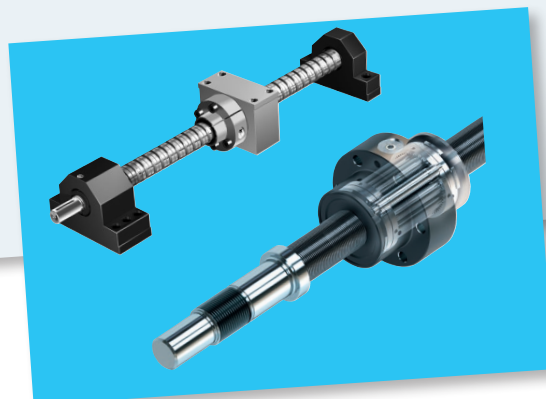
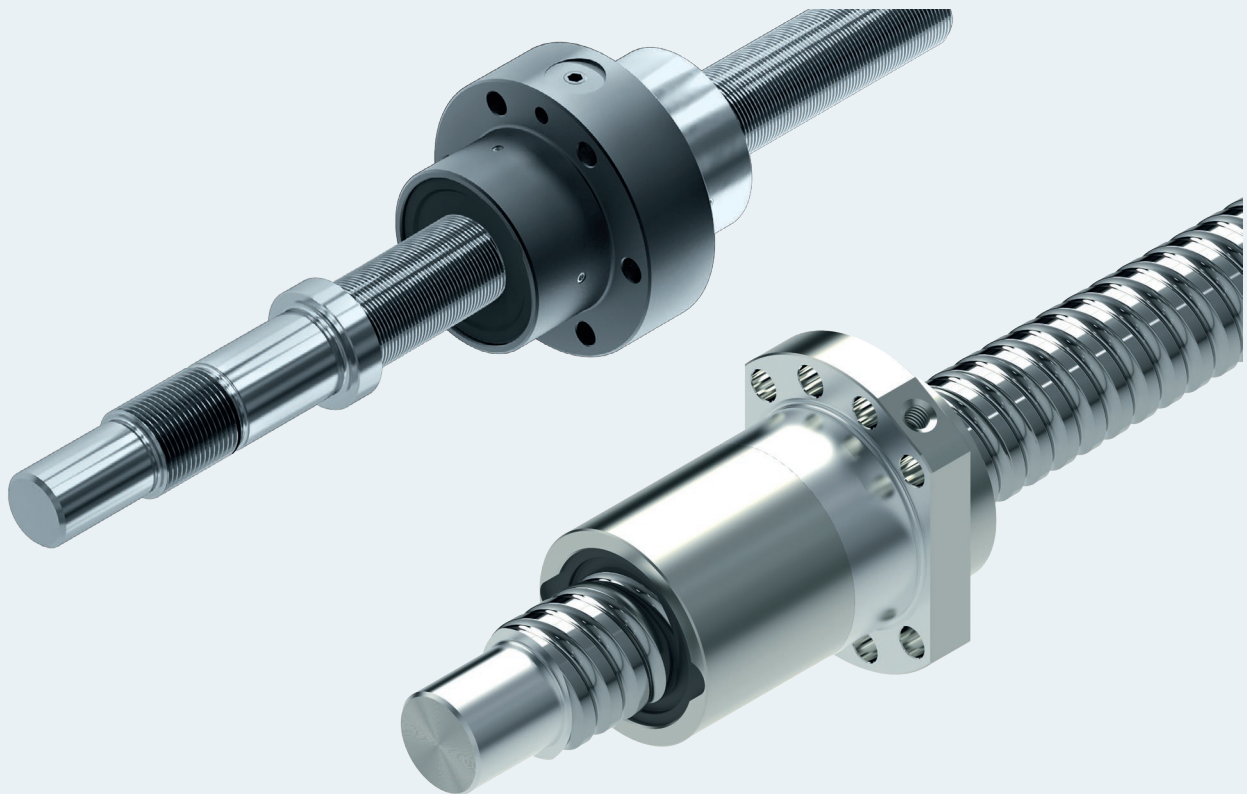


Screw assemblies

Ball screw assemblies BASA/Planetary screw assemblies PLSA



Ball screw assemblies BASA

Ball screw assemblies are the efficient solution for the precise conversion of rotary to linear motion. Building on our many years of experience and extensive engineering expertise, we have developed a product range that fulfills the most diverse requirements. No matter whether you need very high linear speeds, maximum load ratings, or minimum installed length, you will always find the right solution in Rexroth's broad manufacturing spectrum. To make sure your application runs with the utmost accuracy and operational reliability, the individual components in our range have been precisely matched to one another, so complete assemblies can be put together efficiently.

More detailed information from page 7 onwards

Characteristic features

- ▶ **A really varied range**, suitable for virtually any requirements
- ▶ Absolutely **uniform** and **stable functioning**
- ▶ **Especially smooth operation** due to optimal ball pick-up and recirculation
- ▶ **High load rating** due to large number of balls
- ▶ **Short nut length**
- ▶ **Easy installation** of the nuts, mounting orientation individually specified
- ▶ **Adjustable** preloaded **single nuts**
- ▶ Extensive range comprising various series
- ▶ Matching supplementary individual components such as nut housings and end bearings, also as pillow block units, partly prepared for the installation of suitable motor flanges

Planetary screw assemblies PLSA

The planetary screw assembly PLSA is a complete cylindrical screw assembly with planets as the rolling elements. It serves to convert rotary motion into linear motion and vice versa. The basic functioning of a planetary screw assembly is easy to describe, but the range of designs and the requirements for practical applications are many and varied.

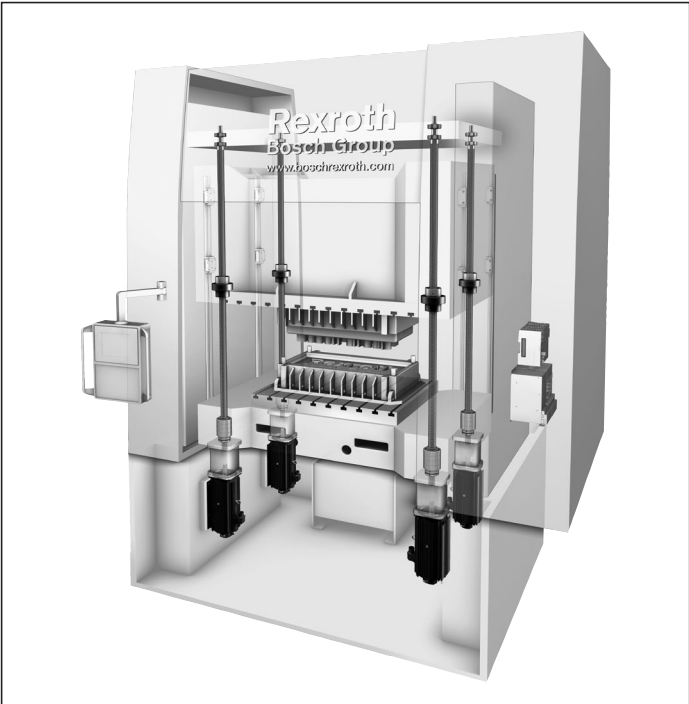
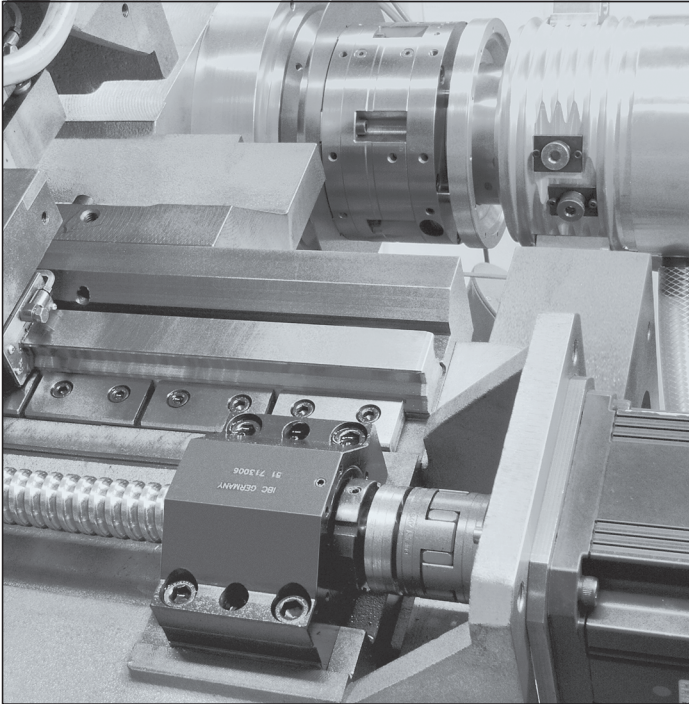
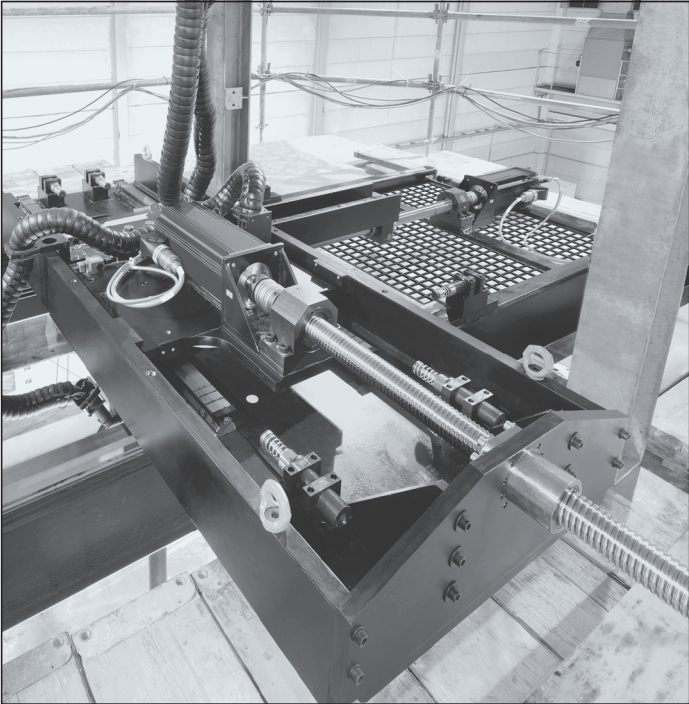
Planetary screw assemblies are designed to transmit high forces and thus round off the upper end of the screw assembly product portfolio.

Planetary screw assemblies are screw assemblies in which threaded rollers (the planets) are housed in a threaded nut, their ends being lodged in discs with holes arranged around a pitch circle so that they rotate axially parallel to the special threaded screw, causing the nut to move linearly along the screw.

More detailed information from page 193 onwards

Characteristic features

- ▶ **Smooth functioning** due to the principle of synchronized planets
- ▶ Very **quiet operation**
- ▶ Long **service life**
- ▶ **Compact** design
- ▶ High **power density**
- ▶ **Pre-tensioned** units available
- ▶ High **positioning accuracy** and **repeatability**
- ▶ **Low** lubricant consumption



Notes

General notes

► Non-horizontal installation

There is no self-locking effect due to the low level of friction between the screw and the nut.

The components of the product are designed to last for the product's service life; a major defect may nonetheless arise in exceptional cases, and if the moving part (i.e. the screw assembly nut) is not installed horizontally it may fall off. An additional protection against falling loads is therefore required for non-horizontal installation.

Intended use

- Rexroth screw assemblies are components that are used to convert a rotary motion into a linear motion, and vice versa. Rexroth screw assemblies are intended exclusively for use in machines for moving and positioning.
- The product is intended exclusively for professional use and not for private use.
- Use for the intended purpose also includes the requirement that users must have read and understood the related documentation completely, in particular the "Safety Instructions."

Misuse

Use of the product in any other way than as described under "Intended use" is considered to be misuse and is therefore not permitted. If unsuitable products are installed or used in safety-relevant applications, this may lead to uncontrolled operating statuses in the application which can cause personal injury and/or damage to property.

The product may only be used in safety-relevant applications if this use has been expressly specified and permitted in the product documentation.

Bosch Rexroth AG will not accept any liability for injury or damage caused by misuse of the product. The risks associated with any misuse of the product shall be borne by the user alone.

Misuse of the product includes:

- transporting people

General safety instructions

- The safety rules and regulations of the country in which the product is used must be complied with.
- All current and applicable accident prevention and environmental regulations must be adhered to.
- The product may only be used when it is in technically perfect condition.
- The technical data and environmental conditions stated in the product documentation must be complied with.
- The product must not be put into service until it has been verified that the final product (for example a machine or system) into which the product has been installed complies with the country-specific requirements, safety regulations and standards for the application.
- Rexroth screw assemblies may not be used in zones with potentially explosive atmospheres as defined in the ATEX directive 94/9/EC.
- Rexroth screw assemblies must never be altered or modified. The user may only perform the work described in the "Quick user guide" or the "Mounting instructions for screw assemblies."
- The product must never be disassembled.
- At high travel speeds a certain amount of noise is caused by the product. If necessary, appropriate measures should be taken to protect hearing.
- Special safety requirements for specific sectors (e.g. cranes, theaters, foodstuffs) as provided for in laws, directives and standards must be complied with.
- The following standards must be complied with: ISO 3408 and DIN 69051.

Directives and standards

Rexroth screw assemblies are suitable for dynamic linear applications that are moved and positioned reliably and precisely. The machine tool industry and other sectors must observe a series of standards and directives. These requirements can vary significantly worldwide. It is therefore essential to understand the legislation and standards that apply in each particular region.

DIN EN ISO 12100

This standard is entitled Safety of machinery – General principles for design – Risk assessment and risk reduction. It gives a general overview and contains a guide to the major developments governing machines and their intended use.

Directive 2006/42/EC

This European Machinery Directive describes the basic health and safety requirements for the design and manufacture of machinery. The manufacturer of a machine or his authorized representative has a duty to ensure that a risk assessment has been performed in order to determine the health and safety requirements which have to be fulfilled for that machine. The machine must be designed and built with the results of the risk assessment in mind.

Directive 2001/95/EC

This directive covers general safety requirements for any product placed on the market and intended for consumers, or likely to be used by consumers under reasonably foreseeable conditions, including products that are made available to consumers in the context of service provision for use by them.

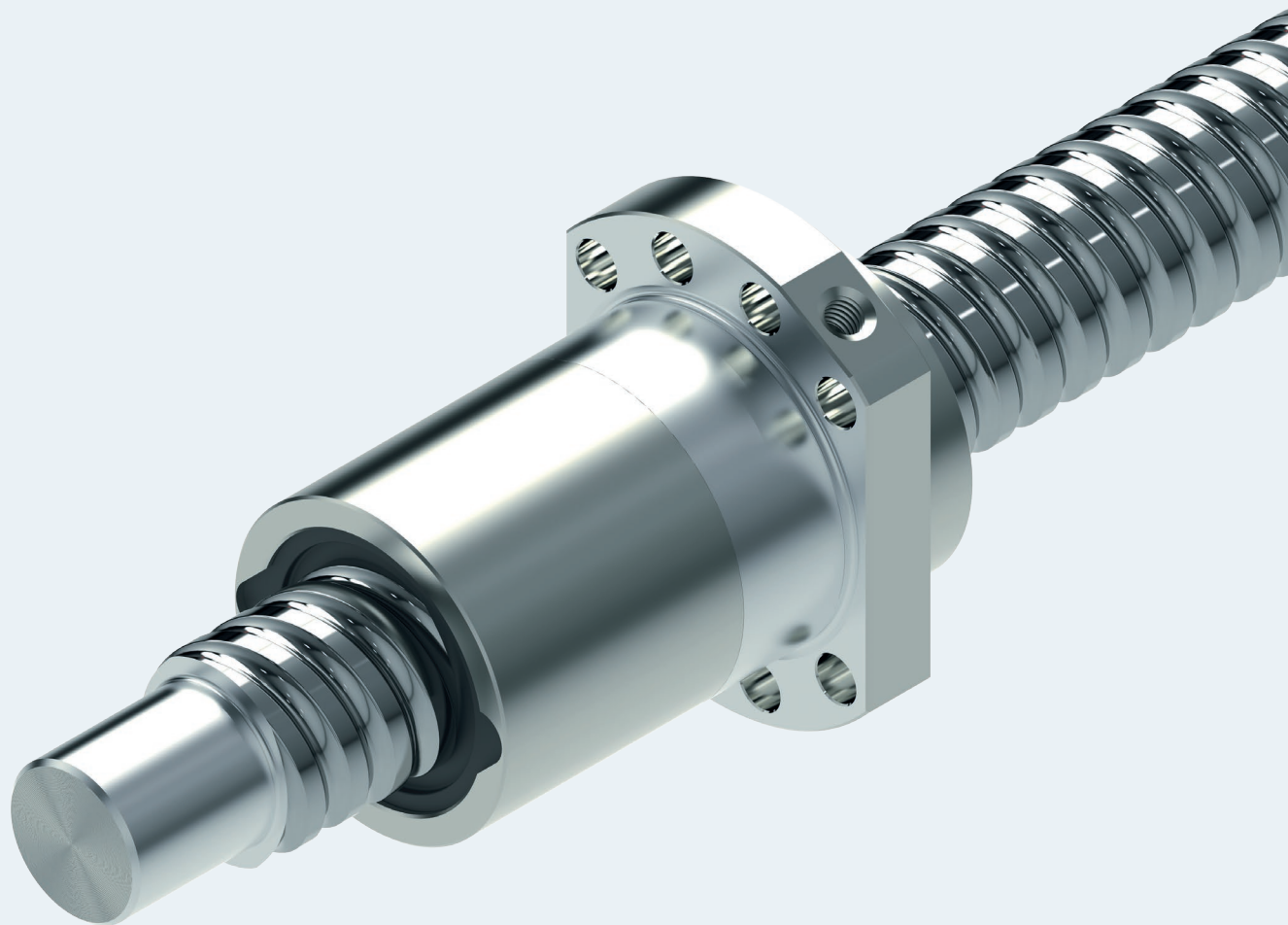
Directive 1999/34/EC

This directive concerns liability for defective products and applies to industrially manufactured movables, irrespective of whether they have been incorporated into another movable or into an immovable or not.

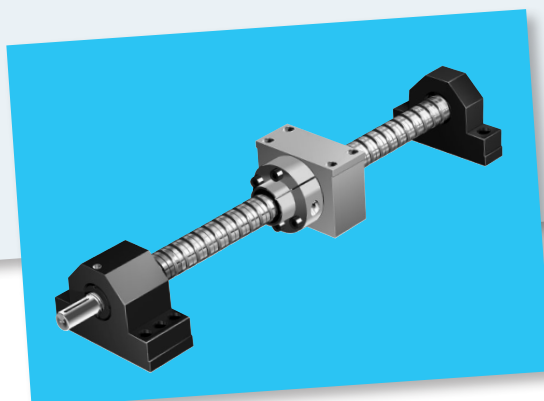
REGULATION (EC) No. 1907/2006 (REACH)

This regulation relates to restrictions on the marketing and use of certain dangerous substances and preparations. “Substances” means chemical elements and their compounds as they occur in the natural state or as produced by industry. “Preparations” are mixtures, compounds or solutions consisting of two or more substances.

Ball screw assemblies BASA



Ball screw assemblies BASA



New features at a glance

Discontinuation of 4 nut types

In the standard series, single nuts with flange with recirculation cap FSZ-E-S and FSZ-E-B have been discontinued,



▲ FSZ-E-S



▲ FSZ-E-B

Introduction of the B flange

The C flange in the series FEM-E-C and FDM-E-C is replaced by the B flange. The nuts of the new design are available now under the designation FEM-E-B and FDM-E-B. All technical data remain unchanged. This change is necessary as the market and DIN favor the B flange.



▲ FEM-E-B



▲ FDM-E-B

Series expansion

To complete our product portfolio, for size 8, lead 5 has been reissued. For this new lead, single nuts with flange FEM-E-B and cylindrical single nuts ZEM-E-S are available. Size 40 has also been expanded with lead 25 and 30 as well as size 50 with lead 30. These leads have been brought out especially for the machine tool. These are available for the nut types single nut FEM-E-B and single nut with flange FED-E-B. Another new series is the size 80 x 40, which was created for the single flange nut FEM-E-B.

Introduction of the ID number for the screw drive

By the middle of the year, the ID number for the entire screw drive range (BASA and PLSA) was introduced. The ID number (R0404.....) is a serial number, which is already generated in the quotation phase and not only during order processing. This way, the material number of the requested screw drive is already provided to clients with their quotation.

Extension of relubrication intervals of grease lubrication

The latest assessments in testing by Bosch Rexroth verify that under specific operating conditions, the relubrication intervals of grease lubrication can be considerably extended.

At low loads, normal ambient temperatures and medium to high linear travel speeds or rotary speeds, 200 million revolutions can be realized at ball screw assemblies without relubrication.

This considerable increase was enabled by continuous improvements in the production quality of spindles and nuts leading to better surfaces and higher accuracy in the geometrical dimensions of the track.

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Nuts and Nut Housings

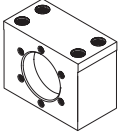
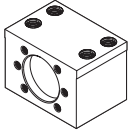
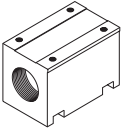
| Nuts | Series | Miniature | | | | | | | | | | | | Page | | | | |
|--|---------------------------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------------------|---------|--|--|--|---------|
| | Size | FEM-E-B | FEM-E-S | SEM-E-S | ZEM-E-S | ZEM-E-K | ZEV-E-S | | | | | | | | | | | |
| Miniature series FEM-E-B / FEM-E-S / SEM-E-S / ZEM-E-S / ZEM-E-K / ZEV-E-S | $d_0 \times P \times D_w$ | | | | | | | | | | | | | | | | | from 25 |
| | 6 x 1 x 0.8 | | | | | | | | | | | | | | | | | |
| | 6 x 2 x 0.8 | | | | | | | | | | | | | | | | | |
| | 8 x 1 x 0.8 | | | | | | | | | | | | | | | | | |
| | 8 x 2 x 1.2 | | | | | | | | | | | | | | | | | |
| Speed series | 8 x 2.5 x 1.588 | | | | | | | | | | | | | | | | | |
| | 8 x 5 x 1.588 | | | | | | | | | | | | | | | | | |
| Single nut with flange with recirculation caps FEP-E-S | 12 x 2 x 1.2 | | | | | | | | | | | | | | | | | 31 |
| | 12 x 5 x 2 | | | | | | | | | | | | | | | | | |
| | 12 x 10 x 2 | | | | | | | | | | | | | | | | | |
| Standard series | Series | | | | | | | | | | | | High-performance | 34 | | | | |
| | Speed | | | | | | | | | | | | | | | | | |
| Single nut with flange FEM-E-S | Size | FEP-E-S | FEM-E-S | FEM-E-B | SEM-E-S | SEM-E-C | ZEM-E-S | ZEM-E-K | ZEM-E-A | ZEV-E-S | FDM-E-S | FDM-E-D | FED-E-B | FAR-B-S | | | | |
| | $d_0 \times P \times D_w$ | | | | | | | | | | | | | | | | | |
| | 16 x 5 x 3 | | L | L | L | | L | | | | | | | | | | | |
| | 16 x 10 x 3 | | | | | | | | | | | | | | | | | |
| | 16 x 16 x 3 | | | | | | | | | | | | | | | | | |
| | 20 x 5 x 3 | | L | L | L | | L | L | | | | | | | | | | |
| | 20 x 10 x 3 | | | | | | | | | | | | | | | | | |
| | 20 x 20 x 3.5 | | | | | | | | | | | | | | | | | |
| | 20 x 40 x 3.5 | | | | | | | | | | | | | | | | | |
| Adjustable-preload single nut SEM-E-S | 25 x 5 x 3 | | L | L | L | | L | | | | | | | | | | | 38 |
| | 25 x 10 x 3 | | | | | | | | | | | | | | | | | |
| | 25 x 25 x 3.5 | | | | | | | | | | | | | | | | | |
| | 32 x 5 x 3.5 | | L | L | L | | L | | | | | | | | | | | |
| | 32 x 10 x 3.969 | | | | | | | | | | | | | | | | | |
| | 32 x 20 x 3.969 | | | | | | | | | | | | | | | | | 40 |
| | 32 x 32 x 3.969 | | | | | | | | | | | | | | | | | |
| | 32 x 64 x 3.969 | | | | | | | | | | | | | | | | | |
| | 40 x 5 x 3.5 | | L | L | L | | L | | | | | | | | | | | |
| | 40 x 10 x 6 | | L | L | L | | L | | | | | | | | | | | |
| | 40 x 12 x 6 | | | | | | | | | | | | | | | | | 42 |
| | 40 x 16 x 6 | | | | | | | | | | | | | | | | | |
| | 40 x 20 x 6 | | | | | | | | | | | | | | | | | |
| | 40 x 25 x 6 | | | | | | | | | | | | | | | | | |
| | 40 x 30 x 6 | | | | | | | | | | | | | | | | | |
| | 40 x 40 x 6 | | | | | | | | | | | | | | | | | |
| Screw-in nut ZEV-E-S | 50 x 5 x 3.5 | | | | | | | | | | | | | | | | | 44 |
| | 50 x 10 x 6 | | | | | | | | | | | | | | | | | |
| | 50 x 12 x 6 | | | | | | | | | | | | | | | | | |
| | 50 x 16 x 6 | | | | | | | | | | | | | | | | | |
| | 50 x 20 x 6.5 | | | | | | | | | | | | | | | | | |
| | 50 x 25 x 6.5 | | | | | | | | | | | | | | | | | |
| Double nut with flange FDM-E-S | 50 x 30 x 6.5 | | | | | | | | | | | | | | | | | 46 |
| | 50 x 40 x 6.5 | | | | | | | | | | | | | | | | | |
| | 63 x 10 x 6 | | | | | | | | | | | | | | | | | |
| | 63 x 20 x 6.5 | | | | | | | | | | | | | | | | | |
| | 63 x 40 x 6.5 | | | | | | | | | | | | | | | | | |
| | 80 x 10 x 6.5 | | | | | | | | | | | | | | | | | |
| Double nut with flange DIN 69 051, Part 5 FDM-E-B | 80 x 20 x 12.7 | | | | | | | | | | | | | | | | | 48 |
| | 80 x 40 x 12.7 | | | | | | | | | | | | | | | | | |

Standard range, right-hand lead
L Left-hand lead readily available

High-performance series **Page**

| | | |
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Nut housing **Page**

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|---|---|-------|----|-----|-------|-----|----|-------|-------|----|----|----|----|-----|-----|--|-----|--|--|--|--|--|--|----|-------|-------|--|--|-------|--|--|--|---|--|----|-----|-----|--|--|--|-----|--|--|--|--|----|-------|-------|--|--|-------|--|--|-------|--|---|----|-------|-------|---|---|-------|---|---|--|-------|--|----|-----|-----|---|-----|-----|--|---|--|-----|--|----|--|-----|--|--|---|--|--|--|---|--|----|--|-----|--|--|---|--|--|--|---|--|----|
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| 16 | A B | A B | | A B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 63 | | A B | | | B | | | | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 80 | | A B | | | B | | | | B | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>MGD for standard series FEM-E-B SEM-E-C FDM-E-B FED-E-B</p>  | | 96 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>MGA for cylindrical single nut ZEM-E-S ZEM-E-K ZEM-E-A</p>  | <p>A = MGS B = MGD C = MGA</p> | 98 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Screws

| Precision screw BAS | | Page |
|--|--|------|
| Tolerance grades: T5, T7, T9 | <p>Sizes 6 to 12</p> <p>Screw length →</p> | 57 |
| Tolerance grades: T5, T7, T9 | <p>Left-hand lead</p> <p>Size</p> <p>Screw length →</p> | |
| Screws in tolerance grade T3 (longer versions and larger sizes available on request) | <p>Screw length →</p> <p> Standard, available at short notice on request </p> | |

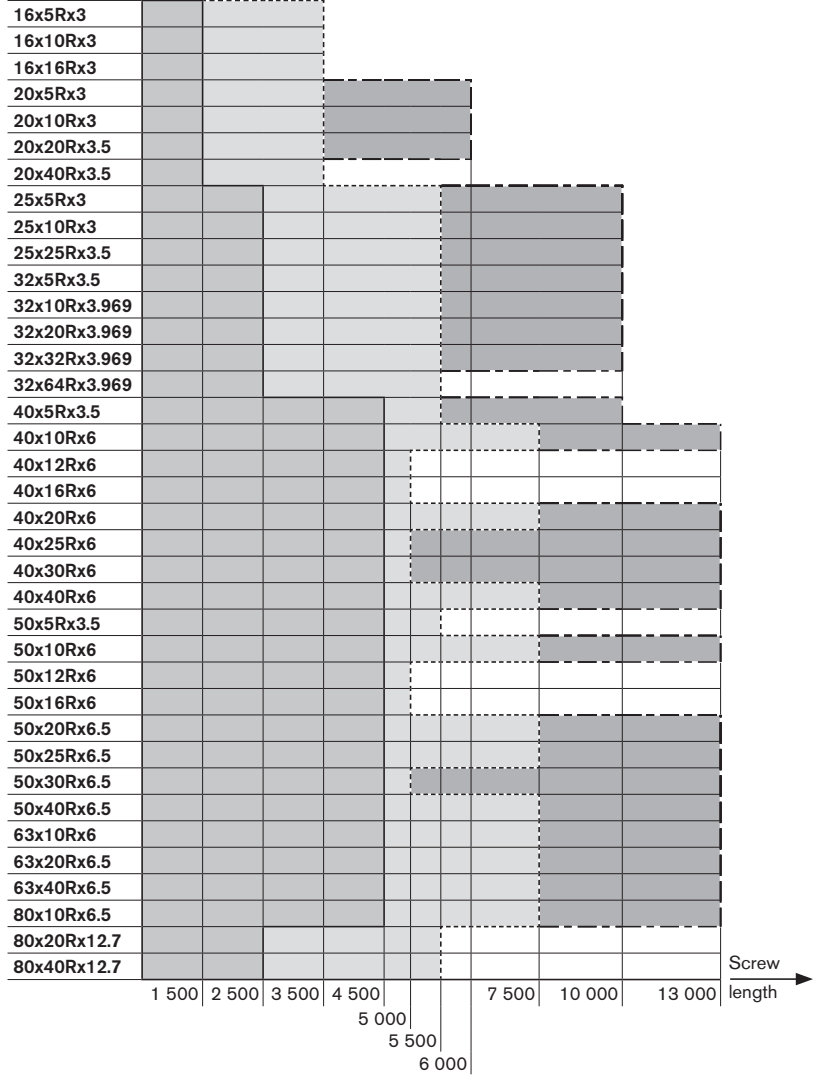
Precision screw BAS

Tolerance grades:
T5, T7, T9

Page

57

Größen 16 bis 80



- Standard, available at short notice
- On request
- Maximum length (assembled) on request

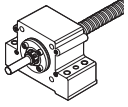
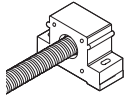
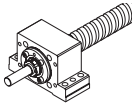
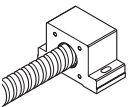
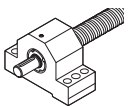
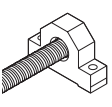
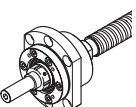
Screw ends



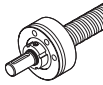
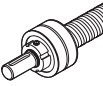


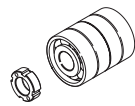
Page

58

Bearing

| Pillow block unit | | | | | | | | | | | | | | | Page | | | | | |
|-------------------|---|--|---|---|-----|---|----|----|----|----|----|----|----|----|------|----|---|---|---|---|
| SEC-F |  | | | | | | | | | | | | | | 100 | | | | | |
| SEC-L |  | | | | | | | | | | | | | | 102 | | | | | |
| SES-F |  | Lead P | | | | | | | | | | | | | 104 | | | | | |
| | | | 1 | 2 | 2.5 | 5 | 10 | 12 | 16 | 20 | 25 | 30 | 32 | 40 | | 64 | | | | |
| | | 6 | A | A | | | | | | | | | | | | | | | | |
| | | 8 | A | A | A | A | | | | | | | | | | | | | | |
| | | 12 | | A | | A | | A | | | | | | | | | | | | |
| SES-L |  | 16 | | | A | | A | | A | | | | | | | | | | | |
| | | 20 | | | A | B | C | D | A | B | C | D | | | A | B | C | | | |
| | | 25 | | | A | C | D | A | C | D | | | | A | C | | | | | |
| | | 32 | | | A | B | C | D | A | B | C | D | | | A | B | C | A | B | C |
| | | 40 | | | A | B | C | D | A | B | C | D | A | B | C | A | B | C | A | B |
| SEB-F |  | 50 | | | A | | D | A | | D | A | A | A | D | A | A | | A | D | |
| | | 63 | | | | | | A | | | | A | | | | | | A | | |
| | | 80 | | | | | | A | | | | A | | | | | | A | | |
| SEB-L |  | A = SEB-F and SEB-L B = SEC-F and SEC-L C = SES-F and SES-L D = SEE-F | | | | | | | | | | | | | 110 | | | | | |
| SEE-F-Z |  | | | | | | | | | | | | | | 112 | | | | | |

Bearing

| Bearing | | Page |
|---------|--|------|
| LAF |  | 114 |
| LAN |  | 116 |
| LAD |  | 118 |
| LAL |  | 120 |
| LAS |  | 122 |

| Diameter d ₀ | Lead p | | | | | | | | | | | | |
|-------------------------|--------|---|-----|---|----|----|----|----|----|----|----|----|----|
| | 1 | 2 | 2,5 | 5 | 10 | 12 | 16 | 20 | 25 | 30 | 32 | 40 | 64 |
| 6 | ■ | ■ | | | | | | | | | | | |
| 8 | ■ | ■ | | | | | | | | | | | |
| 12 | | ■ | | | | | | | | | | | |
| 16 | | | | | | | ■ | | | | | | |
| 20 | | | | ■ | | | | ■ | | | | ■ | |
| 25 | | | | ■ | | | | | ■ | | | | |
| 32 | | | | ■ | | | | | | ■ | | ■ | |
| 40 | | | | ■ | | | | | | | ■ | | ■ |
| 50 | | | | ■ | | | | | | | | ■ | |
| 63 | | | | ■ | | | | | | | | | ■ |
| 80 | | | | ■ | | | | | | | | | ■ |

■ LAF ■ LAN / LAD

| Diameter d ₀ | Lead p | | | | |
|-------------------------|--------|---|-----|---|----|
| | 1 | 2 | 2,5 | 5 | 10 |
| 6 | ■ | | | | |
| 8 | ■ | | | | |
| 12 | | ■ | | | |
| 16 | | | | | |
| 20 | | | | | |
| 25 | | | | | |
| 32 | | | | | |







■ LAL

| Diameter d ₀ | Lead p | | | | | | | | |
|-------------------------|--------|----|----|----|----|----|----|----|----|
| | 5 | 10 | 12 | 16 | 20 | 25 | 32 | 40 | 64 |
| 16 | ■ | ■ | | | | | | | |
| 20 | ■ | ■ | | | | | | ■ | |
| 25 | ■ | ■ | | | | | | | |
| 32 | ■ | ■ | | | | | | | |
| 40 | ■ | ■ | | | | | | ■ | |
| 50 | ■ | ■ | | | | | | | |
| 63 | ■ | ■ | | | | | | | |
| 80 | ■ | ■ | | | | | | | |

■ LAS

Accessories

The load capacities of bearing and ball screw drive must be kept in reasonable balance.

| Single parts | | Page |
|----------------------------------|---|------|
| Slotted nut NMA, NMZ |  | 124 |
| Assembly tool for NMA/NMZ/NMG |  | 125 |
| Ring nut GWR |  | 125 |
| Front lube unit |  | 126 |
| Measuring pads |  | 131 |
| Arrestor nut |  | 131 |

| Acceptance conditions | Page |
|-----------------------|------|
| | 134 |

Definition of ball screw assembly

ISO 3408-1 defines a ball screw assembly as follows:

A unit consisting of a ball screw shaft, ball nut and balls which is able to convert rotary motion into linear motion, and vice versa. The basic functioning of a ball screw assembly is easy to describe, but there are numerous different designs and requirements for practical applications.

Several innovations and adaptations have contributed to the extension of the product portfolio.

Rexroth ball screw assemblies provide design engineers with diverse solutions for transport and positioning tasks with driven screws or with driven nuts.

At Rexroth you will be sure to find exactly the kind of tailor-made products you need for special applications.

The flange nuts from the standard series are available in versions with Rexroth or DIN mounting dimensions.

In order to make it easier in future for customers to decide between particular series and/or sizes in terms of delivery time too, we have introduced **A, B and C** categories for nuts.

Each individual nut part number is assigned to a particular category.

A parts (GoTo Europe Focused Delivery Program) are always stocked to meet average order quantities.

B parts (corresponds to standard range) are in stock, whereas for **C parts**, inquiries have to be made regarding the delivery capability.

For deliveries within Europe, there is the quantity-dependent GoTo Europe Focused Delivery Program.

The special delivery times and quantities can be found in the "GoTo Europe Focused Delivery Program" catalog.

Almost all single nuts in the version with backlash can be easily mounted on the screw by the customer himself, especially during servicing. In addition, the standard series adjustable-preload single nut allows the customer to carry out preload adjustment in-house.

Appropriate nut housings for the standard series and several types of end bearings are also stocked.

Precision screws

in a variety of sizes and of unequalled quality have long been an essential part of our product range. Our comprehensive, world-wide stocks guarantee fast response times in every location. Availability is one advantage, low prices another. Every nut featured in this catalog can be combined with precision screws.

Precision screws can also be supplied without nuts to allow customers to machine the screw ends themselves.

For special servicing jobs, please consult us.

Calculation software and product configuration tool

The Linear Motion Designer (LMD) calculation software is used for designing and calculating ball screw assemblies BASA.

The CAD model is created via the product configuration tool.

This can be accessed via the Rexroth online portal / eConfigurators and Tools.

www.boschrexroth.de/gewindetriebkonfigurator

This online configuration tool makes it possible to visually configure ball screw assemblies quickly to match specific requirements in each case.

The tool automatically checks the plausibility of changed parameters. The link to the eShop means that ball screw assemblies can be directly ordered at any time of the day or night.



Benefits

- Smooth functioning due to the principle of internal recirculation
- Especially smooth running due to the optimal pick-up of balls from the raceway
- Adjustable-pre-tensioned single nut
- High load rating due to large number of balls
- Short nut length
- No protruding parts, nut is easily mounted
- Smooth outer shell
- Effective, wiping sealing
- Large range of series available ex stock

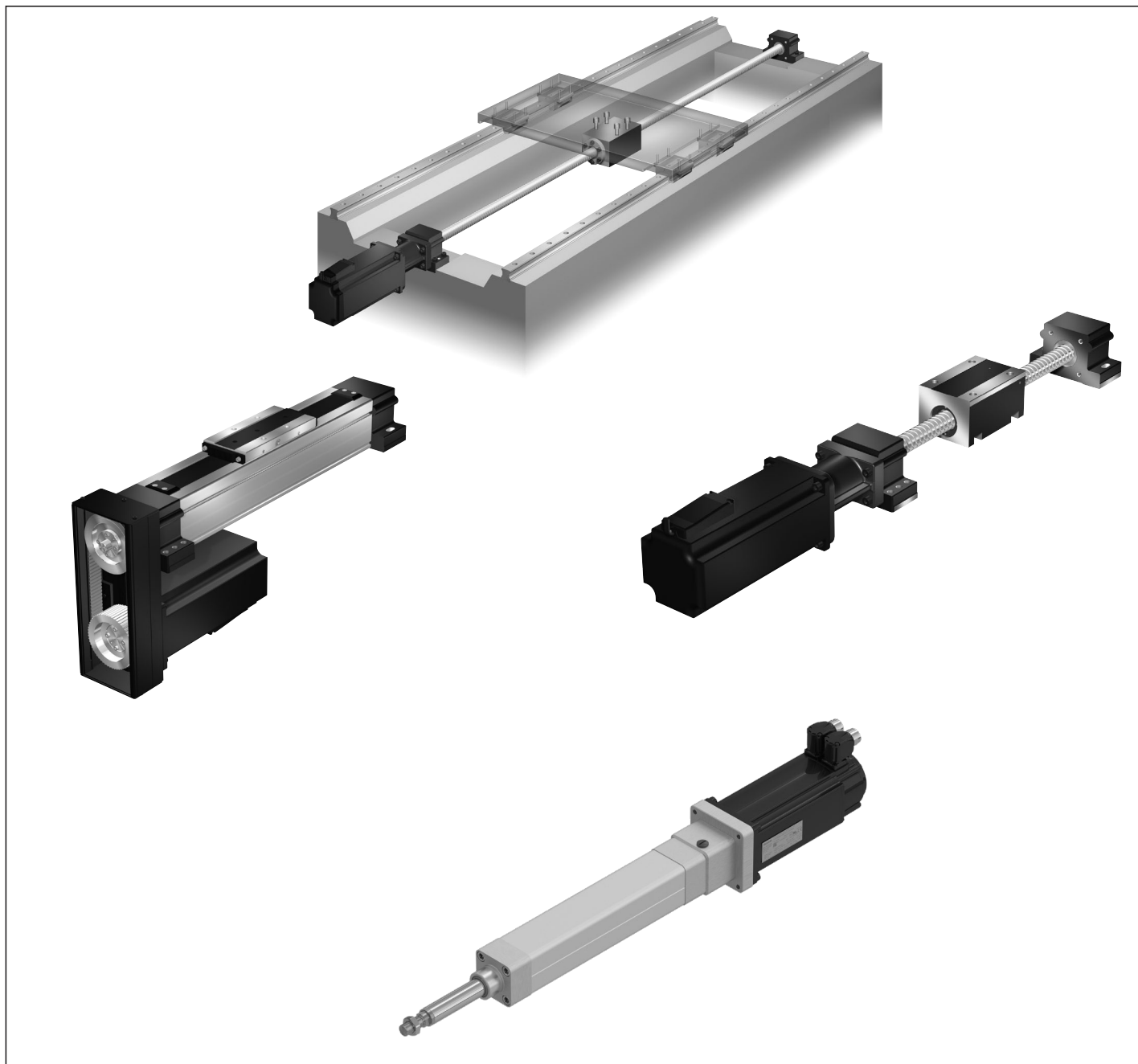
Ball screw assemblies for all applications

Drive units

You will find further system solutions in our catalog on Rexroth Drive Units.

This catalog contains ball screw assemblies with a protecting housing, including versions with integrated screw supports and matching AC servo motors.

To perform particularly demanding positioning tasks we have developed the integrated measuring system for ball rail and roller rail systems. This enables us to achieve maximum design flexibility and operating precision.



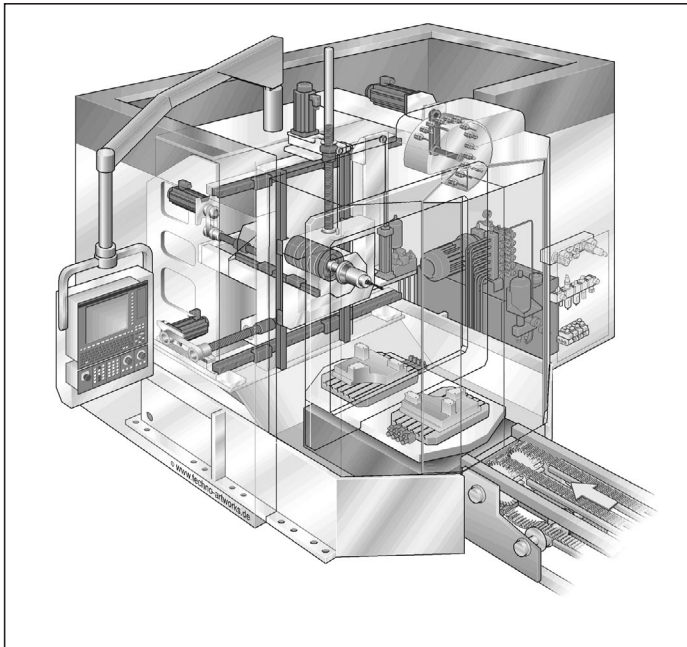
Sample applications

Rexroth ball screw assemblies have been successfully implemented worldwide in the following areas:

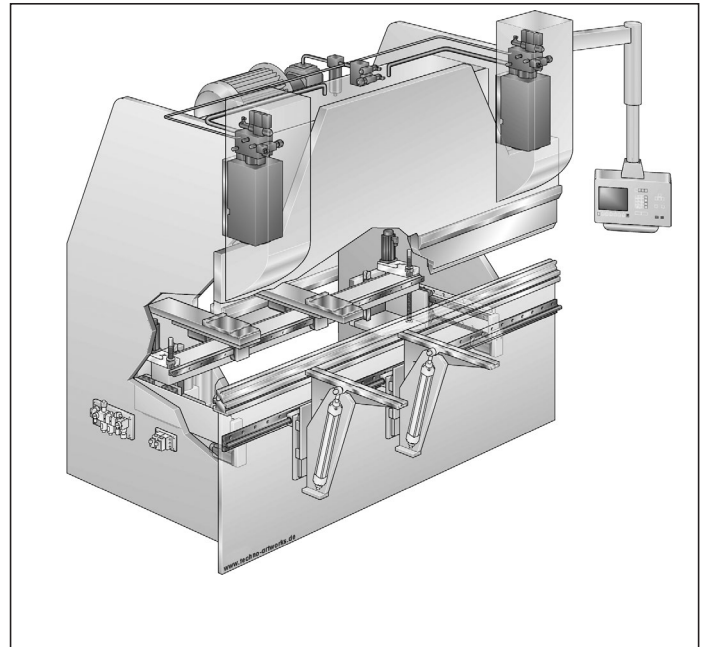
- Cutting operations
- Forming operations
- Automation and handling
- Woodworking
- Electrical and electronics
- Printing and paper industry
- Injection molding machines
- Food and packaging industries
- Medical technology
- Textile industry
- etc.

Machining center

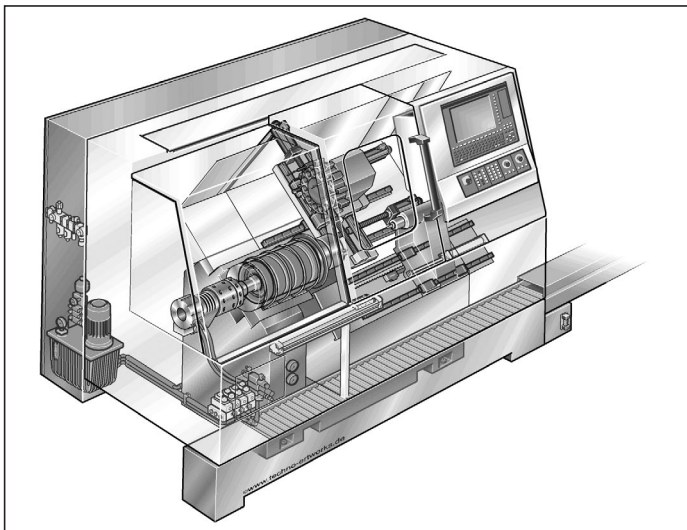
Vertical axis with driven nut



Press brake



Lathe



Inquiries and orders

All nuts, screws and end machining details can now be defined with the ordering code as a complete precision ball screw assembly. We have taken account of all the existing selection criteria as well as adding new ones. The diversity of possible combinations and specifications is basically limitless. Attention is focused in particular on the definition of end machining details. For many design versions there is a prepared definition, which means that a suitable solution can be devised for virtually any application. If you wish to send us an inquiry, simply complete the form at the end of this catalog.

- If you submit a manufacturing drawing as a CAD file in Pro/E, STEP or DXF, you can e-mail the data to us.
- If the drawing exists on paper only, we will of course accept a scan or a drawing sent by conventional mail.
- If no drawing is available, please specify your wishes using the variable ordering code. The available options are shown at several places in the catalog.

Each customer-specific ball screw assembly is issued with an ID number when an order is placed. For queries or repeat orders, simply quote this number. If you know the specific ordering code you can also easily generate a CAD drawing yourself in numerous file formats via the functionality provided on our website.

Rexroth offers an online product configuration tool for this and for directly submitting product requests.

To configure specific solutions quickly and easily, simply go to www.boschrexroth.de/gewindetrieb-konfigurator.

This online tool enables you to visually configure the specific ball screw assembly or planetary screw assembly that you need. You can select any catalog option or any defined product modification. The tool automatically checks the plausibility of changed parameters. Once configuration is complete, 2D and 3D data is available for download in all established formats. As regards end machining, you can choose either standard versions or tailor-made solutions. Rexroth machines the screw ends of the ball screw assembly or planetary screw assembly so that it matches the customer's connecting design and fulfills the desired requirements. The configuration tool which is incorporated into the eShop allows you to obtain a price for customer-specific ball screw assemblies, and also to directly order the product.

