflections and deformation of the supporting structure; these can fulfil the requirement for high operational reliability with low maintenance outlay. Specially developed housings are available for all bearing sizes.

The support rollers, connected either rigidly or in a jointed arrangement with each other, are normally fitted with deep groove ball bearings that are standardised, sealed and lubricated for life. Externally mounted seals prevent contamination entering the bearing arrangement.

<b>Special publications</b>	WL 21107	Heavy-Duty Rolling and Plain Bearings for Mining, Processing, On- and Offshore Technology
	WL 43165	Split FAG spherical roller bearings
	WL 90118	Split FAG plummer block housings of series SNV.

## **Bearings for materials processing**

Extreme operating and environmental conditions require robust bearing arrangements in crushers and mills, sieving and sorting machines as well as cylindrical rotary kilns, pelletising and sintering plants. Substantial shaft deflections and misalignments of the bearing positions must be compensated. High demands are made on the lubrication and sealing of the bearings.

Due to the high forces and harsh operation in crushers, spherical and cylindrical roller bearings are normally used.

In jaw crushers, also known as crosshead or double toggle crushers, spherical roller bearings support the crushing forces, the mass of the flywheels and the peripheral force of the drive via an eccentric shaft.

In gyratory or cone type crushers, the high radial forces are transmitted by two cylindrical roller bearings (outer bearings) and a spherical roller bearing (central bearing). The axial weight is normally supported by an axial cylindrical roller bearing. Crusher cone and crusher shaft bearing arrangements with single and double row radial and axial cylindrical roller bearings or with large special tapered roller bearings are also in use.



*Figure 15*  
Large spherical roller bearings  
for tube mills





## Market sectors

For the rotating striking trains of single and twin shaft hammer crushers, spherical roller bearings are suitable due to the harsh operation and shaft deflection.

Heavy weights and shock type loads are characteristic of tube mills and also of hammer mills, impact crushers, rigid hammer crushers and impact wheel mills. Spherical roller bearings in specially developed housings are suitable for these requirements, *Figure 15*, page 1623. In roller grinding mills, the pressing, tilting and axial forces acting on the mill roller induce high radial and axial loads. These can be supported by a cylindrical roller bearing in combination with a spherical roller bearing or a tapered roller bearing unit in an X arrangement. In other roller grinding mills, each mill roller is supported by two tapered roller bearings mounted in an O arrangement.

Preferred bearing types for roller presses are spherical roller bearings and multi-row cylindrical roller bearings.

In order to support the particularly high shock type loads and radial accelerations of the exciter shaft in linear and free vibrators as well as eccentric screens, spherical roller bearings of series 223..-E1 and 223..-A of special designs are used, *Figure 16*.

These bearings are characterised by cages guided on the outer ring, restricted tolerances and increased radial internal clearance.

For special cases, spherical roller bearings of series 223..-E1A and 223..-A are also used.



*Figure 16*  
Spherical roller bearings  
for oscillating stresses



The high combined loads at low speeds are supported in the radial track rollers of cylindrical rotary kilns by spherical roller bearings of series 241; they are located in split RLE or RLZ plummer block housings. In axial track rollers, tapered roller bearings in an O arrangement have proven successful.

For the bearing arrangement of the pinion drive shaft, spherical roller bearings in specially developed RA plummer block housings have proven successful.

The particular operating conditions in sintering and pelletising plant are best met by spherical roller bearings with a tapered bore on withdrawal sleeves. The bearings are mounted in split RA or SGB plummer block housings. Sealed double row cylindrical roller bearings can be considered for the bearing arrangements of pressure rollers, tapered roller bearings can be considered for the track wheels.

<b>Special publications</b>	WL 21100	FAG special spherical roller bearings for vibratory machinery
	WL 21105	Rolling Bearings in Grinding Mills
	WL 21106	Secure handling of severe vibration · Special spherical roller bearings in vibrating screens
	WL 21107	Heavy-Duty Rolling and Plain Bearings for Mining, Processing, On- and Offshore Technology.



## Market sectors

### Bearing arrangements and components in the fluid technology sector

Bearing arrangements and components for hydraulic drives and fluid pumps are subject to high requirements for functional security and cost-efficiency. These requirements are fulfilled predominantly using customer-specific developments but also in some cases with highly developed standard bearings and components.

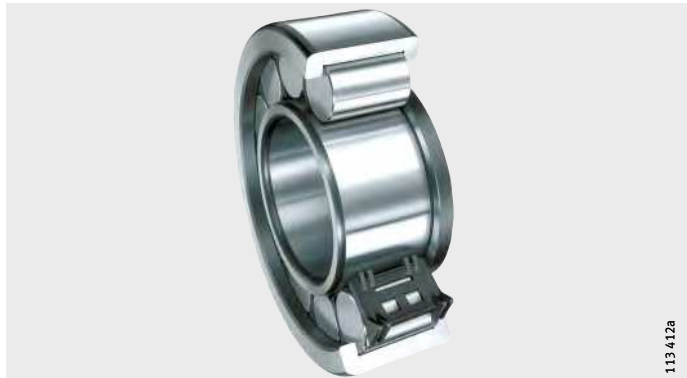
High torque motors are used, for example, in industry, in agricultural equipment, rolling mills, paper machinery and conveying equipment. They generate extremely high torques at low speeds. A decisive contribution to low starting friction, jolt-free and reliable operation is made by special cylindrical roller bearings and further components such as high precision locknuts. In addition to bearings with coated rolling elements, inner rings machined free from spiral marks are used to provide an optimum sliding surface for sealing rings.