The screw diameter size that can be selected for ball screw assemblies ranges from 6 to 80 millimeters. In addition, any type of nut can be chosen.

| Nominal Diameter | | |
|------------------------------|--------------------------|------------------------------|
| 6 d ₁ = 6 mm | <input type="checkbox"/> | 8 d ₁ = 8 mm |
| 12 d ₁ = 12 mm | <input type="checkbox"/> | 16 d ₁ = 16 mm |
| 20 d ₁ = 20 mm | <input type="checkbox"/> | 25 d ₁ = 25 mm |
| 32 d ₁ = 32 mm | <input type="checkbox"/> | 40 d ₁ = 40 mm |
| 50 d ₁ = 50 mm | <input type="checkbox"/> | 63 d ₁ = 63 mm |
| 80 d ₁ = 80 mm | <input type="checkbox"/> | |

Version

151

170

175

individually configured, max. Ø 20.9 mm, max. offset length 125 mm

Legend

- 10.00 fixed dimension
- 10.00 individually configured dimension
- 10.00 individually configured dimension
- 10.00 dimension outside the limit values



Customers who are registered in the eShop can generate manufacturing drawings as well as requesting CAD models. This drawing can then be used directly by our production departments, which accelerates order processing and delivery. What's more, in this case you can order directly in the eShop.

In the case of configuration without prior registration, only CAD models are provided. We can refer to this if an order is placed, and use it to produce a manufacturing drawing.

Access the eShop via this link: <https://www.boschrexroth.com/eshop>

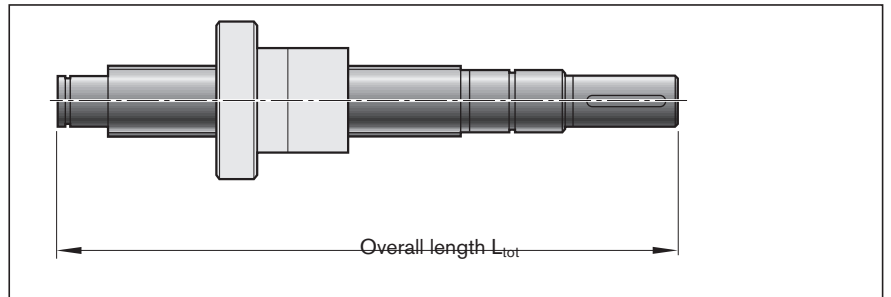
The ordering code provided on page 22 covers all the parameters of a ball screw assembly. Once you have defined the nominal diameter and lead and entered the total length, the functionality guides you through a succession of dialog boxes allowing you to select the desired options.

Nominal diameters, leads

-  Available ball nut sizes
-  Combinable with VSE

| | | Lead P | | | | | | | | | | | | |
|---------------------------------|----|--------|---|-----|---|----|----|----|----|----|----|----|----|----|
| | | 1 | 2 | 2,5 | 5 | 10 | 12 | 16 | 20 | 25 | 30 | 32 | 40 | 64 |
| Nominal diameter d ₀ | 6 | | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | |
| | 16 | | | | | | | | | | | | | |
| | 20 | | | | | | | | | | | | | |
| | 25 | | | | | | | | | | | | | |
| | 32 | | | | | | | | | | | | | |
| | 40 | | | | | | | | | | | | | |
| | 50 | | | | | | | | | | | | | |
| | 63 | | | | | | | | | | | | | |
| | 80 | | | | | | | | | | | | | |

Overall length L_{tot} of a ball screw assembly



Identification system for short product names BASA / ordering data

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|---|-----------|--|----------|--|-----------|---|----------|---|-----------|--|----------|---|----------|--------------------------------|----------|--------------------------------|------------|--------------------------------|----------|--|------------|--|----------|--|--|---------------------------------------|--|---------------------------------------|--|---------------------------------------|--|
| Ball screw assembly | BASA | 20 | x | 5 | R | x3 | FEM-E-B | - | 4 | 00 | 1 | 2 | T7 | R | 81 | A | Z | 120 | 41 | A | Z | 120 | 1234.5 | 0 | 1 | | | | | | | |
| Size | Nominal diameter (mm) | | Lead (mm) | | Direction of lead R ... right, L ... left | | Ball diameter (mm) | | FEM-E-B Single nut with flange miniature series | | SEM-E-S Adjustable-preload single nut | | SEM-E-C Adjustable-preload single nut DIN 69051, Part 5 | | ZEM-E-S Cylindrical single nut | | ZEM-E-K Cylindrical single nut | | ZEM-E-A Cylindrical single nut | | ZEV-E-S Screw-in nut | | FDM-E-S ⁴⁾ Double nut with flange | | FDM-E-B ⁴⁾ Double nut with flange DIN 69051, Part 5 | | FED-E-B Single nut with flange | | FAR-B-S Driven single nut with flange | | Number of ball track turns in the nut | |
| Nut type | FEM-E-B Single nut with flange miniature series | | FEP-E-S Single nut with flange with recirculation caps | | FEM-E-S Single nut with flange | | FEM-E-B Single nut with flange DIN 69051, Part 5 | | SEM-E-S Adjustable-preload single nut | | SEM-E-C Adjustable-preload single nut DIN 69051, Part 5 | | ZEM-E-S Cylindrical single nut | | ZEM-E-K Cylindrical single nut | | ZEM-E-A Cylindrical single nut | | ZEV-E-S Screw-in nut | | FDM-E-S ⁴⁾ Double nut with flange | | FDM-E-B ⁴⁾ Double nut with flange DIN 69051, Part 5 | | FED-E-B Single nut with flange | | FAR-B-S Driven single nut with flange | | Number of ball track turns in the nut | | | |
| Nut rework | 00 ... no rework | | 02 ... axial lube point | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sealing system | 0 ... no seals | | 2 ¹⁾ ... reinforced seal | | 1 ... standard seal | | 3 ²⁾ ... low-friction seal | | | | | | | | | | | | | | | | | | | | | | | | | |
| Preload classes | 0 ... C0 (standard backlash) | | 4 ... C4 (high preload DN ⁶⁾) | | 1 ... C00 (reduced backlash) | | 5 ... C5 (average preload DN ⁶⁾) | | 2 ... C3 ³⁾ (high preload SN ⁵⁾) | | 6 ... C2 (average preload SN) | | 3 ... C1 (slight preload SN ⁵⁾) | | | | | | | | | | | | | | | | | | | |
| Accuracy | T3, T5, T7 , T9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Screw | R ... Precision screw BAS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Left screw end | Form: | | ... standard form | | ... A with wrench flat on the ball screw | | ... B with wrench flat on the collar | | Option | | Z ... centering per DIN 332-D | | (machining of end face): | | S... hex socket | | G... female thread | | K... none | | Versions: | | ... standard version | | | | | | | | | |
| Right screw end | | | ... see left screw end | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Overall length [mm] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Documentation | 0 ... Standard (acceptance test report) | | 2 ... Torque test report | | 1 ... Lead test report | | 3 ... Lead and torque test report | | 5 ... Two-point compensation | | 5 ... Torque test report and Two-point compensation | | | | | | | | | | | | | | | | | | | | | |
| Lubrication | 0 ... Preserved | | 1 ... Preserved and nut with basic greasing | | 2 ... Front lube unit on left, ball nut with basic greasing | | 3 ... Front lube unit on right, ball nut with basic greasing | | 4 ... Front lube unit at both ends, ball nut with basic greasing | | | | | | | | | | | | | | | | | | | | | | | |

1) only for d₀ 25 to 63; consider the higher frictional torque! See page 144

2) See page 144 for sizes

3) only for d₀ 16 to 80

4) FDM-E-S and FDM-E-B only available as a complete ball screw assembly.

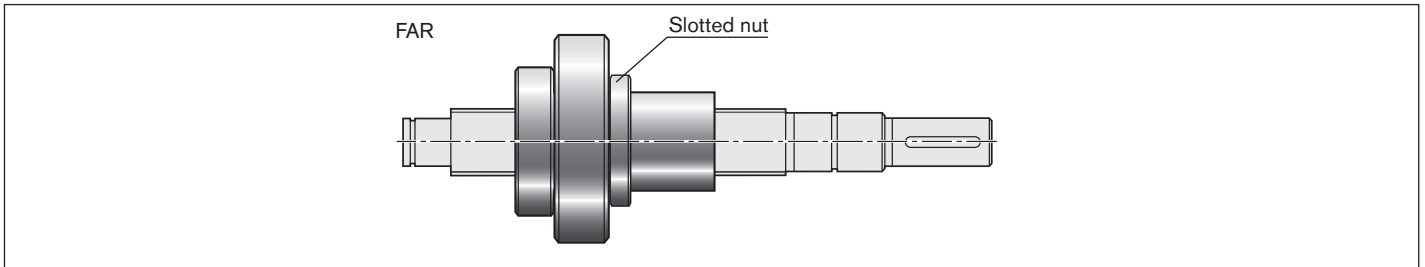
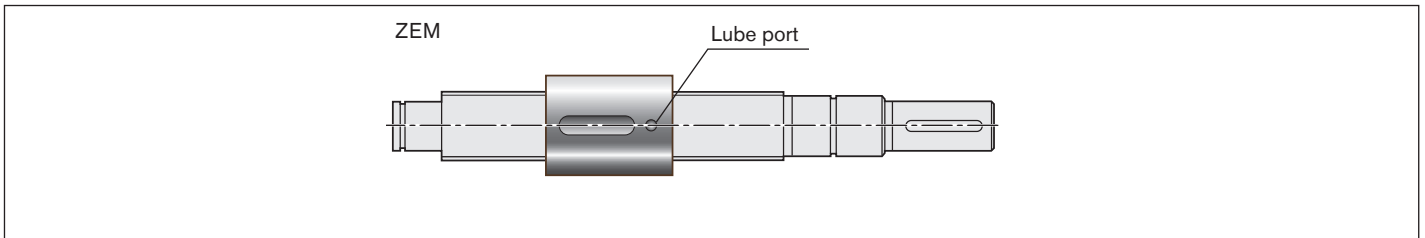
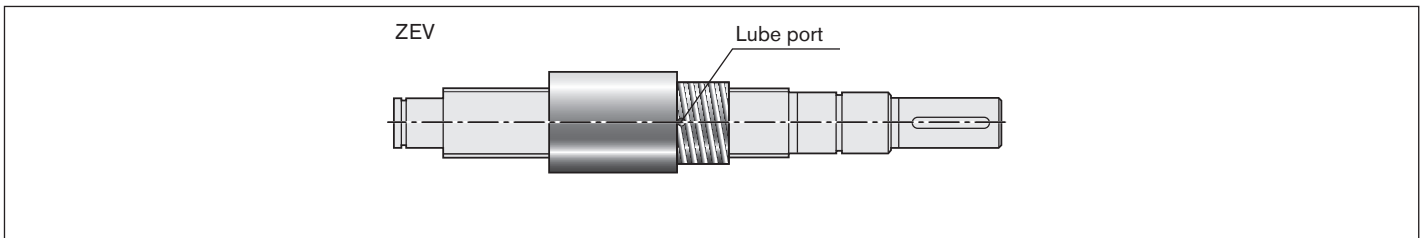
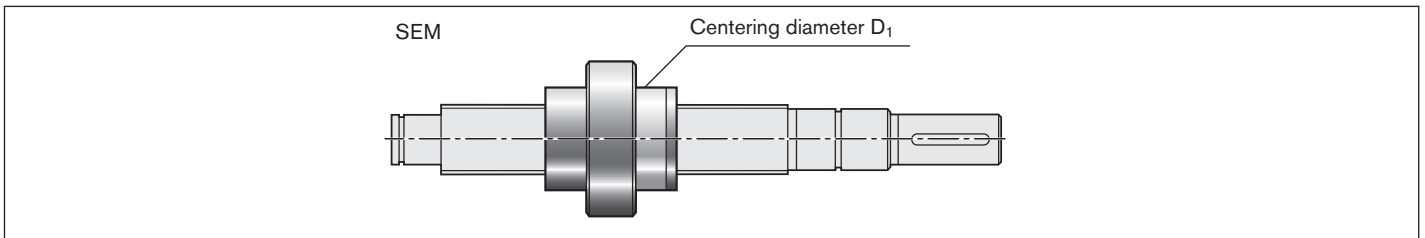
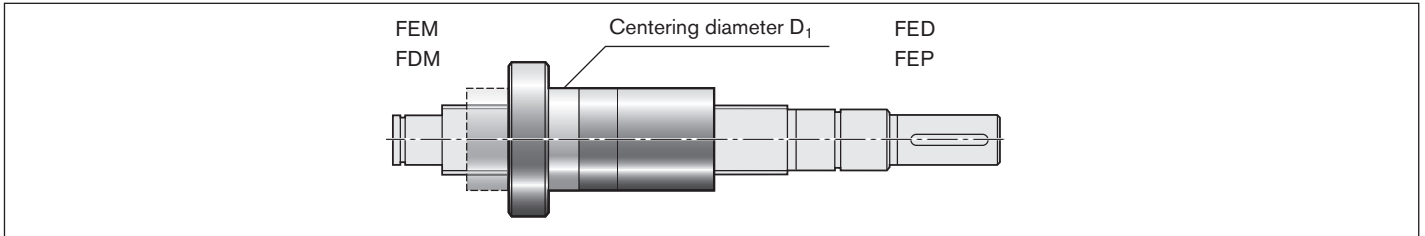
5) SN = Single nut

6) DN = Double nut

Mounting direction of nut types

Definition: The centering diameter on a nut with flange, the slotted nut on a driven nut, and the lube bore on a cylindrical nut points to the right end of the screw.

Note: The front lube unit is delivered ready-mounted to the ball screw assembly.



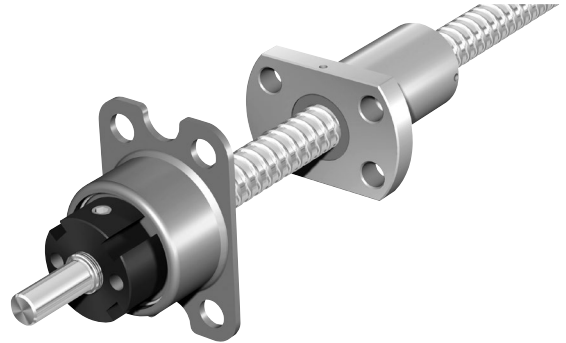
Ball screw assemblies BASA

Nuts, miniature series

Miniature series

Miniature series ball screw assemblies are available with nominal diameters of 6 – 12 mm, and leads of 1 – 10 mm.

The nut types are flange, cylindrical and adjustable-preload single nuts as well as screw-in nuts.



Overview of formats



Preload classes

| Option | Preload class | Definition |
|--------|---------------|-------------------------------|
| 0 | C0 | Standard backlash |
| 1 | C00 | Reduced backlash |
| 2 | C3 | High preload (single nut) |
| 3 | C1 | Moderate preload (single nut) |
| 4 | C4 | High preload (double nut) |
| 5 | C5 | Average preload (double nut) |
| 6 | C2 | Average preload (single nut) |

See nut versions for allocation of the preload classes

Single nut with flange FEM-E-B

Rexroth connection dimensions flange type B

With seals, preload class: C0, C00
Except for size 8 x 2.5 and 12 x 5/10:
Preload class C1.
Tolerance grade: T5, T7, T9



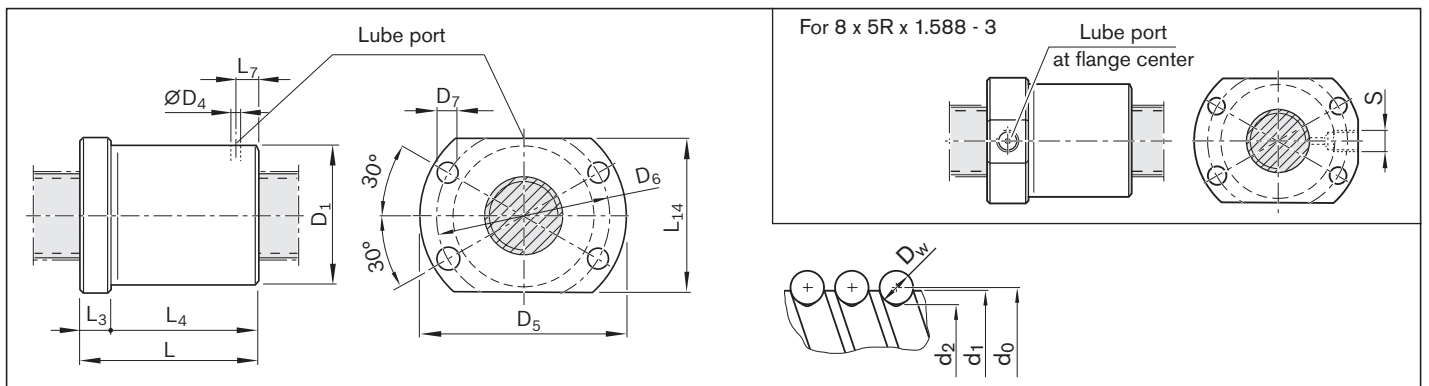
Ordering data:

| | | | | | | | | | | | | |
|------|--------------|-------------|----|---|---|----|---|---------|--------|-----|---|---|
| BASA | 8 x 2R x 1.2 | FEM-E-B - 4 | 00 | 1 | 1 | T7 | R | 831K062 | 41K050 | 250 | 0 | 1 |
|------|--------------|-------------|----|---|---|----|---|---------|--------|-----|---|---|

d_0 = nominal diameter
 P = lead
(R = right-hand side)
 D_w = ball diameter
 i = number of ball track turns

| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ³⁾ | | Linear speed ¹⁾ v_{max} (m/min) |
|----------|---------------------------------------|--------------|----------------------------|-----------------------------|--|
| | | | dyn. C (N) | stat. C ₀ (N) | |
| C | 6 x 1R x 0.8 - 3 ²⁾ | R1532 100 16 | 1,080 | 1,030 | 6 |
| C | 6 x 2R x 0.8 - 3 ²⁾ | R1532 120 16 | 1,070 | 1,020 | 12 |
| C | 8 x 1R x 0.8 - 4 ²⁾ | R1532 200 16 | 1,310 | 1,850 | 6 |
| C | 8 x 2R x 1.2 - 4 ²⁾ | R1532 220 16 | 2,360 | 2,950 | 12 |
| C | 8 x 2.5R x 1.588 - 3 | R1532 230 06 | 2,640 | 2,800 | 15 |
| C | 8 x 5R x 1.588 - 3 | R1532 260 06 | 2,500 | 2,650 | 30 |
| B | 12 x 2R x 1.2 - 4 ²⁾ | R1532 420 06 | 2,690 | 4,160 | 12 |
| B | 12 x 5R x 2 - 3 | R1532 460 06 | 4,560 | 5,800 | 30 |
| B | 12 x 10R x 2 - 2 | R1532 490 06 | 3,000 | 3,600 | 60 |

- 1) See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed n_{cr} " on page 174
- 2) Supplied only as complete ball screw assembly.
- 3) The load ratings are valid for tolerance grade T3 and T5 only.
For other tolerance grades, please take into account the correction factor f_{ac} on page 133.



| Size | (mm) | | | | | | | | | | | | | Mass m (kg) |
|-------------------------------|-------|-------|-------------|-------|-------|-------|-------|------|-------|-------|-------|----------|----|-------------------|
| | d_1 | d_2 | D_1 g6 | D_4 | D_5 | D_6 | D_7 | L | L_3 | L_4 | L_7 | L_{14} | S | |
| $d_0 \times P \times D_w - i$ | | | | | | | | | | | | | | |
| 6 x 1R x 0.8 - 3 | 6.0 | 5.3 | 12 | 1.5 | 24 | 18 | 3.4 | 11.6 | 3.5 | 8.1 | 3.5 | 16 | - | 0.020 |
| 6 x 2R x 0.8 - 3 | 6.0 | 5.3 | 12 | 1.5 | 24 | 18 | 3.4 | 14.6 | 3.5 | 11.1 | 3.0 | 16 | - | 0.020 |
| 8 x 1R x 0.8 - 4 | 8.0 | 7.3 | 16 | 1.5 | 28 | 22 | 3.4 | 15.5 | 6.0 | 9.5 | 3.5 | 19 | - | 0.035 |
| 8 x 2R x 1.2 - 4 | 8.0 | 7.0 | 16 | 1.5 | 28 | 22 | 3.4 | 19.5 | 6.0 | 13.5 | 3.0 | 19 | - | 0.050 |
| 8 x 2.5R x 1.588 - 3 | 7.5 | 6.3 | 16 | 2.0 | 28 | 22 | 3.4 | 16.0 | 6.0 | 10.0 | 3.0 | 19 | - | 0.030 |
| 8 x 5R x 1.588 - 3 | 7.5 | 6.3 | 16 | - | 28 | 22 | 3.4 | 23.5 | 6.0 | 17.5 | - | 19 | M3 | 0.050 |
| 12 x 2R x 1.2 - 4 | 11.7 | 10.8 | 20 | 2.0 | 37 | 29 | 4.5 | 19.0 | 8.0 | 11.0 | 2.5 | 24 | - | 0.055 |
| 12 x 5R x 2 - 3 | 11.4 | 9.9 | 22 | 2.0 | 37 | 29 | 4.5 | 28.0 | 8.0 | 20.0 | 6.0 | 24 | - | 0.075 |
| 12 x 10R x 2 - 2 | 11.4 | 9.9 | 22 | 2.0 | 37 | 29 | 4.5 | 33.0 | 8.0 | 25.0 | 8.0 | 24 | - | 0.085 |

Single nut with flange FEM-E-S

Rexroth connection dimensions

With seals
Preload class: C0, C00, C1
Tolerance grade: T5, T7, T9

d_0 = nominal diameter
 P = lead (R = right-hand)
 D_w = ball diameter
 i = number of ball track turns

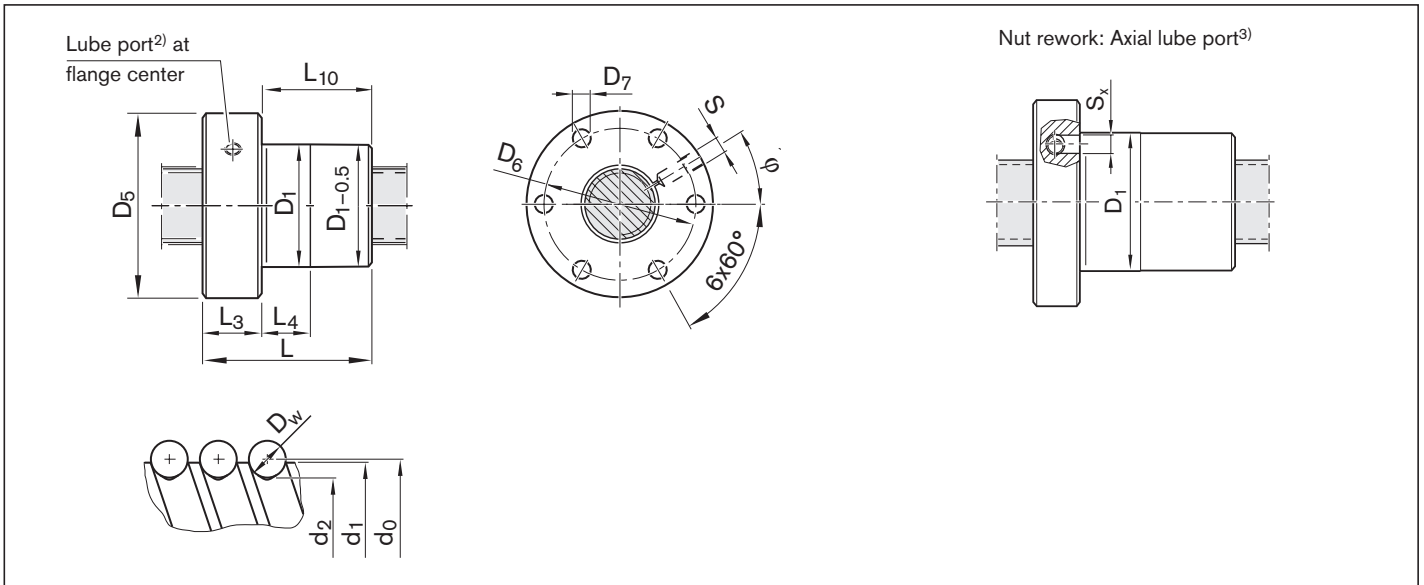


Ordering data:

| | | | | | | | | | | | | |
|------|-------------|-------------|----|---|---|----|---|--------|--------|-----|---|---|
| BASA | 12 x 5R x 2 | FEM-E-S - 3 | 00 | 1 | 1 | T7 | R | 81K060 | 41K060 | 250 | 0 | 1 |
|------|-------------|-------------|----|---|---|----|---|--------|--------|-----|---|---|

| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ²⁾ | | Linear speed ¹⁾ v_{max} (m/min) |
|----------|---------------------------------------|--------------|----------------------------|-----------------------------|--|
| | | | dyn. C (N) | stat. C ₀ (N) | |
| C | 8 x 2.5R x 1.588 - 3 | R1532 230 03 | 2,640 | 2,800 | 15 |
| A | 12 x 5R x 2 - 3 | R1532 460 23 | 4,560 | 5,800 | 30 |
| A | 12 x 10R x 2 - 2 | R1532 490 13 | 3,000 | 3,600 | 60 |

- See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed n_{cr} " on page 174
- The load ratings are valid for tolerance grade T5 only.
For other tolerance grades, please take into account the correction factor f_{ac} on page 133.



3) The axial lube port S_x is always located on the pitch circle D_6 of the nut unit.

| Size | (mm) | | | | | | | | | | | Mass | | |
|-------------------------------|-------|-------|-------------|-------|-------|-------|----|-------|-------|----------|--------|-------|------------------|-----------|
| | d_1 | d_2 | D_1 g6 | D_5 | D_6 | D_7 | L | L_3 | L_4 | L_{10} | $S^4)$ | S_x | φ (°) | m (kg) |
| $d_0 \times P \times D_w - i$ | | | | | | | | | | | | | | |
| 8 x 2.5R x 1.588 - 3 | 7.5 | 6.3 | 16 | 30 | 23 | 3.4 | 16 | 8 | 8.0 | 8 | Ø4 | - | 30.0 | 0.05 |
| 12 x 5R x 2 - 3 | 11.4 | 9.9 | 24 | 40 | 32 | 4.5 | 28 | 12 | 10.0 | 16 | M6 | 4 | 330.0 | 0.12 |
| 12 x 10R x 2 - 2 | 11.4 | 9.9 | 24 | 40 | 32 | 4.5 | 33 | 12 | 16.0 | 21 | M6 | 4 | 330.0 | 0.14 |

4) Lube port machining: flat surface $L_3 \leq 15$ mm, for size 8 x 2.5 a DIN 3405 funnel-type lube nipple is provided.

Adjustable-preload single nut SEM-E-S

Rexroth connection dimensions

With seals
Adjustable preload
Tolerance grade: T5, T7



d_0 = nominal diameter
 P = lead (R = right-hand)
 D_w = ball diameter
 i = number of ball track turns

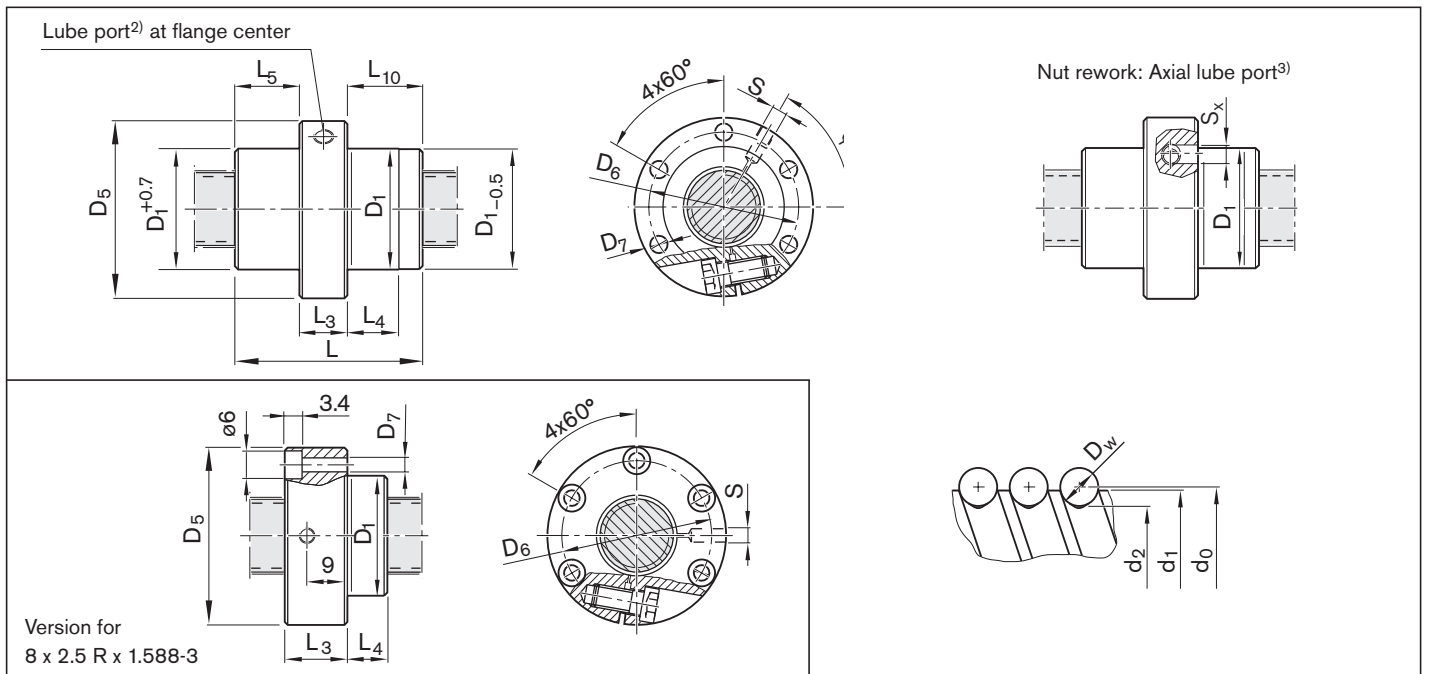
Ordering data:

| | | | | | | | | | | | | |
|------|-------------|-------------|----|---|---|----|---|--------|--------|-----|---|---|
| BASA | 12 x 5R x 2 | SEM-E-S - 3 | 00 | 1 | 2 | T7 | R | 81K060 | 41K060 | 250 | 0 | 1 |
|------|-------------|-------------|----|---|---|----|---|--------|--------|-----|---|---|

| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ²⁾ | | Linear speed ¹⁾ v_{max} (m/min) | Centering diameter D_1 after adjustment | |
|----------|---------------------------------------|--------------|----------------------------|--------------------|--|--|-----------|
| | | | dyn. C (N) | stat. C_0 (N) | | min. (mm) | max. (mm) |
| C | 8 x 2.5R x 1.588 - 3 | R1532 230 04 | 2,640 | 2,800 | 15 | 15.953 | 15.987 |
| B | 12 x 5R x 2 - 3 | R1532 460 24 | 4,560 | 5,800 | 30 | 23.940 | 23.975 |
| B | 12 x 10R x 2 - 2 | R1532 490 14 | 3,000 | 3,600 | 60 | 23.940 | 23.975 |

1) See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed n_{cr} " on page 174

2) The load ratings are valid for tolerance grade T3 and T5 only. For other tolerance grades, please take into account the correction factor f_{ac} on page 133.



3) The axial lube port S_x is always located on the pitch circle D_6 of the nut unit.

| Size | (mm) | | | | | | | | | | | | | | Mass | |
|----------------------|-------|-------|-------------|-------|-------|-------|----|-------|-------|-------|----------|--------|-------|------------------|-----------|--|
| | d_1 | d_2 | D_1 f9 | D_5 | D_6 | D_7 | L | L_3 | L_4 | L_5 | L_{10} | $S^4)$ | S_x | φ (°) | m (kg) | |
| 8 x 2.5R x 1.588 - 3 | 7.5 | 6.3 | 16 | 30 | 23 | 3.4 | 16 | 13 | 3.0 | — | 3.0 | Ø4 | — | 0 | 0.06 | |
| 12 x 5R x 2 - 3 | 11.4 | 9.9 | 24 | 40 | 32 | 4.5 | 28 | 12 | 8.0 | 8.0 | 8.0 | M6 | 4 | 55 | 0.12 | |
| 12 x 10R x 2 - 2 | 11.4 | 9.9 | 24 | 40 | 32 | 4.5 | 33 | 12 | 10.5 | 10.5 | 10.5 | M6 | 4 | 55 | 0.13 | |

4) Lube port machining: flat surface $L_3 \leq 15$ mm, for size 8 x 2.5 a DIN 3405 funnel-type lube nipple is provided.

Cylindrical single nut ZEM-E-S/ZEM-E-K

Rexroth connection dimensions

With seals

Preload class: C0, C00, C1

Except for size 6 x 1/2, 8 x 1/2, 12 x 2:

Preload class C0, C00

Tolerance grade: T5, T7, T9



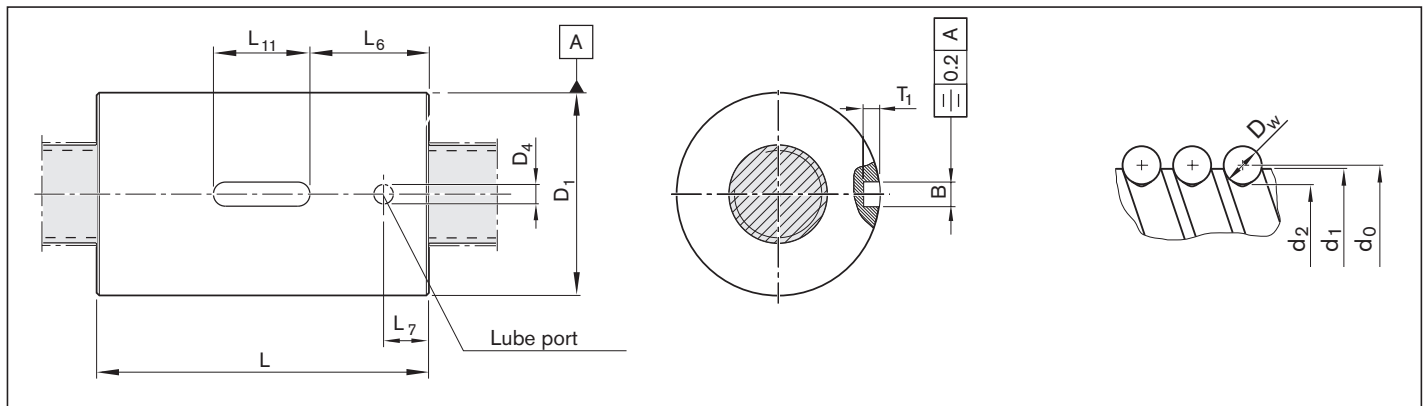
Ordering data:

| | | | | | | | | | | | | |
|------|-------------|-------------|----|---|---|----|---|--------|--------|-----|---|---|
| BASA | 12 x 5R x 2 | ZEM-E-S - 3 | 00 | 1 | 1 | T7 | R | 81K060 | 41K060 | 250 | 0 | 1 |
|------|-------------|-------------|----|---|---|----|---|--------|--------|-----|---|---|

d_0 = nominal diameter
P = lead (R = right-hand)
 D_w = ball diameter
i = number of ball track turns

| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ³⁾ | | Linear speed ²⁾ | |
|----------|---------------------------------------|--------------|----------------------------|-----------------------------|----------------------------|----|
| | | | dyn. C (N) | stat. C ₀ (N) | v_{max} (m/min) | |
| C | 6 x 1R x 0.8 - 3 ¹⁾ | R1532 102 10 | 1 080 | 1 030 | | 6 |
| C | 6 x 2R x 0.8 - 3 ¹⁾ | R1532 122 10 | 1 070 | 1 020 | | 12 |
| C | 8 x 1R x 0.8 - 4 ¹⁾ | R1532 202 10 | 1 310 | 1 850 | | 6 |
| C | 8 x 2R x 1.2 - 4 ¹⁾ | R1532 222 10 | 2 360 | 2 950 | | 12 |
| C | 8 x 2.5R x 1.588 - 3 | R1532 230 02 | 2,640 | 2,800 | | 15 |
| C | 8 x 5R x 1.588 - 3 | R1532 260 02 | 2 500 | 2 650 | | 30 |
| B | 12 x 2R x 1.2 - 4 ¹⁾ | R1532 422 01 | 2,690 | 4,160 | | 12 |
| B | 12 x 5R x 2 - 3 | R1532 460 32 | 4,560 | 5,800 | | 30 |
| B | 12 x 5R x 2 - 3 | R1532 462 25 | 4,560 | 5,800 | | 30 |
| B | 12 x 10R x 2 - 2 | R1532 490 22 | 3,000 | 3,600 | | 60 |
| B | 12 x 10R x 2 - 2 | R1532 492 00 | 3,000 | 3,600 | | 60 |

- 1) Supplied only as complete ball screw assembly.
- 2) See "Characteristic speed $d_0 \cdot n$ " on page 133 and critical speed n_{cr} on page 174
- 3) The load ratings are valid for tolerance grade T5 only. For other tolerance grades, please take into account the correction factor f_{ac} on page 133.



| Size $d_0 \times P \times D_w - i$ | (mm) | | | | | | | | | | Mass m (kg) |
|---------------------------------------|-------|-------|-------------|-------|----------------|-------|-------|--------------------|---------|-----------------|-------------------|
| | d_1 | d_2 | D_1 g6 | D_4 | L ± 0.1 | L_6 | L_7 | L_{11} $+0.2$ | B P9 | T_1 $+0.1$ | |
| 6 x 1R x 0.8 - 3 ¹⁾ | 6.0 | 5.3 | 12 | 1.5 | 11.6 | - | 3.5 | - | - | - | 0.014 |
| 6 x 2R x 0.8 - 3 ¹⁾ | 6.0 | 5.3 | 12 | 1.5 | 14.6 | - | 3.1 | - | - | - | 0.015 |
| 8 x 1R x 0.8 - 4 ¹⁾ | 8.0 | 7.3 | 16 | 1.5 | 15.5 | 5.00 | 3.5 | 6 | 3 | 1.2 | 0.023 |
| 8 x 2R x 1.2 - 4 ¹⁾ | 8.0 | 7.0 | 16 | 1.5 | 19.5 | 5.00 | 3.1 | 6 | 3 | 1.8 | 0.037 |
| 8 x 2.5R x 1.588 - 3 | 7.5 | 6.3 | 16 | 2 | 16.0 | 5.00 | 3.5 | 6 | 3 | 1.8 | 0.02 |
| 8 x 5R x 1.588 - 3 | 7.5 | 6.3 | 16 | 2 | 23.5 | 7.75 | 3.5 | 8 | 3 | 1.8 | 0.04 |
| 12 x 2R x 1.2 - 4 ¹⁾ | 11.7 | 10.8 | 21 | 2 | 19.0 | 5.50 | 3.5 | 8 | 3 | 1.8 | 0.03 |
| 12 x 5R x 2 - 3 | 11.4 | 9.9 | 24 | 2 | 28.0 | 8.00 | 3.5 | 12 | 5 | 3.0 | 0.06 |
| 12 x 5R x 2 - 3 | 11.4 | 9.9 | 21 | 2 | 28.0 | 8.00 | 3.5 | 12 | 3 | 1.8 | 0.04 |
| 12 x 10R x 2 - 2 | 11.4 | 9.9 | 24 | 2 | 33.0 | 10.50 | 3.5 | 12 | 5 | 3.0 | 0.07 |
| 12 x 10R x 2 - 2 | 11.4 | 9.9 | 21 | 2 | 33.0 | 10.50 | 3.5 | 12 | 3 | 1.8 | 0.05 |

Screw-in nut ZEV-E-S

Rexroth connection dimensions

With low-friction seal,
preload class: C0, C00, C1

Tolerance grade: T5, T7, T9



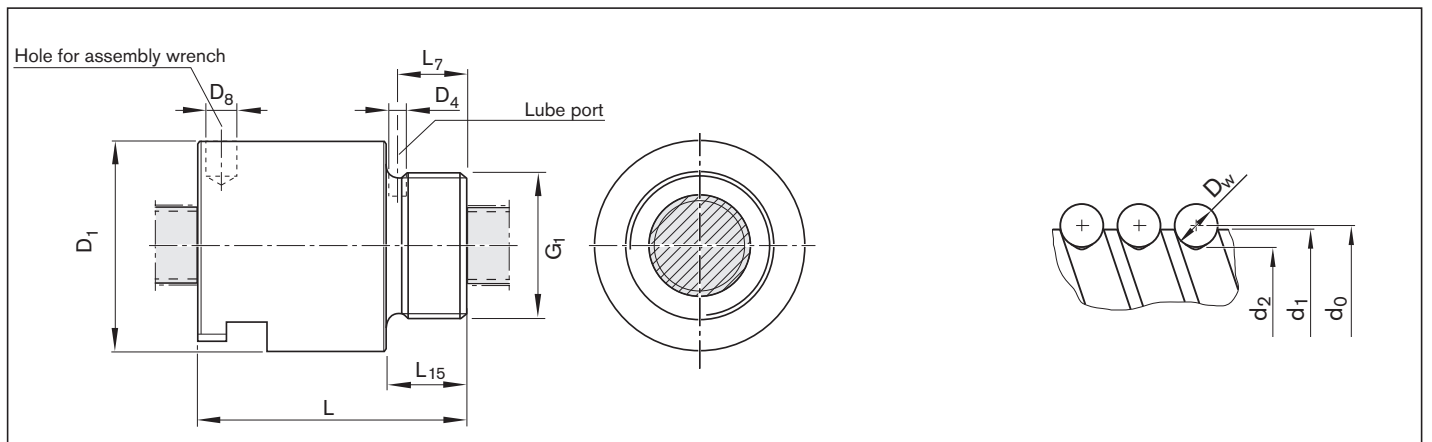
d_0 = nominal diameter
 P = lead (R = right-hand)
 D_w = ball diameter
 i = number of ball track turns

Ordering data:

| | | | | | | | | | | | | |
|------|-------------|-------------|----|---|---|----|---|--------|--------|-----|---|---|
| BASA | 12 x 5R x 2 | ZEV-E-S - 3 | 00 | 3 | 1 | T7 | R | 81K060 | 41K060 | 250 | 0 | 1 |
|------|-------------|-------------|----|---|---|----|---|--------|--------|-----|---|---|

| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ²⁾ | | Linear speed ¹⁾ |
|----------|---------------------------------------|--------------|----------------------------|-----------------------------|----------------------------|
| | | | dyn. C (N) | stat. C ₀ (N) | v_{max} (m/min) |
| C | 8 x 2.5R x 1.588 - 4 | R2542 230 05 | 3,490 | 3,910 | 15.0 |
| B | 12 x 5R x 2 - 3 | R2542 430 05 | 4,560 | 5,800 | 30.0 |
| B | 12 x 10R x 2 - 2 | R2542 430 15 | 3,000 | 3,600 | 60.0 |

1) See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed n_{cr} " on page 174
2) The load ratings are valid for tolerance grade T3 and T5 only.
For other tolerance grades, please take into account the correction factor f_{ac} on page 133.



| Size | (mm) | | | | | | | L | L ₇ | L ₁₅ | Mass | |
|-------------------------------|-------|-------|--------------|-------|-------|-----------|-------------|-----|----------------|-----------------|------|--|
| | d_1 | d_2 | D_1 h10 | D_4 | D_8 | G_1 | m (kg) | | | | | |
| $d_0 \times P \times D_w - i$ | | | | | | | ± 0.3 | | | | | |
| 8 x 2.5R x 1.588 - 4 | 7.5 | 6.3 | 20.0 | 1.5 | 3.2 | M18x1 | 20.5 | 6.7 | 8 | 0.06 | | |
| 12 x 5R x 2 - 3 | 11.4 | 9.9 | 25.5 | 2.7 | 3.2 | M20 x 1.0 | 36 | 8.5 | 10 | 0.09 | | |
| 12 x 10R x 2 - 2 | 11.4 | 9.9 | 25.5 | 2.7 | 3.2 | M20 x 1.0 | 40 | 8.5 | 10 | 0.10 | | |

Nuts, Speed Series

Speed series

Speed series ball screw assemblies are available with nominal diameters of 20 – 32 mm, and leads of 25 – 64 mm.

The nut type is a single nut with flange.

The distinguishing feature of the speed series is its compact design.

Multi-start screws allow a higher load rating with a short nut. The oversquare leads enable the realization of high traversing speeds.



Preload classes

| Option | Preload class | Definition |
|--------|---------------|-------------------------------|
| 0 | C0 | Standard backlash |
| 1 | C00 | Reduced backlash |
| 2 | C3 | High preload (single nut) |
| 3 | C1 | Moderate preload (single nut) |
| 4 | C4 | High preload (double nut) |
| 5 | C5 | Average preload (double nut) |
| 6 | C2 | Average preload (single nut) |

See nut versions for allocation of the preload classes

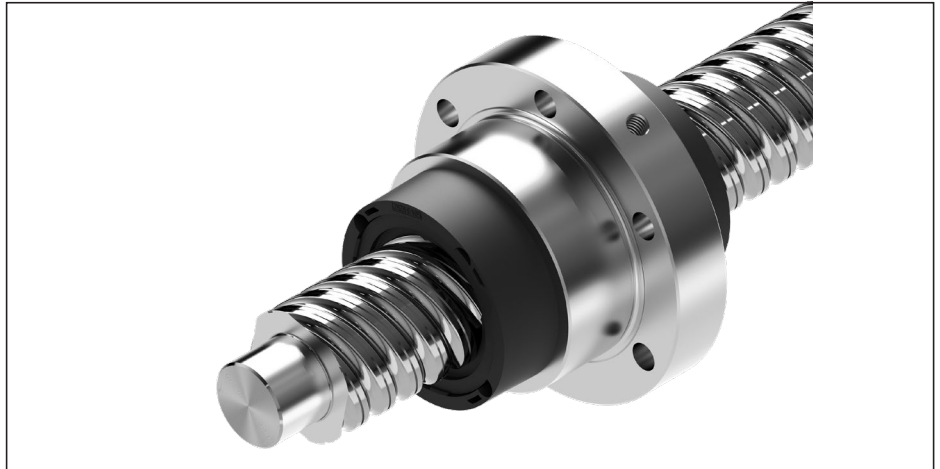
Single nut with flange with recirculation caps FEP-E-S

Rexroth connection dimensions

With seals, preload class: C0, C00, C1
Tolerance grade: T5, T7, T9

⚠ Do not exert force on the plastic recirculation caps or allow them to collide with end stops.

Note: Supplied only as complete ball screw assembly.



Ordering data:

| | | | | | | | | | | | | |
|------|----------------|---------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 25 x 25R x 3.5 | FEM-E-S - 4.8 | 00 | 1 | 0 | T5 | R | 81K170 | 41K170 | 1100 | 0 | 1 |
|------|----------------|---------------|----|---|---|----|---|--------|--------|------|---|---|

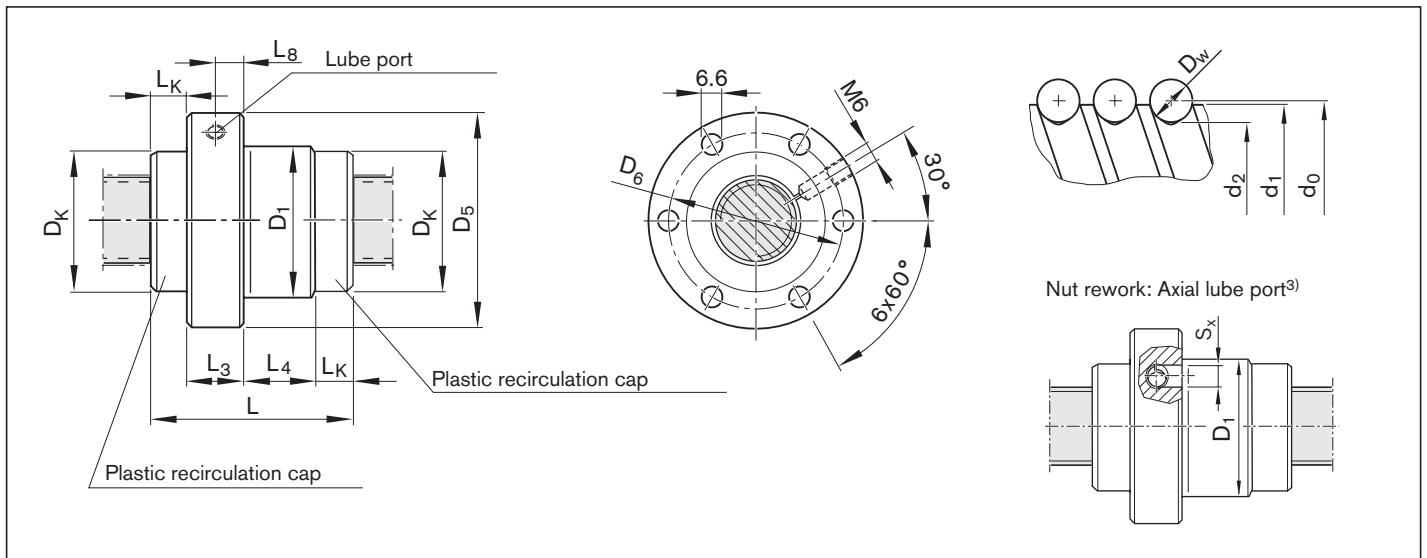
d_0 = nominal diameter
 P = lead (R = right-hand)
 D_w = ball diameter
 i = number of ball track turns

| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ²⁾ | | Linear speed ¹⁾ v_{max} (m/min) |
|----------|---------------------------------------|--------------|----------------------------|--------------------|--|
| | | | dyn. C (N) | stat. C_0 (N) | |
| C | 20 x 40R x 3.5 - 4 | R2522 100 11 | 14,000 | 26,200 | 240 |
| C | 25 x 25R x 3.5 - 4.8 | R2522 200 01 | 19,700 | 39,400 | 150 |
| C | 32 x 32R x 3.969 - 4.8 | R2522 300 01 | 26,300 | 57,600 | 150 |
| C | 32 x 64R x 3.969 - 4 | R2522 300 21 | 21,100 | 49,000 | 300 |

1) See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed n_{cr} " on page 174

2) The load ratings are valid for tolerance grade T3 and T5 only.

For other tolerance grades, please take into account the correction factor f_{ac} on page 133.



3) The axial lube port S_x is always located on the pitch circle D_6 of the nut unit.

| Size $d_0 \times P \times D_w - i$ | (mm) | | | | | | | | | | | | Mass m (kg) |
|---------------------------------------|-------|-------|-------------|-------|-------|-------|------------------|-------|-------|-------|-------|-------|-------------------|
| | d_1 | d_2 | D_1 g6 | D_5 | D_6 | D_K | L ± 0.5 | L_3 | L_4 | L_8 | L_K | S_x | |
| 20 x 40R x 3.5 - 4 | 19 | 16.4 | 38 | 63 | 50 | 37.5 | 57 | 12 | 23 | 8.0 | 11 | 4 | 0.51 |
| 25 x 25R x 3.5 - 4.8 | 24 | 21.4 | 48 | 73 | 60 | 40.0 | 52 | 12 | 14 | 5.0 | 13 | 4 | 0.51 |
| 32 x 32R x 3.969 - 4.8 | 31 | 27.9 | 56 | 80 | 68 | 50.0 | 68 | 15 | 21 | 7.7 | 16 | 4 | 0.78 |
| 32 x 64R x 3.969 - 4 | 31 | 27.9 | 56 | 80 | 68 | 50.0 | 88 | 15 | 45 | 7.5 | 14 | 4 | 1.06 |

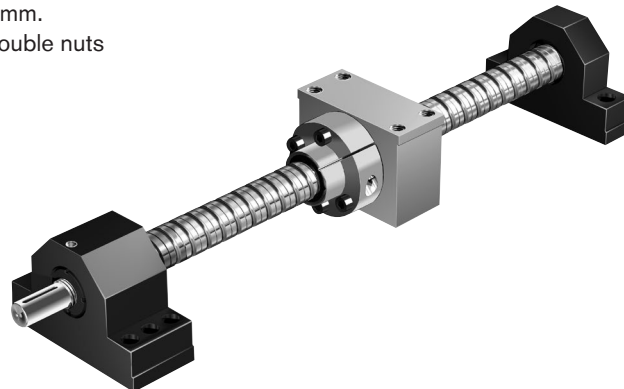
Nuts, standard series

Standard series ball screw assemblies

are available with nominal diameters of 16 – 80 mm, and leads of 5 – 40 mm.
The nut types are flange, cylindrical and adjustable-preload single nuts, double nuts with flange, as well as screw-in nuts.

Benefits

- High axial load-bearing capacity
- High dynamics
- High rigidity
- Low friction
- Available from stock in many versions and sizes
- Nut housing with reference edge (both sides)

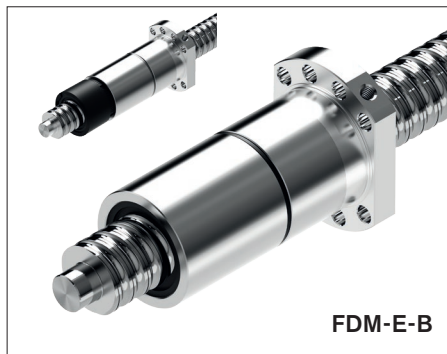
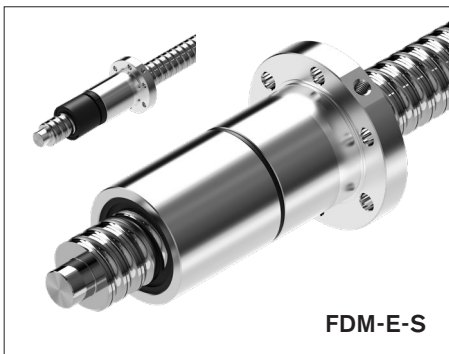
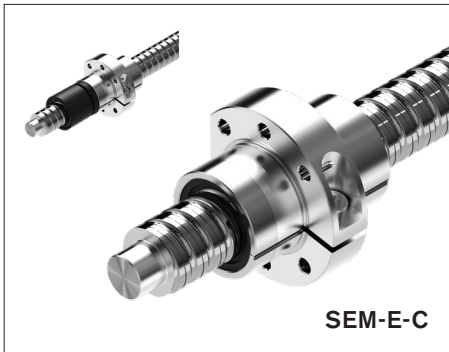
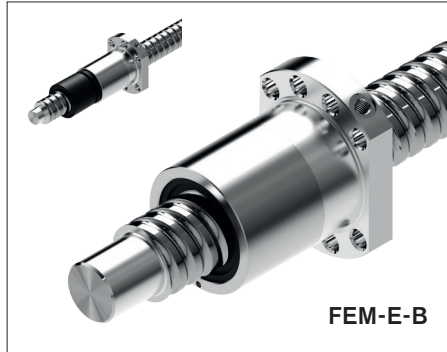
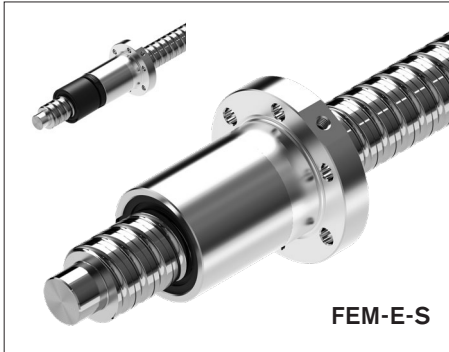


Preload classes

| Option | Preload class | Definition |
|--------|---------------|-------------------------------|
| 0 | C0 | Standard backlash |
| 1 | C00 | Reduced backlash |
| 2 | C3 | High preload (single nut) |
| 3 | C1 | Moderate preload (single nut) |
| 4 | C4 | High preload (double nut) |
| 5 | C5 | Average preload (double nut) |
| 6 | C2 | Average preload (single nut) |

See nut versions for allocation of the preload classes

Overview of formats



Single nut with flange FEM-E-S

Rexroth connection dimensions

With seals

Left-hand version in some cases

Preload class: C0, C00, C1, C2, C3

Tolerance grade: T3²⁾, T5, T7, T9

Note: The front lube unit is only available for the right-hand version.

⚠ When setting up applications, do not allow components to collide with the front lube unit.



Ordering data:

| | | | | | | | | | | | | |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20 x 5R x 3 | FEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 82Z120 | 41Z120 | 1250 | 0 | 1 |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|

d_0 = nominal diameter

P = lead (R = right-hand, L = left-hand)

D_w = ball diameter

i = number of ball track turns

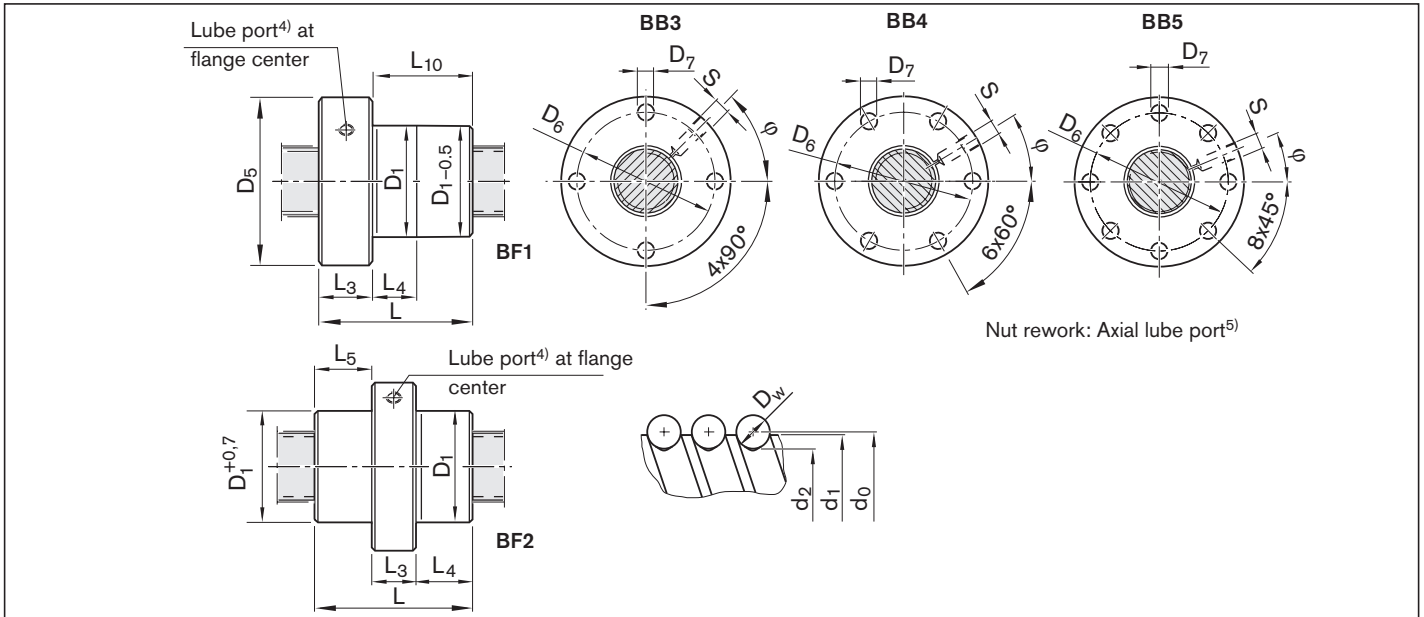
| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ³⁾ | | Linear speed ¹⁾ v_{max} (m/min) |
|-------------------------------------|---------------------------------------|--------------|----------------------------|-----------------------------|--|
| | | | dyn. C (N) | stat. C ₀ (N) | |
| A | 16 x 5R x 3 - 4 | R1512 010 23 | 14,800 | 16,100 | 30 |
| A | 16 x 10R x 3 - 3 | R1512 040 13 | 11,500 | 12,300 | 60 |
| A | 16 x 16R x 3 - 2 | R1512 060 13 | 7,560 | 7,600 | 96 |
| A | 20 x 5R x 3 - 4 | R1512 110 13 | 17,200 | 21,500 | 30 |
| A | 20 x 10R x 3 - 4 | R1512 140 13 | 16,900 | 21,300 | 60 |
| A | 20 x 20R x 3.5 - 2 | R1512 170 13 | 10,900 | 12,100 | 120 |
| A | 25 x 5R x 3 - 4 | R1512 210 13 | 19,100 | 27,200 | 30 |
| A | 25 x 10R x 3 - 4 | R1512 240 13 | 18,800 | 27,000 | 60 |
| A | 25 x 25R x 3.5 - 2 | R1512 280 13 | 12,100 | 15,100 | 150 |
| A | 32 x 5R x 3.5 - 4 | R1512 310 13 | 25,900 | 40,000 | 23 |
| A | 32 x 10R x 3.969 - 5 | R1512 340 13 | 38,000 | 58,300 | 47 |
| A | 32 x 20R x 3.969 - 2 | R1512 370 13 | 16,200 | 21,800 | 94 |
| A | 32 x 32R x 3.969 - 2 | R1512 390 13 | 16,100 | 22,000 | 150 |
| A | 40 x 5R x 3.5 - 5 | R1512 410 13 | 34,900 | 64,100 | 19 |
| A | 40 x 10R x 6 - 4 | R1512 440 13 | 60,000 | 86,400 | 38 |
| B | 40 x 10R x 6 - 6 | R1512 440 23 | 86,500 | 132,200 | 38 |
| A | 40 x 20R x 6 - 3 | R1512 470 13 | 45,500 | 62,800 | 75 |
| A | 40 x 40R x 6 - 2 | R1512 490 13 | 30,600 | 40,300 | 150 |
| B | 50 x 5R x 3.5 - 5 | R1512 510 13 | 38,400 | 81,300 | 15 |
| B | 50 x 10R x 6 - 6 | R1512 540 13 | 95,600 | 166,500 | 30 |
| C | 50 x 16R x 6 - 6 | R1512 560 13 | 95,300 | 166,000 | 48 |
| B | 50 x 20R x 6.5 - 3 | R1512 570 13 | 57,500 | 87,900 | 60 |
| B | 50 x 40R x 6.5 - 2 | R1512 590 13 | 38,500 | 55,800 | 120 |
| B | 63 x 10R x 6 - 6 | R1512 640 13 | 106,600 | 214,300 | 24 |
| B | 63 x 20R x 6.5 - 3 | R1512 670 13 | 63,800 | 112,100 | 48 |
| B | 63 x 40R x 6.5 - 2 | R1512 690 13 | 44,300 | 74,300 | 95 |
| C | 80 x 10R x 6.5 - 6 | R1512 740 13 | 130,100 | 291,700 | 19 |
| C | 80 x 20R x 12.7 - 6 | R1512 770 23 | 315,200 | 534,200 | 30 |
| Versions with left-hand lead | | | | | |
| B | 16 x 5L x 3 - 4 | R1552 010 03 | 14,800 | 16,100 | 30 |
| B | 20 x 5L x 3 - 4 | R1552 110 13 | 17,200 | 21,500 | 30 |
| B | 25 x 5L x 3 - 4 | R1552 210 13 | 19,100 | 27,200 | 30 |
| B | 32 x 5L x 3.5 - 4 | R1552 310 03 | 25,900 | 40,000 | 23 |
| B | 40 x 5L x 3.5 - 5 | R1552 410 03 | 34,900 | 64,100 | 19 |
| B | 40 x 10L x 6 - 4 | R1552 440 03 | 60,000 | 86,400 | 38 |

1) See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed n_{cr} " on page 174

2) Tolerance grade T3 for sizes shown in table page 12

3) The load ratings are valid for tolerance grade T3 and T5 only.

For other tolerance grades, please take into account the correction factor f_{ac} on page 133.



- 4) Lube port machining: flat surface $L_3 \leq 15$ mm, countersink $L_3 > 15$ mm;
5) The axial lube port S_x is always located on the pitch circle D_6 of the nut unit.

| Size | (mm) | | | | | | | | | | | | | | | | Mass |
|-------------------------------------|-------|-------|-------|-------|--------------|-------|-------|--------------|-----|-------|-------|-------|----------|--------|-------|---------------|--------|
| $d_0 \times P \times D_w - i$ | d_1 | d_2 | D_1 | D_5 | Hole pattern | D_6 | D_7 | Design style | L | L_3 | L_4 | L_5 | L_{10} | $S^4)$ | S_x | φ (°) | m (kg) |
| 16 x 5R x 3 - 4 | 15.0 | 12.9 | 28 | 53 | BB3 | 40 | 6.6 | BF1 | 38 | 12 | 10.0 | - | 26 | M6 | 4 | 315.0 | 0.24 |
| 16 x 10R x 3 - 3 | 15.0 | 12.9 | 28 | 53 | BB3 | 40 | 6.6 | BF1 | 45 | 12 | 16.0 | - | 33 | M6 | 4 | 315.0 | 0.25 |
| 16 x 16R x 3 - 2 | 15.0 | 12.9 | 33 | 58 | BB4 | 45 | 6.6 | BF2 | 45 | 15 | 15.0 | 15.0 | - | M6 | 4 | 30.0 | 0.39 |
| 20 x 5R x 3 - 4 | 19.0 | 16.9 | 33 | 58 | BB4 | 45 | 6.6 | BF1 | 40 | 12 | 10.0 | - | 28 | M6 | 4 | 30.0 | 0.28 |
| 20 x 10R x 3 - 4 | 19.0 | 16.9 | 33 | 58 | BB4 | 45 | 6.6 | BF1 | 60 | 12 | 16.0 | - | 48 | M6 | 4 | 30.0 | 0.36 |
| 20 x 20R x 3.5 - 2 | 19.0 | 16.7 | 38 | 63 | BB4 | 50 | 6.6 | BF2 | 57 | 20 | 18.5 | 18.5 | - | M6 | 4 | 30.0 | 0.60 |
| 25 x 5R x 3 - 4 | 24.0 | 21.9 | 38 | 63 | BB4 | 50 | 6.6 | BF1 | 45 | 12 | 10.0 | - | 33 | M6 | 4 | 30.0 | 0.35 |
| 25 x 10R x 3 - 4 | 24.0 | 21.9 | 38 | 63 | BB4 | 50 | 6.6 | BF1 | 64 | 12 | 16.0 | - | 52 | M6 | 4 | 30.0 | 0.44 |
| 25 x 25R x 3.5 - 2 | 24.0 | 21.4 | 48 | 73 | BB4 | 60 | 6.6 | BF2 | 70 | 25 | 22.5 | 22.5 | - | M6 | 4 | 18.0 | 1.09 |
| 32 x 5R x 3.5 - 4 | 31.0 | 28.4 | 48 | 73 | BB4 | 60 | 6.6 | BF1 | 48 | 13 | 10.0 | - | 35 | M6 | 4 | 30.0 | 0.54 |
| 32 x 10R x 3.969 - 5 | 31.0 | 27.9 | 48 | 73 | BB4 | 60 | 6.6 | BF1 | 77 | 13 | 16.0 | - | 64 | M6 | 4 | 30.0 | 0.72 |
| 32 x 20R x 3.969 - 2 | 31.0 | 27.9 | 56 | 80 | BB4 | 68 | 6.6 | BF1 | 64 | 15 | 25.0 | - | 49 | M6 | 4 | 30.0 | 1.02 |
| 32 x 32R x 3.969 - 2 | 31.0 | 27.9 | 56 | 80 | BB4 | 68 | 6.6 | BF2 | 88 | 20 | 34.0 | 34.0 | - | M6 | 4 | 30.0 | 1.40 |
| 40 x 5R x 3.5 - 5 | 39.0 | 36.4 | 56 | 80 | BB4 | 68 | 6.6 | BF1 | 54 | 15 | 10.0 | - | 39 | M8x1 | 5 | 30.0 | 0.71 |
| 40 x 10R x 6 - 4 | 38.0 | 33.8 | 63 | 95 | BB4 | 78 | 9.0 | BF1 | 70 | 15 | 16.0 | - | 55 | M8x1 | 5 | 30.0 | 1.29 |
| 40 x 10R x 6 - 6 | 38.0 | 33.8 | 63 | 95 | BB4 | 78 | 9.0 | BF1 | 90 | 15 | 16.0 | - | 75 | M8x1 | 5 | 30.0 | 1.59 |
| 40 x 20R x 6 - 3 | 38.0 | 33.8 | 63 | 95 | BB4 | 78 | 9.0 | BF1 | 88 | 15 | 25.0 | - | 73 | M8x1 | 5 | 30.0 | 1.54 |
| 40 x 40R x 6 - 2 | 38.0 | 33.8 | 72 | 110 | BB4 | 90 | 11.0 | BF2 | 102 | 40 | 31.0 | 31.0 | - | M8x1 | 5 | 19.0 | 3.59 |
| 50 x 5R x 3.5 - 5 | 49.0 | 46.4 | 68 | 98 | BB4 | 82 | 9.0 | BF1 | 54 | 15 | 10.0 | - | 39 | M8x1 | 5 | 30.0 | 1.02 |
| 50 x 10R x 6 - 6 | 48.0 | 43.8 | 72 | 110 | BB4 | 90 | 11.0 | BF1 | 90 | 18 | 16.0 | - | 72 | M8x1 | 5 | 30.0 | 2.02 |
| 50 x 16R x 6 - 6 | 48.0 | 43.8 | 72 | 110 | BB4 | 90 | 11.0 | BF1 | 128 | 18 | 25.0 | - | 110 | M8x1 | 5 | 30.0 | 2.58 |
| 50 x 20R x 6.5 - 3 | 48.0 | 43.4 | 85 | 125 | BB4 | 105 | 11.0 | BF1 | 92 | 22 | 25.0 | - | 70 | M8x1 | 5 | 30.0 | 3.40 |
| 50 x 40R x 6.5 - 2 | 48.0 | 43.4 | 85 | 125 | BB4 | 105 | 11.0 | BF1 | 109 | 22 | 45.0 | - | 87 | M8x1 | 5 | 30.0 | 3.87 |
| 63 x 10R x 6 - 6 | 61.0 | 56.8 | 85 | 125 | BB4 | 105 | 11.0 | BF1 | 90 | 22 | 16.0 | - | 68 | M8x1 | 5 | 30.0 | 2.62 |
| 63 x 20R x 6.5 - 3 | 61.0 | 56.4 | 95 | 140 | BB4 | 118 | 14.0 | BF1 | 92 | 22 | 25.0 | - | 70 | M8x1 | 5 | 30.0 | 3.71 |
| 63 x 40R x 6.5 - 2 | 61.0 | 56.4 | 95 | 140 | BB4 | 118 | 14.0 | BF1 | 109 | 22 | 45.0 | - | 87 | M8x1 | 5 | 30.0 | 4.21 |
| 80 x 10R x 6.5 - 6 | 78.0 | 73.3 | 105 | 150 | BB4 | 125 | 14.0 | BF1 | 95 | 22 | 16.0 | - | 73 | M8x1 | 5 | 30.0 | 3.78 |
| 80 x 20R x 12.7 - 6 | 76.0 | 67.0 | 125 | 180 | BB5 | 152 | 18.0 | BF1 | 170 | 25 | 25.0 | - | 145 | M8x1 | 5 | 22.5 | 11.00 |
| Versions with left-hand lead | | | | | | | | | | | | | | | | | |
| 16 x 5L x 3 - 4 | 15.0 | 12.9 | 28 | 53 | BB3 | 40 | 6.6 | BF1 | 38 | 12 | 10.0 | - | 26 | M6 | 4 | 45.0 | 0.24 |
| 20 x 5L x 3 - 4 | 19.0 | 16.9 | 33 | 58 | BB4 | 45 | 6.6 | BF1 | 40 | 12 | 10.0 | - | 28 | M6 | 4 | 30.0 | 0.28 |
| 25 x 5L x 3 - 4 | 24.0 | 21.9 | 38 | 63 | BB4 | 50 | 6.6 | BF1 | 45 | 12 | 10.0 | - | 33 | M6 | 4 | 30.0 | 0.35 |
| 32 x 5L x 3.5 - 4 | 31.0 | 28.4 | 48 | 73 | BB4 | 60 | 6.6 | BF1 | 48 | 13 | 10.0 | - | 35 | M6 | 4 | 30.0 | 0.54 |
| 40 x 5L x 3.5 - 5 | 39.0 | 36.4 | 56 | 80 | BB4 | 68 | 6.6 | BF1 | 54 | 15 | 10.0 | - | 39 | M8x1 | 5 | 30.0 | 0.71 |
| 40 x 10L x 6 - 4 | 38.0 | 33.8 | 63 | 95 | BB4 | 78 | 9.0 | BF1 | 70 | 15 | 16.0 | - | 55 | M8x1 | 5 | 30.0 | 1.29 |

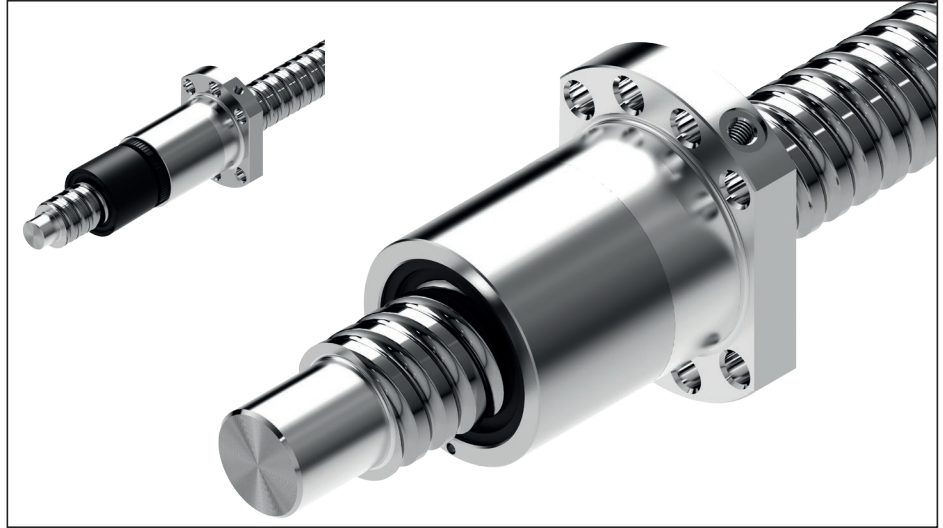
Single nut with flange FEM-E-B

Mounting dimensions similar to
DIN 69051, Part 5
Flange type B

With seals
With left-hand version in some cases
Preload class: C0, C00, C1, C2, C3
Tolerance grade: T3²⁾, T5, T7, T9

Note: The front lube unit is only available
for the right-hand version.

▲ When setting up applications, do not
allow components to collide with the
front lube unit.



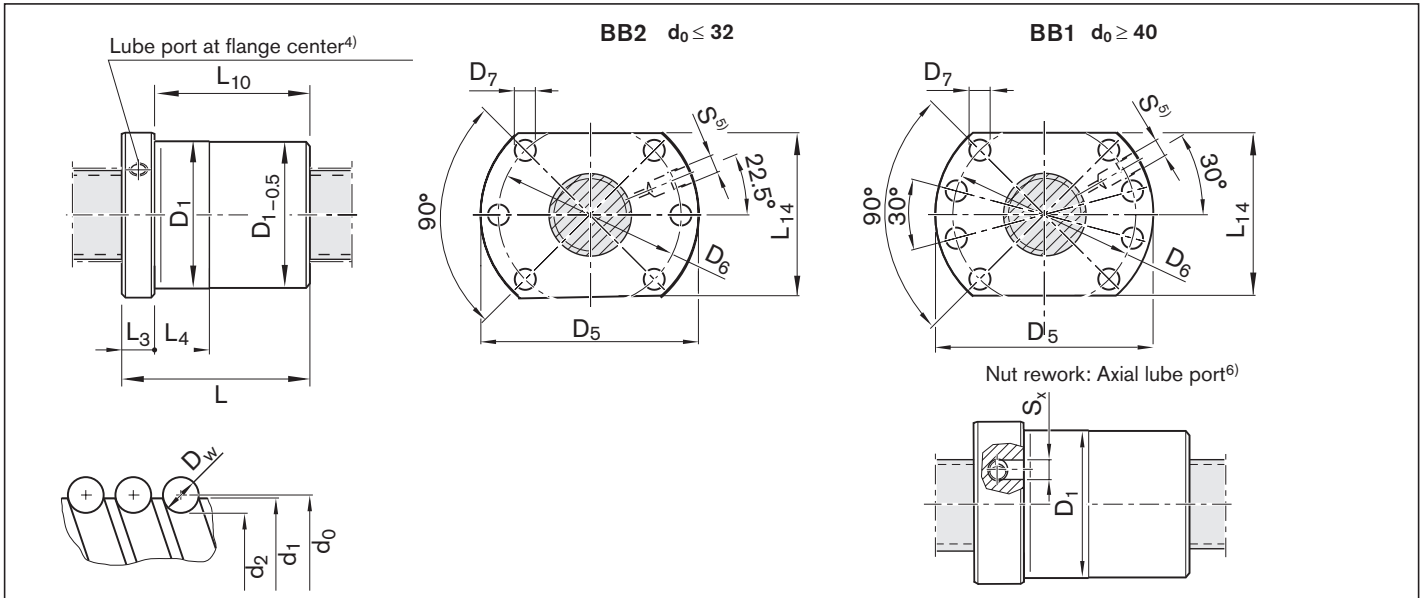
Ordering data:

| | | | | | | | | | | | | |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20 x 5R x 3 | FEM-E-B - 4 | 00 | 1 | 2 | T7 | R | 82Z120 | 41Z120 | 1250 | 0 | 1 |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|

d_0 = nominal diameter
 P = lead (R = right-hand, L = left-hand)
 D_w = ball diameter
 i = number of ball track turns

| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ³⁾ | | Linear speed ¹⁾ v_{max} (m/min) |
|-------------------------------------|---------------------------------------|--------------|----------------------------|-----------------------------|--|
| | | | dyn. C (N) | stat. C ₀ (N) | |
| A | 16 x 5R x 3 - 4 | R1502 010 63 | 14,800 | 16,100 | 30 |
| A | 16 x 10R x 3 - 3 | R1502 040 83 | 11,500 | 12,300 | 60 |
| A | 16 x 16R x 3 - 3 | R1502 060 63 | 11,200 | 12,000 | 96 |
| A | 20 x 5R x 3 - 4 | R1502 110 83 | 17,200 | 21,500 | 30 |
| A | 20 x 10R x 3 - 4 | R1502 140 63 | 16,900 | 21,300 | 60 |
| A | 20 x 20R x 3.5 - 3 | R1502 170 63 | 16,000 | 18,800 | 120 |
| A | 25 x 5R x 3 - 4 | R1502 210 83 | 19,100 | 27,200 | 30 |
| A | 25 x 10R x 3 - 4 | R1502 240 83 | 18,800 | 27,000 | 60 |
| A | 25 x 25R x 3.5 - 3 | R1502 280 63 | 17,600 | 23,300 | 150 |
| A | 32 x 5R x 3.5 - 4 | R1502 310 83 | 25,900 | 40,000 | 23 |
| A | 32 x 10R x 3.969 - 5 | R1502 340 84 | 38,000 | 58,300 | 47 |
| A | 32 x 20R x 3.969 - 3 | R1502 370 63 | 23,600 | 33,700 | 94 |
| A | 32 x 32R x 3.969 - 3 | R1502 390 63 | 23,400 | 34,000 | 150 |
| A | 40 x 5R x 3.5 - 5 | R1502 410 84 | 34,900 | 64,100 | 19 |
| A | 40 x 10R x 6 - 4 | R1502 440 83 | 60,000 | 86,400 | 38 |
| B | 40 x 10R x 6 - 6 | R1502 440 84 | 86,500 | 132,200 | 38 |
| C | 40 x 12R x 6 - 4 | R1502 450 63 | 59,900 | 86,200 | 45 |
| C | 40 x 16R x 6 - 4 | R1502 460 63 | 59,600 | 85,900 | 60 |
| A | 40 x 20R x 6 - 3 | R1502 470 83 | 45,500 | 62,800 | 75 |
| B | 40 x 25R x 6 - 4 | R1502 480 83 | 56,900 | 85,800 | 93 |
| B | 40 x 30R x 6 - 4 | R1502 4A0 83 | 56,300 | 85,100 | 112 |
| A | 40 x 40R x 6 - 3 | R1502 490 63 | 44,400 | 62,300 | 150 |
| B | 50 x 5R x 3.5 - 5 | R1502 510 84 | 38,400 | 81,300 | 15 |
| B | 50 x 10R x 6 - 6 | R1502 540 84 | 95,600 | 166,500 | 30 |
| C | 50 x 12R x 6 - 6 | R1502 550 64 | 95,500 | 166,400 | 36 |
| C | 50 x 16R x 6 - 6 | R1502 560 64 | 95,300 | 166,000 | 48 |
| B | 50 x 20R x 6.5 - 5 | R1502 570 84 | 90,800 | 149,700 | 60 |
| B | 50 x 25R x 6.5 - 4 | R1502 580 84 | 71 800 | 149 700 | 75 |
| B | 50 x 30R x 6.5 - 4 | R1502 5A0 83 | 71,300 | 118,800 | 90 |
| B | 50 x 40R x 6.5 - 3 | R1502 590 63 | 55,800 | 85,900 | 120 |
| B | 63 x 10R x 6 - 6 | R1502 640 84 | 106,600 | 214,300 | 24 |
| B | 63 x 20R x 6.5 - 5 | R1502 670 84 | 100,700 | 190,300 | 48 |
| B | 63 x 40R x 6.5 - 3 | R1502 690 63 | 64,100 | 114,100 | 95 |
| C | 80 x 10R x 6.5 - 6 | R1502 740 84 | 130,100 | 291,700 | 19 |
| C | 80 x 20R x 12.7 - 6 | R1502 770 94 | 315,200 | 534,200 | 30 |
| C | 80 x 40R x 12.7 - 4 | R1502 790 94 | 216,600 | 367,600 | 60 |
| Versions with left-hand lead | | | | | |
| B | 16 x 5L x 3 - 4 | R1552 010 63 | 14,800 | 16,100 | 30 |
| B | 20 x 5L x 3 - 4 | R1552 110 83 | 17,200 | 21,500 | 30 |
| B | 25 x 5L x 3 - 4 | R1552 210 83 | 19,100 | 27,200 | 30 |
| B | 32 x 5L x 3.5 - 4 | R1552 310 63 | 25,900 | 40,000 | 23 |
| B | 40 x 5L x 3.5 - 5 | R1552 410 64 | 34,900 | 64,100 | 19 |
| B | 40 x 10L x 6 - 4 | R1552 440 63 | 60,000 | 86,400 | 38 |

- See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed n_{cr} " on page 174
- Tolerance grade T3 for sizes shown in table page 12
- The load ratings are valid for tolerance grade T3 and T5 only.
For other tolerance grades, please take into account the correction factor f_{ac} on page 133.
- Lube port machining: flat surface $L_3 \leq 15$ mm, countersink $L_3 > 15$ mm;
- With left-hand lead the lube port position mirrors its position with right-hand lead!
- The axial lube port S_x is always located on the pitch circle D_6 of the nut unit.



| Size $d_0 \times P \times D_w - i$ | (mm) | | | | | | | | | | | | | | Mass | |
|---------------------------------------|-------|-------|-------------|-------|--------------|-------|-------|-----|-------|-------|----------|----------|--------|-------|-----------|--|
| | d_1 | d_2 | D_1 g6 | D_5 | Hole pattern | D_6 | D_7 | L | L_3 | L_4 | L_{10} | L_{14} | $S^4)$ | S_x | m (kg) | |
| 16 x 5R x 3 - 4 | 15 | 12.9 | 28 | 48 | BB2 | 38 | 5.5 | 38 | 12 | 10 | 26 | 40.0 | M6 | 4 | 0.19 | |
| 16 x 10R x 3 - 3 | 15 | 12.9 | 28 | 48 | BB2 | 38 | 5.5 | 45 | 12 | 16 | 33 | 40.0 | M6 | 4 | 0.21 | |
| 16 x 16R x 3 - 3 | 15 | 12.9 | 28 | 48 | BB2 | 38 | 5.5 | 61 | 12 | 20 | 49 | 40.0 | M6 | 4 | 0.26 | |
| 20 x 5R x 3 - 4 | 19 | 16.9 | 36 | 58 | BB2 | 47 | 6.6 | 40 | 12 | 10 | 28 | 44.0 | M6 | 4 | 0.31 | |
| 20 x 10R x 3 - 4 | 19 | 16.9 | 36 | 58 | BB2 | 47 | 6.6 | 60 | 12 | 16 | 48 | 44.0 | M6 | 4 | 0.40 | |
| 20 x 20R x 3.5 - 3 | 19 | 16.7 | 36 | 58 | BB2 | 47 | 6.6 | 77 | 12 | 25 | 65 | 44.0 | M6 | 4 | 0.49 | |
| 25 x 5R x 3 - 4 | 24 | 21.9 | 40 | 62 | BB2 | 51 | 6.6 | 45 | 12 | 10 | 33 | 48.0 | M6 | 4 | 0.36 | |
| 25 x 10R x 3 - 4 | 24 | 21.9 | 40 | 62 | BB2 | 51 | 6.6 | 64 | 12 | 16 | 52 | 48.0 | M6 | 4 | 0.47 | |
| 25 x 25R x 3.5 - 3 | 24 | 21.4 | 40 | 62 | BB2 | 51 | 6.6 | 95 | 12 | 30 | 83 | 48.0 | M6 | 4 | 0.63 | |
| 32 x 5R x 3.5 - 4 | 31 | 28.4 | 50 | 80 | BB2 | 65 | 9.0 | 48 | 13 | 10 | 35 | 62.0 | M6 | 4 | 0.62 | |
| 32 x 10R x 3.969 - 5 | 31 | 27.9 | 50 | 80 | BB2 | 65 | 9.0 | 77 | 13 | 16 | 64 | 62.0 | M6 | 4 | 0.84 | |
| 32 x 20R x 3.969 - 3 | 31 | 27.9 | 50 | 80 | BB2 | 65 | 9.0 | 84 | 13 | 25 | 71 | 62.0 | M6 | 4 | 0.90 | |
| 32 x 32R x 3.969 - 3 | 31 | 27.9 | 50 | 80 | BB2 | 65 | 9.0 | 120 | 13 | 40 | 107 | 62.0 | M6 | 4 | 1.21 | |
| 40 x 5R x 3.5 - 5 | 39 | 36.4 | 63 | 93 | BB1 | 78 | 9.0 | 54 | 15 | 10 | 39 | 70.0 | M8x1 | 5 | 1.03 | |
| 40 x 10R x 6 - 4 | 38 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 70 | 15 | 16 | 55 | 70.0 | M8x1 | 5 | 1.19 | |
| 40 x 10R x 6 - 6 | 38 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 90 | 15 | 16 | 75 | 70.0 | M8x1 | 5 | 1.49 | |
| 40 x 12R x 6 - 4 | 38 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 75 | 15 | 25 | 60 | 70.0 | M8x1 | 5 | 1.27 | |
| 40 x 16R x 6 - 4 | 38 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 90 | 15 | 25 | 75 | 70.0 | M8x1 | 5 | 1.51 | |
| 40 x 20R x 6 - 3 | 38 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 88 | 15 | 25 | 73 | 70.0 | M8x1 | 5 | 1.44 | |
| 40 x 25R x 6 - 4 | 38 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 127 | 15 | 30 | 112 | 70.0 | M8x1 | 5 | 1.91 | |
| 40 x 30R x 6 - 4 | 38 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 145 | 15 | 35 | 130 | 70.0 | M8x1 | 5 | 2.21 | |
| 40 x 40R x 6 - 4 | 38 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 142 | 15 | 45 | 127 | 70.0 | M8x1 | 5 | 2.16 | |
| 50 x 5R x 3.5 - 5 | 49 | 46.4 | 75 | 110 | BB1 | 93 | 11.0 | 54 | 15 | 10 | 39 | 85.0 | M8x1 | 5 | 1.39 | |
| 50 x 10R x 6 - 6 | 48 | 43.8 | 75 | 110 | BB1 | 93 | 11.0 | 90 | 18 | 16 | 72 | 85.0 | M8x1 | 5 | 2.14 | |
| 50 x 12R x 6 - 6 | 48 | 43.8 | 75 | 110 | BB1 | 93 | 11.0 | 105 | 18 | 25 | 87 | 85.0 | M8x1 | 5 | 2.38 | |
| 50 x 16R x 6 - 6 | 48 | 43.8 | 75 | 110 | BB1 | 93 | 11.0 | 128 | 18 | 25 | 110 | 85.0 | M8x1 | 5 | 2.75 | |
| 50 x 20R x 6.5 - 5 | 48 | 43.4 | 75 | 110 | BB1 | 93 | 11.0 | 132 | 18 | 25 | 114 | 85.0 | M8x1 | 5 | 2.73 | |
| 50 x 25R x 6.5 - 4 | 48 | 43.4 | 75 | 110 | BB1 | 93 | 11.0 | 132 | 18 | 25 | 114 | 85.0 | M8x1 | - | 2.78 | |
| 50 x 30R x 6.5 - 4 | 48 | 43.4 | 75 | 110 | BB1 | 93 | 11.0 | 151 | 18 | 35 | 133 | 85.0 | M8x1 | 5 | 3.12 | |
| 50 x 40R x 6.5 - 3 | 48 | 43.4 | 75 | 110 | BB1 | 93 | 11.0 | 149 | 18 | 45 | 131 | 85.0 | M8x1 | 5 | 3.04 | |
| 63 x 10R x 6 - 6 | 61 | 56.8 | 90 | 125 | BB1 | 108 | 11.0 | 90 | 22 | 16 | 68 | 95.0 | M8x1 | 5 | 2.56 | |
| 63 x 20R x 6.5 - 5 | 61 | 56.4 | 95 | 135 | BB1 | 115 | 13.5 | 132 | 22 | 25 | 110 | 100.0 | M8x1 | 5 | 4.51 | |
| 63 x 40R x 6.5 - 3 | 61 | 56.4 | 95 | 135 | BB1 | 115 | 13.5 | 149 | 22 | 45 | 127 | 100.0 | M8x1 | 5 | 5.04 | |
| 80 x 10R x 6.5 - 6 | 78 | 73.3 | 105 | 145 | BB1 | 125 | 13.5 | 95 | 22 | 16 | 73 | 110.0 | M8x1 | 5 | 3.40 | |
| 80 x 20R x 12.7 - 6 | 76 | 67.0 | 125 | 165 | BB1 | 145 | 13.5 | 170 | 25 | 25 | 145 | 130.0 | M8x1 | 5 | 10.20 | |
| 80 x 40R x 12.7 - 4 | 76 | 67.0 | 125 | 165 | BB1 | 145 | 13.5 | 206 | 25 | 25 | 181 | 130.0 | M8x1 | 5 | 11.60 | |
| Versions with left-hand lead | | | | | | | | | | | | | | | | |
| 16 x 5L x 3 - 4 | 15 | 12.9 | 28 | 48 | BB2 | 38 | 5.5 | 38 | 12 | 10 | 26 | 40.0 | M6 | 4 | 0.19 | |
| 20 x 5L x 3 - 4 | 19 | 16.9 | 36 | 58 | BB2 | 47 | 6.6 | 40 | 12 | 10 | 28 | 44.0 | M6 | 4 | 0.31 | |
| 25 x 5L x 3 - 4 | 24 | 21.9 | 40 | 62 | BB2 | 51 | 6.6 | 45 | 12 | 10 | 33 | 48.0 | M6 | 4 | 0.36 | |
| 32 x 5L x 3.5 - 4 | 31 | 28.4 | 50 | 80 | BB2 | 65 | 9.0 | 48 | 13 | 10 | 35 | 62.0 | M6 | 4 | 0.62 | |
| 40 x 5L x 3.5 - 5 | 39 | 36.4 | 63 | 93 | BB1 | 78 | 9.0 | 54 | 15 | 10 | 39 | 70.0 | M8x1 | 5 | 1.03 | |
| 40 x 10L x 6 - 4 | 38 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 70 | 15 | 16 | 55 | 70.0 | M8x1 | 5 | 1.19 | |

Adjustable-preload single nut SEM-E-S

Rexroth connection dimensions

With seals
Left-hand version in some cases
Preload adjustable
Tolerance grade T3², T5, T7

Note: The front lube unit is only available for the right-hand version.

⚠ When setting up applications, do not allow components to collide with the front lube unit.

d_0 = nominal diameter
 P = lead (R = right-hand, L = left-hand)
 D_w = ball diameter
 i = number of ball track turns



Ordering data:

| | | | | | | | | | | | | |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20 x 5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 82Z120 | 41Z120 | 1250 | 0 | 1 |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|

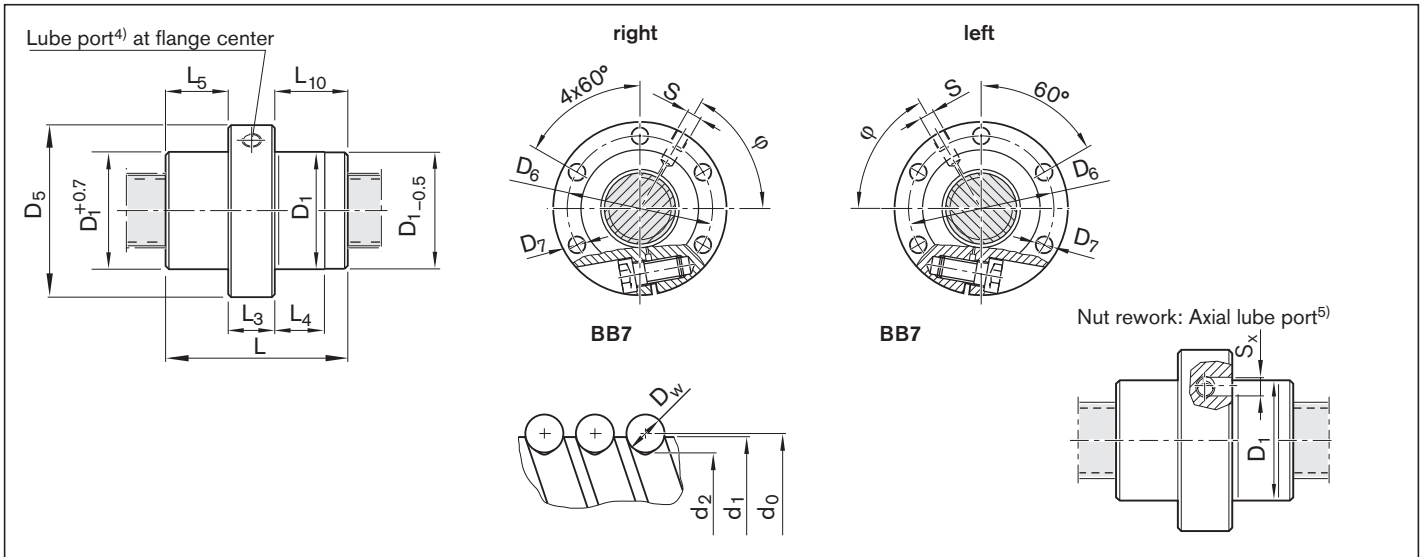
| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ³⁾ | | Linear speed ¹⁾ v_{max} (m/min) | Centering diameter D_1 after adjustment | |
|------------------------------|---------------------------------------|--------------|----------------------------|--------------------|--|---|-----------|
| | | | dyn. C (N) | stat. C_0 (N) | | min. (mm) | max. (mm) |
| B | 16 x 5R x 3 - 4 | R1512 010 24 | 14,800 | 16,100 | 30 | 27.940 | 27.975 |
| B | 16 x 10R x 3 - 3 | R1512 040 14 | 11,500 | 12,300 | 60 | 27.940 | 27.975 |
| B | 16 x 16R x 3 - 2 | R1512 060 14 | 7,560 | 7,600 | 96 | 32.945 | 32.973 |
| B | 20 x 5R x 3 - 4 | R1512 110 14 | 17,200 | 21,500 | 30 | 32.935 | 32.970 |
| B | 20 x 20R x 3.5 - 2 | R1512 170 14 | 10,900 | 12,100 | 120 | 37.945 | 37.973 |
| B | 25 x 5R x 3 - 4 | R1512 210 14 | 19,100 | 27,200 | 30 | 37.935 | 37.970 |
| B | 25 x 10R x 3 - 4 | R1512 240 14 | 18,800 | 27,000 | 60 | 37.935 | 37.970 |
| B | 25 x 25R x 3.5 - 2 | R1512 280 14 | 12,100 | 15,100 | 150 | 47.945 | 47.973 |
| B | 32 x 5R x 3.5 - 4 | R1512 310 14 | 25,900 | 40,000 | 23 | 47.935 | 47.970 |
| B | 32 x 10R x 3.969 - 5 | R1512 340 14 | 38,000 | 58,300 | 47 | 47.935 | 47.970 |
| B | 32 x 20R x 3.969 - 2 | R1512 370 14 | 16,200 | 21,800 | 94 | 55.941 | 55.969 |
| B | 32 x 32R x 3.969 - 2 | R1512 390 14 | 16,100 | 22,000 | 150 | 55.941 | 55.969 |
| B | 40 x 5R x 3.5 - 5 | R1512 410 14 | 34,900 | 64,100 | 19 | 55.931 | 55.966 |
| B | 40 x 10R x 6 - 4 | R1512 440 14 | 60,000 | 86,400 | 38 | 62.931 | 62.966 |
| B | 40 x 20R x 6 - 3 | R1512 470 14 | 45,500 | 62,800 | 75 | 62.941 | 62.969 |
| B | 40 x 40R x 6 - 2 | R1512 490 14 | 30,600 | 40,300 | 150 | 71.941 | 71.969 |
| B | 50 x 5R x 3.5 - 5 | R1512 510 14 | 38,400 | 81,300 | 15 | 67.931 | 67.966 |
| B | 50 x 10R x 6 - 6 | R1512 540 14 | 95,600 | 166,500 | 30 | 71.931 | 71.966 |
| B | 50 x 20R x 6.5 - 3 | R1512 570 14 | 57,500 | 87,900 | 60 | 84.936 | 84.964 |
| B | 50 x 40R x 6.5 - 2 | R1512 590 14 | 38,500 | 55,800 | 120 | 84.936 | 84.964 |
| B | 63 x 10R x 6 - 6 | R1512 640 14 | 106,600 | 214,300 | 24 | 84.926 | 84.961 |
| B | 63 x 20R x 6.5 - 3 | R1512 670 14 | 63,800 | 112,100 | 48 | 94.936 | 94.964 |
| B | 63 x 40R x 6.5 - 2 | R1512 690 14 | 44,300 | 74,300 | 95 | 94.936 | 94.964 |
| C | 80 x 10R x 6.5 - 6 | R1512 740 14 | 130,100 | 291,700 | 19 | 104.926 | 104.961 |
| C | 80 x 20R x 12.7 - 6 | R1512 770 24 | 315,200 | 534,200 | 30 | 124.931 | 124.959 |
| Versions with left-hand lead | | | | | | | |
| B | 16 x 5L x 3 - 4 | R1552 010 04 | 14,800 | 16,100 | 30 | 27.94 | 27.975 |
| B | 20 x 5L x 3 - 4 | R1552 110 14 | 17,200 | 21,500 | 30 | 32.935 | 32.970 |
| B | 25 x 5L x 3 - 4 | R1552 210 14 | 19,100 | 27,200 | 30 | 37.935 | 37.970 |
| B | 32 x 5L x 3.5 - 4 | R1552 310 04 | 25,900 | 40,000 | 23 | 47.935 | 47.970 |
| B | 40 x 5L x 3.5 - 5 | R1552 410 04 | 34,900 | 64,100 | 19 | 55.931 | 55.966 |
| B | 40 x 10L x 6 - 4 | R1552 440 04 | 60,000 | 86,400 | 38 | 62.931 | 62.966 |

1) See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed n_{cr} " on page 174

2) Tolerance grade T3 for sizes shown in table page 12

3) The load ratings are valid for tolerance grade T3 and T5 only.