In construction machinery, hydraulic power is an indispensable source of energy for earthmoving and transport. Hydraulic cylinders with maintenance-free spherical plain bearings from INA have sliding areas with ELGOGLIDE® coating. The dry plain bearings with low friction and high load carrying capacity are suitable for oscillating motion under high load. The bearings require very little space and are particularly environmentally-friendly. In axial piston pumps of a swash plate design, axial roller bearings support the high forces of the pistons acting in the direction of stroke.

The high imbalance forces and radial forces are supported by double row cylindrical roller bearings with optimised speed characteristics. Swash plate pumps with an adjustable cradle are used to allow precise control of excavators or road making machinery. Full complement or nearly full complement cylindrical roller bearings allow precise adjustment of the volume flow, even at high pressures.

Gear pumps convey coolants, transport foodstuffs and keep hydraulic systems moving. Metal/polymer composite plain bearings or high quality needle roller bearings ensure that gears move with practically no losses. In most cases, the medium being conveyed is also used as the lubricant for the bearings. If fluids with poor lubrication ability are to be conveyed, plain bearings are increasingly replaced by needle roller bearings. In this way, higher speeds and a longer operating life of the gear pumps can be achieved.

*Figure 17*  
Cylindrical roller bearings  
with spacers  
for low friction



Hydrostatic gearboxes give stepless transmission of the drive force in tractors, ride-on lawnmowers and similar machines. Their reliable function is ensured by means of rolling and plain bearings as well as INA precision components such as hollow pistons, valves and fine blanked parts.

Fluid pumps facilitate the supply of water for the purposes of drinking, extinguishing, heating and cooling, the conveying of aggressive or abrasive media and the disposal of, for example, contaminated and waste water. Economical plain and rolling bearings ensure smooth running over the long term. Depending on the speed and load, ball bearings, cylindrical roller or spherical roller bearings or plain bearings are fitted. Rolling and plain bearings help to ensure that valves and shut-off systems function reliably after long periods of stoppage.

In various types of pumps, very high requirements are fulfilled using X-life bearings.

**Special publications**

Publication PHP	Bearing Supports and Components for Hydraulic Drives and Pumps
Publication PFS	Fine Blanking and Systems Engineering
TPI 16	Steel Sealing Rings DRG
TPI 92	Axial Swash Plate Ball Bearings
TPI 128	Sealing Rings
TPI 211	Metal/Polymer Composite Plain Bearings
Catalogue HG 1	Plain Bearings.



## Market sectors

### Bearing arrangements in the air handling sector

Bearing arrangements for compressors, fans and centrifuges must fulfil high requirements in relation to functional reliability and cost-efficiency. In many cases standard bearings are suitable, in some cases special bearings are required.

In order to minimise gap losses in compressors, the rolling bearing arrangement must have narrow guidance clearance. Some compressors run at very high speeds, so particular attention must be paid to the speed capacity of the bearings. Predominantly, four point contact bearings, cylindrical roller bearings and angular contact ball bearings are used.

For bearing arrangements in smaller fans, we offer special bearing units VRE3, *Figure 18*. Depending on the load conditions, six bearing arrangement variants are available. The tubular form, unsplit plummer block housings are fitted with deep groove ball bearings, matched angular contact ball bearings and cylindrical roller bearings.



*Figure 18*  
Plummer block housing unit VRE3  
for fans

In large fans and blowers, bearings with proven success include spherical roller bearings or self-aligning ball bearings in plummer block housings SNV, LOE or LOU. Grease or oil lubrication is used according to the operating conditions.

Separators and decanters are centrifuges that can be used to separate solid materials from liquids or mixtures of liquids with simultaneous centrifuging of solids. Separation methods are used, for example, in the food and drinks industry, in chemical engineering and in environmental protection. The design of the bearing arrangement must often take account of vibrations, external temperatures and special lubrication requirements. Selection of suitable bearings is made considerably easier by use of the calculation software BEARINX®.

In many cases, it is possible to use cost-effective standard bearings such as angular contact ball bearings and cylindrical roller bearings with sheet steel cages. Through the use of BEARINX® for design work, it is possible to achieve a high level of functional reliability even taking account even of extreme operating conditions.

**Special publications**    WL 22101    Bearing technology for compressors, fans and centrifuges.



## Market sectors

### Consumer Products

Rolling bearings are present almost everywhere in our environment: at home, at work and in leisure. In most cases, however, the bearings are simply not noticed.

Rolling bearings in electrical devices are found in household appliances, in communications equipment and in DIY tools as well as in sports equipment and medical technology.

In household appliances, the requirement is normally for operation with little noise and little vibration. In order that the bearings achieve high cost-efficiency and reliability, there is a focus on long operating life and low maintenance requirements. For small devices, simple, sealed deep groove ball bearings lubricated for life are generally preferred in order to meet these requirements.

In order to avoid damage through passage of current, current-insulated bearings are available, *Figure 19*. In such deep groove ball bearings, cylindrical roller bearings and tapered roller bearings of variant J20., an oxide ceramic coating is applied to the outside surface and end faces of the outer ring.

Alternatively, hybrid bearings with ceramic rolling elements can be used. Hybrid deep groove ball bearings (prefix HC) with silicon nitride balls are available by agreement.

In order to detect the speed and direction of rotation in electrical devices, deep groove ball bearings with an integral sensor are available.

INA/FAG rolling bearings have also proven themselves in modern sports equipment. In motorcycles, waterjets and bob skis, their speed capacity and quiet running are particularly significant.

Low bearing friction is important where the sportsman works using muscle power, for example in bicycles and inline skates.



*Figure 19*  
Current-insulated rolling bearings

### Special publications

TPI 206

Current-insulated rolling bearings prevent damage due to the passage of electrical current

TI WL 43-1206

FAG deep groove ball bearings with integral sensor

TI WL 43-1210

FAG hybrid deep groove ball bearings.

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