For other tolerance grades, please take into account the correction factor f_{ac} on page 133.



- 4) Lube port machining: flat surface $L_3 \leq 15$ mm, countersink $L_3 > 15$ mm. For size 8 x 2.5, a funnel-type lube nipple DIN 3405 is provided.
5) The axial lube port S_x is always located on the pitch circle D_6 of the nut unit.

| Size | (mm) | | | | | | | | | | | | | | | Mass |
|-------------------------------------|-------|-------|-------|-------|--------------|-------|-------|-----|-------|-------|-------|----------|-------|-------|-----------|------|
| | d_1 | d_2 | D_1 | D_5 | Hole pattern | D_6 | D_7 | L | L_3 | L_4 | L_5 | L_{10} | S^4 | S_x | φ | |
| $d_0 \times P \times D_w - i$ | | | f9 | | | | | | | | | | | | (°) | (kg) |
| 16 x 5R x 3 - 4 | 15.0 | 12.9 | 28 | 53 | BB7 | 40 | 6.6 | 38 | 15 | 10.0 | 11.5 | 11.5 | M6 | 4 | 53 | 0.24 |
| 16 x 10R x 3 - 3 | 15.0 | 12.9 | 28 | 53 | BB7 | 40 | 6.6 | 45 | 15 | 15.0 | 15.0 | 15.0 | M6 | 4 | 180 | 0.25 |
| 16 x 16R x 3 - 2 | 15.0 | 12.9 | 33 | 58 | BB7 | 45 | 6.6 | 45 | 15 | 15.0 | 15.0 | 15.0 | M6 | 4 | 50 | 0.42 |
| 20 x 5R x 3 - 4 | 19.0 | 16.9 | 33 | 58 | BB7 | 45 | 6.6 | 40 | 15 | 10.0 | 12.5 | 12.5 | M6 | 4 | 56 | 0.31 |
| 20 x 20R x 3.5 - 2 | 19.0 | 16.7 | 38 | 63 | BB7 | 50 | 6.6 | 57 | 20 | 18.5 | 18.5 | 18.5 | M6 | 4 | 60 | 0.63 |
| 25 x 5R x 3 - 4 | 24.0 | 21.9 | 38 | 63 | BB7 | 50 | 6.6 | 45 | 20 | 10.0 | 12.5 | 12.5 | M6 | 4 | 60 | 0.44 |
| 25 x 10R x 3 - 4 | 24.0 | 21.9 | 38 | 63 | BB7 | 50 | 6.6 | 64 | 20 | 16.0 | 22.0 | 22.0 | M6 | 4 | 60 | 0.53 |
| 25 x 25R x 3.5 - 2 | 24.0 | 21.4 | 48 | 73 | BB7 | 60 | 6.6 | 70 | 25 | 22.5 | 22.5 | 22.5 | M6 | 4 | 48 | 1.13 |
| 32 x 5R x 3.5 - 4 | 31.0 | 28.4 | 48 | 73 | BB7 | 60 | 6.6 | 48 | 20 | 10.0 | 14.0 | 14.0 | M6 | 4 | 60 | 0.64 |
| 32 x 10R x 3.969 - 5 | 31.0 | 27.9 | 48 | 73 | BB7 | 60 | 6.6 | 77 | 20 | 16.0 | 28.5 | 28.5 | M6 | 4 | 168 | 0.87 |
| 32 x 20R x 3.969 - 2 | 31.0 | 27.9 | 56 | 80 | BB7 | 68 | 6.6 | 64 | 20 | 22.0 | 22.0 | 22.0 | M6 | 4 | 60 | 1.14 |
| 32 x 32R x 3.969 - 2 | 31.0 | 27.9 | 56 | 80 | BB7 | 68 | 6.6 | 88 | 20 | 34.0 | 34.0 | 34.0 | M6 | 4 | 60 | 1.44 |
| 40 x 5R x 3.5 - 5 | 39.0 | 36.4 | 56 | 80 | BB7 | 68 | 6.6 | 54 | 20 | 10.0 | 17.0 | 17.0 | M8x1 | 5 | 65 | 0.87 |
| 40 x 10R x 6 - 4 | 38.0 | 33.8 | 63 | 95 | BB7 | 78 | 9.0 | 70 | 25 | 16.0 | 22.5 | 22.5 | M8x1 | 5 | 57 | 1.53 |
| 40 x 20R x 6 - 3 | 38.0 | 33.8 | 63 | 95 | BB7 | 78 | 9.0 | 88 | 25 | 25.0 | 31.5 | 31.5 | M8x1 | 5 | 180 | 1.77 |
| 40 x 40R x 6 - 2 | 38.0 | 33.8 | 72 | 110 | BB7 | 90 | 11.0 | 102 | 40 | 31.0 | 31.0 | 31.0 | M8x1 | 5 | 49 | 3.77 |
| 50 x 5R x 3.5 - 5 | 49.0 | 46.4 | 68 | 98 | BB7 | 82 | 9.0 | 54 | 25 | 10.0 | 14.5 | 14.5 | M8x1 | 5 | 67 | 1.23 |
| 50 x 10R x 6 - 6 | 48.0 | 43.8 | 72 | 110 | BB7 | 90 | 11.0 | 90 | 30 | 16.0 | 30.0 | 30.0 | M8x1 | 5 | 61 | 2.44 |
| 50 x 20R x 6.5 - 3 | 48.0 | 43.3 | 85 | 125 | BB7 | 105 | 11.0 | 92 | 30 | 25.0 | 31.0 | 31.0 | M8x1 | 5 | 180 | 3.94 |
| 50 x 40R x 6.5 - 2 | 48.0 | 43.3 | 85 | 125 | BB7 | 105 | 11.0 | 109 | 30 | 39.5 | 39.5 | 39.5 | M8x1 | 5 | 60 | 4.42 |
| 63 x 10R x 6 - 6 | 61.0 | 56.8 | 85 | 125 | BB7 | 105 | 11.0 | 90 | 30 | 16.0 | 30.0 | 30.0 | M8x1 | 5 | 65 | 2.94 |
| 63 x 20R x 6.5 - 3 | 61.0 | 56.3 | 95 | 140 | BB7 | 118 | 14.0 | 92 | 30 | 25.0 | 31.0 | 31.0 | M8x1 | 5 | 190 | 4.45 |
| 63 x 40R x 6.5 - 2 | 61.0 | 56.3 | 95 | 140 | BB7 | 118 | 14.0 | 109 | 30 | 39.5 | 39.5 | 39.5 | M8x1 | 5 | 70 | 4.95 |
| 80 x 10R x 6.5 - 6 | 78.0 | 73.3 | 105 | 150 | BB7 | 125 | 14.0 | 95 | 30 | 16.0 | 32.5 | 32.5 | M8x1 | 5 | 67 | 4.20 |
| 80 x 20R x 12.7 - 6 | 76.0 | 67.0 | 125 | 180 | BB7 | 152 | 18.0 | 170 | 50 | 25.0 | 60.0 | 60.0 | M8x1 | 5 | 60 | 13.3 |
| Versions with left-hand lead | | | | | | | | | | | | | | | | |
| 16 x 5L x 3 - 4 | 15.0 | 12.9 | 28 | 53 | BB7 | 40 | 6.6 | 38 | 15 | 10.0 | 11.5 | 11.5 | M6 | 4 | 53 | 0.24 |
| 20 x 5L x 3 - 4 | 19.0 | 16.9 | 33 | 58 | BB7 | 45 | 6.6 | 40 | 15 | 10.0 | 12.5 | 12.5 | M6 | 4 | 56 | 0.31 |
| 25 x 5L x 3 - 4 | 24.0 | 21.9 | 38 | 63 | BB7 | 50 | 6.6 | 45 | 20 | 10.0 | 12.5 | 12.5 | M6 | 4 | 60 | 0.44 |
| 32 x 5L x 3.5 - 4 | 31.0 | 28.4 | 48 | 73 | BB7 | 60 | 6.6 | 48 | 20 | 10.0 | 14.0 | 14.0 | M6 | 4 | 59 | 0.64 |
| 40 x 5L x 3.5 - 5 | 39.0 | 36.4 | 56 | 80 | BB7 | 68 | 6.6 | 54 | 20 | 10.0 | 17.0 | 17.0 | M8x1 | 5 | 65 | 0.87 |
| 40 x 10L x 6 - 4 | 38.0 | 33.8 | 63 | 95 | BB7 | 78 | 9.0 | 70 | 25 | 16.0 | 22.5 | 22.5 | M8x1 | 5 | 57 | 1.53 |

Adjustable-preload single nut SEM-E-C

Mounting dimensions similar to
DIN 69051, Part 5
flange type C

With seals Adjustable preload
Tolerance grade T3², T5, T7

⚠ When setting up applications, do not
allow components to collide with the
front lube unit.

d_0 = nominal diameter
P = lead (R = right-hand)
 D_w = ball diameter
i = number of ball track turns



Ordering data:

| | | | | | | | | | | | | |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20 x 5R x 3 | SEM-E-C - 4 | 00 | 1 | 2 | T7 | R | 82Z120 | 41Z120 | 1250 | 0 | 1 |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|

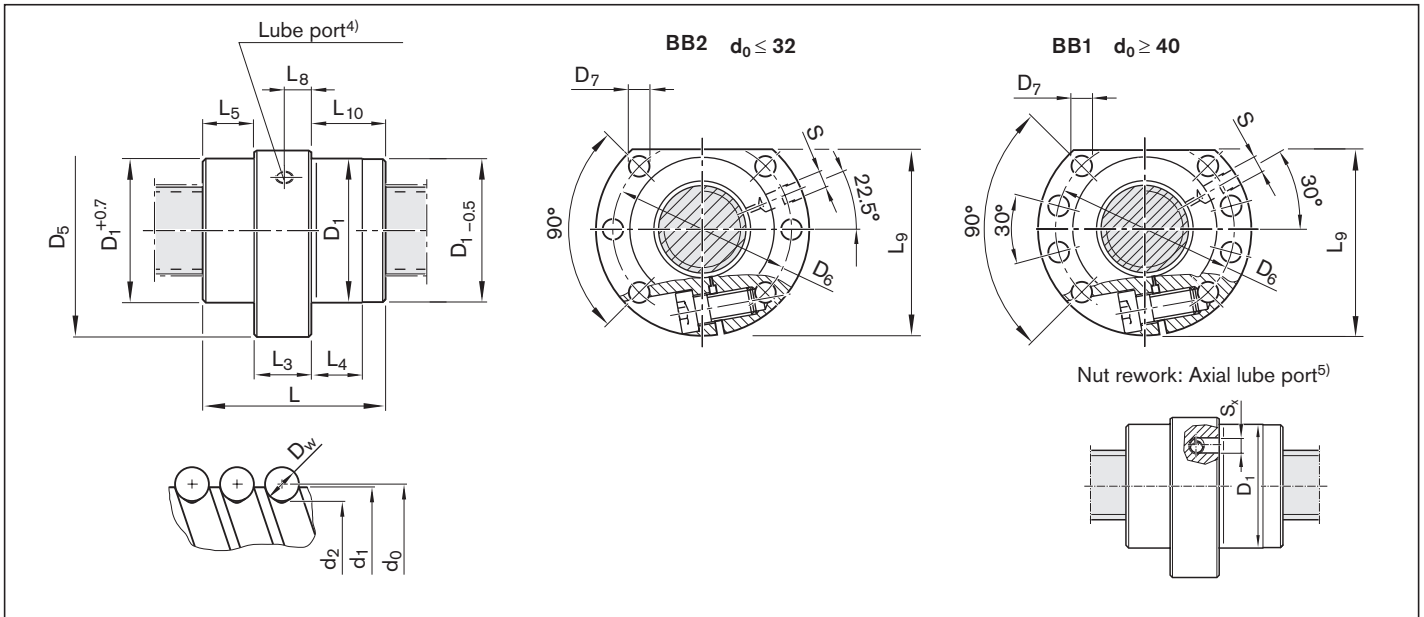
| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ³⁾ | | Linear speed ¹⁾ v_{max} (m/min) | Centering diameter D_1 after adjustment | |
|----------|---------------------------------------|--------------|----------------------------|--------------------|--|--|-----------|
| | | | dyn. C (N) | stat. C_0 (N) | | min. (mm) | max. (mm) |
| B | 16 x 5R x 3 - 4 | R1512 010 55 | 14,800 | 16,100 | 30 | 27.940 | 27.975 |
| B | 16 x 10R x 3 - 3 | R1512 040 75 | 11,500 | 12,300 | 60 | 27.940 | 27.975 |
| B | 16 x 16R x 3 - 3 | R1512 060 55 | 11,200 | 12,000 | 96 | 27.950 | 27.978 |
| B | 20 x 5R x 3 - 4 | R1512 110 75 | 17,200 | 21,500 | 30 | 35.935 | 35.970 |
| B | 20 x 20R x 3.5 - 3 | R1512 170 55 | 16,000 | 18,800 | 120 | 35.945 | 35.973 |
| B | 25 x 5R x 3 - 4 | R1512 210 75 | 19,100 | 27,200 | 30 | 39.935 | 39.970 |
| B | 25 x 10R x 3 - 4 | R1512 240 75 | 18,800 | 27,000 | 60 | 39.935 | 39.970 |
| B | 25 x 25R x 3.5 - 3 | R1512 280 55 | 17,600 | 23,300 | 150 | 39.945 | 39.973 |
| B | 32 x 5R x 3.5 - 4 | R1512 310 75 | 25,900 | 40,000 | 23 | 49.935 | 49.970 |
| B | 32 x 10R x 3.969 - 5 | R1512 340 75 | 38,000 | 58,300 | 47 | 49.935 | 49.970 |
| B | 32 x 20R x 3.969 - 3 | R1512 370 55 | 23,600 | 33,700 | 94 | 49.945 | 49.973 |
| B | 32 x 32R x 3.969 - 3 | R1512 390 55 | 23,400 | 34,000 | 150 | 49.945 | 49.973 |
| B | 40 x 5R x 3.5 - 5 | R1512 410 75 | 34,900 | 64,100 | 19 | 62.931 | 62.966 |
| B | 40 x 10R x 6 - 4 | R1512 440 75 | 60,000 | 86,400 | 38 | 62.931 | 62.966 |
| C | 40 x 12R x 6 - 4 | R1512 450 55 | 59,900 | 86,200 | 45 | 62.931 | 62.966 |
| B | 40 x 20R x 6 - 3 | R1512 470 75 | 45,500 | 62,800 | 75 | 62.941 | 62.969 |
| B | 40 x 40R x 6 - 3 | R1512 490 55 | 44,400 | 62,300 | 150 | 62.941 | 62.969 |
| B | 50 x 5R x 3.5 - 5 | R1512 510 75 | 38,400 | 81,300 | 15 | 74.931 | 74.966 |
| B | 50 x 10R x 6 - 6 | R1512 540 75 | 95,600 | 166,500 | 30 | 74.931 | 74.966 |
| C | 50 x 12R x 6 - 6 | R1512 550 55 | 95,500 | 166,400 | 36 | 74.931 | 74.966 |
| B | 50 x 20R x 6.5 - 5 | R1512 570 76 | 90,800 | 149,700 | 60 | 74.941 | 74.969 |
| B | 50 x 40R x 6.5 - 3 | R1512 590 55 | 55,800 | 85,900 | 120 | 74.941 | 74.969 |
| B | 63 x 10R x 6 - 6 | R1512 640 75 | 106,600 | 214,300 | 24 | 89.926 | 89.961 |
| B | 63 x 20R x 6.5 - 5 | R1512 670 76 | 100,700 | 190,300 | 48 | 94.936 | 94.964 |
| B | 63 x 40R x 6.5 - 3 | R1512 690 55 | 64,100 | 114,100 | 95 | 94.936 | 94.964 |
| C | 80 x 10R x 6.5 - 6 | R1512 740 75 | 130,100 | 291,700 | 19 | 104.926 | 104.961 |
| C | 80 x 20R x 12.7 - 6 | R1512 770 56 | 315,200 | 534,200 | 30 | 124.931 | 124.959 |

1) See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed n_{cr} " on page 174

2) Tolerance grade T3 for sizes shown in table page 12

3) The load ratings are valid for tolerance grade T3 and T5 only.

For other tolerance grades, please take into account the correction factor f_{ac} on page 133.



- 4) Lube port machining: flat surface $L_3 \leq 15$ mm, countersink $L_3 > 15$ mm
 5) The axial lube port S_x is always located on the pitch circle D_6 of the nut unit.

| Size $d_0 \times P \times D_w - i$ | (mm) | | | | | | | | | | | | | | | Mass m (kg) | |
|---------------------------------------|-------|-------|-------------|-------|--------------|-------|-------|-----|-------|-------|-------|-------|-------|----------|--------|-------------------|-------|
| | d_1 | d_2 | D_1 f9 | D_5 | Hole pattern | D_6 | D_7 | L | L_3 | L_4 | L_5 | L_8 | L_9 | L_{10} | $S^4)$ | | S_x |
| 16 x 5R x 3 - 4 | 15.0 | 12.9 | 28 | 48 | BB2 | 38 | 5.5 | 38 | 15 | 10 | 11.5 | 7.1 | 44.0 | 11.5 | M6 | 4 | 0.20 |
| 16 x 10R x 3 - 3 | 15.0 | 12.9 | 28 | 48 | BB2 | 38 | 5.5 | 45 | 15 | 15 | 15.0 | 11.0 | 44.0 | 15.0 | M6 | 4 | 0.22 |
| 16 x 16R x 3 - 3 | 15.0 | 12.9 | 28 | 48 | BB2 | 38 | 5.5 | 61 | 15 | 20 | 23.0 | 10.0 | 44.0 | 23.0 | M6 | 4 | 0.29 |
| 20 x 5R x 3 - 4 | 19.0 | 16.9 | 36 | 58 | BB2 | 47 | 6.6 | 40 | 15 | 10 | 12.5 | 7.1 | 51.0 | 12.5 | M6 | 4 | 0.33 |
| 20 x 20R x 3.5 - 3 | 19.0 | 16.7 | 36 | 58 | BB2 | 47 | 6.6 | 77 | 20 | 25 | 28.5 | 12.5 | 51.0 | 28.5 | M6 | 4 | 0.56 |
| 25 x 5R x 3 - 4 | 24.0 | 21.9 | 40 | 62 | BB2 | 51 | 6.6 | 45 | 20 | 10 | 12.5 | 9.5 | 55.0 | 12.5 | M6 | 4 | 0.43 |
| 25 x 10R x 3 - 4 | 24.0 | 21.9 | 40 | 62 | BB2 | 51 | 6.6 | 64 | 20 | 16 | 22.0 | 10.0 | 55.0 | 22.0 | M6 | 4 | 0.54 |
| 25 x 25R x 3.5 - 3 | 24.0 | 21.4 | 40 | 62 | BB2 | 51 | 6.6 | 95 | 25 | 30 | 35.0 | 14.0 | 55.0 | 35.0 | M6 | 4 | 0.77 |
| 32 x 5R x 3.5 - 4 | 31.0 | 28.4 | 50 | 80 | BB2 | 65 | 9.0 | 48 | 20 | 10 | 14.0 | 9.7 | 71.0 | 14.0 | M6 | 4 | 0.74 |
| 32 x 10R x 3.969 - 5 | 31.0 | 27.9 | 50 | 80 | BB2 | 65 | 9.0 | 77 | 20 | 16 | 28.5 | 12.5 | 71.0 | 28.5 | M6 | 4 | 0.97 |
| 32 x 20R x 3.969 - 3 | 31.0 | 27.9 | 50 | 80 | BB2 | 65 | 9.0 | 84 | 20 | 25 | 32.0 | 12.5 | 71.0 | 32.0 | M6 | 4 | 1.04 |
| 32 x 32R x 3.969 - 3 | 31.0 | 27.9 | 50 | 80 | BB2 | 65 | 9.0 | 120 | 20 | 40 | 50.0 | 12.5 | 71.0 | 50.0 | M6 | 4 | 1.34 |
| 40 x 5R x 3.5 - 5 | 39.0 | 36.4 | 63 | 93 | BB1 | 78 | 9.0 | 54 | 25 | 10 | 14.5 | 12.0 | 81.5 | 14.5 | M8x1 | 5 | 1.25 |
| 40 x 10R x 6 - 4 | 38.0 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 70 | 25 | 16 | 22.5 | 11.8 | 81.5 | 22.5 | M8x1 | 5 | 1.39 |
| 40 x 12R x 6 - 4 | 38.0 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 75 | 25 | 25 | 25.0 | 12.5 | 81.5 | 25.0 | M8x1 | 5 | 1.47 |
| 40 x 20R x 6 - 3 | 38.0 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 88 | 25 | 25 | 31.5 | 16.5 | 81.5 | 31.5 | M8x1 | 5 | 1.55 |
| 40 x 40R x 6 - 3 | 38.0 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 142 | 40 | 45 | 51.0 | 25.0 | 81.5 | 51.0 | M8x1 | 5 | 2.69 |
| 50 x 5R x 3.5 - 5 | 49.0 | 46.4 | 75 | 110 | BB1 | 93 | 11.0 | 54 | 25 | 10 | 14.5 | 12.0 | 97.5 | 14.5 | M8x1 | 5 | 1.67 |
| 50 x 10R x 6 - 6 | 48.0 | 43.8 | 75 | 110 | BB1 | 93 | 11.0 | 90 | 30 | 16 | 30.0 | 14.1 | 97.5 | 30.0 | M8x1 | 5 | 2.46 |
| 50 x 12R x 6 - 6 | 48.0 | 43.8 | 75 | 110 | BB1 | 93 | 11.0 | 105 | 30 | 25 | 37.5 | 15.0 | 97.5 | 37.5 | M8x1 | 5 | 2.69 |
| 50 x 20R x 6.5 - 5 | 48.0 | 43.4 | 75 | 110 | BB1 | 93 | 11.0 | 132 | 30 | 25 | 51.0 | 20.0 | 97.5 | 51.0 | M8x1 | 5 | 3.08 |
| 50 x 40R x 6.5 - 3 | 48.0 | 43.4 | 75 | 110 | BB1 | 93 | 11.0 | 149 | 30 | 45 | 59.5 | 18.0 | 97.5 | 59.5 | M8x1 | 5 | 3.39 |
| 63 x 10R x 6 - 6 | 61.0 | 56.8 | 90 | 125 | BB1 | 108 | 11.0 | 90 | 30 | 16 | 30.0 | 14.0 | 110.0 | 30.0 | M8x1 | 5 | 2.83 |
| 63 x 20R x 6.5 - 5 | 61.0 | 56.4 | 95 | 135 | BB1 | 115 | 13.5 | 132 | 30 | 25 | 51.0 | 20.0 | 117.5 | 51.0 | M8x1 | 5 | 4.86 |
| 63 x 40R x 6.5 - 3 | 61.0 | 56.4 | 95 | 135 | BB1 | 115 | 13.5 | 149 | 30 | 45 | 59.5 | 18.0 | 117.5 | 59.5 | M8x1 | 5 | 5.36 |
| 80 x 10R x 6.5 - 6 | 78.0 | 73.3 | 105 | 145 | BB1 | 125 | 13.5 | 95 | 30 | 16 | 32.5 | 14.0 | 127.5 | 32.5 | M8x1 | 5 | 3.73 |
| 80 x 20R x 12.7 - 6 | 76.0 | 67.0 | 125 | 165 | BB1 | 145 | 13.5 | 170 | 50 | 25 | 60.0 | 24.0 | 147.5 | 60.0 | M8x1 | 5 | 13.50 |

Cylindrical single nut ZEM-E-S / ZEM-E-K¹⁾ / ZEM-E-A²⁾

Rexroth connection dimensions

With seals Left-hand version in some cases

Preload class: C0, C00, C1, C2, C3

Tolerance grade T3⁴⁾, T5, T7, T9



Ordering data:

| | | | | | | | | | | | | |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20 x 5R x 3 | ZEM-E-S - 5 | 00 | 1 | 2 | T7 | R | 82Z120 | 41Z120 | 1250 | 0 | 1 |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|

d_0 = nominal diameter

P = lead (R = right-hand, L = left-hand)

D_w = ball diameter

i = number of ball track turns

| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ⁵⁾ | | Linear speed ³⁾ | |
|-------------------------------------|---------------------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|-----|
| | | | dyn. C (N) | stat. C ₀ (N) | v_{max} (m/min) | |
| B | 16 x 5R x 3 - 4 | R1512 010 22 | 14,800 | 16,100 | | 30 |
| B | 16 x 5R x 3 - 4 | R1512 012 67 ¹⁾ | 14,800 | 16,100 | | 30 |
| B | 16 x 10R x 3 - 3 | R1512 040 12 | 11,500 | 12,300 | | 60 |
| B | 16 x 10R x 3 - 3 | R1512 042 08 ¹⁾ | 11,500 | 12,300 | | 60 |
| B | 16 x 10R x 3 - 3 | R1512 042 09 ¹⁾ | 11,500 | 12,300 | | 60 |
| B | 16 x 16R x 3 - 2 | R1512 060 12 | 7,560 | 7,600 | | 96 |
| B | 16 x 16R x 3 - 2 | R1512 062 10 ¹⁾ | 7,560 | 7,600 | | 96 |
| B | 16 x 16R x 3 - 3 | R1512 060 52 | 11,200 | 12,300 | | 96 |
| B | 16 x 16R x 3 - 3 | R1512 062 11 ¹⁾ | 11,200 | 12,300 | | 96 |
| B | 20 x 5R x 3 - 4 | R1512 112 43 ¹⁾ | 17,200 | 21,500 | | 30 |
| B | 20 x 5R x 3 - 5 | R1512 110 12 | 21,000 | 27,300 | | 30 |
| B | 20 x 10R x 3 - 4 | R1512 140 12 | 16,900 | 21,300 | | 60 |
| B | 20 x 20R x 3.5 - 2 | R1512 170 12 | 10,900 | 12,100 | | 120 |
| B | 20 x 20R x 3.5 - 3 | R1512 170 52 | 16,000 | 18,800 | | 120 |
| B | 20 x 20R x 3.5 - 3 | R1512 172 07 ¹⁾ | 16,000 | 18,800 | | 120 |
| B | 25 x 5R x 3 - 4 | R1512 210 12 | 19,100 | 27,200 | | 30 |
| B | 25 x 10R x 3 - 4 | R1512 240 12 | 18,800 | 27,000 | | 60 |
| B | 25 x 25R x 3.5 - 2 | R1512 280 12 | 12,100 | 15,100 | | 150 |
| B | 25 x 25R x 3.5 - 3 | R1512 280 52 | 17,600 | 23,300 | | 150 |
| B | 32 x 5R x 3.5 - 4 | R1512 310 12 | 25,900 | 40,000 | | 23 |
| B | 32 x 5R x 3.5 - 4 | R1512 310 52 ²⁾ | 25,900 | 40,000 | | 23 |
| B | 32 x 10R x 3.969 - 5 | R1512 340 12 | 38,000 | 58,300 | | 47 |
| B | 32 x 10R x 3.969 - 5 | R1512 340 52 ²⁾ | 38,000 | 58,300 | | 47 |
| B | 32 x 20R x 3.969 - 2 | R1512 370 12 | 16,200 | 21,800 | | 94 |
| B | 32 x 20R x 3.969 - 3 | R1512 370 52 | 23,600 | 33,700 | | 94 |
| B | 32 x 32R x 3.969 - 2 | R1512 390 12 | 16,100 | 22,000 | | 150 |
| B | 32 x 32R x 3.969 - 3 | R1512 390 52 | 23,400 | 34,000 | | 150 |
| B | 40 x 5R x 3.5 - 5 | R1512 410 12 | 34,900 | 64,100 | | 19 |
| B | 40 x 5R x 3.5 - 5 | R1512 412 21 ¹⁾ | 34,900 | 64,100 | | 19 |
| B | 40 x 10R x 6 - 4 | R1512 440 12 | 60,000 | 86,400 | | 38 |
| B | 40 x 10R x 6 - 6 | R1512 440 22 | 86,500 | 132,200 | | 38 |
| B | 40 x 20R x 6 - 3 | R1512 470 12 | 45,500 | 62,800 | | 75 |
| B | 40 x 40R x 6 - 2 | R1512 490 12 | 30,600 | 40,300 | | 150 |
| B | 40 x 40R x 6 - 3 | R1512 490 52 | 44,400 | 62,300 | | 150 |
| B | 50 x 5R x 3.5 - 5 | R1512 510 12 | 38,400 | 81,300 | | 15 |
| B | 50 x 10R x 6 - 6 | R1512 540 12 | 95,600 | 166,500 | | 30 |
| B | 50 x 20R x 6.5 - 3 | R1512 570 12 | 57,500 | 87,900 | | 60 |
| B | 63 x 10R x 6 - 6 | R1512 640 12 | 106,600 | 214,300 | | 24 |
| C | 80 x 10R x 6.5 - 6 | R1512 740 12 | 130,100 | 291,700 | | 19 |
| Versions with left-hand lead | | | | | | |
| B | 16 x 5L x 3 - 4 | R1552 010 02 | 14,800 | 16,100 | | 30 |
| B | 20 x 5L x 3 - 5 | R1552 110 12 | 21,000 | 27,300 | | 30 |
| B | 20 x 5L x 3 - 4 | R1552 112 04 ¹⁾ | 17,200 | 21,500 | | 30 |
| B | 25 x 5L x 3 - 4 | R1552 210 12 | 19,100 | 27,200 | | 30 |
| B | 32 x 5L x 3.5 - 4 | R1552 310 02 | 25,900 | 40,000 | | 23 |
| B | 40 x 5L x 3.5 - 5 | R1552 410 02 | 34,900 | 64,100 | | 19 |
| B | 40 x 10L x 6 - 4 | R1552 440 02 | 60,000 | 86,400 | | 38 |

1) ZEM-E-K / nuts for Rexroth modules and drive units

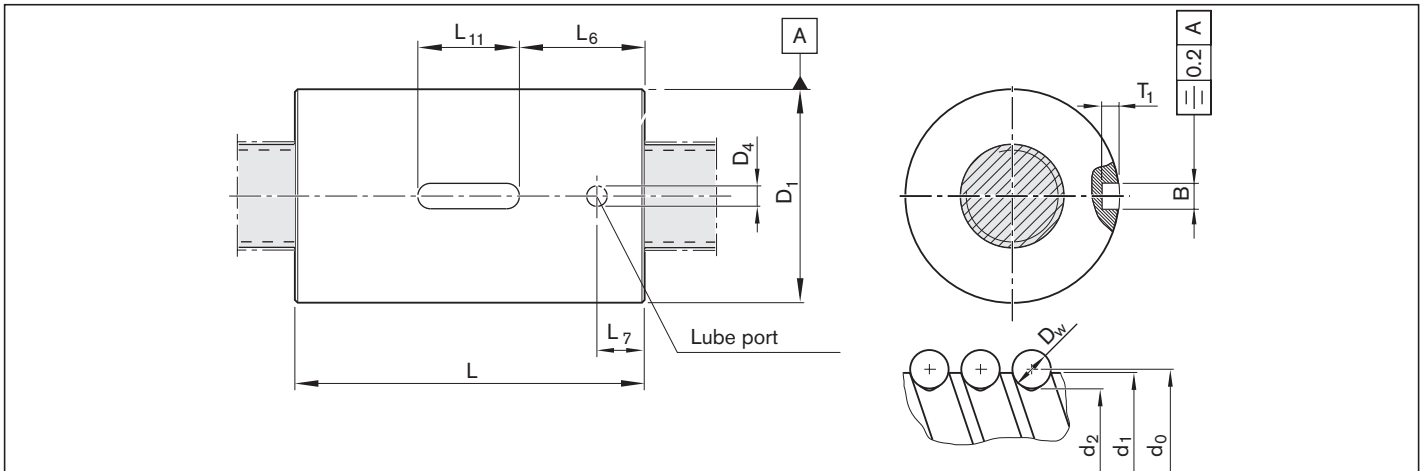
2) ZEM-E-A / nuts with mounting dimensions as per DIN 69051, Part 5

3) See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed n_{cr} " on page 174

4) Tolerance grade T3 for sizes shown in table page 12

5) The load ratings are valid for tolerance grade T3 and T5 only.

For other tolerance grades, please take into account the correction factor f_{ac} on page 133.



| Size d ₀ x P x D _w - i | (mm) | | | | | | | | | | | Mass m (kg) |
|---|----------------|----------------|----------------------|----------------|-----------|----------------|----------------|-------------------------|---------|------------------------|------|-------------------|
| | d ₁ | d ₂ | D ₁ g6 | D ₄ | L ±0.1 | L ₆ | L ₇ | L ₁₁ +0.2 | B P9 | T ₁ +0.1 | | |
| 16 x 5R x 3 - 4 | 15.0 | 12.9 | 28 | 4 | 35 | 14.5 | 9.5 | 12 | 5 | 3.0 | 0.09 | |
| 16 x 5R x 3 - 4 | 15.0 | 12.9 | 33 | 2 | 45 | 14.5 | 9.5 | 16 | 5 | 3.0 | 0.17 | |
| 16 x 10R x 3 - 3 | 15.0 | 12.9 | 28 | 4 | 45 | 14.5 | 9.5 | 16 | 5 | 3.0 | 0.12 | |
| 16 x 10R x 3 - 3 | 15.0 | 12.9 | 38 | 4 | 54 | 19.0 | 9.5 | 16 | 5 | 3.0 | 0.35 | |
| 16 x 10R x 3 - 3 | 15.0 | 12.9 | 33 | 4 | 45 | 14.5 | 9.5 | 16 | 5 | 3.0 | 0.20 | |
| 16 x 16R x 3 - 2 | 15.0 | 12.9 | 33 | 4 | 45 | 14.5 | 9.5 | 16 | 5 | 3.0 | 0.20 | |
| 16 x 16R x 3 - 2 | 15.0 | 12.9 | 28 | 4 | 45 | 14.5 | 9.5 | 16 | 5 | 3.0 | 0.12 | |
| 16 x 16R x 3 - 3 | 15.0 | 12.9 | 28 | 4 | 61 | 22.5 | 9.5 | 16 | 5 | 3.0 | 0.16 | |
| 16 x 16R x 3 - 3 | 15.0 | 12.9 | 38 | 4 | 61 | 22.5 | 9.5 | 16 | 5 | 3.0 | 0.42 | |
| 20 x 5R x 3 - 4 | 19.0 | 16.9 | 38 | 4 | 40 | 21.0 | 9.5 | 12 | 5 | 3.0 | 0.21 | |
| 20 x 5R x 3 - 5 | 19.0 | 16.9 | 33 | 4 | 45 | 14.5 | 9.5 | 16 | 5 | 3.0 | 0.16 | |
| 20 x 10R x 3 - 4 | 19.0 | 16.9 | 33 | 4 | 60 | 22.0 | 9.5 | 16 | 5 | 3.0 | 0.16 | |
| 20 x 20R x 3.5 - 2 | 19.0 | 16.7 | 38 | 4 | 64 | 22.0 | 9.5 | 20 | 5 | 3.0 | 0.34 | |
| 20 x 20R x 3.5 - 3 | 19.0 | 16.7 | 36 | 4 | 77 | 28.5 | 9.5 | 20 | 5 | 3.0 | 0.37 | |
| 20 x 20R x 3.5 - 3 | 19.0 | 16.7 | 38 | 4 | 77 | 28.5 | 9.5 | 20 | 5 | 3.0 | 0.44 | |
| 25 x 5R x 3 - 4 | 24.0 | 21.9 | 38 | 4 | 45 | 14.5 | 9.5 | 16 | 5 | 3.0 | 0.19 | |
| 25 x 10R x 3 - 4 | 24.0 | 21.9 | 38 | 4 | 64 | 22.0 | 9.5 | 20 | 5 | 3.0 | 0.28 | |
| 25 x 25R x 3.5 - 2 | 24.0 | 21.4 | 48 | 4 | 80 | 30.0 | 10.5 | 20 | 5 | 3.0 | 0.73 | |
| 25 x 25R x 3.5 - 3 | 24.0 | 21.4 | 40 | 4 | 95 | 37.5 | 10.5 | 20 | 5 | 3.0 | 0.50 | |
| 32 x 5R x 3.5 - 4 | 31.0 | 28.4 | 48 | 4 | 48 | 14.0 | 9.5 | 20 | 5 | 3.0 | 0.32 | |
| 32 x 5R x 3.5 - 4 | 31.0 | 28.4 | 50 | 4 | 48 | 14.0 | 9.5 | 20 | 5 | 3.0 | 0.35 | |
| 32 x 10R x 3.969 - 5 | 31.0 | 27.9 | 48 | 4 | 77 | 28.5 | 9.5 | 20 | 5 | 3.0 | 0.50 | |
| 32 x 10R x 3.969 - 5 | 31.0 | 27.9 | 50 | 4 | 77 | 28.5 | 9.5 | 20 | 5 | 3.0 | 0.61 | |
| 32 x 20R x 3.969 - 2 | 31.0 | 27.9 | 56 | 4 | 64 | 22.0 | 9.5 | 20 | 5 | 3.0 | 0.74 | |
| 32 x 20R x 3.969 - 3 | 31.0 | 27.9 | 50 | 4 | 84 | 32.0 | 9.5 | 20 | 5 | 3.0 | 0.66 | |
| 32 x 32R x 3.969 - 2 | 31.0 | 27.9 | 56 | 4 | 88 | 34.0 | 9.5 | 20 | 5 | 3.0 | 1.03 | |
| 32 x 32R x 3.969 - 3 | 31.0 | 27.9 | 50 | 4 | 120 | 50.0 | 9.5 | 20 | 5 | 3.0 | 0.97 | |
| 40 x 5R x 3.5 - 5 | 39.0 | 36.4 | 56 | 4 | 54 | 17.0 | 9.5 | 20 | 5 | 3.0 | 0.44 | |
| 40 x 5R x 3.5 - 5 | 39.0 | 36.4 | 63 | 4 | 70 | 25.0 | 14.0 | 20 | 5 | 3.0 | 0.82 | |
| 40 x 10R x 6 - 4 | 38.0 | 33.8 | 63 | 4 | 70 | 25.0 | 14.0 | 20 | 5 | 3.0 | 0.88 | |
| 40 x 10R x 6 - 6 | 38.0 | 33.8 | 63 | 4 | 90 | 35.0 | 14.0 | 20 | 5 | 3.0 | 1.15 | |
| 40 x 20R x 6 - 3 | 38.0 | 33.8 | 63 | 4 | 88 | 34.0 | 14.0 | 20 | 5 | 3.0 | 1.13 | |
| 40 x 40R x 6 - 2 | 38.0 | 33.8 | 72 | 4 | 113 | 46.5 | 14.0 | 20 | 5 | 3.0 | 2.23 | |
| 40 x 40R x 6 - 3 | 38.0 | 33.8 | 63 | 4 | 142 | 61.0 | 14.0 | 20 | 5 | 3.0 | 1.85 | |
| 50 x 5R x 3.5 - 5 | 49.0 | 46.4 | 68 | 4 | 54 | 17.0 | 9.5 | 20 | 5 | 3.0 | 0.62 | |
| 50 x 10R x 6 - 6 | 48.0 | 43.8 | 72 | 5 | 90 | 35.0 | 14.0 | 20 | 5 | 3.0 | 1.34 | |
| 50 x 20R x 6.5 - 3 | 48.0 | 43.4 | 85 | 5 | 92 | 30.0 | 14.0 | 32 | 6 | 3.5 | 2.39 | |
| 63 x 10R x 6 - 6 | 61.0 | 56.8 | 85 | 5 | 90 | 29.0 | 14.0 | 32 | 6 | 3.5 | 1.59 | |
| 80 x 10R x 6.5 - 6 | 78.0 | 73.3 | 105 | 5 | 95 | 31.5 | 15.0 | 32 | 6 | 3.5 | 2.23 | |
| Versions with left-hand lead | | | | | | | | | | | | |
| 16 x 5L x 3 - 4 | 15.0 | 12.9 | 28 | 4 | 35 | 14.5 | 9.5 | 12 | 5 | 3.0 | 0.09 | |
| 20 x 5L x 3 - 5 | 19.0 | 16.9 | 33 | 4 | 45 | 14.5 | 9.5 | 16 | 5 | 3.0 | 0.16 | |
| 20 x 5L x 3 - 4 | 19.0 | 16.9 | 38 | 4 | 40 | 21.0 | 9.5 | 12 | 5 | 3.0 | 0.21 | |
| 25 x 5L x 3 - 4 | 24.0 | 21.9 | 38 | 4 | 45 | 14.5 | 9.5 | 16 | 5 | 3.0 | 0.19 | |
| 32 x 5L x 3.5 - 4 | 31.0 | 28.4 | 48 | 4 | 48 | 14.0 | 9.5 | 20 | 5 | 3.0 | 0.32 | |
| 40 x 5L x 3.5 - 5 | 39.0 | 36.4 | 56 | 4 | 54 | 17.0 | 9.5 | 20 | 5 | 3.0 | 0.44 | |
| 40 x 10L x 6 - 4 | 38.0 | 33.8 | 63 | 4 | 70 | 25.0 | 14.0 | 20 | 5 | 3.0 | 0.88 | |

Screw-in nut ZEV-E-S

Rexroth connection dimensions

With low-friction seal,
preload class: C0, C00, C1
Tolerance grade T3²⁾, T5, T7, T9



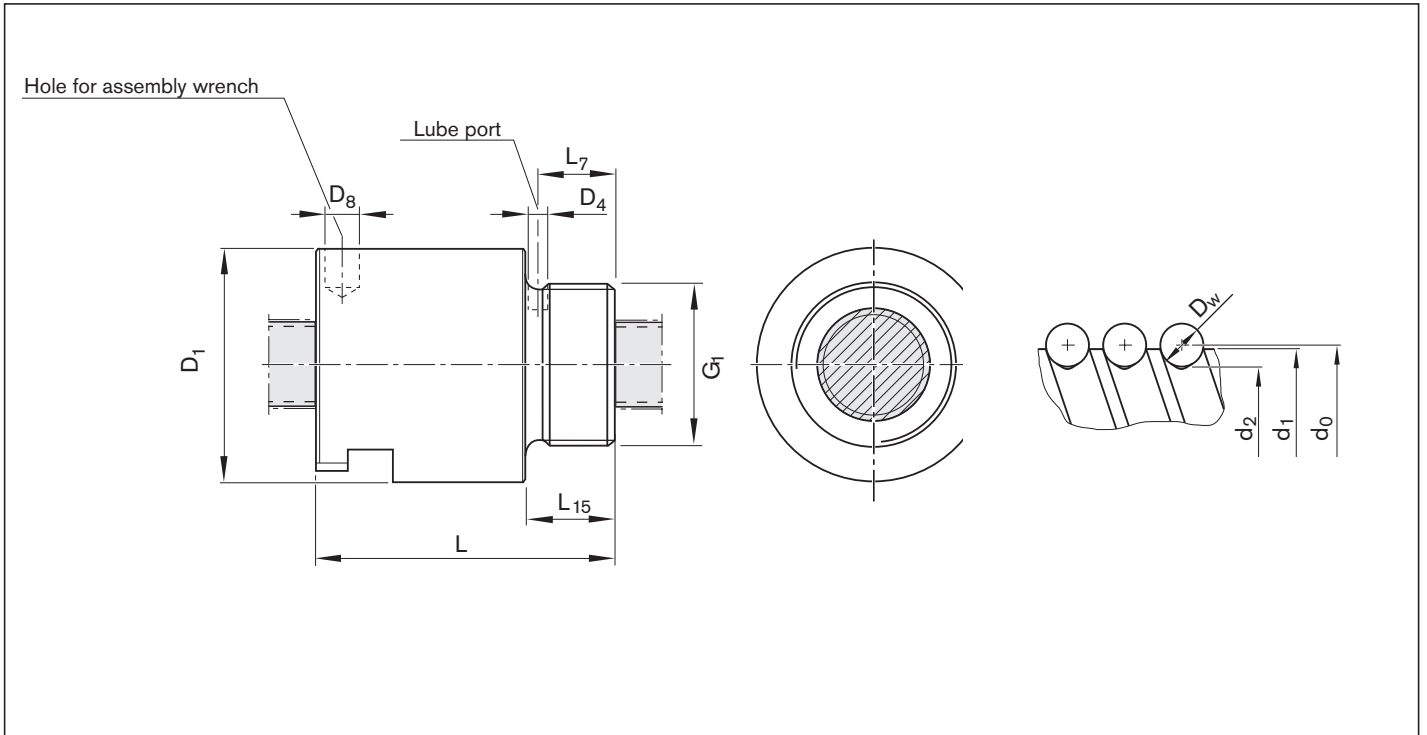
Ordering data:

| | | | | | | | | | | | | |
|------|-------------|-------------|----|---|---|----|---|--------|--------|-----|---|---|
| BASA | 20 x 5R x 3 | ZEV-E-S - 4 | 00 | 0 | 0 | T7 | R | 81K120 | 41K120 | 550 | 0 | 0 |
|------|-------------|-------------|----|---|---|----|---|--------|--------|-----|---|---|

d_0 = nominal diameter
 P = lead (R = right-hand)
 D_w = ball diameter
 i = number of ball track turns

| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ³⁾ | | Linear speed ¹⁾ |
|----------|---------------------------------------|--------------|----------------------------|-----------------------------|----------------------------|
| | | | dyn. C (N) | stat. C ₀ (N) | v_{max} (m/min) |
| B | 16 x 5R x 3 - 3 | R2542 000 05 | 11,300 | 11,800 | 30.0 |
| B | 16 x 10R x 3 - 3 | R2542 000 15 | 11,500 | 12,300 | 60.0 |
| B | 20 x 5R x 3 - 4 | R2542 100 05 | 17,200 | 21,500 | 30.0 |
| B | 25 x 5R x 3 - 7 | R2542 200 05 | 31,400 | 48,700 | 24.0 |
| B | 25 x 10R x 3 - 5 | R2542 200 15 | 23,200 | 34,200 | 48.0 |
| B | 32 x 5R x 3.5 - 5 | R2542 300 05 | 31,700 | 50,600 | 18.8 |
| B | 32 x 10R x 3.969 - 5 | R2542 300 15 | 38,000 | 58,300 | 37.5 |

- 1) See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed n_{cr} " on page 174
- 2) Tolerance grade T3 for sizes shown in table page 12
- 3) The load ratings are valid for tolerance grade T3 and T5 only.
For other tolerance grades, please take into account the correction factor f_{ac} on page 133.



| Size | (mm) | | | | | | | | | | Mass | |
|-------------------------------|-------|-------|--------------|-------|-------|-----------|------------------|-------|----------|-------------|------|--|
| | d_1 | d_2 | D_1 h10 | D_4 | D_8 | G_1 | L ± 0.3 | L_7 | L_{15} | m (kg) | | |
| $d_0 \times P \times D_w - i$ | | | | | | | | | | | | |
| 16 x 5R x 3 - 3 | 15.0 | 12.9 | 32.5 | 2.7 | 4.2 | M26 x 1.5 | 40 | 10.5 | 12 | 0.14 | | |
| 16 x 10R x 3 - 3 | 15.0 | 12.9 | 32.5 | 2.7 | 4.2 | M26 x 1.5 | 54 | 10.5 | 12 | 0.21 | | |
| 20 x 5R x 3 - 4 | 19.0 | 16.9 | 38.0 | 2.7 | 8.0 | M35 x 1.5 | 50 | 12.5 | 14 | 0.25 | | |
| 25 x 5R x 3 - 7 | 24.0 | 21.9 | 43.0 | 1.5 | 8.0 | M40 x 1.5 | 60 | 17.5 | 19 | 0.36 | | |
| 25 x 10R x 3 - 5 | 24.0 | 21.9 | 43.0 | 2.0 | 8.0 | M40 x 1.5 | 74 | 17.7 | 19 | 0.45 | | |
| 32 x 5R x 3.5 - 5 | 31.0 | 28.4 | 54.0 | 2.7 | 8.0 | M48 x 1.5 | 69 | 17.5 | 19 | 0.58 | | |
| 32 x 10R x 3.969 - 5 | 31.0 | 27.9 | 54.0 | 2.7 | 8.0 | M48 x 1.5 | 95 | 17.5 | 19 | 0.88 | | |

Double nut with flange FDM-E-S

Rexroth connection dimensions

With seals,
preload class: C4, C5
Tolerance grades T3²⁾, T5, T7

Note: Supplied only as complete ball screw assembly.

⚠ When setting up applications, do not allow components to collide with the front lube unit.



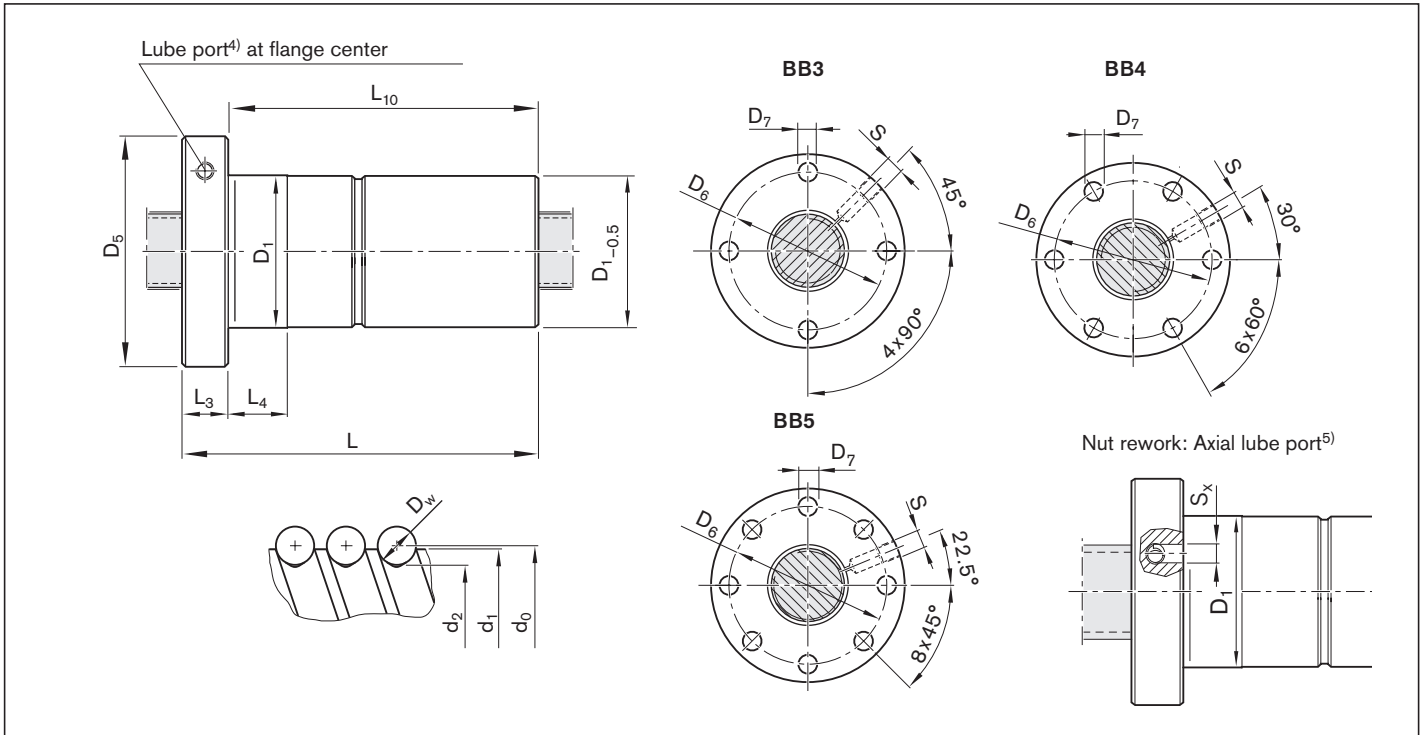
d_0 = nominal diameter
P = lead (R = right-hand)
 D_w = ball diameter
i = number of ball track turns

Ordering data:

| | | | | | | | | | | | | |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20 x 5R x 3 | FDM-E-S - 4 | 00 | 1 | 5 | T7 | R | 82Z120 | 41Z120 | 1250 | 0 | 1 |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ³⁾ | | Linear speed ¹⁾ v_{max} (m/min) |
|----------|---------------------------------------|--------------|----------------------------|-----------------------------|--|
| | | | dyn. C (N) | stat. C ₀ (N) | |
| C | 16 x 5R x 3 - 4 | R1502 010 23 | 14,800 | 16,100 | 30 |
| C | 20 x 5R x 3 - 4 | R1502 110 33 | 17,200 | 21,500 | 30 |
| C | 25 x 5R x 3 - 4 | R1502 210 33 | 19,100 | 27,200 | 30 |
| C | 25 x 10R x 3 - 4 | R1502 240 33 | 18,800 | 27,000 | 60 |
| C | 32 x 5R x 3.5 - 4 | R1502 310 33 | 25,900 | 40,000 | 23 |
| C | 32 x 10R x 3.969 - 5 | R1502 340 33 | 38,000 | 58,300 | 47 |
| C | 40 x 5R x 3.5 - 5 | R1502 410 33 | 34,900 | 64,100 | 19 |
| C | 40 x 10R x 6 - 4 | R1502 440 33 | 60,000 | 86,400 | 38 |
| C | 40 x 10R x 6 - 6 | R1502 440 34 | 86,500 | 132,200 | 38 |
| C | 40 x 20R x 6 - 3 | R1502 470 33 | 45,500 | 62,800 | 75 |
| C | 50 x 5R x 3.5 - 5 | R1502 510 33 | 38,400 | 81,300 | 15 |
| C | 50 x 10R x 6 - 4 | R1502 540 33 | 66,500 | 109,000 | 30 |
| C | 50 x 10R x 6 - 6 | R1502 540 34 | 95,600 | 166,500 | 30 |
| C | 50 x 20R x 6.5 - 5 | R1502 570 34 | 90,800 | 149,700 | 60 |
| C | 63 x 10R x 6 - 4 | R1502 640 33 | 74,200 | 140,500 | 24 |
| C | 63 x 10R x 6 - 6 | R1502 640 34 | 106,600 | 214,300 | 24 |
| C | 63 x 20R x 6.5 - 5 | R1502 670 34 | 100,700 | 190,300 | 48 |
| C | 80 x 10R x 6.5 - 6 | R1502 740 34 | 130,100 | 291,700 | 19 |
| C | 80 x 20R x 12.7 - 6 | R1502 770 04 | 315,200 | 534,200 | 30 |

- 1) See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed n_{cr} " on page 174
- 2) Tolerance grade T3 for sizes shown in table page 12
- 3) The load ratings are valid for tolerance grade T3 and T5 only.
For other tolerance grades, please take into account the correction factor f_{ac} on page 133.



- 4) Lube port machining: flat surface $L_3 \leq 15$ mm, countersink $L_3 > 15$ mm
 5) The axial lube port S_x is always located on the pitch circle D_6 of the nut unit.

| Size | (mm) | | | | | | | | | | | | | | Mass m (kg) |
|-------------------------------|-------|-------|-------------|-------|--------------|-------|-------|-----|-------|-------|----------|--------|-------|-------|-------------------|
| | d_1 | d_2 | D_1 g6 | D_5 | Hole pattern | D_6 | D_7 | L | L_3 | L_4 | L_{10} | $S^4)$ | S_x | | |
| $d_0 \times P \times D_w - i$ | | | | | | | | | | | | | | | |
| 16 x 5R x 3 - 4 | 15.0 | 12.9 | 28 | 53 | BB3 | 40 | 6.6 | 72 | 12 | 10 | 60 | M6 | 4 | 0.33 | |
| 20 x 5R x 3 - 4 | 19.0 | 16.9 | 33 | 58 | BB4 | 45 | 6.6 | 82 | 12 | 10 | 70 | M6 | 4 | 0.45 | |
| 25 x 5R x 3 - 4 | 24.0 | 21.9 | 38 | 63 | BB4 | 50 | 6.6 | 82 | 12 | 10 | 70 | M6 | 4 | 0.53 | |
| 25 x 10R x 3 - 4 | 24.0 | 21.9 | 38 | 63 | BB4 | 50 | 6.6 | 120 | 12 | 16 | 108 | M6 | 4 | 0.70 | |
| 32 x 5R x 3.5 - 4 | 31.0 | 28.4 | 48 | 73 | BB4 | 60 | 6.6 | 88 | 13 | 10 | 75 | M6 | 4 | 0.84 | |
| 32 x 10R x 3.969 - 5 | 31.0 | 27.9 | 48 | 73 | BB4 | 60 | 6.6 | 146 | 13 | 16 | 133 | M6 | 4 | 1.22 | |
| 40 x 5R x 3.5 - 5 | 39.0 | 36.4 | 56 | 80 | BB4 | 68 | 6.6 | 100 | 15 | 10 | 85 | M8x1 | 5 | 1.13 | |
| 40 x 10R x 6 - 4 | 38.0 | 33.8 | 63 | 95 | BB4 | 78 | 9.0 | 140 | 15 | 16 | 125 | M8x1 | 5 | 2.25 | |
| 40 x 10R x 6 - 6 | 38.0 | 33.8 | 63 | 95 | BB4 | 78 | 9.0 | 180 | 15 | 16 | 165 | M8x1 | 5 | 2.83 | |
| 40 x 20R x 6 - 3 | 38.0 | 33.8 | 63 | 95 | BB4 | 78 | 9.0 | 175 | 15 | 25 | 160 | M8x1 | 5 | 2.66 | |
| 50 x 5R x 3.5 - 5 | 49.0 | 46.4 | 68 | 98 | BB4 | 82 | 9.0 | 100 | 15 | 10 | 85 | M8x1 | 5 | 1.60 | |
| 50 x 10R x 6 - 4 | 48.0 | 43.8 | 72 | 110 | BB4 | 90 | 11.0 | 140 | 18 | 16 | 122 | M8x1 | 5 | 2.74 | |
| 50 x 10R x 6 - 6 | 48.0 | 43.8 | 72 | 110 | BB4 | 90 | 11.0 | 180 | 18 | 16 | 162 | M8x1 | 5 | 3.39 | |
| 50 x 20R x 6.5 - 5 | 48.0 | 43.4 | 85 | 125 | BB4 | 105 | 11.0 | 255 | 22 | 25 | 233 | M8x1 | 5 | 6.71 | |
| 63 x 10R x 6 - 4 | 61.0 | 56.8 | 85 | 125 | BB4 | 105 | 11.0 | 140 | 22 | 16 | 118 | M8x1 | 5 | 3.53 | |
| 63 x 10R x 6 - 6 | 61.0 | 56.8 | 85 | 125 | BB4 | 105 | 11.0 | 180 | 22 | 16 | 158 | M8x1 | 5 | 4.32 | |
| 63 x 20R x 6.5 - 5 | 61.0 | 56.3 | 95 | 140 | BB4 | 118 | 14.0 | 255 | 22 | 25 | 233 | M8x1 | 5 | 8.65 | |
| 80 x 10R x 6.5 - 6 | 78.0 | 73.3 | 105 | 150 | BB4 | 125 | 14.0 | 190 | 22 | 16 | 168 | M8x1 | 5 | 6.35 | |
| 80 x 20R x 12.7 - 6 | 76.0 | 67.0 | 125 | 180 | BB5 | 152 | 18.0 | 340 | 25 | 25 | 315 | M8x1 | 5 | 20.20 | |

Double nut with flange FDM-E-B

Mounting dimensions similar to
DIN 69051, Part 5
Flange type B

With seals, preload class: C4, C5
Tolerance grades T3²⁾, T5, T7

Note: Supplied only as complete
ball screw assembly.

⚠ When setting up applications, do not
allow components to collide with the
front lube unit.



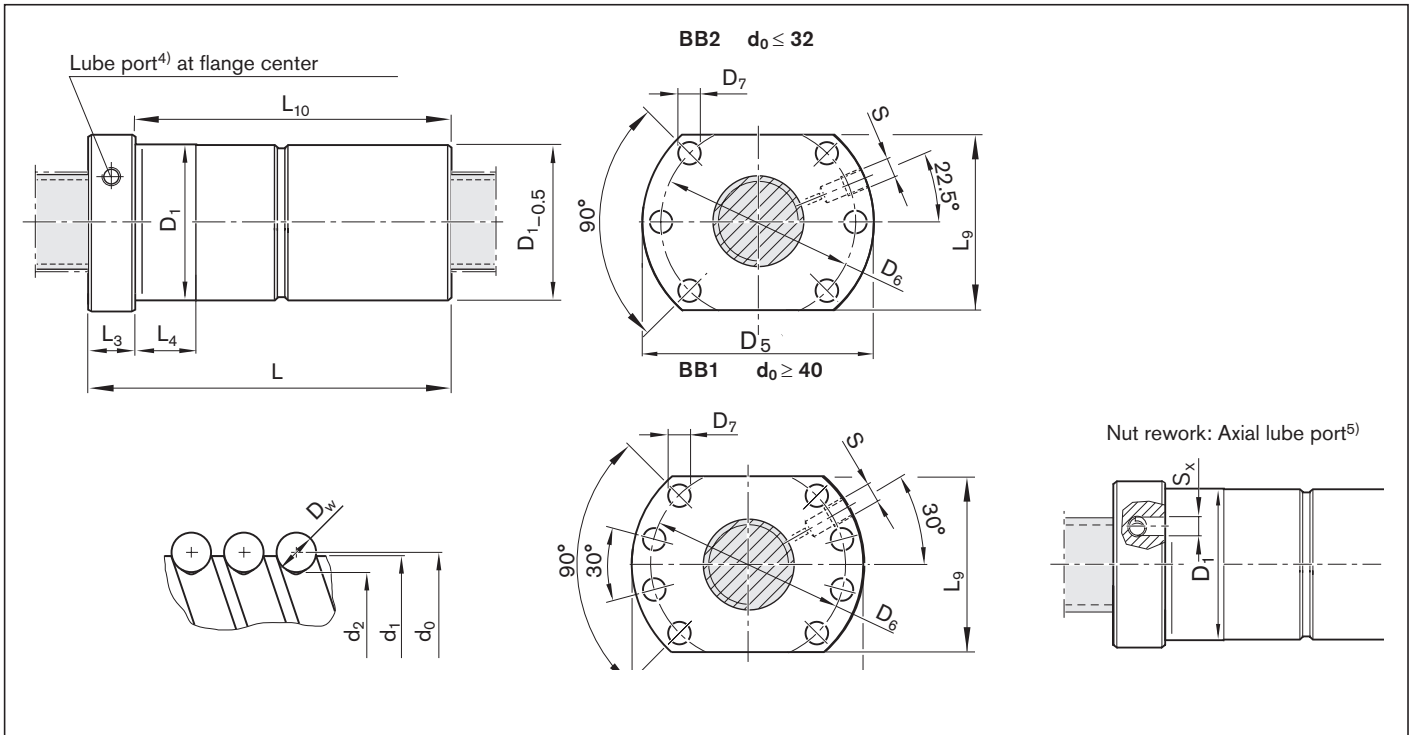
d_0 = nominal diameter
 P = lead (R = right-hand)
 D_w = ball diameter
 i = number of ball track turns

Ordering data:

| | | | | | | | | | | | | |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20 x 5R x 3 | FDM-E-B - 4 | 00 | 1 | 5 | T7 | R | 82Z120 | 41Z120 | 1250 | 0 | 1 |
|------|-------------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Category | Size $d_0 \times P \times D_w - i$ | Part number | Load ratings ³⁾ | | Linear speed ¹⁾ v_{max} (m/min) |
|----------|---------------------------------------|--------------|----------------------------|-----------------------------|--|
| | | | dyn. C (N) | stat. C ₀ (N) | |
| C | 16 x 5R x 3 - 4 | R1502 010 53 | 14,800 | 16,100 | 30 |
| C | 20 x 5R x 3 - 4 | R1502 110 73 | 17,200 | 21,500 | 30 |
| C | 25 x 5R x 3 - 4 | R1502 210 73 | 19,100 | 27,200 | 30 |
| C | 25 x 10R x 3 - 4 | R1502 240 73 | 18,800 | 27,000 | 60 |
| C | 32 x 5R x 3.5 - 4 | R1502 310 73 | 25,900 | 40,000 | 23 |
| C | 32 x 10R x 3.969 - 5 | R1502 340 74 | 38,000 | 58,300 | 47 |
| C | 40 x 5R x 3.5 - 5 | R1502 410 74 | 34,900 | 64,100 | 19 |
| C | 40 x 10R x 6 - 4 | R1502 440 73 | 60,000 | 86,400 | 38 |
| C | 40 x 10R x 6 - 6 | R1502 440 74 | 86,500 | 132,200 | 38 |
| C | 40 x 20R x 6 - 3 | R1502 470 73 | 45,500 | 62,800 | 75 |
| C | 50 x 5R x 3.5 - 5 | R1502 510 74 | 38,400 | 81,300 | 15 |
| C | 50 x 10R x 6 - 4 | R1502 540 73 | 66,500 | 109,000 | 30 |
| C | 50 x 10R x 6 - 6 | R1502 540 74 | 95,600 | 166,500 | 30 |
| C | 50 x 20R x 6.5 - 5 | R1502 570 74 | 90,800 | 149,700 | 60 |
| C | 63 x 10R x 6 - 4 | R1502 640 73 | 74,200 | 140,500 | 24 |
| C | 63 x 10R x 6 - 6 | R1502 640 74 | 106,600 | 214,300 | 24 |
| C | 63 x 20R x 6.5 - 5 | R1502 670 74 | 100,700 | 190,300 | 48 |
| C | 80 x 10R x 6.5 - 6 | R1502 740 74 | 130,100 | 291,700 | 19 |
| C | 80 x 20R x 12.7 - 6 | R1502 770 44 | 315,200 | 534,200 | 30 |

- 1) See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed $n_{c,r}$ " on page 174
- 2) Tolerance grade T3 for sizes shown in table page 12
- 3) The load ratings are valid for tolerance grade T3 and T5 only.
For other tolerance grades, please take into account the correction factor f_{ac} on page 133.



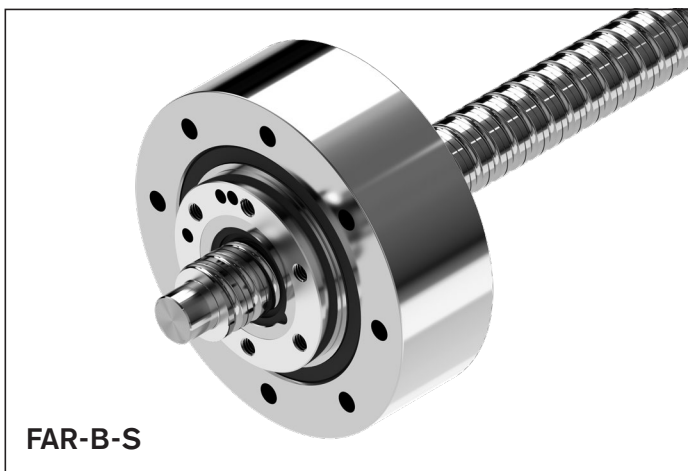
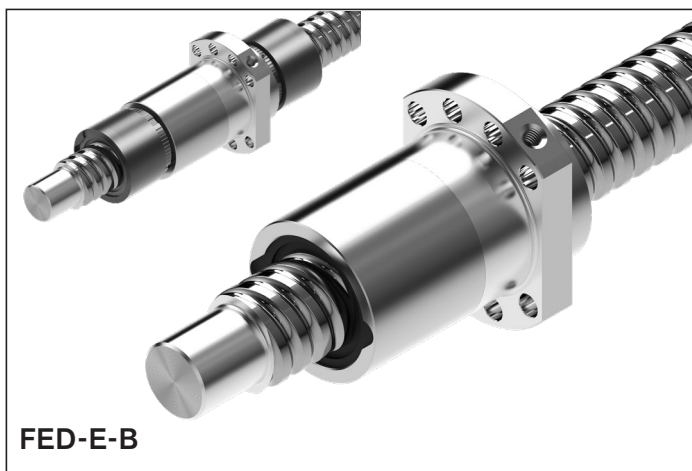
- 4) Lube port machining: flat surface $L_3 \leq 15$ mm, countersink $L_3 > 15$ mm
5) The axial lube port S_x is always located on the pitch circle D_6 of the nut unit.

| Size | (mm) | | | | | | | | | | | | | | | Mass m (kg) |
|-------------------------------|-------|-------|-------------|-------|--------------|-------|-------|-----|-------|-------|----------|----------|--------|-------|-------|-------------------|
| | d_1 | d_2 | D_1 g6 | D_5 | Hole pattern | D_6 | D_7 | L | L_3 | L_4 | L_{10} | L_{14} | $S^4)$ | S_x | | |
| $d_0 \times P \times D_w - i$ | | | | | | | | | | | | | | | | |
| 16 x 5R x 3 - 4 | 15.0 | 12.9 | 28 | 48 | BB2 | 38 | 5.5 | 72 | 12 | 10 | 60 | 40.0 | M6 | 4 | 0.29 | |
| 20 x 5R x 3 - 4 | 19.0 | 16.9 | 36 | 58 | BB2 | 47 | 6.6 | 82 | 12 | 10 | 70 | 44.0 | M6 | 4 | 0.53 | |
| 25 x 5R x 3 - 4 | 24.0 | 21.9 | 40 | 62 | BB2 | 51 | 6.6 | 82 | 12 | 10 | 70 | 48.0 | M6 | 4 | 0.57 | |
| 25 x 10R x 3 - 4 | 24.0 | 21.9 | 40 | 62 | BB2 | 51 | 6.6 | 120 | 12 | 16 | 108 | 48.0 | M6 | 4 | 0.77 | |
| 32 x 5R x 3.5 - 4 | 31.0 | 28.4 | 50 | 80 | BB2 | 65 | 9.0 | 88 | 13 | 10 | 75 | 62.0 | M6 | 4 | 0.96 | |
| 32 x 10R x 3.969 - 5 | 31.0 | 27.9 | 50 | 80 | BB2 | 65 | 9.0 | 146 | 13 | 16 | 133 | 62.0 | M6 | 4 | 1.34 | |
| 40 x 5R x 3.5 - 5 | 39.0 | 36.4 | 63 | 93 | BB1 | 78 | 9.0 | 100 | 15 | 10 | 85 | 70.0 | M8x1 | 5 | 1.68 | |
| 40 x 10R x 6 - 4 | 38.0 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 140 | 15 | 16 | 125 | 70.0 | M8x1 | 5 | 2.15 | |
| 40 x 10R x 6 - 6 | 38.0 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 180 | 15 | 16 | 165 | 70.0 | M8x1 | 5 | 2.73 | |
| 40 x 20R x 6 - 3 | 38.0 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 175 | 15 | 25 | 160 | 70.0 | M8x1 | 5 | 2.56 | |
| 50 x 5R x 3.5 - 5 | 49.0 | 46.4 | 75 | 110 | BB1 | 93 | 11.0 | 100 | 15 | 10 | 85 | 85.0 | M8x1 | 5 | 2.25 | |
| 50 x 10R x 6 - 4 | 48.0 | 43.8 | 75 | 110 | BB1 | 93 | 11.0 | 140 | 18 | 16 | 122 | 85.0 | M8x1 | 5 | 2.97 | |
| 50 x 10R x 6 - 6 | 48.0 | 43.8 | 75 | 110 | BB1 | 93 | 11.0 | 180 | 18 | 16 | 162 | 85.0 | M8x1 | 5 | 3.73 | |
| 50 x 20R x 6.5 - 5 | 48.0 | 43.3 | 75 | 110 | BB1 | 93 | 11.0 | 255 | 18 | 25 | 237 | 85.0 | M8x1 | 5 | 4.93 | |
| 63 x 10R x 6 - 4 | 61.0 | 56.8 | 90 | 125 | BB1 | 108 | 11.0 | 140 | 22 | 16 | 118 | 95.0 | M8x1 | 5 | 4.00 | |
| 63 x 10R x 6 - 6 | 61.0 | 56.8 | 90 | 125 | BB1 | 108 | 11.0 | 180 | 22 | 16 | 158 | 95.0 | M8x1 | 5 | 4.45 | |
| 63 x 20R x 6.5 - 5 | 61.0 | 56.3 | 95 | 135 | BB1 | 115 | 13.5 | 255 | 22 | 25 | 233 | 100.0 | M8x1 | 5 | 8.21 | |
| 80 x 10R x 6.5 - 6 | 78.0 | 73.3 | 105 | 145 | BB1 | 125 | 13.5 | 190 | 22 | 16 | 168 | 110.0 | M8x1 | 5 | 5.93 | |
| 80 x 20R x 12.7 - 6 | 76.0 | 67.0 | 125 | 165 | BB1 | 145 | 13.5 | 340 | 25 | 25 | 315 | 130.0 | M8x1 | 5 | 19.40 | |

Nuts, high-performance series

High-performance series

HP series ball screw assemblies are available with nominal diameters of 20 – 63 mm, and leads of 10 – 40 mm. The HP nut type is a single nut with flange which is available with a driven screw or as a driven nut.



Preload classes

| Option | Preload class | Definition |
|--------|---------------|-------------------------------|
| 0 | C0 | Standard backlash |
| 1 | C00 | Reduced backlash |
| 2 | C3 | High preload (single nut) |
| 3 | C1 | Moderate preload (single nut) |
| 4 | C4 | High preload (double nut) |
| 5 | C5 | Average preload (double nut) |
| 6 | C2 | Average preload (single nut) |

See nut versions for allocation of the preload classes

Driven single nut with flange FAR-B-S

Fundamental advantages of systems with driven nuts

Moment of inertia

In the case of long screws, the screw does not have to be rotated in the acceleration phase, only the nut.

The mass moment of inertia of the screw is not therefore critical. The moment of inertia of the nut is comparatively low and it is no longer dependent on the required stroke.

Dynamics

The intricate end bearing designs required for high dynamics, for example, fixed bearing on both ends with angular-contact ball bearings, are no longer necessary.

Screw extenders

Since the screw is stationary, relatively effort is needed to stretch the screw

- Increase in permissible axial loading (buckling load); not limited by end bearings
- Compensation of temperature influences
- Increase in overall rigidity

Design and manufacturing tolerances

The use of nuts with a high level of axial and radial runout precision minimizes the induced screw vibration. All functional components are supplied from a single source. In-house designs are no longer needed.

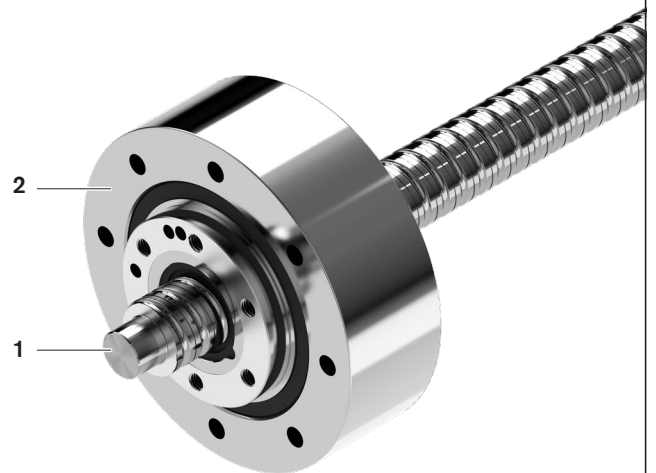
Liquid cooling

Improved cooling can easily be provided by using a hollow-bored screw:

cooling of the stationary screw can be provided with comparatively little effort. Controlled cooling virtually eliminates changes in length due to temperature fluctuations.

User benefits

- Economic efficiency provided by complete unit
- Adjustment to various speeds and loads is possible using the screw lead and the speed reducing belt
- Small installation space thanks to its compact construction
- Integral functionality and little installation work for the customer
- Low system costs
- High positioning accuracy
- For particularly demanding positioning tasks, it can be combined with the direct position measuring system that is integrated in the guide rail



1 Ball screw assemblies (BASA) screw
2 Driven nut FAR

Single nut with flange FED-E-B

Mounting dimensions similar to
DIN 69051, Part 5 flange type B

Nut for significantly increasing the dynamic
and static load capacity
With standard seals
Preload class: C0, C00, C1, C2
Tolerance grade T3¹⁾, T5, T7, T9



⚠ When setting up applications, do not
allow components to collide with the
front lube unit.

Ordering data:

| | | | | | | | | | | | | |
|------|------------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 40x20R x 6 | FED-E-B - 8 | 00 | 1 | 2 | T5 | R | 82Z300 | 41K300 | 1250 | 0 | 1 |
|------|------------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Category | Size $d_0 \times P \times D_W - i$ | Part number | Load ratings ³⁾ | | Linear speed ²⁾ | |
|---------------------|---------------------------------------|--------------|----------------------------|-----------------------------|----------------------------|--|
| | | | dyn. C (N) | stat. C ₀ (N) | v_{max} (m/min) | |
| B | 16 x 16 R x 3 - 6 | R1512 060 32 | 17 800 | 24 200 | 96 | |
| | 20 x 20 R x 3.5 - 6 | R1512 170 32 | 25 700 | 38 100 | 120 | |
| | 25 x 25 R x 3.5 - 6 | R1512 280 32 | 28 500 | 47 100 | 150 | |
| | 32 x 20 R x 3.969 - 6 | R1512 370 32 | 38 300 | 67 300 | 94 | |
| | 32 x 32 R x 3.969 - 6 | R1512 390 32 | 37 900 | 68 000 | 150 | |
| | 40 x 20 R x 6 - 8 | R1512 470 32 | 95 500 | 171 100 | 75 | |
| | 40 x 25 R x 6 - 8 | R1512 480 32 | 91 400 | 171 700 | 93 | |
| | 40 x 30 R x 6 - 8 | R1512 4A0 32 | 90 400 | 170 300 | 112 | |
| | 40 x 40 R x 6 - 6 | R1512 490 32 | 71 500 | 124 500 | 150 | |
| | 50 x 20 R x 6.5 - 8 | R1512 570 32 | 116 500 | 240 000 | 60 | |
| | 50 x 25 R x 6.5 - 6 | R1512 580 32 | 92 600 | 175 100 | 75 | |
| | 50 x 30 R x 6.5 - 6 | R1512 5A0 32 | 114 500 | 237 700 | 90 | |
| | 50 x 40 R x 6.5 - 6 | R1512 590 32 | 89 300 | 171 500 | 120 | |
| | 63 x 20 R x 6.5 - 8 | R1512 670 32 | 130 800 | 292 000 | 48 | |
| 63 x 40 R x 6.5 - 6 | R1512 690 32 | 100 000 | 230 600 | 95 | | |

1) Tolerance grade T3 for sizes shown in table page 12

2) See "Characteristic speed $d_0 \cdot n$ " on page 133 and "Critical speed n_{cr} " on page 174

3) The load ratings are valid for tolerance grade T3 and T5 only.

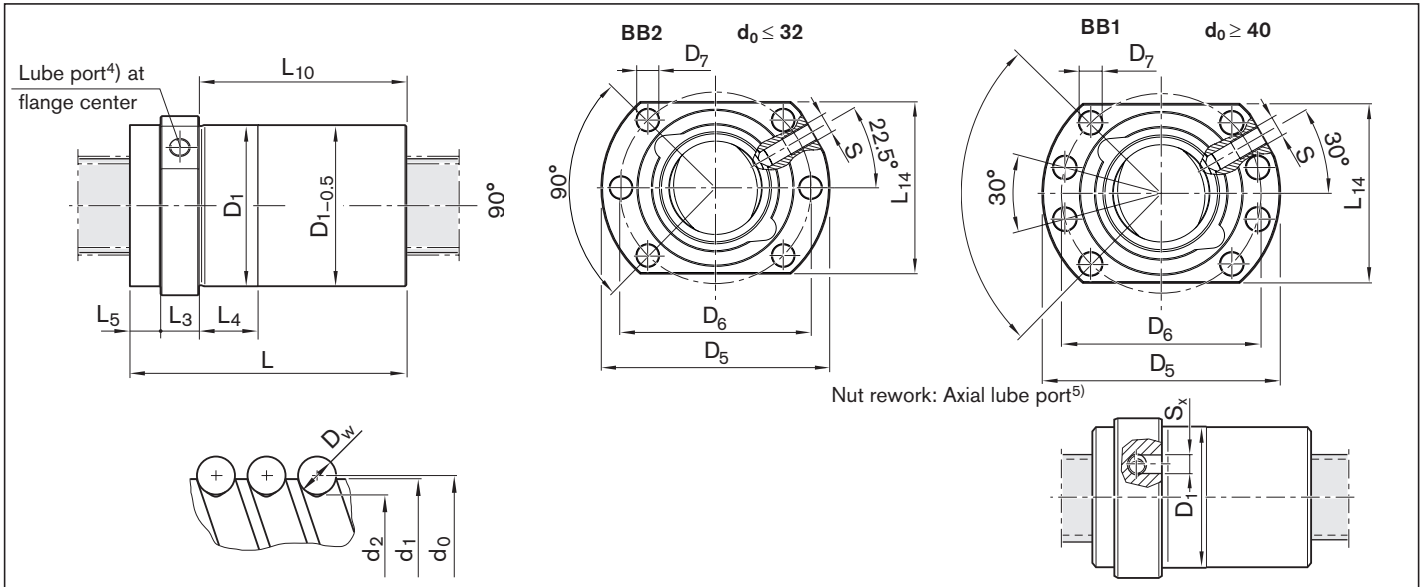
For other tolerance grades, please take into account the correction factor f_{acc} on page 133.

d_0 = nominal diameter

P = lead (R = right-hand)

D_W = ball diameter

i = number of ball track turns



- 4) Lube port machining: flat surface $L_3 \leq 15$ mm, countersink $L_3 > 15$ mm
5) The axial lube port S_x is always located on the pitch circle D_6 of the nut unit.

| Size $d_0 \times P \times D_w - i$ | (mm) | | | | | | | | | | | | | | | Mass m (kg) |
|---------------------------------------|-------|-------|-------------|-------|--------------|-------|-------|-----|-------|-------|-------|----------|----------|--------|-------|-------------------|
| | d_1 | d_2 | D_1 g6 | D_5 | Hole pattern | D_6 | D_7 | L | L_3 | L_4 | L_5 | L_{10} | L_{14} | $S^4)$ | S_x | |
| 16 x 16 R x 3 - 6 | 15.0 | 12.9 | 28 | 48 | BB2 | 38 | 5.5 | 61 | 12 | 20 | 6.0 | 43.0 | 40 | M6 | 4 | 0.27 |
| 20 x 20 R x 3.5 - 6 | 19.0 | 16.7 | 36 | 58 | BB2 | 47 | 6.6 | 77 | 12 | 25 | 8.0 | 57.0 | 44 | M6 | 4 | 0.48 |
| 25 x 25 R x 3.5 - 6 | 24.0 | 21.4 | 40 | 62 | BB2 | 51 | 6.6 | 95 | 12 | 30 | 9.0 | 74.0 | 48 | M6 | 4 | 0.63 |
| 32 x 20 R x 3.969 - 6 | 31.0 | 27.9 | 50 | 80 | BB2 | 65 | 9.0 | 84 | 13 | 25 | 11.0 | 60.0 | 62 | M6 | 4 | 0.91 |
| 32 x 32 R x 3.969 - 6 | 31.0 | 27.9 | 50 | 80 | BB2 | 65 | 9.0 | 120 | 13 | 40 | 12.0 | 95.0 | 62 | M6 | 4 | 1.25 |
| 40 x 20 R x 6 - 8 | 38.0 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 108 | 15 | 25 | 13.0 | 80.0 | 70 | M8x1 | 5 | 1.85 |
| 40 x 25 R x 6 - 8 | 38.0 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 127 | 15 | 30 | 11.5 | 100.5 | 70 | M8x1 | 5 | 1.88 |
| 40 x 30 R x 6 - 8 | 38.0 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 145 | 15 | 35 | 11.5 | 118.5 | 70 | M8x1 | 5 | 2.13 |
| 40 x 40 R x 6 - 6 | 38.0 | 33.8 | 63 | 93 | BB1 | 78 | 9.0 | 142 | 15 | 45 | 11.5 | 115.5 | 70 | M8x1 | 5 | 2.35 |
| 50 x 20 R x 6.5 - 8 | 48.0 | 43.3 | 75 | 110 | BB1 | 93 | 11.0 | 112 | 18 | 25 | 13.0 | 81.0 | 85 | M8x1 | 5 | 2.50 |
| 50 x 25 R x 6.5 - 6 | 48.0 | 43.3 | 75 | 110 | BB1 | 93 | 11.0 | 107 | 18 | 25 | 13.5 | 75.5 | 85 | M8x1 | 5 | 2.45 |
| 50 x 30 R x 6.5 - 6 | 48.0 | 43.3 | 75 | 110 | BB1 | 93 | 11.0 | 151 | 18 | 35 | 15.0 | 118.0 | 85 | M8x1 | 5 | 3.04 |
| 50 x 40 R x 6.5 - 6 | 48.0 | 43.3 | 75 | 110 | BB1 | 93 | 11.0 | 149 | 18 | 45 | 15.0 | 116.0 | 85 | M8x1 | 5 | 3.40 |
| 63 x 20 R x 6.5 - 8 | 61.0 | 56.3 | 95 | 135 | BB1 | 115 | 13.5 | 112 | 22 | 25 | 11.0 | 79.0 | 100 | M8x1 | 5 | 3.90 |
| 63 x 40 R x 6.5 - 6 | 61.0 | 56.3 | 95 | 135 | BB1 | 115 | 13.5 | 149 | 22 | 45 | 12.0 | 115.0 | 100 | M8x1 | 5 | 5.05 |

Driven single nut with flange FAR-B-S

Rexroth connection dimensions

With seals,
preload class: C1, C2, C3
Tolerance grade T3²⁾, T5, T7

The unit consists of:
nut, angular-contact thrust ball bearing and
slotted nut NMZ

When in standstill, it can be relubricated
with NLGI Class 2 grease via the stationary
lube port of the bearing outer race

Note: Supplied only as complete
ball screw assembly.

d_0 = nominal diameter
 P = lead (R = right-hand)
 D_w = ball diameter
 i = number of ball track turns



Ordering data:

| | | | | | | | | | | | | |
|------|------------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 40x20R x 6 | FAR-B-S - 3 | 00 | 1 | 6 | T5 | R | 51K300 | 51K300 | 1250 | 0 | 1 |
|------|------------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Cat- egory | FAR size | Size $d_0 \times P \times D_w - i$ | Part number Module | Load ratings ^{1) 4)} | | Mass m_{FAR} (kg) | Mass moment of inertia J_{rotFAR} ($kg \cdot m^2 \cdot 10^{-4}$) | Frictional torque Bearing | | Max. speed ³⁾ n_G (rpm) |
|---------------|-------------|---------------------------------------|-----------------------|-------------------------------|--------------------|---------------------------|---|------------------------------|--|--|
| | | | | dyn. C (N) | stat. C_0 (N) | | | M_{RL} (Nm) | | |
| C | 32 | 32 x 10R x 3.969 - 5 | R2532 301 01 | 38,000 | 58,300 | 5.8 | 22.5 | 1.0 | | 3 000 |
| | | 32 x 20R x 3.969 - 3 | R2532 301 11 | 23,600 | 33,700 | 5.9 | 22.9 | | | |
| | | 32 x 32R x 3.969 - 3 | R2532 301 21 | 23,400 | 34,000 | 6.3 | 25.1 | | | |
| C | 40 | 40 x 10R x 6 - 5 | R2532 401 01 | 73,400 | 109,300 | 7.3 | 42.7 | 1.2 | | 2 800 |
| | | 40 x 20R x 6 - 3 | R2532 401 31 | 45,500 | 62,800 | 7.5 | 43.9 | | | |
| | | 40 x 40R x 6 - 3 | R2532 401 41 | 44,400 | 62,300 | 8.4 | 50.7 | | | |
| C | 50 | 50 x 10R x 6 - 6 | R2532 501 01 | 95,600 | 166,500 | 8.3 | 67.6 | 1.4 | | 2 700 |
| | | 50 x 20R x 6.5 - 5 | R2532 501 31 | 90,800 | 149,700 | 9.1 | 76.0 | | | |
| | | 50 x 40R x 6.5 - 3 | R2532 501 41 | 55,800 | 85,900 | 9.5 | 79.8 | | | |
| C | 63 | 63 x 10R x 6 - 6 | R2532 601 01 | 106,600 | 214,300 | 12.8 | 139.0 | 2.3 | | 2 300 |
| | | 63 x 20R x 6.5 - 5 | R2532 601 11 | 100,700 | 190,300 | 13.5 | 156.4 | | | |
| | | 63 x 40R x 6.5 - 3 | R2532 601 21 | 64,100 | 114,100 | 13.9 | 161.6 | | | |

1) Load ratings calculated according to DIN ISO 3408-5

2) Tolerance grade T3 for sizes shown in table page 12

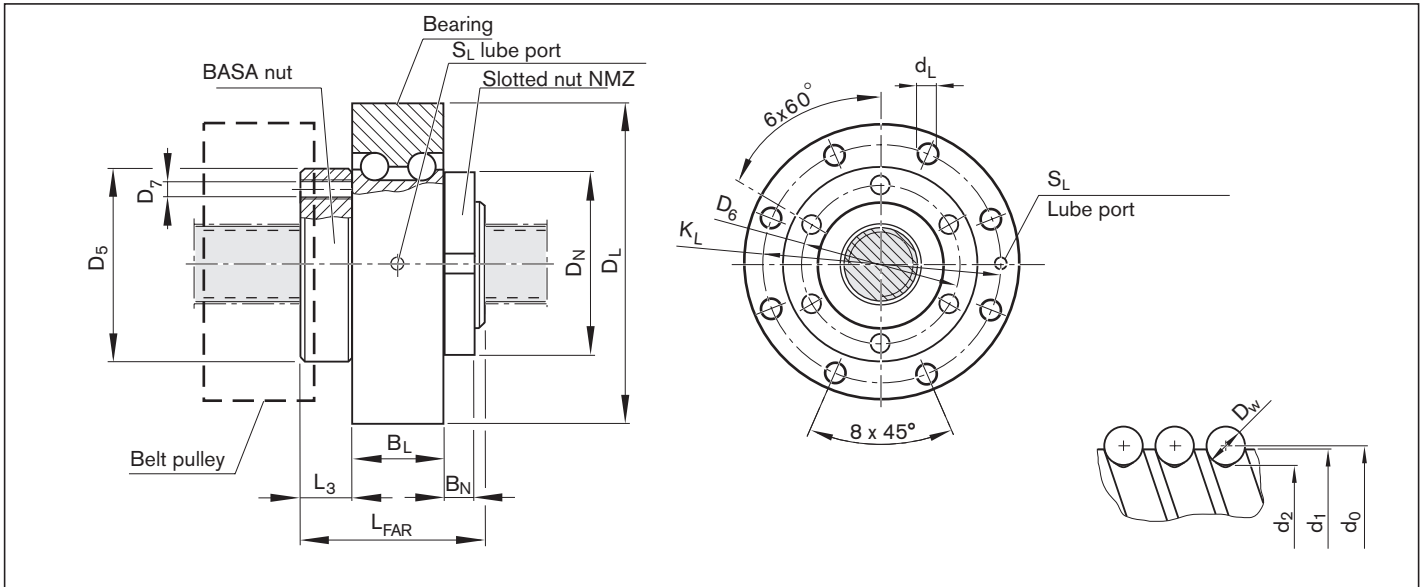
3) Limited by the max. speed of the bearing. Bearing pre-tensioned without external operating load. Duty cycle 25%; max. steady-state temp. +50 °C

4) The load ratings are valid for tolerance grade T3 and T5 only.

For other tolerance grades, please take into account the correction factor f_{ac} on page 133.

FAR rigidity levels

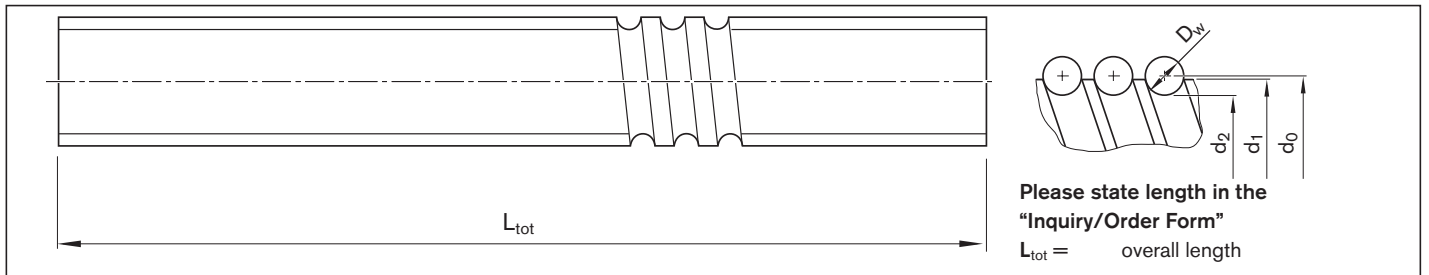
| FAR size | Size $d_0 \times P \times D_w - i$ | Rigidity | | Overall rigidity of the nut unit (N/ μ m) | | |
|-------------|---------------------------------------|---------------------------------|-------------------------------------|---|---------------------------|---------------------------|
| | | Screw R_S (Nm/ μ m) | Bearing R_{aL} (N/ μ m) | Preload class C1 R_G | Preload class C2 R_G | Preload class C3 R_G |
| 32 | 32 x 10R x 3.969 - 5 | 141 | 860 | 320 | 350 | 380 |
| | 32 x 20R x 3.969 - 3 | 141 | 860 | 220 | 250 | 280 |
| | 32 x 32R x 3.969 - 3 | 141 | 860 | 220 | 240 | 270 |
| 40 | 40 x 10R x 6 - 5 | 211 | 950 | 390 | 420 | 450 |
| | 40 x 20R x 6 - 3 | 211 | 950 | 270 | 300 | 330 |
| | 40 x 40R x 6 - 3 | 211 | 950 | 270 | 290 | 330 |
| 50 | 50 x 10R x 6 - 6 | 345 | 1,050 | 490 | 520 | 560 |
| | 50 x 20R x 6.5 - 5 | 340 | 1,050 | 450 | 480 | 530 |
| | 50 x 40R x 6.5 - 3 | 340 | 1,050 | 320 | 350 | 390 |
| 63 | 63 x 10R x 6 - 6 | 569 | 1,150 | 560 | 600 | 640 |
| | 63 x 20R x 6.5 - 5 | 563 | 1,150 | 520 | 560 | 610 |
| | 63 x 40R x 6.5 - 3 | 563 | 1,150 | 390 | 420 | 460 |



| FAR size | Size $d_0 \times P \times D_w - i$ | Dimensions (mm) | | | | | | | | | | | | | |
|----------|---------------------------------------|-----------------|-------|-----------|-------------|-------|-------|-------|-----------------|-------|-------|--------------------|------------|-------|-------|
| | | d_1 | d_2 | L_{FAR} | D_5 h6 | D_6 | D_7 | L_3 | D_L -0.018 | B_L | K_L | d_L +0.3/-0.1 | $S_L^{5)}$ | D_N | B_N |
| 32 | 32 x 10R x 3.969 - 5 | 31 | 27.9 | 77 | 80 | 65 | M8 | 11 | 145 | 49 | 120 | 8.8 | M6 | 75 | 16 |
| | 84 | | | | | | | | | | | | | | |
| | 120 | | | | | | | | | | | | | | |
| 40 | 40 x 10R x 6 - 5 | 38 | 33.8 | 80 | 93 | 80 | M8 | 12 | 155 | 49 | 130 | 8.8 | M6 | 92 | 18 |
| | 88 | | | | | | | | | | | | | | |
| | 142 | | | | | | | | | | | | | | |
| 50 | 50 x 10R x 6 - 6 | 48 | 43.8 | 90 | 105 | 90 | M8 | 13 | 165 | 49 | 140 | 8.8 | M6 | 105 | 18 |
| | 43.3 | | 132 | | | | | | | | | | | | |
| | 149 | | | | | | | | | | | | | | |
| 63 | 63 x 10R x 6 - 6 | 61 | 56.8 | 100 | 130 | 110 | M10 | 20 | 190 | 60 | 165 | 11.0 | M6 | 120 | 20 |
| | 56.3 | | 132 | | | | | | | | | | | | |
| | 149 | | | | | | | | | | | | | | |

5) Condition on delivery: lube ports S_L sealed by setscrews (M6).
The desired lube port can be opened by removing the set screw.

Precision screw


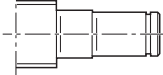
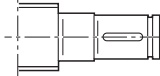
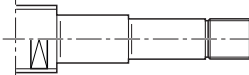
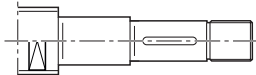


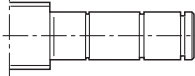

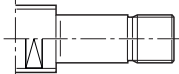
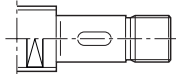
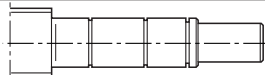
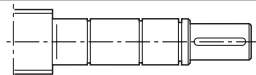
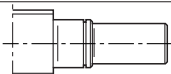
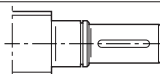
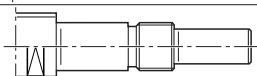
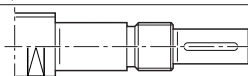
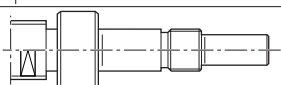
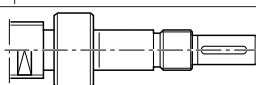
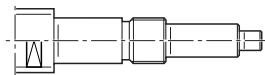
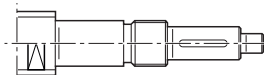
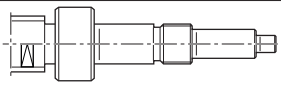
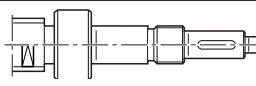
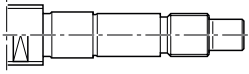
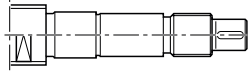


| Size d ₀ x P x D _w | Part number Tolerance grade | | | (mm) | | Moment of inertia J _s (kg · cm ² /m) | Maximum length (mm) | | Mass (kg/m) |
|---|--------------------------------|--------------|--------------|----------------|----------------|--|---------------------|------------|----------------|
| | T5 | T7 | T9 | d ₁ | d ₂ | | Standard | on request | |
| 6 ¹⁾ x 1R x 0.8 | – | – | – | 6.0 | 5.3 | 0.02 | – | – | 0.19 |
| 6 ¹⁾ x 2R x 0.8 | – | – | – | 6.0 | 5.3 | 0.02 | – | – | 0.19 |
| 8 ¹⁾ x 1R x 0.8 | – | – | – | 8.0 | 7.3 | 0.04 | – | – | 0.36 |
| 8 ¹⁾ x 2R x 1.2 | – | – | – | 8.0 | 7.0 | 0.04 | – | – | 0.36 |
| 8 x 2.5R x 1.588 | R1531 235 00 | R1531 237 00 | R1531 239 00 | 7.5 | 6.3 | 0.04 | 1 500 | 2 500 | 0.30 |
| 8 x 5R x 1.588 | R1531 265 00 | R1531 267 00 | R1531 269 00 | 7.5 | 6.3 | 0.04 | 1 500 | 2 500 | 0.30 |
| 12 ¹⁾ x 2R x 1.2 | – | – | – | 11.7 | 10.7 | 0.13 | – | – | 0.79 |
| 12 x 5R x 2 | R1531 465 10 | R1531 467 10 | R1531 469 10 | 11.4 | 9.9 | 0.11 | 1 500 | 2 500 | 0.75 |
| 12 x 10R x 2 | R1531 495 00 | R1531 497 00 | R1531 499 00 | 11.4 | 9.9 | 0.11 | – | – | 0.74 |
| 16 x 5L x 3 | R1551 015 00 | R1551 017 00 | R1551 019 00 | 15.0 | 12.9 | 0.31 | 1 500 | 3 500 | 1.24 |
| 16 x 5R x 3 | R1511 015 00 | R1511 017 00 | R1511 019 00 | 15.0 | 12.9 | 0.31 | – | – | 1.24 |
| 16 x 10R x 3 | R1511 045 00 | R1511 047 00 | R1511 049 00 | 15.0 | 12.9 | 0.31 | – | – | 1.23 |
| 16 x 16R x 3 | R1511 065 10 | R1511 067 10 | R1511 069 10 | 15.0 | 12.9 | 0.34 | – | – | 1.29 |
| 20 x 5R x 3 | R1511 115 00 | R1511 117 00 | R1511 119 00 | 19.0 | 16.9 | 0.84 | 1 500 | 3 500 | 2.03 |
| 20 x 5L x 3 | R1551 115 00 | R1551 117 00 | R1551 119 00 | 19.0 | 16.9 | 0.84 | – | – | 2.03 |
| 20 x 10R x 3 | R1511 145 00 | R1511 147 00 | R1511 149 00 | 19.0 | 16.9 | 0.84 | – | – | 2.03 |
| 20 x 20R x 3.5 | R1511 175 10 | R1511 177 10 | R1511 179 10 | 19.0 | 16.7 | 0.81 | – | – | 1.99 |
| 20 ¹⁾ x 40R x 3.5 | – | – | – | 19.0 | 16.4 | 0.86 | – | – | 2.06 |
| 25 x 5R x 3 | R1511 215 00 | R1511 217 00 | R1511 219 00 | 24.0 | 21.9 | 2.22 | 2 500 | 5 500 | 3.31 |
| 25 x 5L x 3 | R1551 215 00 | R1551 217 00 | R1551 219 00 | 24.0 | 21.9 | 2.22 | – | – | 3.31 |
| 25 x 10R x 3 | R1511 245 00 | R1511 247 00 | R1511 249 00 | 24.0 | 21.9 | 2.39 | – | – | 3.43 |
| 25 x 25R x 3.5 | R1511 285 10 | R1511 287 10 | R1511 289 10 | 24.0 | 21.4 | 2.15 | – | – | 3.25 |
| 32 x 5R x 3.5 | R1511 315 00 | R1511 317 00 | R1511 319 00 | 31.0 | 28.4 | 6.05 | 2 500 | 5 500 | 5.45 |
| 32 x 5L x 3.5 | R1551 315 00 | R1551 317 00 | R1551 319 00 | 31.0 | 28.4 | 6.05 | – | – | 5.45 |
| 32 x 10R x 3.969 | R1511 345 10 | R1511 347 10 | R1511 349 10 | 31.0 | 27.9 | 6.40 | – | – | 5.60 |
| 32 x 20R x 3.969 | R1511 375 10 | R1511 377 10 | R1511 379 10 | 31.0 | 27.9 | 6.39 | – | – | 5.60 |
| 32 x 32R x 3.969 | R1511 395 10 | R1511 397 10 | R1511 399 10 | 31.0 | 27.9 | 6.17 | – | – | 5.50 |
| 32 ¹⁾ x 64R x 3.969 | – | – | – | 31.0 | 27.9 | 6.04 | – | – | 5.44 |
| 40 x 5R x 3.5 | R1511 415 00 | R1511 417 00 | R1511 419 00 | 39.0 | 36.4 | 15.64 | 4 500 | 5 500 | 8.78 |
| 40 x 5L x 3.5 | R1551 415 00 | R1551 417 00 | R1551 419 00 | 39.0 | 36.4 | 15.64 | – | – | 8.78 |
| 40 x 10R x 6 | R1511 445 00 | R1511 447 00 | R1511 449 00 | 38.0 | 33.8 | 13.55 | – | 7 500 | 8.15 |
| 40 x 10L x 6 | R1551 445 00 | R1551 447 00 | R1551 449 00 | 38.0 | 33.8 | 13.55 | – | – | 8.15 |
| 40 x 12R x 6 | R1511 455 00 | R1511 457 00 | R1511 459 00 | 38.0 | 33.8 | 13.97 | – | 5 000 | 8.27 |
| 40 x 16R x 6 | R1511 465 00 | R1511 467 00 | R1511 469 00 | 38.0 | 33.8 | 12.90 | – | – | 7.95 |
| 40 x 20R x 6 | R1511 475 00 | R1511 477 00 | R1511 479 00 | 38.0 | 33.8 | 13.52 | – | 7 500 | 8.14 |
| 40 x 25R x 6 | R1511 485 00 | R1511 487 00 | R1511 489 00 | 38.0 | 33.8 | 13.51 | – | 5 000 | 8.67 |
| 40 x 30R x 6 | R1511 4A5 00 | R1511 4A7 00 | R1511 4A9 00 | 38.0 | 33.8 | 13.71 | – | – | 8.67 |
| 40 x 40R x 6 | R1511 495 10 | R1511 497 10 | R1511 499 10 | 38.0 | 33.8 | 13.42 | – | 7 500 | 8.11 |
| 50 x 5R x 3.5 | R1511 515 00 | R1511 517 00 | R1511 519 00 | 49.0 | 46.4 | 40.03 | 4 500 | 5 500 | 14.05 |
| 50 x 10R x 6 | R1511 545 00 | R1511 547 00 | R1511 549 00 | 48.0 | 43.8 | 35.71 | – | 7 500 | 13.25 |
| 50 x 12R x 6 | R1511 555 00 | R1511 557 00 | R1511 559 00 | 48.0 | 43.8 | 36.58 | – | 5 000 | 13.41 |
| 50 x 16R x 6 | R1511 565 00 | R1511 567 00 | R1511 569 00 | 48.0 | 43.8 | 34.37 | – | – | 13.00 |
| 50 x 20R x 6.5 | R1511 575 10 | R1511 577 10 | R1511 579 10 | 48.0 | 43.3 | 34.50 | – | 7 500 | 13.01 |
| 50 x 25R x 6.5 | R1511 585 00 | R1511 587 00 | R1511 589 00 | 48.0 | 43.3 | 32.40 | – | – | 12.58 |
| 50 x 30R x 6.5 | R1511 5A5 00 | R1511 5A7 00 | R1511 5A9 00 | 48.0 | 43.3 | 36.64 | – | 5 000 | 13.42 |
| 50 x 40R x 6.5 | R1511 595 10 | R1511 597 10 | R1511 599 10 | 48.0 | 43.3 | 34.34 | – | 7 500 | 12.98 |
| 63 x 10R x 6 | R1511 645 00 | R1511 647 00 | R1511 649 00 | 61.0 | 56.8 | 95.82 | 4 500 | 7 500 | 21.72 |
| 63 x 20R x 6.5 | R1511 675 10 | R1511 677 10 | R1511 679 10 | 61.0 | 56.3 | 93.29 | – | – | 21.42 |
| 63 x 40R x 6.5 | R1511 695 10 | R1511 697 10 | R1511 699 10 | 61.0 | 56.3 | 93.08 | – | – | 21.40 |
| 80 x 10R x 6.5 | R1511 745 00 | R1511 747 00 | R1511 749 00 | 78.0 | 73.3 | 256.86 | 4 500 | 7 500 | 35.58 |
| 80 ¹⁾ x 20R x 12.7 | – | – | – | 76.0 | 67.0 | 211.51 | – | – | 32.16 |
| 80 ¹⁾ x 40R x 12.7 | – | – | – | 76.0 | 67.0 | 243.51 | – | – | 33.88 |

1) Size not available as cut length

Overview of screw ends

Screw ends, forms for a left or right screw end

| Basic version | | with keyway | |
|---------------|---|-------------|--|
| 00 |  | page 59 | |
| L1 |  | page 60 | |
| | | | 02  page 62 |
| K1 K1A |  | page 64 | |
| | | | 12 12A  page 66 |
| 21 |  | page 68 | 22  page 68 |
| 31 |  | page 70 | |
| 41 |  | page 72 | |
| 51 51A |  | page 74 | 52 52A  page 74 |
| 61 |  | page 76 | 62  page 76 |
| 71 |  | page 78 | 72  page 78 |
| 81 81A |  | page 80 | 82 82A  page 80 |
| 831/83 83A |  | page 84 | 841/84 84A  page 84 |
| 91 91A |  | page 86 | 92 92A  page 86 |
| 931/93 93A |  | page 88 | 941/94 94A  page 88 |
| N1 N1A |  | page 90 | N2 N2A  page 90 |

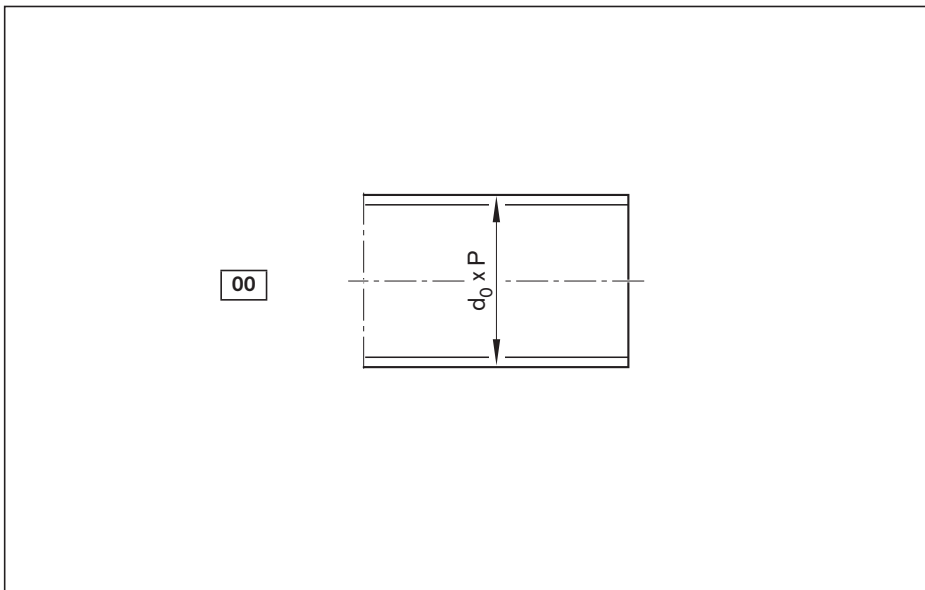
End machining of end-face

| Z Centering hole DIN 332-D | S Hex socket | G Female thread |
|---|--|---|
|  |  |  |

Abbreviations

- C = dynamic load rating
- C₀ = static load rating
- d₀ x P = size
- d₀ = nominal diameter
- F_{aB} = axial breaking load of slotted nut
- G = female thread
- n_G = limit speed (grease)
- No. = part number
- M_A = tightening torque of slotted nut
- M_{AG} = tightening torque of set screw
- M_{RL} = bearing friction torque with seal
- M_p = maximum permissible drive torque (condition: no radial load at drive journal)
- R_{fb} = rigidity (axial)
- R_{ki} = rigidity against tilting
- P = lead (R = right-hand)
- S = hex socket
- Z = centering hole

Form 00



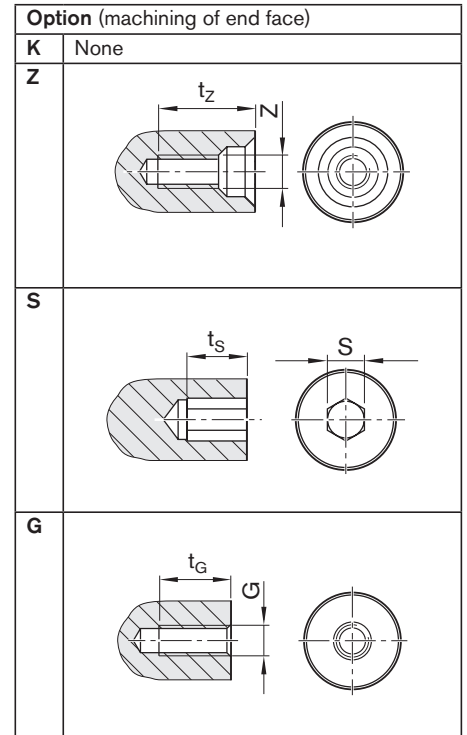
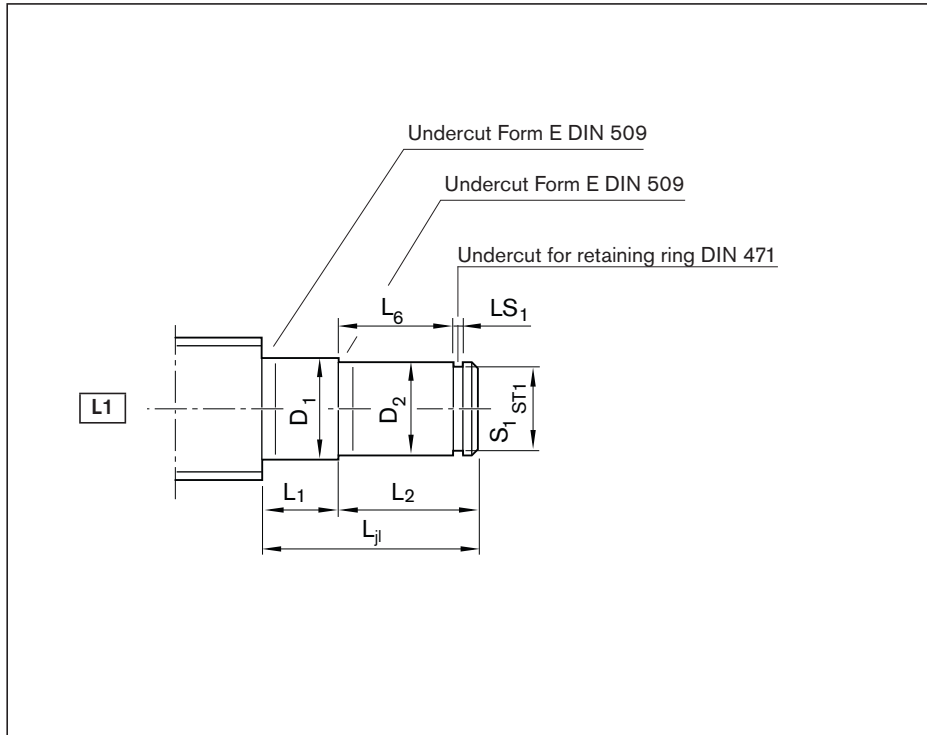
| Option (machining of end face) | |
|--------------------------------|------|
| K | None |
| Z | |
| S | |
| G | |

Ordering data:

| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 00Z200 | 82Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Form | Version | Size | | (mm) | | Centering hole | | Hex socket | | Thread | |
|------|---------|----------------|------------------------|------|----------------|----------------|----------------|------------|----------------|--------|---|
| | | d ₀ | P | Z | t _z | S | t _s | G | t _g | | |
| 00 | 060 | 6 | 1/2 | - | - | - | - | - | - | - | - |
| | 080 | 8 | 1/2/2.5/5 | - | - | - | - | - | - | - | - |
| | 120 | 12 | 2/5/10 | M3 | 9 | 4 | 4 | M4 | 6 | 6 | |
| | 160 | 16 | 5/10/16 | M4 | 10 | 5 | 5 | M5 | 8 | 8 | |
| | 200 | 20 | 5/10/20/40 | M6 | 16 | 8 | 8 | M6 | 9 | 9 | |
| | 250 | 25 | 5/10/25 | M8 | 19 | 10 | 10 | M8 | 12 | 12 | |
| | 320 | 32 | 5/10/20/32/64 | M10 | 22 | 12 | 12 | M10 | 15 | 15 | |
| | 400 | 40 | 5/10/12/16/20/25/30/40 | M12 | 28 | 14 | 14 | M12 | 18 | 18 | |
| | 500 | 50 | 5/10/12/16/20/25/30/40 | M16 | 36 | 17 | 17 | M16 | 24 | 24 | |
| | 630 | 63 | 10/20/40 | M20 | 42 | 17 | 17 | M20 | 30 | 30 | |
| 800 | 80 | 10/20/40 | M20 | 42 | 19 | 19 | M24 | 36 | 36 | | |

Form L1



Ordering data:

| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 02Z120 | 82Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Form | Version ¹⁾ | (mm) | | | | | | | | | | |
|------|-----------------------|----------------|------------------------|-----------------|-----------------------|----------------|----------------------|----------------|----------------|----------------|-----------------|------------------------|
| | | d ₀ | P | L _{ji} | D ₁ h11 | L ₁ | D ₂ j6 | L ₂ | L ₆ | S ₁ | S _{T1} | L _{S1} H13 |
| L1 | 050 | 8 | 1/2/2.5/5 | 17 | 6.0 | 10 | 5 | 7 | 5 | 4.8 | h10 | 0.70 |
| | 060 | 12 | 2/5/10 | 18 | 9.5 | 10 | 6 | 8 | 6 | 5.7 | h10 | 0.80 |
| | 100 | 16 | 5/10/16 | 22 | 12.5 | 10 | 10 | 12 | 9 | 9.6 | h10 | 1.10 |
| | 120 | 20 | 5/10/20/40 | 23 | 16.0 | 10 | 12 | 13 | 10 | 11.5 | h11 | 1.10 |
| | 150 | 20 | 5/10/20/40 | 24 | 16.0 | 10 | 15 | 14 | 11 | 14.3 | h11 | 1.10 |
| | 170 | 25 | 5/10/25 | 25 | 21.0 | 10 | 17 | 15 | 12 | 16.2 | h11 | 1.10 |
| | 200 | 32 | 5/10/20/32/64 | 28 | 27.5 | 10 | 20 | 18 | 14 | 19.0 | h11 | 1.30 |
| | 250 | 32 | 5/10/20/32/64 | 29 | 27.5 | 10 | 25 | 19 | 15 | 23.9 | h12 | 1.30 |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 30 | 33.5 | 10 | 30 | 20 | 16 | 28.6 | h12 | 1.60 |
| | 350 | 50 | 5/10/12/16/20/25/30/40 | 32 | 43.0 | 10 | 35 | 22 | 17 | 33.0 | h12 | 1.60 |
| | 500 | 63 | 10/20/40 | 37 | 56.0 | 10 | 50 | 27 | 20 | 47.0 | h12 | 2.15 |
| | 600 | 80 | 10/20/40 | 39 | 66.5 | 10 | 60 | 29 | 22 | 57.0 | h12 | 2.15 |

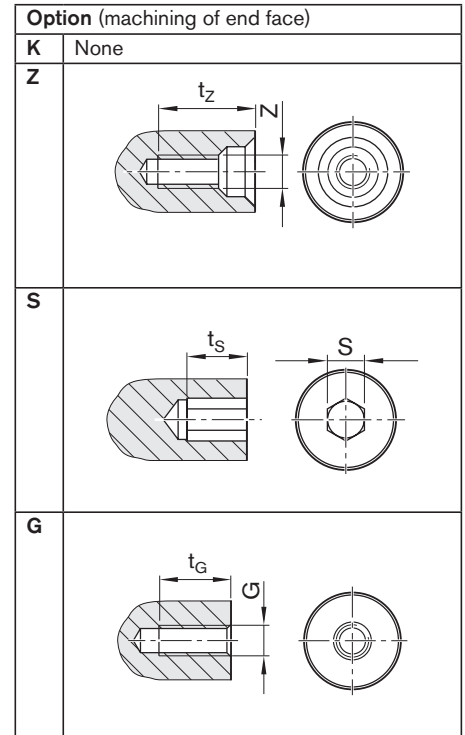
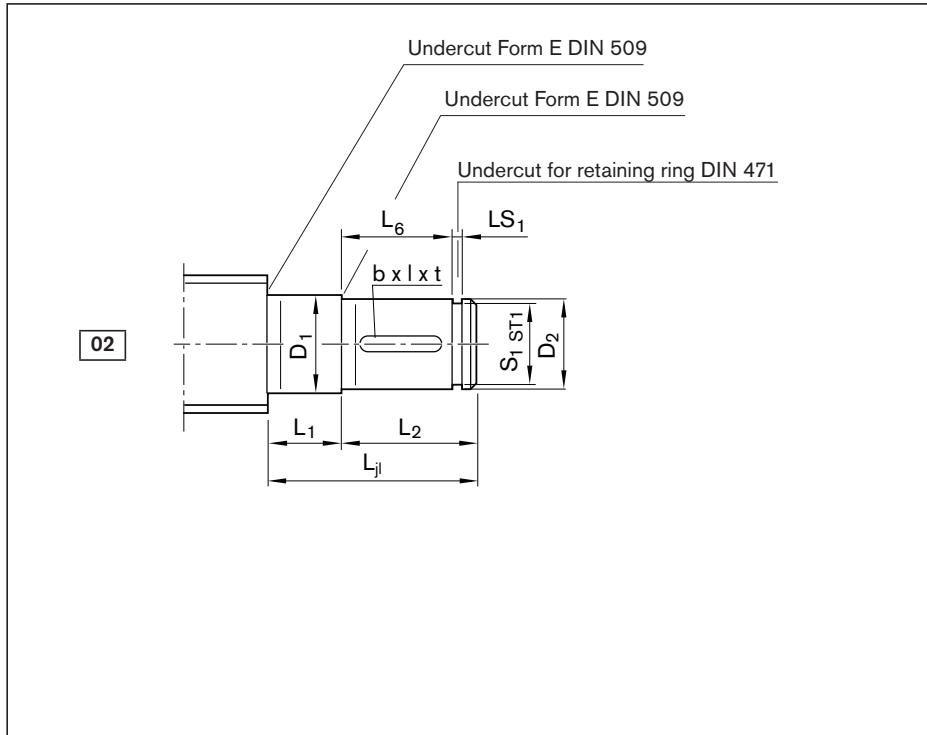
1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

End bearings for screw ends
Form L1



| Version ¹⁾ | Centering hole | | Hex socket | | Thread | | Deep-groove ball bearing | | Retaining ring | |
|-----------------------|----------------|----------------|------------|----------------|--------|----------------|--------------------------|--------------|----------------|--------------|
| | Z | t _z | S | t _s | G | t _g | Abbreviation | Part number | Abbreviation | Part number |
| 050 | – | – | – | – | – | – | 625.2RS | R3414 048 00 | 5x0.6 | R3410 742 00 |
| 060 | – | – | – | – | – | – | 626.2RS | R3414 043 00 | 10x1 | R3410 736 00 |
| 100 | M3 | 9.0 | 4 | 4 | M4 | 6 | 6200.2RS | R3414 049 00 | 10x1 | R3410 745 00 |
| 120 | M4 | 10.0 | 4 | 4 | M5 | 8 | 6201.2RS | R3414 042 00 | 12x1 | R3410 712 00 |
| 150 | M5 | 12.5 | 4 | 4 | M6 | 9 | 6202.2RS | R3414 074 00 | 15x1 | R3410 748 00 |
| 170 | M6 | 16.0 | 5 | 5 | M6 | 9 | 6203.2RS | R3414 050 00 | 17x1 | R3410 749 00 |
| 200 | M6 | 16.0 | 5 | 5 | M8 | 12 | 6204.2RS | R3414 038 00 | 20x1.2 | R3410 735 00 |
| 250 | M10 | 22.0 | 8 | 8 | M10 | 15 | 6205.2RS | R3414 063 00 | 25x1.2 | R3410 750 00 |
| 300 | M10 | 22.0 | 10 | 10 | M12 | 18 | 6206.2RS | R3414 051 00 | 30x1.5 | R3410 724 00 |
| 350 | M12 | 28.0 | 12 | 12 | M12 | 18 | 6207.2RS | R3414 075 00 | 35x1.5 | R3410 725 00 |
| 500 | M16 | 36.0 | 19 | 19 | M20 | 30 | 6210.2RS | R3414 077 00 | 50x2 | R3410 727 00 |
| 600 | M20 | 42.0 | 19 | 19 | M24 | 36 | 6212.2RS | R3414 078 00 | 60x2 | R3410 764 00 |

Form 02



Ordering data:

| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 02Z120 | 82Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | | | | | | | | | Keyway as per DIN 6885 | | |
|------|-----------------------|----------------|------------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------|----------------|-----|------------------------|---------|------------------------|-----|--|
| | | d ₀ | P | L _{jl} | D ₁ j6 | L ₁ | D ₂ h7 | L ₂ | L ₆ | S ₁ | ST1 | LS ₁ H13 | b P9 | l | t | |
| 02 | 100 | 16 | 5/10/16 | 32 | 10 | 9 | 8 | 23 | 20 | 7.6 | h10 | 0.90 | 2 | 14 | 1.2 | |
| | 120 | 20 | 5/10/20/40 | 38 | 12 | 10 | 10 | 28 | 25 | 9.6 | h10 | 1.10 | 3 | 20 | 1.8 | |
| | 150 | 20 | 5/10/20/40 | 39 | 15 | 11 | 12 | 28 | 25 | 11.5 | h11 | 1.10 | 4 | 20 | 2.5 | |
| | 170 | 25 | 5/10/25 | 45 | 17 | 12 | 15 | 33 | 30 | 14.3 | h11 | 1.10 | 5 | 25 | 3.0 | |
| | 200 | 32 | 5/10/20/32/64 | 58 | 20 | 14 | 18 | 44 | 40 | 17.0 | h11 | 1.30 | 6 | 28 | 3.5 | |
| | 250 | 32 | 5/10/20/32/64 | 69 | 25 | 15 | 22 | 54 | 50 | 21.0 | h11 | 1.30 | 6 | 36 | 3.5 | |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 70 | 30 | 16 | 28 | 54 | 50 | 26.6 | h12 | 1.60 | 8 | 36 | 4.0 | |
| | 350 | 50 | 5/10/12/16/20/25/30/40 | 82 | 35 | 17 | 32 | 65 | 60 | 30.3 | h12 | 1.60 | 10 | 40 | 5.0 | |
| | 500 | 63 | 10/20/40 | 107 | 50 | 20 | 48 | 87 | 80 | 45.5 | h12 | 1.85 | 14 | 63 | 5.5 | |
| | 600 | 80 | 10/20/40 | 109 | 60 | 22 | 58 | 87 | 80 | 55.0 | h12 | 2.15 | 16 | 63 | 6.0 | |

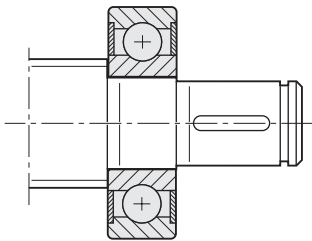
1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

**End bearings for screw ends
Form 02**

Deep-groove ball bearing as per DIN 625



Application



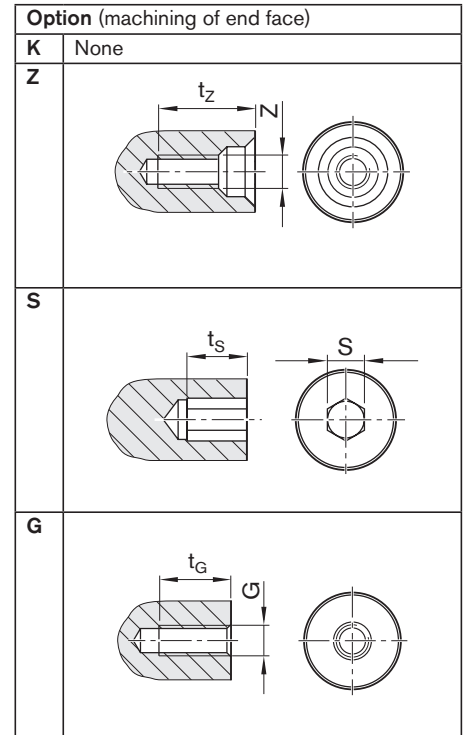
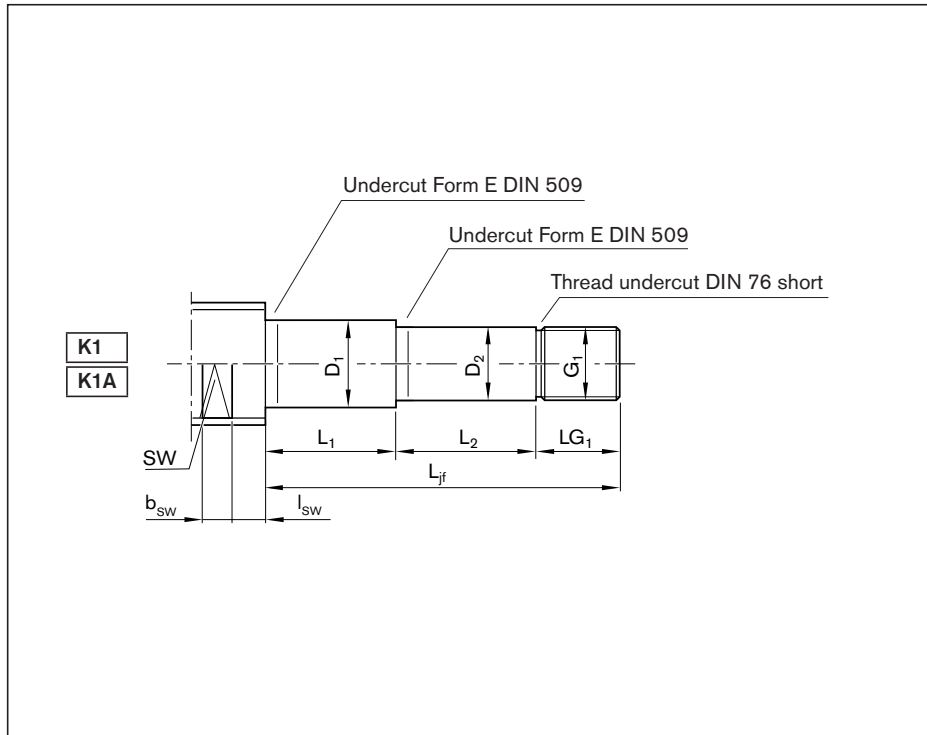
Separate technical dimensioning of the permissible drive torque is absolutely necessary.

Retaining ring as per DIN 471



| Version ¹⁾ | Centering hole | | Hex socket | | Thread | | Deep-groove ball bearing | | Retaining ring | |
|-----------------------|----------------|----------------|------------|----------------|--------|----------------|--------------------------|--------------|----------------|--------------|
| | Z | t _Z | S | t _S | G | t _G | Abbreviation | Part number | Abbreviation | Part number |
| 100 | M3 | 9.0 | - | - | M3 | 5 | 6200.2RS | R3414 049 00 | 8x0.8 | R3410 737 00 |
| 120 | M3 | 9.0 | 4 | 4 | M4 | 6 | 6201.2RS | R3414 042 00 | 10x1 | R3410 745 00 |
| 150 | M4 | 10.0 | 4 | 4 | M5 | 8 | 6202.2RS | R3414 074 00 | 12x1 | R3410 712 00 |
| 170 | M5 | 12.5 | 4 | 4 | M6 | 9 | 6203.2RS | R3414 050 00 | 15x1 | R3410 748 00 |
| 200 | M6 | 16.0 | 5 | 5 | M6 | 9 | 6204.2RS | R3414 038 00 | 18x1.2 | R3410 723 00 |
| 250 | M8 | 19.0 | 6 | 6 | M8 | 12 | 6205.2RS | R3414 063 00 | 22x1.2 | R3410 714 00 |
| 300 | M10 | 22.0 | 10 | 10 | M10 | 15 | 6206.2RS | R3414 051 00 | 28x1.5 | R3410 752 00 |
| 350 | M12 | 28.0 | 10 | 10 | M12 | 18 | 6207.2RS | R3414 075 00 | 32x1.5 | R3410 753 00 |
| 500 | M16 | 36.0 | 17 | 17 | M16 | 24 | 6210.2RS | R3414 077 00 | 48x1.75 | R3410 718 00 |
| 600 | M20 | 42.0 | 19 | 19 | M20 | 30 | 6212.2RS | R3414 078 00 | 58x2 | R3410 728 00 |

Form K1, K1A



Ordering data:

| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|---------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | K1AZ120 | 41Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|---------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | | | | | | | Centering hole | | Hex socket | |
|--------|-----------------------|----------------|------------------------|-----------------|-----------------------|----------------------|----------------------|----------------|----------------|-----------------|-----|----------------|----|----------------|--|
| | | d ₀ | P | L _{jf} | D ₁ h11 | L ₁ h6 | D ₂ h6 | L ₂ | G ₁ | L _{G1} | Z | t _z | S | t _s | |
| K1/K1A | 100 | 16 | 5/10/16 | 40 | 12.5 | 10 | 10 | 18 | M10x1 | 12 | M3 | 9.0 | 4 | 4 | |
| | 120 | 20 | 5/10/20/40 | 45 | 16.0 | 10 | 12 | 23 | M12x1 | 12 | M4 | 10.0 | 4 | 4 | |
| | 170 | 25 | 5/10/25 | 55 | 21.0 | 10 | 17 | 23 | M17x1 | 22 | M6 | 16.0 | 5 | 5 | |
| | 200 | 32 | 5/10/20/32/64 | 58 | 27.5 | 10 | 20 | 26 | M20x1 | 22 | M6 | 16.0 | 5 | 5 | |
| | 250 | 40 | 5/10/12/16/20/25/30/40 | 90 | 33.5 | 10 | 25 | 54 | M25x1.5 | 26 | M10 | 22.0 | 8 | 8 | |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 61 | 33.5 | 10 | 30 | 25 | M30x1.5 | 26 | M10 | 22.0 | 10 | 10 | |
| | 301 | 50 | 5/10/12/16/20/25/30/40 | 90 | 43.0 | 10 | 30 | 54 | M30x1.5 | 26 | M10 | 22.0 | 10 | 10 | |
| | 350 | 50 | 5 | 70 | 45.0 | 10 | 35 | 32 | M35x1.5 | 28 | M12 | 28.0 | 12 | 12 | |
| | 400 | 63 | 10/20/40 | 82 | 56.0 | 10 | 40 | 44 | M40x1.5 | 28 | M16 | 36.0 | 12 | 12 | |
| | 500 | 80 | 10/20/40 | 94 | 66.5 | 10 | 50 | 52 | M50x1.5 | 32 | M16 | 36.0 | 19 | 19 | |

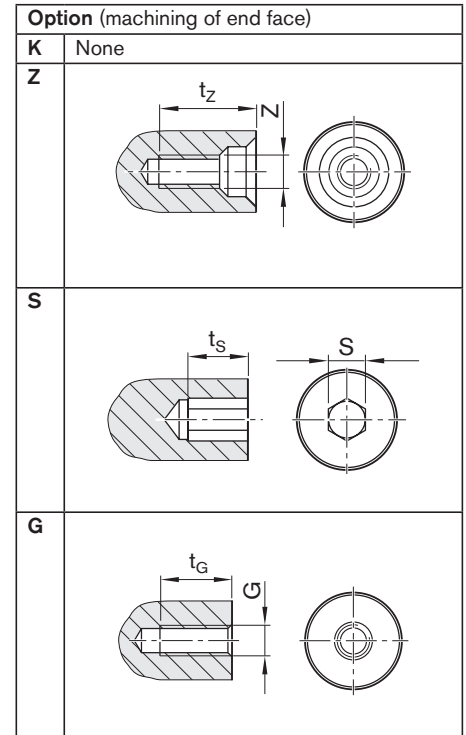
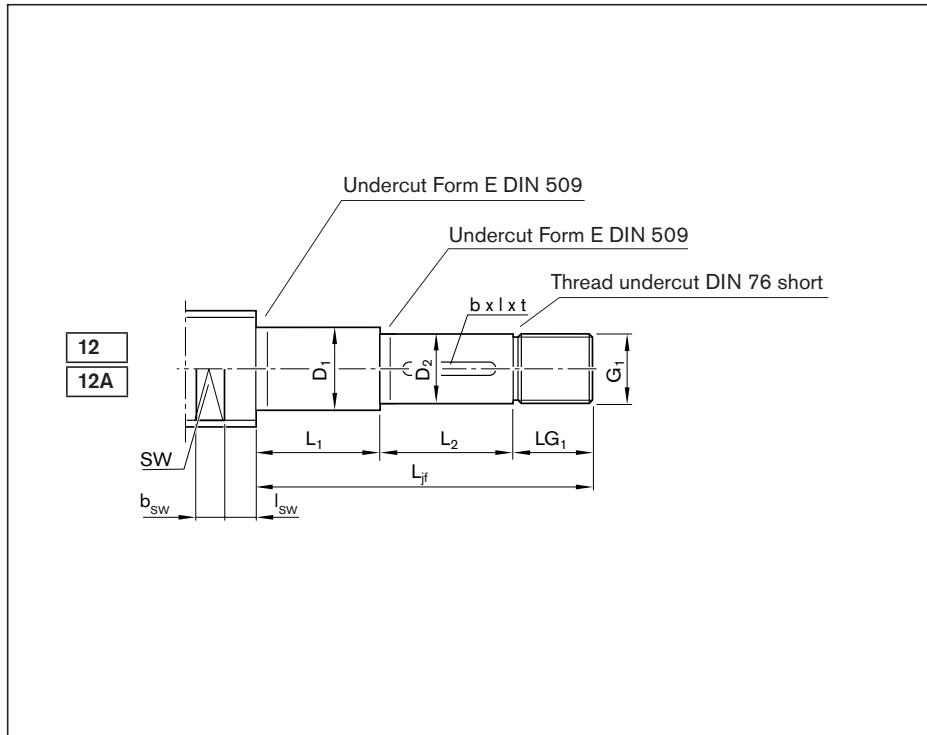
1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

End bearings for screw ends
Form K1, K1A



| Version ¹⁾ | Thread | | Wrench size | | | Angular-contact thrust ball bearing | | | | Slotted nut NMZ/NMA | |
|-----------------------|--------|----------------|-------------|-----------------|-----------------|-------------------------------------|--------------|--------------|--------------|---------------------|--------------|
| | G | t _g | SW | b _{sw} | l _{sw} | LGF | | LGN | | NMZ/NMA | |
| | | | | | | Abbreviation | Part number | Abbreviation | Part number | Abbreviation | Part number |
| 100 | M4 | 6 | 11 | 10 | 8.5 | – | – | LGN-B-1034 | R3414 003 06 | NMZ 10x1 | R3446 002 04 |
| 120 | M5 | 8 | 15 | 10 | 8.5 | LGF-B-1255 | R3414 009 06 | LGN-B-1242 | R3414 004 06 | NMZ 12x1 | R3446 003 04 |
| 170 | M6 | 9 | 19 | 10 | 10.5 | LGF-B-1762 | R3414 010 06 | LGN-B-1747 | R3414 005 06 | NMA 17x1 | R3446 014 04 |
| 200 | M8 | 12 | 24 | 15 | 10.5 | LGF-B-2068 | R3414 001 06 | LGN-B-2052 | R3414 006 06 | NMA 20x1 | R3446 015 04 |
| 250 | M10 | 15 | 30 | 15 | 12.5 | LGF-C-2575 | R3414 015 06 | LGN-C-2557 | R3414 014 06 | NMA 25x1.5 | R3446 011 04 |
| 300 | M12 | 18 | 30 | 15 | 12.5 | LGF-B-3080 | R3414 011 06 | LGN-B-3062 | R3414 007 06 | NMA 30x1.5 | R3446 016 04 |
| 301 | M12 | 18 | 41 | 22 | 15.5 | LGF-C-3080 | R3414 027 06 | LGN-C-3062 | R3414 023 06 | NMA 30x1.5 | R3446 016 04 |
| 350 | M12 | 18 | 41 | 22 | 15.5 | LGF-B-3590 | R3414 026 06 | LGN-B-3572 | R3414 022 06 | NMA 35x1.5 | R3446 012 04 |
| 400 | M16 | 24 | 50 | 27 | 16.5 | LGF-B-40115 | R3414 028 06 | LGN-A-4090 | R3414 024 06 | NMA 40x1.5 | R3446 018 04 |
| 500 | M20 | 30 | 60 | 27 | 18.5 | LGF-A-50140 | R3414 029 06 | LGN-A-50110 | R3414 025 06 | NMA 50x1.5 | R3446 019 04 |

Form 12, 12A



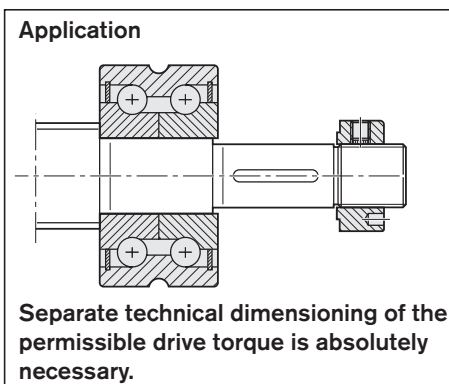
Ordering data:

| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|---------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | K1AZ120 | 41Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|---------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | | | | | | | Keyway as per DIN 6885 | | | Centering hole | | Hex socket | |
|--------|-----------------------|----------------|------------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------|-----------------|---------|------------------------|-----|-----|----------------|----|----------------|--|
| | | d ₀ | P | L _{ff} | D ₁ h6 | L ₁ | D ₂ h7 | L ₂ | G ₁ | LG ₁ | b P9 | l | t | Z | t _z | S | t _s | |
| 12/12A | 100 | 16 | 5/10/16 | 48 | 10 | 18 | 8 | 20 | M6x0.5 | 10 | 2 | 14 | 1.2 | - | - | - | - | |
| | 120 | 20 | 5/10/20/40 | 60 | 12 | 23 | 10 | 25 | M10x1 | 12 | 3 | 20 | 1.8 | M3 | 9.0 | 4 | 4 | |
| | 170 | 25 | 5/10/25 | 75 | 17 | 23 | 15 | 30 | M15x1 | 22 | 5 | 25 | 3.0 | M5 | 12.5 | 4 | 4 | |
| | 200 | 32 | 5/10/20/32/64 | 88 | 20 | 26 | 18 | 40 | M17x1 | 22 | 6 | 28 | 3.5 | M6 | 16.0 | 5 | 5 | |
| | 250 | 40 | 5/10/12/16/20/25/30/40 | 126 | 25 | 54 | 22 | 50 | M20x1 | 22 | 6 | 36 | 3.5 | M6 | 16.0 | 5 | 5 | |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 101 | 30 | 25 | 28 | 50 | M25x1.5 | 26 | 8 | 36 | 4.0 | M10 | 22.0 | 8 | 8 | |
| | 301 | 50 | 5/10/12/16/20/25/30/40 | 130 | 30 | 54 | 28 | 50 | M25x1.5 | 26 | 8 | 36 | 4.0 | M10 | 22.0 | 8 | 8 | |
| | 350 | 50 | 5 | 118 | 35 | 32 | 32 | 60 | M30x1.5 | 26 | 10 | 40 | 5.0 | M10 | 22.0 | 10 | 10 | |
| | 400 | 63 | 10/20/40 | 132 | 40 | 44 | 38 | 60 | M35x1.5 | 28 | 10 | 40 | 5.0 | M12 | 28.0 | 12 | 12 | |
| | 500 | 80 | 10/20/40 | 160 | 50 | 52 | 48 | 80 | M40x1.5 | 28 | 14 | 63 | 5.5 | M16 | 36.0 | 12 | 12 | |

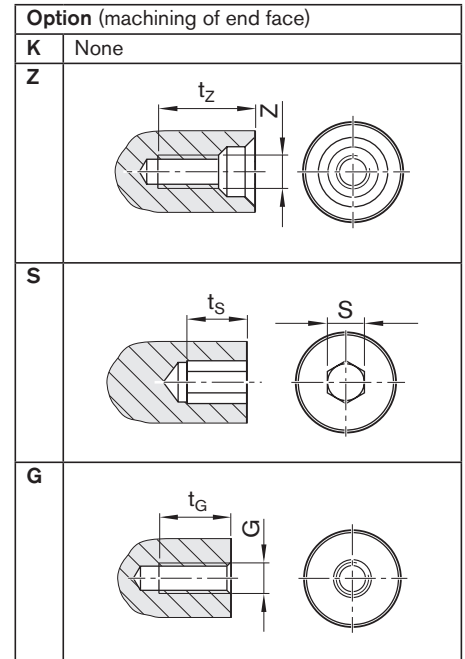
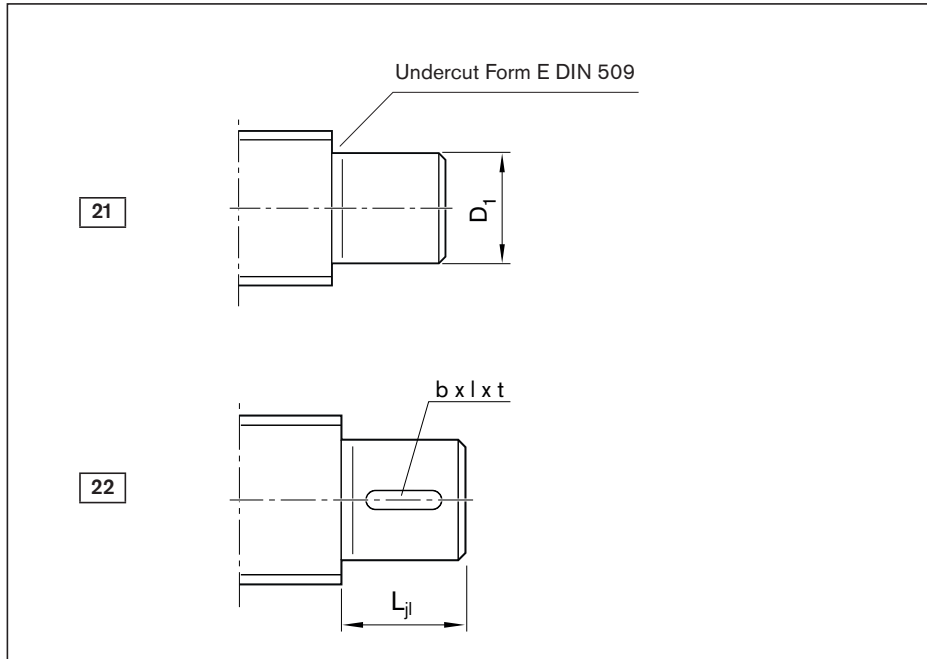
1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

End bearings for screw ends
Form 12, 12A



| Version ¹⁾ | Thread | | Wrench size | | | Angular-contact thrust ball bearing | | | | Slotted nut | |
|-----------------------|--------|----------------|-------------|-----------------|-----------------|-------------------------------------|--------------|--------------|--------------|--------------|--------------|
| | G | t _G | SW | b _{SW} | l _{SW} | LGF | | LGN | | NMZ/NMA | |
| | | | | | | Abbreviation | Part number | Abbreviation | Part number | Abbreviation | Part number |
| 100 | - | - | 11 | 10 | 8.5 | - | - | LGN-B-1034 | R3414 003 06 | NMZ6x0.5 | R3446 001 04 |
| 120 | M4 | 6 | 15 | 10 | 8.5 | LGF-B-1255 | R3414 009 06 | LGN-B-1242 | R3414 004 06 | NMZ10x1 | R3446 002 04 |
| 170 | M6 | 9 | 19 | 10 | 10.5 | LGF-B-1762 | R3414 010 06 | LGN-B-1747 | R3414 005 06 | NMA15x1 | R3446 020 04 |
| 200 | M6 | 9 | 24 | 15 | 10.5 | LGF-B-2068 | R3414 001 06 | LGN-B-2052 | R3414 006 06 | NMA17x1 | R3446 014 04 |
| 250 | M8 | 12 | 30 | 15 | 12.5 | LGF-B-2575 | R3414 015 06 | LGN-C-2557 | R3414 014 06 | NMA20x1 | R3446 015 04 |
| 300 | M10 | 15 | 30 | 15 | 12.5 | LGF-B-3080 | R3414 011 06 | LGN-B-3062 | R3414 007 06 | NMA25x1.5 | R3446 011 04 |
| 301 | M10 | 15 | 41 | 22 | 15.5 | LGF-C-3080 | R3414 027 06 | LGN-C-3062 | R3414 023 06 | NMA25x1.5 | R3446 011 04 |
| 350 | M12 | 18 | 41 | 22 | 15.5 | LGF-B-3590 | R3414 026 06 | LGN-B-3572 | R3414 022 06 | NMA30x1.5 | R3446 016 04 |
| 400 | M12 | 18 | 50 | 27 | 16.5 | LGF-B-40115 | R3414 028 06 | LGN-A-4090 | R3414 024 06 | NMA35x1.5 | R3446 012 04 |
| 500 | M16 | 24 | 60 | 27 | 18.5 | LGF-A-50140 | R3414 029 06 | LGN-A-50110 | R3414 025 06 | NMA40x1.5 | R3446 018 04 |

Form 21, 22



Ordering data:

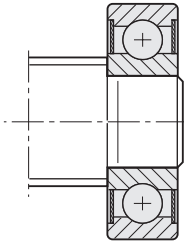
| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 21Z120 | 82Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | Keyway as per DIN 6885 | | | Centering hole | |
|------|-----------------------|----------|------------------------|----------|-------------|------------------------|----|-----|----------------|-------|
| | | d_0 | P | L_{jl} | D_1 j6 | b P9 | l | t | Z | t_z |
| 21 | 050 | 8 | 1/2/2.5/5 | 5 | 5 | - | - | - | - | - |
| | 060 | 12 | 2/5/10 | 6 | 6 | - | - | - | - | - |
| | 100 | 16 | 5/10/16 | 9 | 10 | - | - | - | M3 | 9.0 |
| | 120 | 20 | 5/10/20/40 | 10 | 12 | - | - | - | M4 | 10.0 |
| | 150 | 20 | 5/10/20/40 | 11 | 15 | - | - | - | M5 | 12.5 |
| | 170 | 25 | 5/10/25 | 12 | 17 | - | - | - | M6 | 16.0 |
| | 200 | 32 | 5/10/20/32/64 | 14 | 20 | - | - | - | M6 | 16.0 |
| | 250 | 32 | 5/10/20/32/64 | 15 | 25 | - | - | - | M10 | 22.0 |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 16 | 30 | - | - | - | M10 | 22.0 |
| | 350 | 50 | 5/10/12/16/20/25/30/40 | 17 | 35 | - | - | - | M12 | 28.0 |
| 500 | 63 | 10/20/40 | 20 | 50 | - | - | - | M16 | 36.0 | |
| 600 | 80 | 10/20 | 22 | 60 | - | - | - | M20 | 42.0 | |
| 22 | 100 | 16 | 5/10/16 | 11 | 10 | 3 | 6 | 1.8 | M3 | 9.0 |
| | 120 | 20 | 5/10/20/40 | 13 | 12 | 4 | 8 | 2.5 | M4 | 10.0 |
| | 150 | 20 | 5/10/20/40 | 15 | 15 | 5 | 10 | 3.0 | M5 | 12.5 |
| | 170 | 25 | 5/10/25 | 15 | 17 | 5 | 10 | 3.0 | M6 | 16.0 |
| | 200 | 32 | 5/10/20/32/64 | 24 | 20 | 6 | 14 | 3.5 | M6 | 16.0 |
| | 250 | 32 | 5/10/20/32/64 | 28 | 25 | 8 | 18 | 4.0 | M10 | 22.0 |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 28 | 30 | 8 | 18 | 4.0 | M10 | 22.0 |
| | 350 | 50 | 5/10/12/16/20/25/30/40 | 32 | 35 | 10 | 22 | 5.0 | M12 | 28.0 |
| | 500 | 63 | 10/20/40 | 46 | 50 | 14 | 36 | 5.5 | M16 | 36.0 |
| | 600 | 80 | 10/20/40 | 60 | 60 | 18 | 50 | 7.0 | M20 | 42.0 |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.


End bearings for screw ends in Form 21

Application



Separate technical dimensioning of the permissible drive torque is absolutely necessary.

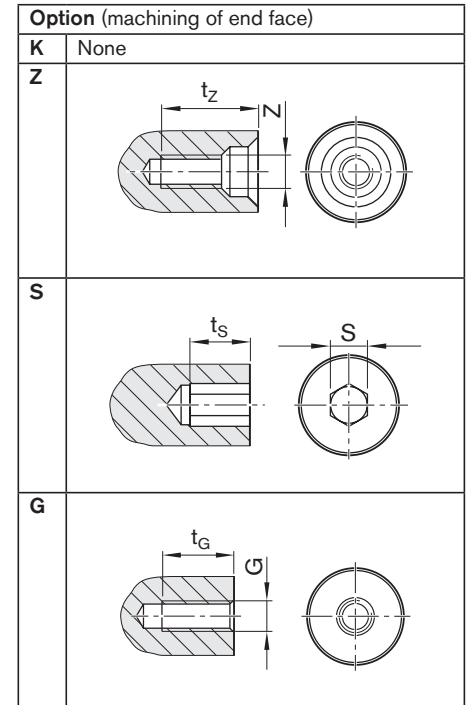
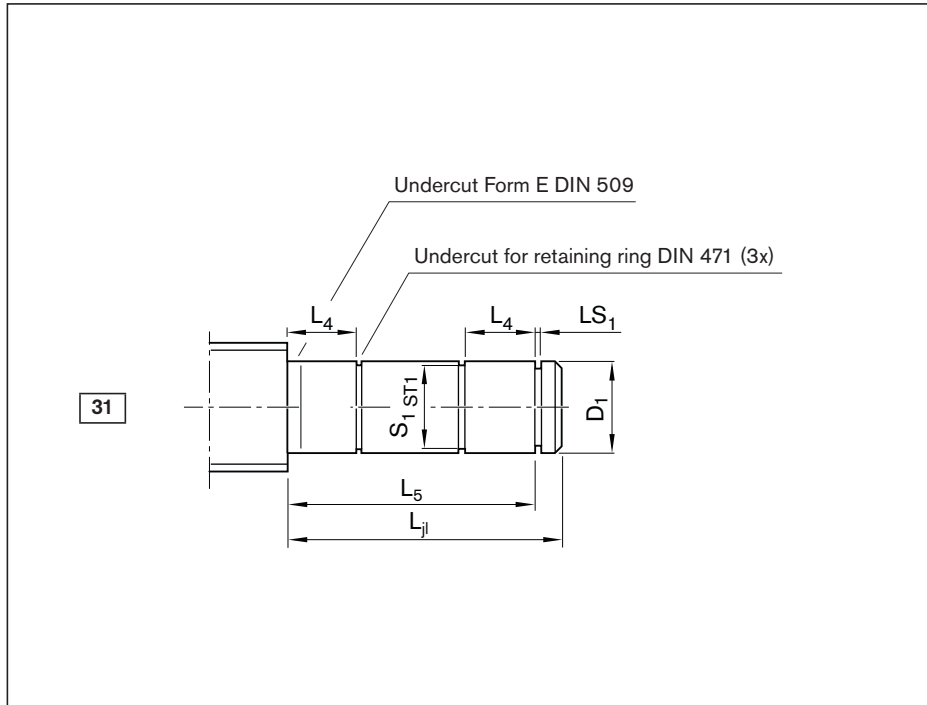
Bearing assembly LAD²⁾



| Version ¹⁾ | Hex socket S | t _s | Thread G | t _G | Bearing assembly (deep-groove ball bearing as per DIN 625) LAD | |
|-----------------------|-----------------|----------------|-------------|----------------|---|--------------|
| | | | | | Abbreviation | Part number |
| 050 | – | – | – | – | 625.2RS | R3414 048 00 |
| 060 | – | – | – | – | 626.2RS | R3414 043 00 |
| 100 | 4 | 4 | M4 | 6 | 6200.2RS | R3414 049 00 |
| 120 | 4 | 4 | M5 | 8 | 6201.2RS | R3414 042 00 |
| 150 | 4 | 4 | M6 | 9 | 6202.2RS | R3414 074 00 |
| 170 | 5 | 5 | M6 | 9 | 6203.2RS | R3414 050 00 |
| 200 | 5 | 5 | M8 | 12 | 6204.2RS | R3414 038 00 |
| 250 | 8 | 8 | M10 | 15 | 6205.2RS | R3414 063 00 |
| 300 | 10 | 10 | M12 | 18 | 6206.2RS | R3414 051 00 |
| 350 | 12 | 12 | M12 | 18 | 6207.2RS | R3414 075 00 |
| 500 | 19 | 19 | M20 | 30 | 6210.2RS | R3414 077 00 |
| 600 | 19 | 19 | M24 | 36 | 6212.2RS | R3414 078 00 |
| 100 | 4 | 4 | M4 | 6 | – | – |
| 120 | 4 | 4 | M5 | 8 | – | – |
| 150 | 4 | 4 | M6 | 9 | – | – |
| 170 | 5 | 5 | M6 | 9 | – | – |
| 200 | 5 | 5 | M8 | 12 | – | – |
| 250 | 8 | 8 | M10 | 15 | – | – |
| 300 | 10 | 10 | M12 | 18 | – | – |
| 350 | 12 | 12 | M12 | 18 | – | – |
| 500 | 19 | 19 | M20 | 30 | – | – |
| 600 | 19 | 19 | M24 | 36 | – | – |

2) Scope of delivery: 1 bearing, 2 retaining rings.

Form 31



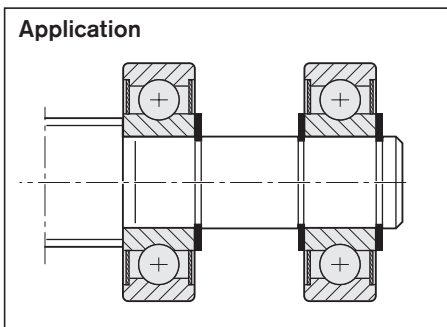
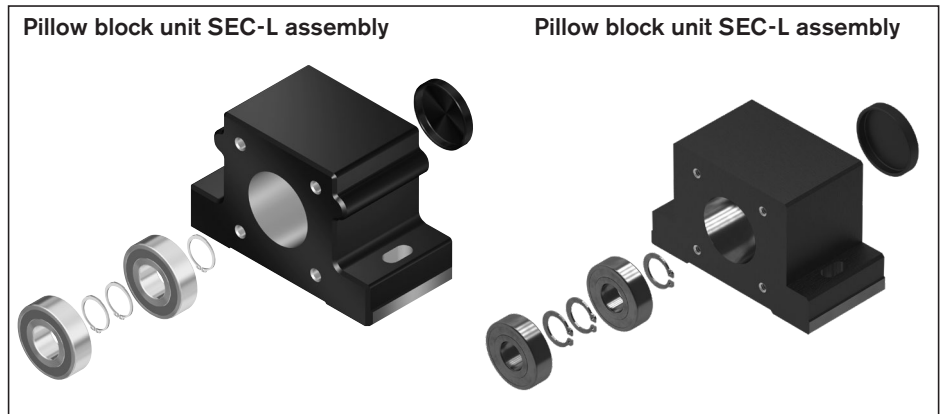
Ordering data:

| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 31Z120 | 82Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | | | | | | Centering hole | |
|------|-----------------------|----------|------------------------|----------|-------------|-------|-------|-------|------|---------------|----------------|-------|
| | | d_0 | P | L_{ij} | D_1 j6 | L_4 | L_5 | S_1 | ST1 | LS_1 H13 | Z | t_z |
| 31 | 050 | 8 | 1/2/2.5/5 | 22 | 5 | 5 | 20 | 4.8 | h10 | 0.70 | - | - |
| | 060 | 12 | 2/5/10 | 26 | 6 | 6 | 24 | 5.7 | h10 | 0.80 | - | - |
| | 100 | 16 | 5/10/16 | 39 | 10 | 9 | 36 | 9.6 | h10 | 1.10 | M3 | 9.0 |
| | 120 | 20 | 5/10/20/40 | 43 | 12 | 10 | 40 | 11.5 | h11 | 1.10 | M4 | 10.0 |
| | 150 | 20 | 5/10/20/40 | 47 | 15 | 11 | 44 | 14.3 | h11 | 1.10 | M5 | 12.5 |
| | 170 | 25 | 5/10/25 | 51 | 17 | 12 | 48 | 16.2 | h11 | 1.10 | M6 | 16.0 |
| | 200 | 32 | 5/10/20/32/64 | 60 | 20 | 14 | 56 | 19.0 | h11 | 1.30 | M6 | 16.0 |
| | 250 | 32 | 5/10/20/32/64 | 64 | 25 | 15 | 60 | 23.9 | h12 | 1.30 | M10 | 22.0 |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 68 | 30 | 16 | 64 | 28.6 | h12 | 1.60 | M10 | 22.0 |
| | 350 | 50 | 5/10/12/16/20/25/30/40 | 73 | 35 | 17 | 68 | 33.0 | h12 | 1.60 | M12 | 28.0 |
| | 500 | 63 | 10/20/40 | 87 | 50 | 20 | 80 | 47.0 | h12 | 2.15 | M16 | 36.0 |
| 600 | 80 | 10/20/40 | 95 | 60 | 22 | 88 | 57.0 | h12 | 2.15 | M20 | 42.0 | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.
Note: Form 31 with double floating bearing increases the critical speed, n_{cr} . See "Critical speed n_{cr} " on page 174.

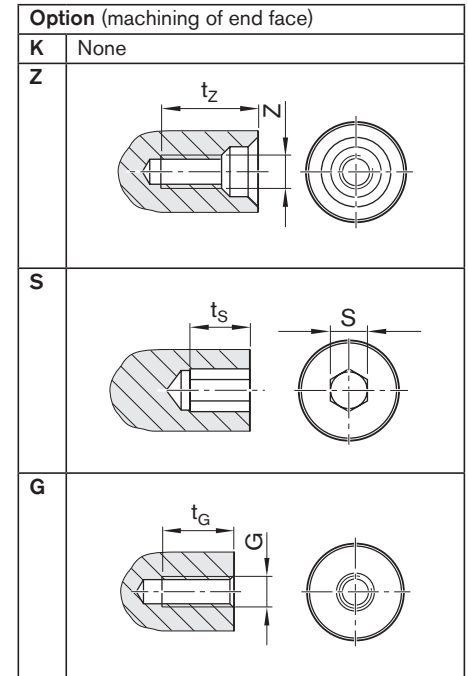
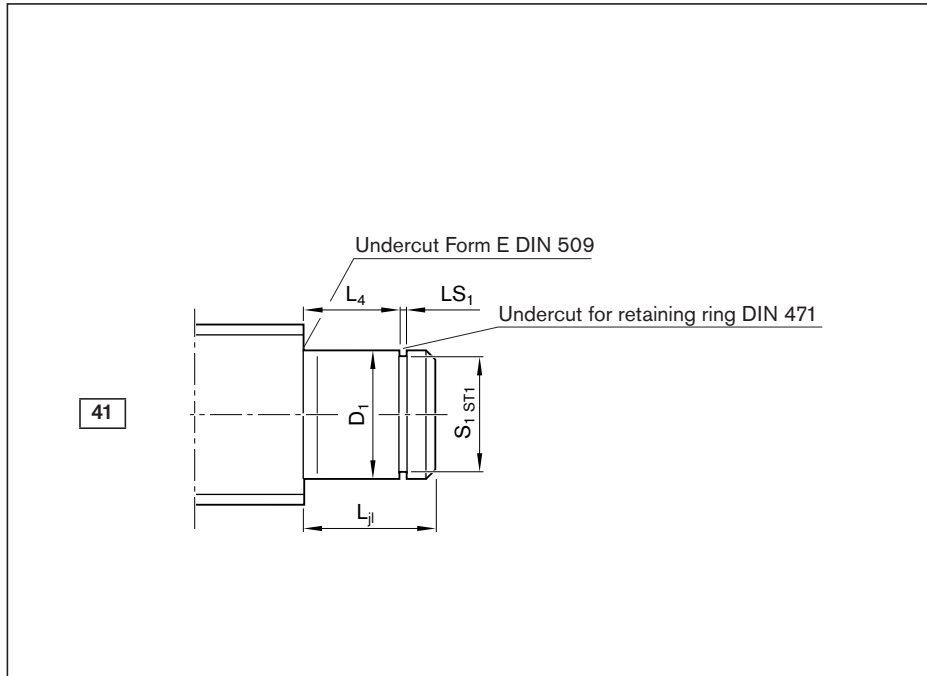
**End bearings
for screw ends in Form 31**



| Version ¹⁾ | Hex socket | | Thread G | t _G | Module Pillow block unit SEC-L | | Bearing LAD ²⁾ Part number |
|-----------------------|------------|----------------|-------------|----------------|--------------------------------------|----------------------|---|
| | S | t _S | | | Part number | SES-L Part number | |
| 050 | - | - | - | - | - | - | R1590 605 00 |
| 060 | - | - | - | - | - | - | R1590 606 00 |
| 100 | 4 | 4 | M4 | 6 | - | - | R1590 610 00 |
| 120 | 4 | 4 | M5 | 8 | - | - | R1590 612 00 |
| 150 | 4 | 4 | M6 | 9 | R1594 615 00 | R1595 615 00 | R1590 615 00 |
| 170 | 5 | 5 | M6 | 9 | - | R1595 617 00 | R1590 617 00 |
| 200 | 5 | 5 | M8 | 12 | R1594 620 00 | R1595 620 00 | R1590 620 00 |
| 250 | 8 | 8 | M10 | 15 | - | - | R1590 625 00 |
| 300 | 10 | 10 | M12 | 18 | R1594 630 00 | R1595 630 00 | R1590 630 00 |
| 350 | 12 | 12 | M12 | 18 | - | - | R1590 635 00 |
| 500 | 19 | 19 | M20 | 30 | - | - | R1590 650 00 |
| 600 | 19 | 19 | M24 | 36 | - | - | R1590 660 00 |

2) Items delivered per bearing LAD: 1 bearing, 2 retaining rings. For application with form 31: 2x assemblies required.

Form 41



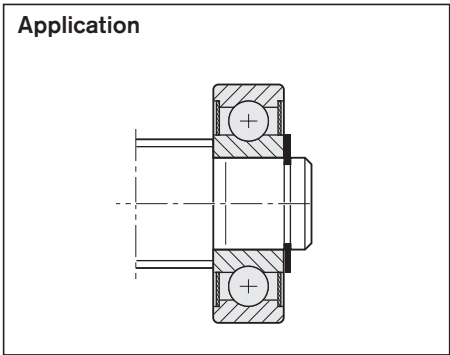
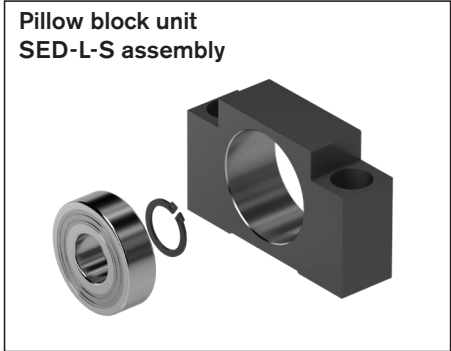
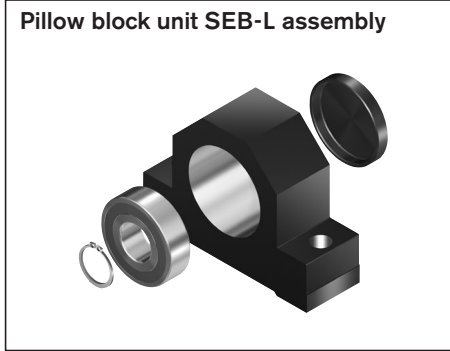
Ordering data:

| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 41Z120 | 82Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | | | | | | Centering hole | |
|------|-----------------------|----------|------------------------|----------|-------|-------|-------|------|--------|------|----------------|--|
| | | d_0 | P | L_{ji} | D_1 | L_4 | S_1 | ST1 | LS_1 | Z | t_z | |
| 41 | 050 | 8 | 1/2/2.5/5 | 7 | 5 | 5 | 4.8 | h10 | 0.70 | – | – | |
| | 060 | 12 | 2/5/10 | 8 | 6 | 6 | 5.7 | h10 | 0.80 | – | – | |
| | 100 | 16 | 5/10/16 | 12 | 10 | 9 | 9.6 | h10 | 1.10 | M3 | 9.0 | |
| | 120 | 20 | 5/10/20/40 | 13 | 12 | 10 | 11.5 | h11 | 1.10 | M4 | 10.0 | |
| | 150 | 20 | 5/10/20/40 | 14 | 15 | 11 | 14.3 | h11 | 1.10 | M5 | 12.5 | |
| | 151 | 20 | 5/10/20/40 | 14 | 15 | 9 | 14.3 | h11 | 1.10 | M5 | 12.5 | |
| | 170 | 25 | 5/10/25 | 15 | 17 | 12 | 16.2 | h11 | 1.10 | M6 | 16.0 | |
| | 200 | 32 | 5/10/20/32/64 | 18 | 20 | 14 | 19.0 | h11 | 1.30 | M6 | 16.0 | |
| | 202 | 25 | 5/10/25 | 19 | 20 | 14 | 19.0 | h11 | 1.30 | M6 | 16.0 | |
| | 250 | 32 | 5/10/20/32/64 | 19 | 25 | 15 | 23.9 | h12 | 1.30 | M10 | 22.0 | |
| | 252 | 32 | 5/10/20/32/64 | 20 | 25 | 15 | 23.9 | h12 | 1.30 | M10 | 22.0 | |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 20 | 30 | 16 | 28.6 | h12 | 1.60 | M10 | 22.0 | |
| | 350 | 50 | 5/10/12/16/20/25/30/40 | 22 | 35 | 17 | 33.0 | h12 | 1.60 | M12 | 28.0 | |
| | 500 | 63 | 10/20/40 | 27 | 50 | 20 | 47.0 | h12 | 2.15 | M16 | 36.0 | |
| 600 | 80 | 10/20/40 | 29 | 60 | 22 | 57.0 | h12 | 2.15 | M20 | 42.0 | | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

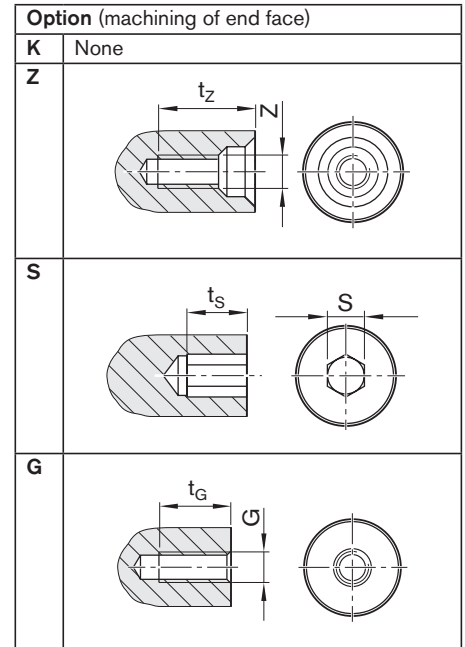
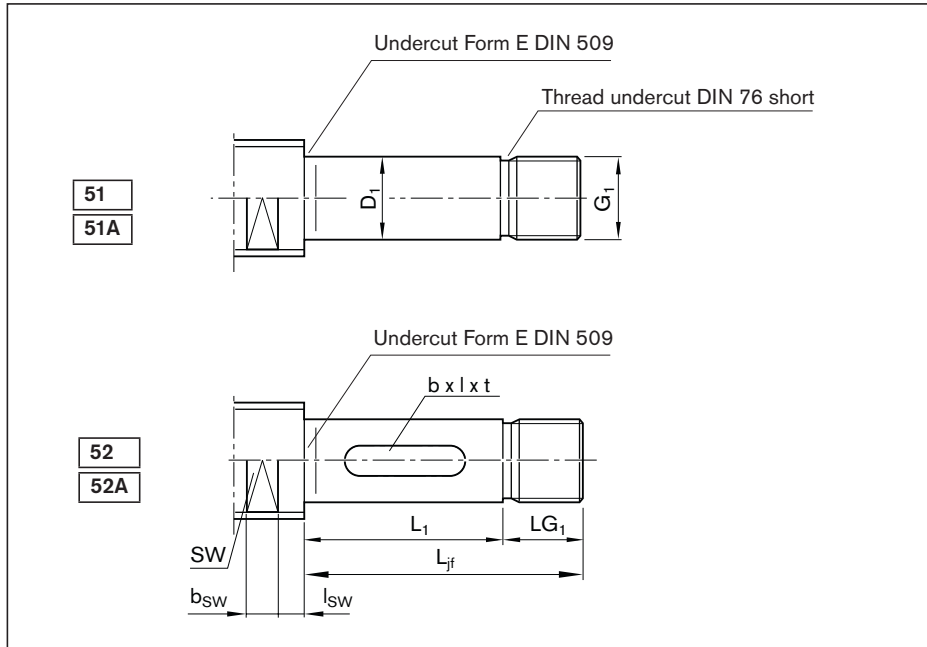
**End bearings
for screw ends in Form 41**



| Version ¹⁾ | Hex socket S | t _S | Thread G | t _G | Bearing assembly LAD ²⁾ Part number | Pillow block unit SEB-L Part number | Pillow block unit SED-L-S Part number |
|-----------------------|-----------------|----------------|-------------|----------------|---|---|---|
| 050 | – | – | – | – | R1590 605 00 | R1591 605 00 | – |
| 060 | – | – | – | – | R1590 606 00 | R1591 606 20 | – |
| 100 | 4 | 4 | M4 | 6 | R1590 610 00 | R1591 610 20 | – |
| 120 | 4 | 4 | M5 | 8 | R1590 612 00 | R1591 612 20 | – |
| 150 | 4 | 4 | M6 | 9 | R1590 615 00 | – | – |
| 151 | 4 | 4 | M6 | 9 | – | – | R1596 615 00 |
| 170 | 5 | 5 | M6 | 9 | R1590 617 00 | R1591 617 20 | – |
| 200 | 5 | 5 | M8 | 12 | R1590 620 00 | R1591 620 20 | – |
| 202 | 5 | 5 | M8 | 12 | – | – | R1596 620 00 |
| 250 | 8 | 8 | M10 | 15 | R1590 625 00 | – | – |
| 252 | 8 | 8 | M10 | 15 | – | – | R1596 625 00 |
| 300 | 10 | 10 | M12 | 18 | R1590 630 00 | R1591 630 20 | – |
| 350 | 12 | 12 | M12 | 18 | R1590 635 00 | R1591 635 20 | – |
| 500 | 19 | 19 | M20 | 30 | R1590 650 00 | R1591 650 20 | – |
| 600 | 19 | 19 | M24 | 36 | R1590 660 00 | R1591 660 20 | – |

2) Scope of delivery: 1 bearing, 2 retaining rings.

Form 51, 51A, 52, 52A



Ordering data:

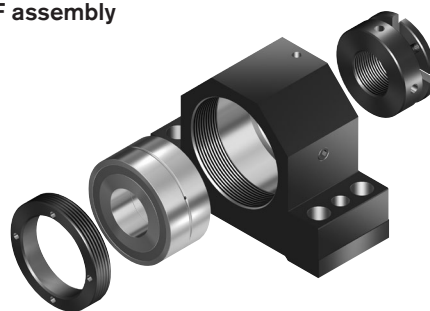
| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|---------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 52AZ120 | 82Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|---------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | | | | Keyway as per DIN 6885 | | | |
|--------|-----------------------|----------------|------------------------|-----------------|----------------------|----------------|----------------|-----------------|------------------------|----|-----|--|
| | | d ₀ | P | L _{jf} | D ₁ h6 | L ₁ | G ₁ | LG ₁ | b P9 | l | t | |
| 51/51A | 060 | 12 | 2/5/10 | 24 | 6 | 14 | M6x0.5 | 10 | - | - | - | |
| | 100 | 16 | 5/10/16 | 30 | 10 | 18 | M10x1 | 12 | - | - | - | |
| | 120 | 20 | 5/10/20/40 | 35 | 12 | 23 | M12x1 | 12 | - | - | - | |
| | 170 | 25 | 5/10/25 | 45 | 17 | 23 | M17x1 | 22 | - | - | - | |
| | 200 | 32 | 5/10/20/32/64 | 48 | 20 | 26 | M20x1 | 22 | - | - | - | |
| | 209 | 32 | 5/10/20/32/64 | 108 | 20 | 77 | M20x1 | 31 | - | - | - | |
| | 250 | 40 | 5/10/12/16/20/25/30/40 | 80 | 25 | 54 | M25x1.5 | 26 | - | - | - | |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 51 | 30 | 25 | M30x1.5 | 26 | - | - | - | |
| | 301 | 50 | 5/10/12/16/20/25/30/40 | 80 | 30 | 54 | M30x1.5 | 26 | - | - | - | |
| | 309 | 40 | 5/10/12/16/20/25/30/40 | 117 | 30 | 83 | M30x1.5 | 34 | - | - | - | |
| | 350 | 50 | 5 | 60 | 35 | 32 | M35x1.5 | 28 | - | - | - | |
| | 359 | 50 | 5/10/20/30/40 | 145 | 35 | 109 | M35x1.5 | 36 | - | - | - | |
| | 400 | 63 | 10/20/40 | 72 | 40 | 44 | M40x1.5 | 28 | - | - | - | |
| | 409 | 63 | 10/20/40 | 183 | 40 | 147 | M40x1.5 | 36 | - | - | - | |
| 500 | 80 | 10/20/40 | 84 | 50 | 52 | M50x1.5 | 32 | - | - | - | | |
| 52/52A | 080 | 12 | 2/5/10 | 30 | 8 | 20 | M8x0.75 | 10 | 2 | 14 | 1.2 | |
| | 100 | 16 | 5/10/16 | 37 | 10 | 25 | M10x1 | 12 | 3 | 20 | 1.8 | |
| | 120 | 20 | 5/10/20/40 | 37 | 12 | 25 | M12x1 | 12 | 4 | 20 | 2.5 | |
| | 170 | 25 | 5/10/25 | 52 | 17 | 30 | M17x1 | 22 | 5 | 25 | 3.0 | |
| | 200 | 32 | 5/10/20/32/64 | 62 | 20 | 40 | M20x1 | 22 | 6 | 28 | 3.5 | |
| | 250 | 40 | 5/10/12/16/20/25/30/40 | 76 | 25 | 50 | M25x1.5 | 26 | 8 | 36 | 4.0 | |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 76 | 30 | 50 | M30x1.5 | 26 | 8 | 36 | 4.0 | |
| | 350 | 50 | 5/10/12/16/20/25/40 | 78 | 35 | 50 | M35x1.5 | 28 | 10 | 40 | 5.0 | |
| | 400 | 63 | 10/20/40 | 88 | 40 | 60 | M40x1.5 | 28 | 12 | 50 | 5.0 | |
| | 500 | 80 | 10/20/40 | 112 | 50 | 80 | M50x1.5 | 32 | 14 | 63 | 5.5 | |

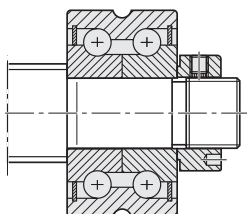
1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

**End bearings
for screw ends Form
51, 51A**

Pillow block unit SEB-F assembly

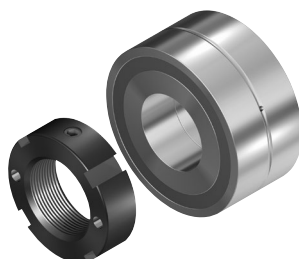


Application



Separate technical dimensioning of the permissible drive torque is absolutely necessary.

Bearing assembly LAN

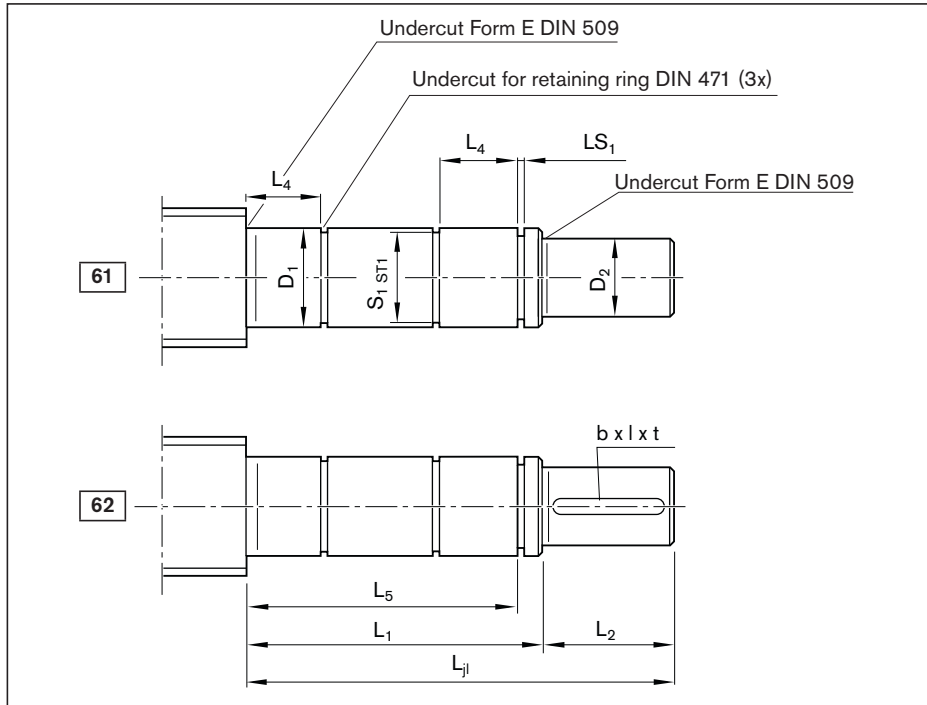


Bearing assembly LAF



| Version ¹⁾ | Centering hole | | Hex socket | | Thread | | Wrench size | | | Module | | |
|-----------------------|----------------|----|------------|----------------|--------|----------------|-------------|-----|------|-------------------------------------|-------------------------|-------------------------|
| | Z | tz | S | t _s | G | t _G | SW | bSW | ISW | Pillow block unit SEB-F Part number | Bearing LAF Part number | Bearing LAN Part number |
| 060 | - | - | - | - | - | - | 9 | 10 | 8.5 | R1591 106 20 | - | R1590 106 00 |
| 100 | M3 | 9 | 4 | 4 | M4 | 6 | 11 | 10 | 8.5 | R1591 110 20 | - | R1590 110 00 |
| 120 | M4 | 10 | 4 | 4 | M5 | 8 | 15 | 10 | 8.5 | R1591 112 20 | R1590 012 00 | R1590 112 00 |
| 170 | M6 | 16 | 5 | 5 | M6 | 9 | 19 | 10 | 10.5 | R1591 117 30 | R1590 017 30 | R1590 117 30 |
| 200 | M6 | 16 | 5 | 5 | M8 | 12 | 24 | 15 | 10.5 | R1591 120 30 | R1590 020 30 | R1590 120 30 |
| 209 | M6 | 16 | 5 | 5 | M8 | 12 | 24 | 15 | 10.5 | - | - | - |
| 250 | M10 | 22 | 8 | 8 | M10 | 15 | 30 | 15 | 12.5 | R1591 225 30 | R1590 325 30 | R1590 225 30 |
| 300 | M10 | 22 | 10 | 10 | M12 | 18 | 30 | 15 | 12.5 | R1591 130 30 | R1590 030 30 | R1590 130 30 |
| 301 | M10 | 22 | 10 | 10 | M12 | 18 | 41 | 22 | 15.5 | R1591 230 30 | R1590 330 30 | R1590 230 30 |
| 309 | M10 | 22 | 10 | 10 | M12 | 18 | 30 | 15 | 12.5 | - | - | - |
| 350 | M12 | 28 | 12 | 12 | M12 | 18 | 41 | 22 | 15.5 | R1591 135 30 | R1590 035 30 | R1590 135 30 |
| 359 | M12 | 28 | 12 | 12 | M12 | 18 | 41 | 22 | 15.5 | - | - | - |
| 400 | M16 | 36 | 12 | 12 | M16 | 24 | 50 | 27 | 16.5 | R1591 140 30 | R1590 040 30 | R1590 140 30 |
| 409 | M16 | 36 | 12 | 12 | M16 | 24 | 50 | 27 | 16.5 | - | - | - |
| 500 | M16 | 36 | 19 | 19 | M20 | 30 | 60 | 27 | 18.5 | R1591 150 30 | R1590 050 30 | R1590 150 30 |
| 080 | M3 | 9 | - | - | M3 | 5 | 9 | 10 | 8.5 | - | - | - |
| 100 | M3 | 9 | 4 | 4 | M4 | 6 | 11 | 10 | 8.5 | - | - | - |
| 120 | M4 | 10 | 4 | 4 | M5 | 8 | 15 | 10 | 8.5 | - | - | - |
| 170 | M6 | 16 | 5 | 5 | M6 | 9 | 19 | 10 | 10.5 | - | - | - |
| 200 | M6 | 16 | 5 | 5 | M8 | 12 | 24 | 15 | 10.5 | - | - | - |
| 250 | M10 | 22 | 8 | 8 | M10 | 15 | 30 | 15 | 12.5 | - | - | - |
| 300 | M10 | 22 | 10 | 10 | M12 | 18 | 30 | 15 | 12.5 | - | - | - |
| 350 | M12 | 28 | 12 | 12 | M12 | 18 | 41 | 22 | 15.5 | - | - | - |
| 400 | M16 | 36 | 12 | 12 | M16 | 24 | 50 | 27 | 16.5 | - | - | - |
| 500 | M16 | 36 | 19 | 19 | M20 | 30 | 60 | 27 | 18.5 | - | - | - |

Form 61, 62



| Option (machining of end face) | |
|--------------------------------|------|
| K | None |
| Z | |
| S | |
| G | |

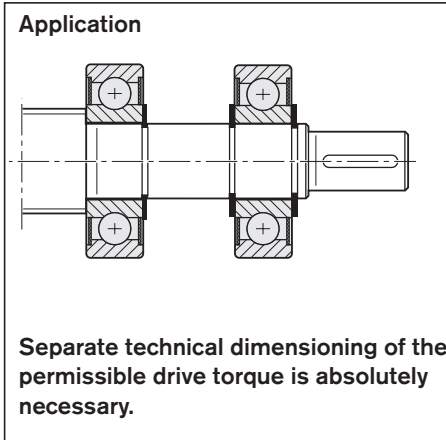
Ordering data:

| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 62Z120 | 51Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | | | | | | | | | |
|------|-----------------------|----------------|------------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------|----------------|----------------|------|------------------------|--|
| | | d ₀ | P | L _{jl} | D ₁ j6 | L ₁ | D ₂ h7 | L ₂ | L ₄ | L ₅ | S ₁ | ST1 | LS ₁ H13 | |
| 61 | 050 | 8 | 1/2/2.5/5 | 34 | 5 | 22 | 4 | 12 | 5 | 20 | 4.8 | h10 | 0.70 | |
| | 060 | 12 | 2/5/10 | 42 | 6 | 26 | 5 | 16 | 6 | 24 | 5.7 | h10 | 0.80 | |
| | 100 | 16 | 5/10/16 | 59 | 10 | 39 | 8 | 20 | 9 | 36 | 9.6 | h10 | 1.10 | |
| | 120 | 20 | 5/10/20/40 | 68 | 12 | 43 | 10 | 25 | 10 | 40 | 11.5 | h11 | 1.10 | |
| | 150 | 20 | 5/10/20/40 | 72 | 15 | 47 | 12 | 25 | 11 | 44 | 14.3 | h11 | 1.10 | |
| | 170 | 25 | 5/10/25 | 81 | 17 | 51 | 15 | 30 | 12 | 48 | 16.2 | h11 | 1.10 | |
| | 200 | 32 | 5/10/20/32/64 | 100 | 20 | 60 | 18 | 40 | 14 | 56 | 19.0 | h11 | 1.30 | |
| | 250 | 32 | 5/10/20/32/64 | 114 | 25 | 64 | 22 | 50 | 15 | 60 | 23.9 | h12 | 1.30 | |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 118 | 30 | 68 | 28 | 50 | 16 | 64 | 28.6 | h12 | 1.60 | |
| | 350 | 50 | 5/10/12/16/20/25/30/40 | 133 | 35 | 73 | 32 | 60 | 17 | 68 | 33.0 | h12 | 1.60 | |
| | 500 | 63 | 10/20/40 | 167 | 50 | 87 | 48 | 80 | 20 | 80 | 47.0 | h12 | 2.15 | |
| 600 | 80 | 10/20/40 | 175 | 60 | 95 | 58 | 80 | 22 | 88 | 57.0 | h12 | 2.15 | | |
| 62 | 100 | 16 | 5/10/16 | 59 | 10 | 39 | 8 | 20 | 9 | 36 | 9.6 | h10 | 1.10 | |
| | 120 | 20 | 5/10/20/40 | 68 | 12 | 43 | 10 | 25 | 10 | 40 | 11.5 | h11 | 1.10 | |
| | 150 | 20 | 5/10/20/40 | 72 | 15 | 47 | 12 | 25 | 11 | 44 | 14.3 | h11 | 1.10 | |
| | 170 | 25 | 5/10/25 | 81 | 17 | 51 | 15 | 30 | 12 | 48 | 16.2 | h11 | 1.10 | |
| | 200 | 32 | 5/10/20/32/64 | 100 | 20 | 60 | 18 | 40 | 14 | 56 | 19.0 | h11 | 1.30 | |
| | 250 | 32 | 5/10/20/32/64 | 114 | 25 | 64 | 22 | 50 | 15 | 60 | 23.9 | h12 | 1.30 | |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 118 | 30 | 68 | 28 | 50 | 16 | 64 | 28.6 | h12 | 1.60 | |
| | 350 | 50 | 5/10/12/16/20/25/30/40 | 133 | 35 | 73 | 32 | 60 | 17 | 68 | 33.0 | h12 | 1.60 | |
| | 500 | 63 | 10/20/40 | 167 | 50 | 87 | 48 | 80 | 20 | 80 | 47.0 | h12 | 2.15 | |
| | 600 | 80 | 10/20/40 | 175 | 60 | 95 | 58 | 80 | 22 | 88 | 57.0 | h12 | 2.15 | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

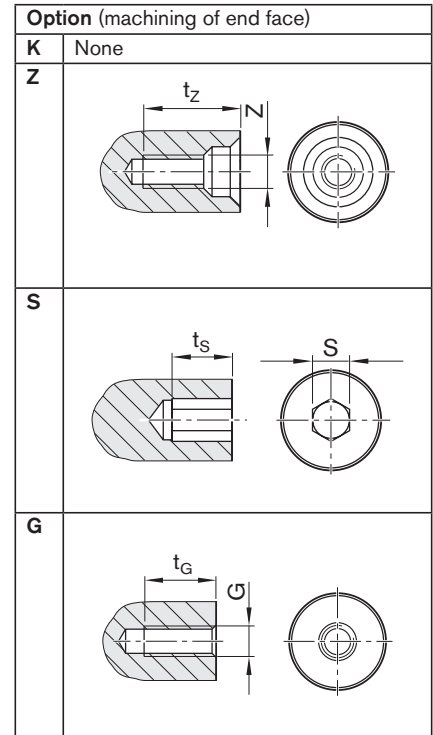
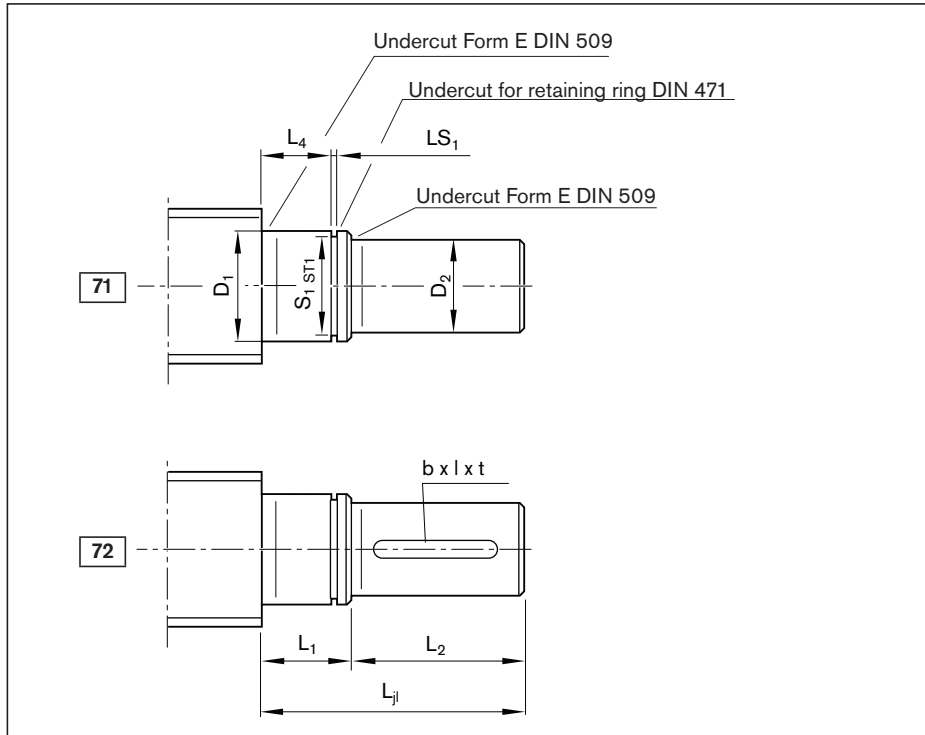
**End bearings
for screw ends Form 61, 62**



| Version ¹⁾ | Keyway as per DIN 6885 | | | Centering hole | | Hex socket | | Thread | | Bearing assembly LAD ²⁾ Part number |
|-----------------------|------------------------|----|-----|----------------|----------------|------------|----------------|--------|----------------|--|
| | b Pg | l | t | Z | t _Z | S | t _S | G | t _G | |
| 050 | - | - | - | - | - | - | - | - | - | R1590 605 00 |
| 060 | - | - | - | - | - | - | - | - | - | R1590 606 00 |
| 100 | - | - | - | M3 | 9.0 | - | - | M3 | 5 | R1590 610 00 |
| 120 | - | - | - | M3 | 9.0 | 4 | 4 | M4 | 6 | R1590 612 00 |
| 150 | - | - | - | M4 | 10.0 | 4 | 4 | M5 | 8 | R1590 615 00 |
| 170 | - | - | - | M5 | 12.5 | 4 | 4 | M6 | 9 | R1590 617 00 |
| 200 | - | - | - | M6 | 16.0 | 5 | 5 | M6 | 9 | R1590 620 00 |
| 250 | - | - | - | M8 | 19.0 | 6 | 6 | M8 | 12 | R1590 625 00 |
| 300 | - | - | - | M10 | 22.0 | 10 | 10 | M10 | 15 | R1590 630 00 |
| 350 | - | - | - | M12 | 28.0 | 10 | 10 | M12 | 18 | R1590 635 00 |
| 500 | - | - | - | M16 | 36.0 | 17 | 17 | M16 | 24 | R1590 650 00 |
| 600 | - | - | - | M20 | 42.0 | 19 | 19 | M20 | 42 | R1590 660 00 |
| 100 | 2 | 14 | 1.2 | M3 | 9.0 | - | - | M3 | 5 | R1590 610 00 |
| 120 | 3 | 20 | 1.8 | M3 | 9.0 | 4 | 4 | M4 | 6 | R1590 612 00 |
| 150 | 4 | 20 | 2.5 | M4 | 10.0 | 4 | 4 | M5 | 8 | R1590 615 00 |
| 170 | 5 | 25 | 3.0 | M5 | 12.5 | 4 | 4 | M6 | 9 | R1590 617 00 |
| 200 | 6 | 28 | 3.5 | M6 | 16.0 | 5 | 5 | M6 | 9 | R1590 620 00 |
| 250 | 6 | 36 | 3.5 | M8 | 19.0 | 6 | 6 | M8 | 12 | R1590 625 00 |
| 300 | 8 | 36 | 4.0 | M10 | 22.0 | 10 | 10 | M10 | 15 | R1590 630 00 |
| 350 | 10 | 40 | 5.0 | M12 | 28.0 | 10 | 10 | M12 | 18 | R1590 635 00 |
| 500 | 14 | 63 | 5.5 | M16 | 36.0 | 17 | 17 | M16 | 24 | R1590 650 00 |
| 600 | 16 | 63 | 6.0 | M20 | 42.0 | 19 | 19 | M20 | 42 | R1590 660 00 |

2) Scope of delivery per assembly: 1 bearing, 2 retaining rings. For application with form 61-62: 2x assemblies required.

Form 71, 72



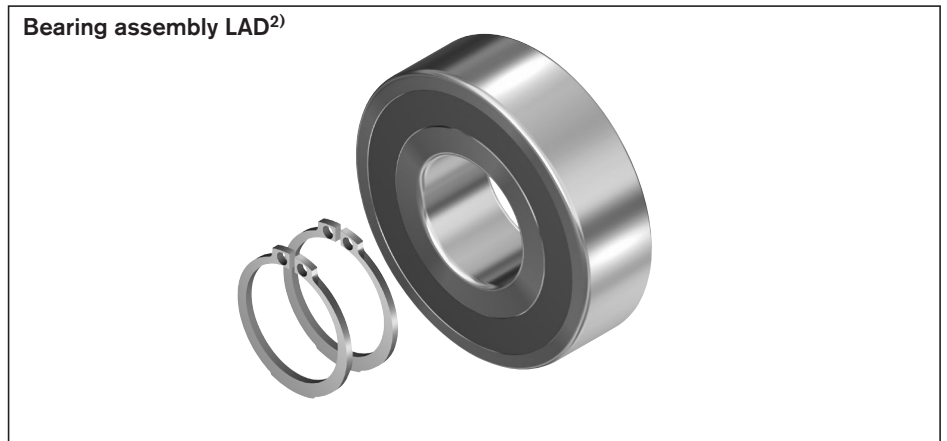
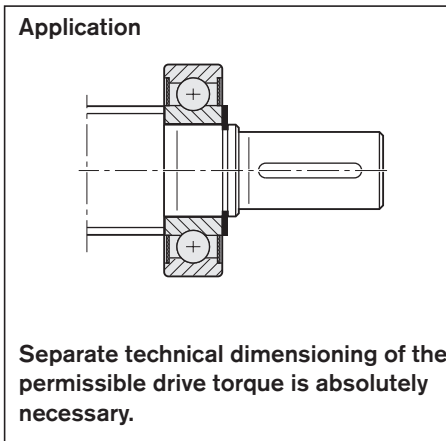
Ordering data:

| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 72Z120 | 51Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | | | | | | | |
|------|-----------------------|----------------|------------------------|----------------|----------------------|----------------|----------------------|----------------|----------------|----------------|------|------------------------|
| | | d ₀ | P | L _j | D ₁ j6 | L ₁ | D ₂ h7 | L ₂ | L ₄ | S ₁ | ST1 | LS ₁ H13 |
| 71 | 050 | 8 | 1/2/2.5/5 | 19 | 5 | 7 | 4 | 12 | 5 | 4.8 | h10 | 0.70 |
| | 060 | 12 | 2/5/10 | 24 | 6 | 8 | 5 | 16 | 6 | 5.7 | h10 | 0.80 |
| | 100 | 16 | 5/10/16 | 32 | 10 | 12 | 8 | 20 | 9 | 9.6 | h10 | 1.10 |
| | 120 | 20 | 5/10/20/40 | 38 | 12 | 13 | 10 | 25 | 10 | 11.5 | h11 | 1.10 |
| | 150 | 20 | 5/10/20/40 | 39 | 15 | 14 | 12 | 25 | 11 | 14.3 | h11 | 1.10 |
| | 170 | 25 | 5/10/25 | 45 | 17 | 15 | 15 | 30 | 12 | 16.2 | h11 | 1.10 |
| | 200 | 32 | 5/10/20/32/64 | 58 | 20 | 18 | 18 | 40 | 14 | 19.0 | h11 | 1.30 |
| | 250 | 32 | 5/10/20/32/64 | 69 | 25 | 19 | 22 | 50 | 15 | 23.9 | h12 | 1.30 |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 70 | 30 | 20 | 28 | 50 | 16 | 28.6 | h12 | 1.60 |
| | 350 | 50 | 5/10/12/16/20/25/30/40 | 82 | 35 | 22 | 32 | 60 | 17 | 33.0 | h12 | 1.60 |
| | 500 | 63 | 10/20/40 | 107 | 50 | 27 | 48 | 80 | 20 | 47.0 | h12 | 2.15 |
| 600 | 80 | 10/20/40 | 109 | 60 | 29 | 58 | 80 | 22 | 57.0 | h12 | 2.15 | |
| 72 | 100 | 16 | 5/10/16 | 32 | 10 | 12 | 8 | 20 | 9 | 9.6 | h10 | 1.10 |
| | 120 | 20 | 5/10/20/40 | 38 | 12 | 13 | 10 | 25 | 10 | 11.5 | h11 | 1.10 |
| | 150 | 20 | 5/10/20/40 | 39 | 15 | 14 | 12 | 25 | 11 | 14.3 | h11 | 1.10 |
| | 170 | 25 | 5/10/25 | 45 | 17 | 15 | 15 | 30 | 12 | 16.2 | h11 | 1.10 |
| | 200 | 32 | 5/10/20/32/64 | 58 | 20 | 18 | 18 | 40 | 14 | 19.0 | h11 | 1.30 |
| | 250 | 32 | 5/10/20/32/64 | 69 | 25 | 19 | 22 | 50 | 15 | 23.9 | h12 | 1.30 |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 70 | 30 | 20 | 28 | 50 | 16 | 28.6 | h12 | 1.60 |
| | 350 | 50 | 5/10/12/16/20/25/30/40 | 82 | 35 | 22 | 32 | 60 | 17 | 33.0 | h12 | 1.60 |
| | 500 | 63 | 10/20/40 | 107 | 50 | 27 | 48 | 80 | 20 | 47.0 | h12 | 2.15 |
| 600 | 80 | 10/20/40 | 109 | 60 | 29 | 58 | 80 | 22 | 57.0 | h12 | 2.15 | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

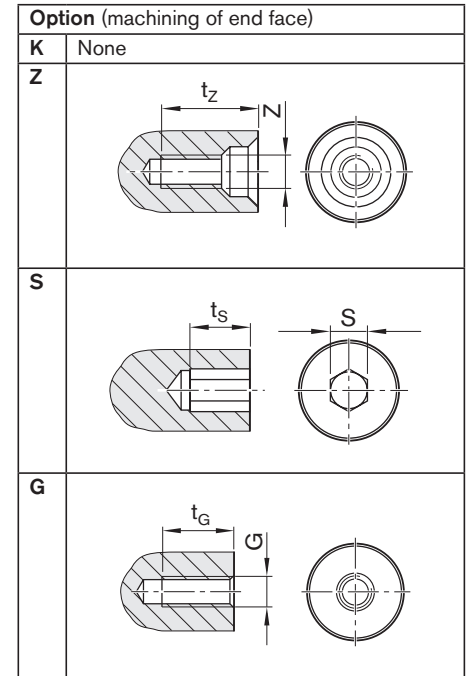
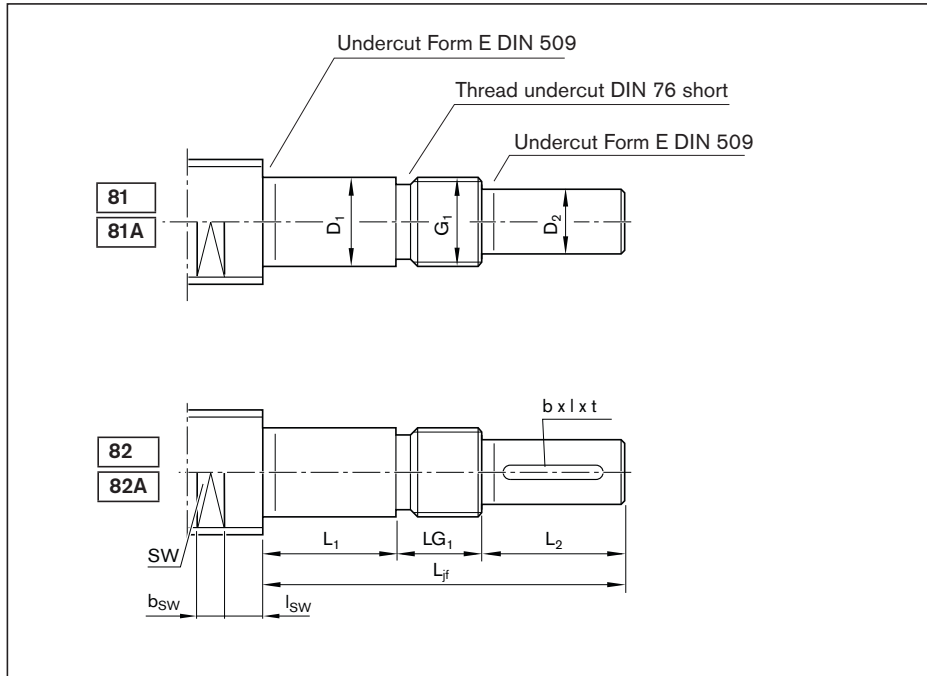
**End bearings
for screw ends Form 71, 72**



| Version ¹⁾ | Keyway as per DIN 6885 | | | Centering hole | | Hex socket | | Thread | | Bearing assembly LAD ²⁾ Part number |
|-----------------------|------------------------|----|-----|----------------|----------------|------------|----------------|--------|----------------|--|
| | b P9 | l | t | Z | t _Z | S | t _S | G | t _G | |
| 050 | - | - | - | - | - | - | - | - | - | R1590 605 00 |
| 060 | - | - | - | - | - | - | - | - | - | R1590 606 00 |
| 100 | - | - | - | M3 | 9 | - | - | M3 | 5 | R1590 610 00 |
| 120 | - | - | - | M3 | 9 | 4 | 4 | M4 | 6 | R1590 612 00 |
| 150 | - | - | - | M4 | 10 | 4 | 4 | M5 | 8 | R1590 615 00 |
| 170 | - | - | - | M5 | 12.5 | 4 | 4 | M6 | 9 | R1590 617 00 |
| 200 | - | - | - | M6 | 16 | 5 | 5 | M6 | 9 | R1590 620 00 |
| 250 | - | - | - | M8 | 19 | 6 | 6 | M8 | 12 | R1590 625 00 |
| 300 | - | - | - | M10 | 22 | 10 | 10 | M10 | 15 | R1590 630 00 |
| 350 | - | - | - | M12 | 28 | 10 | 10 | M12 | 18 | R1590 635 00 |
| 500 | - | - | - | M16 | 36 | 17 | 17 | M16 | 24 | R1590 650 00 |
| 600 | - | - | - | M20 | 42 | 19 | 19 | M20 | 30 | R1590 660 00 |
| 100 | 2 | 14 | 1.2 | M3 | 9 | - | - | M3 | 5 | R1590 610 00 |
| 120 | 3 | 20 | 1.8 | M3 | 9 | 4 | 4 | M4 | 6 | R1590 612 00 |
| 150 | 4 | 20 | 2.5 | M4 | 10 | 4 | 4 | M5 | 8 | R1590 615 00 |
| 170 | 5 | 25 | 3.0 | M5 | 12.5 | 4 | 4 | M6 | 9 | R1590 617 00 |
| 200 | 6 | 28 | 3.5 | M6 | 16 | 5 | 5 | M6 | 9 | R1590 620 00 |
| 250 | 6 | 36 | 3.5 | M8 | 19 | 6 | 6 | M8 | 12 | R1590 625 00 |
| 300 | 8 | 36 | 4.0 | M10 | 22 | 10 | 10 | M10 | 15 | R1590 630 00 |
| 350 | 10 | 40 | 5.0 | M12 | 28 | 10 | 10 | M12 | 18 | R1590 635 00 |
| 500 | 14 | 63 | 5.5 | M16 | 36 | 17 | 17 | M16 | 24 | R1590 650 00 |
| 600 | 16 | 63 | 6.0 | M20 | 42 | 19 | 19 | M20 | 30 | R1590 660 00 |

2) Scope of delivery: 1 bearing, 2 retaining rings.

Form 81, 81A, 82, 82A



Ordering data:

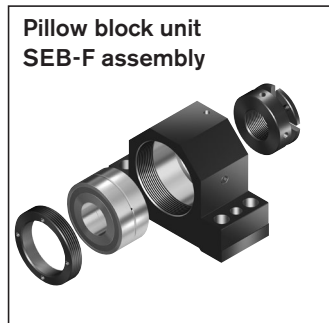
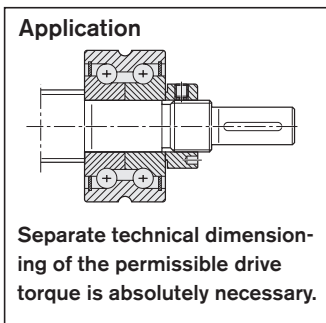
| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|---------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 81AZ120 | 41Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|---------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | | | | | | | | | Centering hole | | Hex socket | | Thread | |
|--------|-----------------------|----------------|------------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------|-----------------|-----|----------------|----|----------------|-----|----------------|--|--------|--|
| | | d ₀ | P | L _{jf} | D ₁ h6 | L ₁ | D ₂ h7 | L ₂ | G ₁ | LG ₁ | Z | t _z | S | t _s | G | t _g | | | |
| 81/81A | 060 | 12 | 2/5/10 | 40 | 6 | 14 | 5 | 16 | M6x0.5 | 10 | - | - | - | - | - | - | | | |
| | 061 | 12 | 2/5/10 | 41 | 6 | 10 | 5 | 16 | M6x0.5 | 15 | - | - | - | - | - | - | | | |
| | 100 | 16 | 5/10/16 | 50 | 10 | 18 | 8 | 20 | M10x1 | 12 | M3 | 9.0 | - | - | M3 | 5 | | | |
| | 104 | 16 | 5/10/16 | 66 | 10 | 34 | 8 | 20 | M10x1 | 12 | M3 | 9.0 | - | - | M3 | 5 | | | |
| | 120 | 20 | 5/10/20/40 | 60 | 12 | 23 | 10 | 25 | M12x1 | 12 | M3 | 9.0 | 4 | 4 | M4 | 6 | | | |
| | 122 | 20 | 5/10/20/40 | 60 | 12 | 17 | 10 | 25 | M12x1 | 18 | M3 | 9.0 | 4 | 4 | M4 | 6 | | | |
| | 123 | 20 | 5/10/20/40 | 60 | 12 | 23 | 10 | 25 | M12x1 | 12 | M3 | 9.0 | 4 | 4 | M4 | 6 | | | |
| | 124 | 20 | 5/10/20/40 | 75 | 12 | 38 | 10 | 25 | M12x1 | 12 | M3 | 9.0 | 4 | 4 | M4 | 6 | | | |
| | 151 | 25 | 5/10/25 | 60 | 15 | 19 | 12 | 25 | M15x1 | 16 | M4 | 10.0 | 4 | 4 | M5 | 8 | | | |
| | 170 | 25 | 5/10/25 | 75 | 17 | 23 | 15 | 30 | M17x1 | 22 | M5 | 12.5 | 4 | 4 | M6 | 9 | | | |
| | 173 ²⁾ | 25 | 5/10/25 | 75 | 17 | 23 | 15 | 30 | M17x1 | 22 | M5 | 12.5 | 4 | 4 | M6 | 9 | | | |
| | 175 | 25 | 5/10/25 | 78 | 17 | 26 | 15 | 30 | M17x1 | 22 | M5 | 12.5 | 4 | 4 | M6 | 9 | | | |
| | 200 | 32 | 5/10/20/32/64 | 88 | 20 | 26 | 18 | 40 | M20x1 | 22 | M6 | 16.0 | 5 | 5 | M6 | 9 | | | |
| | 203 | 32 | 5/10/20/32/64 | 78 | 20 | 26 | 16 | 35 | M20x1 | 17 | M5 | 12.5 | 4 | 4 | M6 | 9 | | | |
| | 204 | 32 | 5/10/20/32/64 | 80 | 20 | 25 | 18 | 40 | M20x1 | 15 | M6 | 16.0 | 5 | 5 | M6 | 9 | | | |
| | 206 | 32 | 5/10/20/32/64 | 116 | 20 | 54 | 18 | 40 | M20x1 | 22 | M6 | 16.0 | 5 | 5 | M6 | 9 | | | |
| | 250 | 40 | 10/12/16/20/25/30/40 | 130 | 25 | 54 | 22 | 50 | M25x1.5 | 26 | M8 | 19.0 | 6 | 6 | M8 | 12 | | | |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 101 | 30 | 25 | 25 | 50 | M30x1.5 | 26 | M10 | 22.0 | 8 | 8 | M10 | 15 | | | |
| | 301 | 40 | 5/10/12/16/20/25/30/40 | 93 | 30 | 25 | 25 | 50 | M30x1.5 | 18 | M10 | 22.0 | 8 | 8 | M10 | 15 | | | |
| | 302 | 40 | 10/12/16/20/25/30/40 | 130 | 30 | 54 | 25 | 50 | M30x1.5 | 26 | M10 | 22.0 | 8 | 8 | M10 | 15 | | | |
| | 305 | 40 | 10/12/16/20/25/30/40 | 121 | 30 | 53 | 25 | 50 | M30x1.5 | 18 | M10 | 22.0 | 8 | 8 | M10 | 15 | | | |
| | 306 | 50 | 10/12/16/20/25/30/40 | 130 | 30 | 54 | 25 | 50 | M30x1.5 | 26 | M10 | 22.0 | 8 | 8 | M10 | 15 | | | |
| | 309 | 40 | 5/10/12/16/20/40 | 150 | 30 | 74 | 25 | 50 | M30x1.5 | 26 | M10 | 22.0 | 8 | 8 | M10 | 15 | | | |
| | 350 | 50 | 5 | 110 | 35 | 32 | 30 | 50 | M35x1.5 | 28 | M10 | 22.0 | 10 | 10 | M12 | 18 | | | |
| | 351 | 50 | 5/10/12/16/20/25 | 158 | 35 | 82 | 30 | 50 | M35x1.5 | 26 | M10 | 22.0 | 10 | 10 | M12 | 18 | | | |
| | 400 | 63 | 10/20/40 | 132 | 40 | 44 | 36 | 60 | M40x1.5 | 28 | M12 | 28.0 | 12 | 12 | M12 | 18 | | | |
| | 401 | 63 | 10/20/40 | 178 | 40 | 90 | 36 | 60 | M40x1.5 | 28 | M12 | 28.0 | 12 | 12 | M12 | 18 | | | |
| | 500 | 80 | 10/20/40 | 154 | 50 | 52 | 40 | 70 | M50x1.5 | 32 | M16 | 36.0 | 12 | 12 | M16 | 24 | | | |
| | 501 | 80 | 10/20/40 | 208 | 50 | 106 | 40 | 70 | M50x1.5 | 32 | M16 | 36.0 | 12 | 12 | M16 | 24 | | | |
| | 601 | 80 | 10/20/40 | 234 | 60 | 122 | 55 | 80 | M60x2 | 32 | M20 | 42.0 | 19 | 19 | M20 | 30 | | | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

2) Version 173 only available in Form 81A

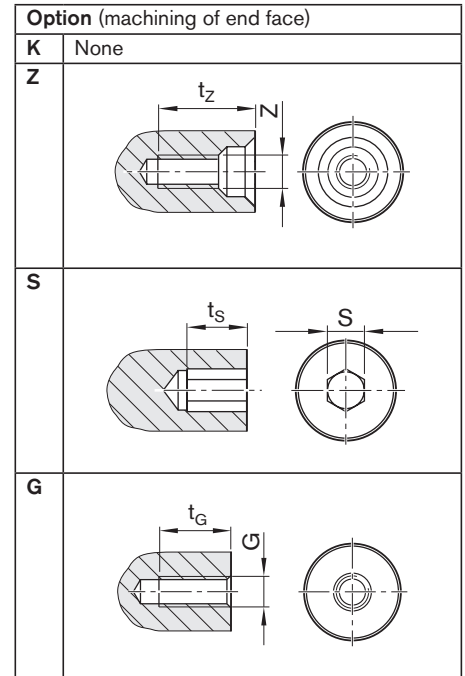
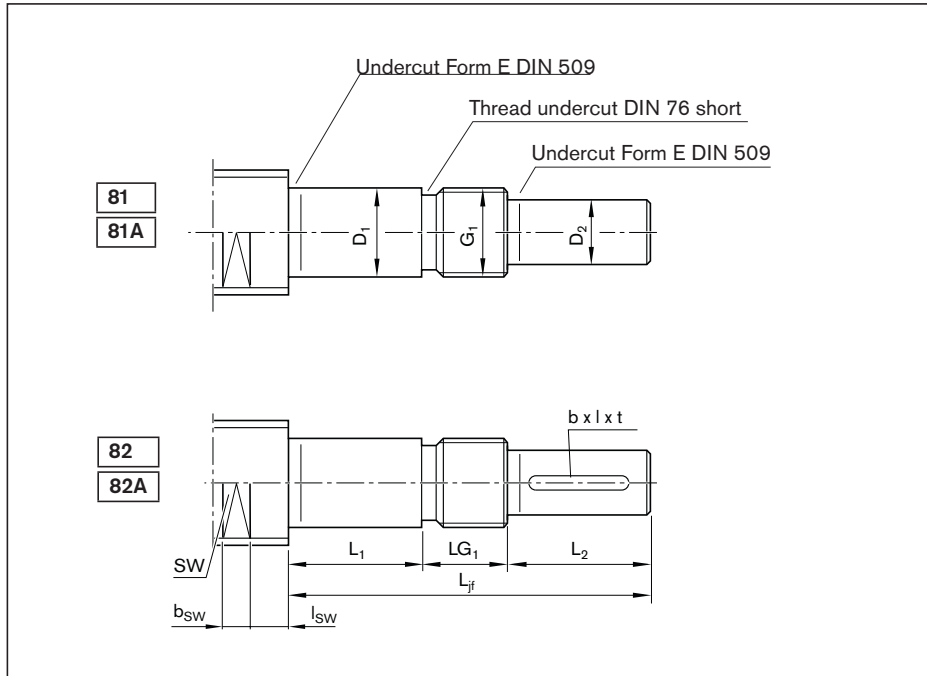
End bearings for screw ends Form 81, 81A, 82, 82A



| Version ¹⁾ | Wrench size | | I _{SW} | Pillow block unit for motor attachment | | | Bearing assembly | | | |
|-----------------------|-------------|-----------------|-----------------|--|-------------------|-------------------|------------------|-----------------|-----------------|----------------------------|
| | SW | b _{SW} | | SEC-F Part number | SEB-F Part number | SES-F Part number | LAF Part number | LAN Part number | LAL Part number | LAS Part number |
| 060 | 9 | 10 | 8.5 | - | R1591 106 20 | - | - | R1590 106 00 | - | - |
| 061 | 9 | 10 | 8.5 | - | - | - | - | - | R1590 406 00 | - |
| 100 | 11 | 10 | 8.5 | - | R1591 110 20 | - | - | R1590 110 00 | - | - |
| 104 | 11 | 10 | 8.5 | - | - | - | - | - | - | R159A 410 01 |
| 120 | 15 | 10 | 42.0 | R1594 012 00 | R1591 112 20 | R1595 012 20 | R1590 012 00 | R1590 112 00 | - | - |
| 122 | 15 | 10 | 8.5 | - | - | - | - | - | R1590 412 00 | - |
| 123 | 15 | 10 | 8.5 | - | R1591 112 20 | - | R1590 012 00 | R1590 112 00 | - | - |
| 124 | 15 | 10 | 8.5 | - | - | - | - | - | - | R159A 412 01 |
| 151 | 19 | 10 | 10.5 | - | - | - | - | - | R1590 415 00 | - |
| 170 | 19 | 10 | 42.0 | - | R1591 117 30 | R1595 017 20 | R1590 017 30 | R1590 117 30 | - | - |
| 173 ²⁾ | 19 | 10 | 10.5 | - | R1591 117 30 | - | R1590 017 30 | R1590 117 30 | - | - |
| 175 | 19 | 10 | 10.5 | - | - | - | - | - | - | R159A 417 01 ³⁾ |
| 200 | 24 | 15 | 10.5 | - | R1591 120 30 | - | R1590 020 30 | R1590 120 30 | - | - |
| 203 | 24 | 15 | 40.0 | R1594 020 00 | - | R1595 020 20 | R1590 020 00 | R1590 120 00 | - | - |
| 204 | 24 | 15 | 10.5 | - | - | - | - | - | R1590 420 00 | - |
| 206 | 24 | 15 | 10.5 | - | - | - | - | - | - | R159A 420 01 |
| 250 | 30 | 15 | 12.5 | - | R1591 225 30 | - | R1590 325 30 | R1590 225 30 | - | - |
| 300 | 30 | 15 | 12.5 | - | R1591 130 30 | - | R1590 030 30 | R1590 130 30 | - | - |
| 301 | 30 | 15 | 45.0 | R1594 030 00 | - | R1595 030 20 | - | - | - | - |
| 302 | 30 | 15 | 37.0 | - | - | R1595 330 20 | - | - | - | - |
| 305 | 30 | 15 | 37.0 | - | - | - | - | - | - | - |
| 306 | 41 | 22 | 15.5 | - | R1591 230 30 | - | R1590 330 30 | R1590 230 30 | - | - |
| 309 | 30 | 15 | 12.5 | - | - | - | - | - | - | R159A 430 01 |
| 350 | 41 | 22 | 15.5 | - | R1591 135 30 | - | R1590 035 30 | R1590 135 30 | - | - |
| 351 | 41 | 22 | 15.5 | - | - | - | - | - | - | R159A 435 01 |
| 400 | 50 | 27 | 16.5 | - | R1591 140 30 | - | R1590 040 30 | R1590 140 30 | - | - |
| 401 | 50 | 27 | 16.5 | - | - | - | - | - | - | R159A 440 01 |
| 500 | 60 | 27 | 18.5 | - | R1591 150 30 | - | R1590 050 30 | R1590 150 30 | - | - |
| 501 | 60 | 27 | 18.5 | - | - | - | - | - | - | R159A 450 01 |
| 601 | 60 | 27 | 18.5 | - | - | - | - | - | - | R159A 460 01 |

3) LAS version 1+1 only for size 25 version 175.

Form 81, 81A, 82, 82A



Ordering data:

| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|---------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 82AZ120 | 41Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|---------|--------|------|---|---|

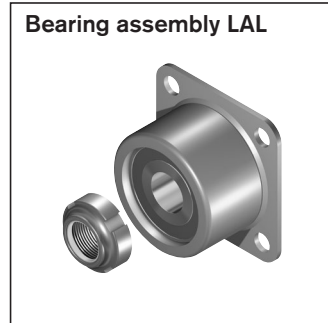
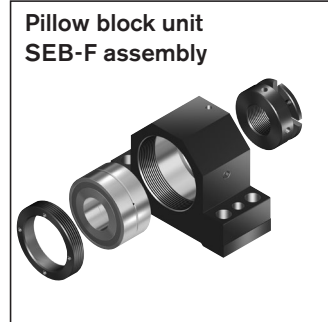
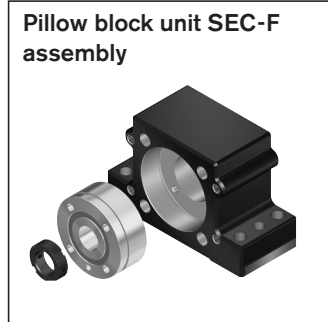
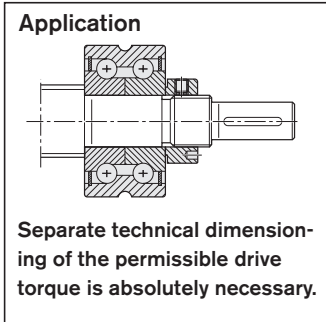
| Form | Version ¹⁾ | Size | | (mm) | | | | | | | | | | Keyway as per DIN 6885 | | | Centering hole | |
|--------|-----------------------|----------------|------------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------|-----------------|---------|----|-----|------------------------|----------------|--|----------------|--|
| | | d ₀ | P | L _{jf} | D ₁ h6 | L ₁ | D ₂ h7 | L ₂ | G ₁ | LG ₁ | b P9 | l | t | Z | t _z | | | |
| 82/82A | 100 | 16 | 5/10/16 | 50 | 10 | 18 | 8 | 20 | M10x1 | 12 | 2 | 14 | 1.2 | M3 | 9.0 | | | |
| | 104 | 16 | 5/10/16 | 66 | 10 | 34 | 8 | 20 | M10x1 | 12 | 2 | 14 | 1.2 | M3 | 9.0 | | | |
| | 120 | 20 | 5/10/20/40 | 60 | 12 | 23 | 10 | 25 | M12x1 | 12 | 3 | 20 | 1.8 | M3 | 9.0 | | | |
| | 123 | 20 | 5/10/20/40 | 60 | 12 | 23 | 10 | 25 | M12x1 | 12 | 3 | 20 | 1.8 | M3 | 9.0 | | | |
| | 124 | 20 | 5/10/20/40 | 75 | 12 | 38 | 10 | 25 | M12x1 | 12 | 3 | 20 | 1.8 | M3 | 9.0 | | | |
| | 170 | 25 | 5/10/25 | 75 | 17 | 23 | 15 | 30 | M17x1 | 22 | 5 | 25 | 3.0 | M5 | 12.5 | | | |
| | 173 ²⁾ | 25 | 5/10/25 | 75 | 17 | 23 | 15 | 30 | M17x1 | 22 | 5 | 25 | 3.0 | M5 | 12.5 | | | |
| | 175 | 25 | 5/10/25 | 78 | 17 | 26 | 15 | 30 | M17x1 | 22 | 5 | 25 | 3.0 | M5 | 12.5 | | | |
| | 200 | 32 | 5/10/20/32/64 | 88 | 20 | 26 | 18 | 40 | M20x1 | 22 | 6 | 28 | 3.5 | M6 | 16.0 | | | |
| | 203 | 32 | 5/10/20/32/64 | 78 | 20 | 26 | 16 | 35 | M20x1 | 17 | 5 | 28 | 3.0 | M5 | 12.5 | | | |
| | 206 | 32 | 5/10/20/32/64 | 116 | 20 | 54 | 18 | 40 | M20x1 | 22 | 6 | 36 | 3.5 | M6 | 16.0 | | | |
| | 250 | 40 | 10/12/16/20/25/30/40 | 130 | 25 | 54 | 22 | 50 | M25x1.5 | 26 | 6 | 36 | 3.5 | M8 | 19.0 | | | |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 101 | 30 | 25 | 25 | 50 | M30x1.5 | 26 | 8 | 36 | 4.0 | M10 | 22.0 | | | |
| | 301 | 40 | 5/10/12/16/20/25/30/40 | 93 | 30 | 25 | 25 | 50 | M30x1.5 | 18 | 8 | 36 | 4.0 | M10 | 22.0 | | | |
| | 302 | 40 | 10/12/16/20/25/30/40 | 130 | 30 | 54 | 25 | 50 | M30x1.5 | 26 | 8 | 36 | 4.0 | M10 | 22.0 | | | |
| | 305 | 40 | 10/12/16/20/25/30/40 | 121 | 30 | 53 | 25 | 50 | M30x1.5 | 18 | 8 | 36 | 4.0 | M10 | 22.0 | | | |
| | 306 | 50 | 10/12/16/20/25/30/40 | 130 | 30 | 54 | 25 | 50 | M30x1.5 | 26 | 8 | 36 | 4.0 | M10 | 22.0 | | | |
| | 309 | 40 | 5/10/12/16/20/40 | 150 | 30 | 74 | 25 | 50 | M30x1.5 | 26 | 8 | 36 | 4.0 | M10 | 22.0 | | | |
| | 350 | 50 | 5 | 110 | 35 | 32 | 30 | 50 | M35x1.5 | 28 | 8 | 36 | 4.0 | M10 | 22.0 | | | |
| | 351 | 50 | 5/10/12/16/20/25 | 158 | 35 | 82 | 30 | 50 | M35x1.5 | 26 | 8 | 36 | 4.0 | M10 | 22.0 | | | |
| | 400 | 63 | 10/20/40 | 132 | 40 | 44 | 36 | 60 | M40x1.5 | 28 | 10 | 40 | 5.0 | M12 | 28.0 | | | |
| | 401 | 63 | 10/20/40 | 178 | 40 | 90 | 36 | 60 | M40x1.5 | 28 | 10 | 40 | 5.0 | M12 | 28.0 | | | |
| | 500 | 80 | 10/20/40 | 154 | 50 | 52 | 40 | 70 | M50x1.5 | 32 | 12 | 50 | 5.0 | M16 | 36.0 | | | |
| | 501 | 80 | 10/20/40 | 208 | 50 | 106 | 40 | 70 | M50x1.5 | 32 | 12 | 50 | 5.0 | M16 | 36.0 | | | |
| | 601 | 80 | 10/20/40 | 234 | 60 | 122 | 55 | 80 | M60x2 | 32 | 16 | 63 | 6.0 | M20 | 42.0 | | | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

2) Version 173 only available in Form 81A

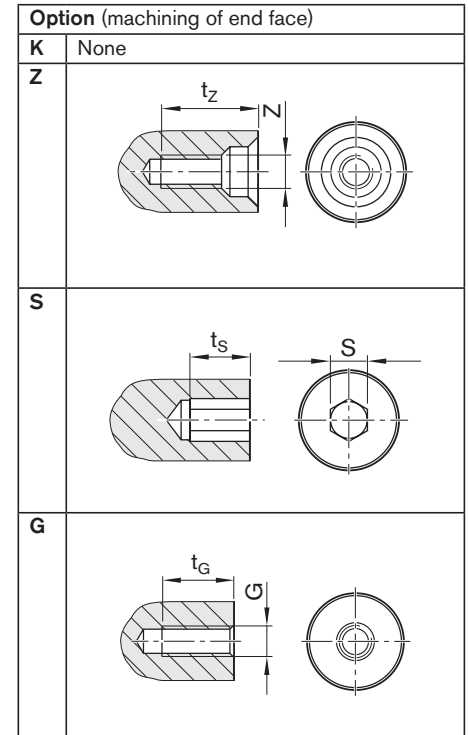
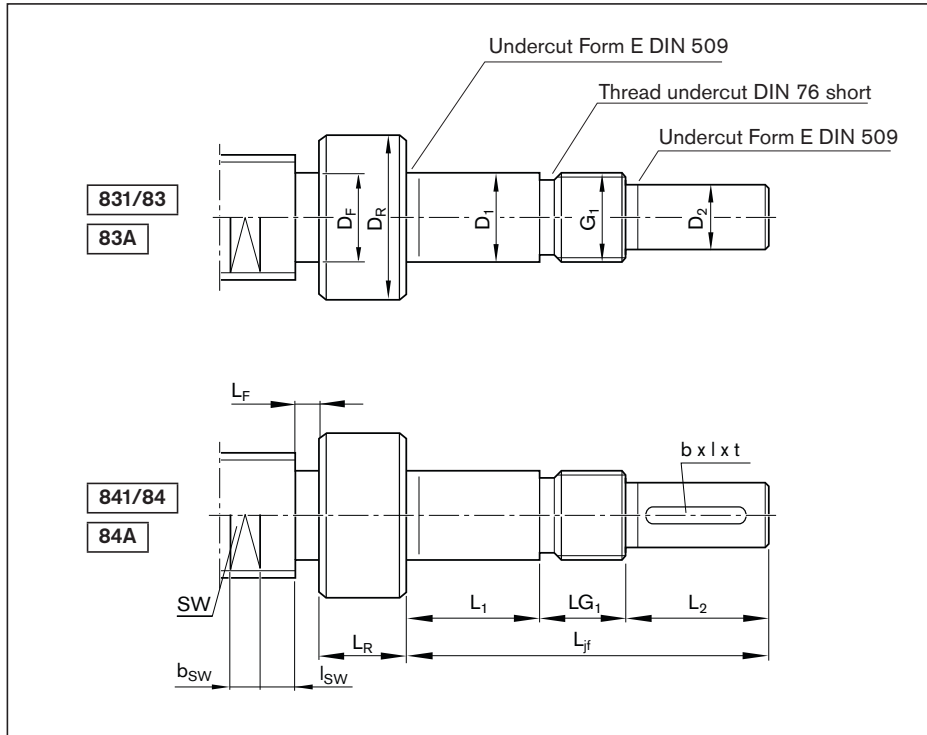
3) LAS version 1+1 only for size 25 version 175.

End bearings for screw ends Form 81, 81A, 82, 82A



| Version ¹⁾ | Hex socket | | Thread | | Wrench size | | | Pillow block unit for motor attachment | | | Bearing assembly | | |
|-----------------------|------------|----------------|--------|----------------|-------------|-----------------|-----------------|--|-------------------|-------------------|------------------|-----------------|----------------------------|
| | S | t _S | G | t _G | SW | b _{SW} | l _{SW} | SEC-F Part number | SEB-F Part number | SES-F Part number | LAF Part number | LAN Part number | LAS Part number |
| 100 | – | – | M3 | 5 | 11 | 10 | 8.5 | – | R1591 110 20 | – | – | R1590110 00 | – |
| 104 | – | – | M3 | 5 | 11 | 10 | 8.5 | – | – | – | – | – | R159A 410 01 |
| 120 | 4 | 4 | M4 | 6 | 15 | 10 | 42.0 | R1594 012 00 | R1591 112 20 | R1595 012 20 | R1590 012 00 | R1590 112 00 | – |
| 123 | 4 | 4 | M4 | 6 | 15 | 10 | 8.5 | – | R1591 112 20 | – | R1590 012 00 | R1590 112 00 | – |
| 124 | 4 | 4 | M4 | 6 | 15 | 10 | 8.5 | – | – | – | – | – | R159A 412 01 |
| 170 | 4 | 4 | M6 | 9 | 19 | 10 | 42.0 | – | R1591 117 30 | R1595 017 20 | R1590 017 30 | R1590 117 30 | – |
| 173 ²⁾ | 4 | 4 | M6 | 9 | 19 | 10 | 10.5 | – | R1591 117 30 | – | R1590 017 30 | R1590 117 30 | – |
| 175 | 4 | 4 | M6 | 9 | 19 | 10 | 10.5 | – | – | – | – | – | R159A 417 01 ³⁾ |
| 200 | 5 | 5 | M6 | 9 | 24 | 15 | 10.5 | – | R1591 120 30 | – | R1590 020 30 | R1590 120 30 | – |
| 203 | 4 | 4 | M6 | 9 | 24 | 15 | 40.0 | R1594 020 00 | – | R1595 020 20 | R1590 020 00 | R1590 120 00 | – |
| 206 | 5 | 5 | M6 | 9 | 24 | 15 | 10.5 | – | – | – | – | – | R159A 420 01 |
| 250 | 6 | 6 | M8 | 12 | 30 | 15 | 12.5 | – | R1591 225 30 | – | R1590 325 30 | R1590 225 30 | – |
| 300 | 8 | 8 | M10 | 15 | 30 | 15 | 12.5 | – | R1591 130 30 | – | R1590 030 30 | R1590 130 30 | – |
| 301 | 8 | 8 | M10 | 15 | 30 | 15 | 45.0 | R1594 030 00 | – | R1595 030 20 | – | – | – |
| 302 | 8 | 8 | M10 | 15 | 30 | 15 | 37.0 | – | – | R1595 330 20 | – | – | – |
| 305 | 8 | 8 | M10 | 15 | 30 | 15 | 37.0 | – | – | – | – | – | – |
| 306 | 8 | 8 | M10 | 15 | 41 | 22 | 15.5 | – | R1591 230 30 | – | R1590 330 30 | R1590 230 30 | – |
| 309 | 8 | 8 | M10 | 15 | 30 | 15 | 12.5 | – | – | – | – | – | R159A 430 01 |
| 350 | 10 | 10 | M12 | 18 | 41 | 22 | 15.5 | – | R1591 135 30 | – | R1590 035 30 | R1590 135 30 | – |
| 351 | 10 | 10 | M12 | 18 | 41 | 22 | 15.5 | – | – | – | – | – | R159A 435 01 |
| 400 | 12 | 12 | M12 | 18 | 50 | 27 | 16.5 | – | R1591 140 30 | – | R1590 040 30 | R1590 140 30 | – |
| 401 | 12 | 12 | M12 | 18 | 50 | 27 | 16.5 | – | – | – | – | – | R159A 440 01 |
| 500 | 12 | 12 | M16 | 24 | 60 | 27 | 18.5 | – | R1591 150 30 | – | R1590 050 30 | R1590 150 30 | – |
| 501 | 12 | 12 | M16 | 24 | 60 | 27 | 18.5 | – | – | – | – | – | R159A 450 01 |
| 601 | 19 | 19 | M20 | 30 | 60 | 27 | 18.5 | – | – | – | – | – | R159A 460 01 |

Form 831, 83, 83A, 841, 84, 84A



Ordering data:

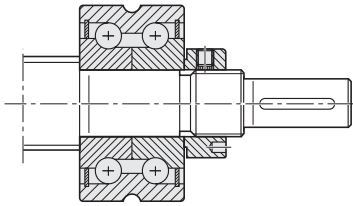
| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 83Z200 | 51Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | | | | | | | | | | Centering hole | |
|--------|-----------------------|----------------|------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------|-----------------|----|------|------|----|----------------|----------------|
| | | d ₀ | P | L _{jf} | D ₁ h6 | L ₁ | D ₂ h7 | L ₂ | G ₁ | LG ₁ | DR | LR | DF | LF | Z | t _z |
| 831 | 060 | 6 | 1/2 | 40 | 6 | 14 | 5 | 16 | M6x0.5 | 10 | 12 | 15 | 5.0 | 1 | - | - |
| | 061 | 6 | 1/2 | 41 | 6 | 10 | 5 | 16 | M6x0.5 | 15 | 12 | 15 | 5.0 | 1 | - | - |
| | 062 | 8 | 1/2/2.5/5 | 41 | 6 | 10 | 5 | 16 | M6x0.5 | 15 | 12 | 15 | 6.0 | 1 | - | - |
| | 065 | 8 | 1/2/2.5/5 | 40 | 6 | 14 | 5 | 16 | M6x0.5 | 10 | 12 | 15 | 6.0 | 1 | - | - |
| | 120 | 12 | 2/5/10 | 60 | 12 | 23 | 10 | 25 | M12x1 | 12 | 16 | 15 | 8.0 | 1 | M3 | 9.0 |
| | 121 | 12 | 2/5/10 | 60 | 12 | 17 | 10 | 25 | M12x1 | 18 | 15 | 15 | 8.0 | 1 | M3 | 9.0 |
| | 122 | 16 | 5/10/16 | 60 | 12 | 17 | 10 | 25 | M12x1 | 18 | 18 | 17 | 12.0 | 1 | M3 | 9.0 |
| 170 | 16 | 5/10/16 | 75 | 17 | 23 | 15 | 30 | M17x1 | 22 | 23 | 17 | 12.0 | 1 | M5 | 12.5 | |
| 83/83A | 200 | 20 | 5/10/20 | 88 | 20 | 26 | 18 | 40 | M20x1 | 22 | 25 | 15 | 16.5 | 8 | M6 | 16.0 |
| | 250 | 25 | 5/10/25 | 102 | 25 | 26 | 22 | 50 | M25x1.5 | 26 | 32 | 15 | 21.0 | 8 | M8 | 19.0 |
| | 300 | 32 | 5/10/20/32 | 101 | 30 | 25 | 25 | 50 | M30x1.5 | 26 | 40 | 20 | 28.0 | 8 | M10 | 22.0 |
| | 400 | 40 | 5/10/12/16/20 | 132 | 40 | 44 | 36 | 60 | M40x1.5 | 28 | 50 | 20 | 33.5 | 8 | M12 | 28.0 |
| | 500 | 50 | 10/12/20 | 154 | 50 | 52 | 40 | 70 | M50x1.5 | 32 | 60 | 20 | 43.5 | 10 | M16 | 36.0 |
| 841 | 120 | 12 | 2/5/10 | 60 | 12 | 23 | 10 | 25 | M12x1 | 12 | 16 | 15 | 8.0 | 1 | M3 | 9.0 |
| | 170 | 16 | 5/10/16 | 75 | 17 | 23 | 15 | 30 | M17x1 | 22 | 23 | 17 | 12.0 | 1 | M5 | 12.5 |
| 84/84A | 200 | 20 | 5/10/20 | 88 | 20 | 26 | 18 | 40 | M20x1 | 22 | 25 | 15 | 16.5 | 8 | M6 | 16.0 |
| | 250 | 25 | 5/10/25 | 102 | 25 | 26 | 22 | 50 | M25x1.5 | 26 | 32 | 15 | 21.0 | 8 | M8 | 19.0 |
| | 300 | 32 | 5/10/20/32 | 101 | 30 | 25 | 25 | 50 | M30x1.5 | 26 | 40 | 20 | 28.0 | 8 | M10 | 22.0 |
| | 400 | 40 | 5/10/12/16/20/40 | 132 | 40 | 44 | 36 | 60 | M40x1.5 | 28 | 50 | 20 | 33.5 | 8 | M12 | 28.0 |
| | 500 | 50 | 10/12/20 | 154 | 50 | 52 | 40 | 70 | M50x1.5 | 32 | 60 | 20 | 43.5 | 10 | M16 | 36.0 |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

**End bearings
for screw ends Form
831, 83, 83A, 841, 84, 84A**

Application



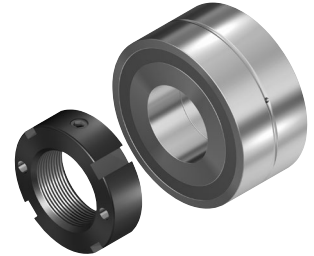
Separate technical dimensioning of the permissible drive torque is absolutely necessary.

Bearing assembly LAF



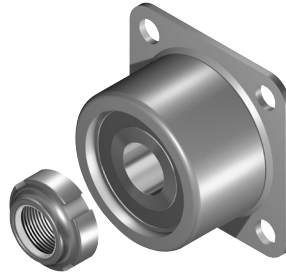
Shown with slotted nut NMA

Bearing assembly LAN



Shown with slotted nut NMZ

Bearing assembly LAL



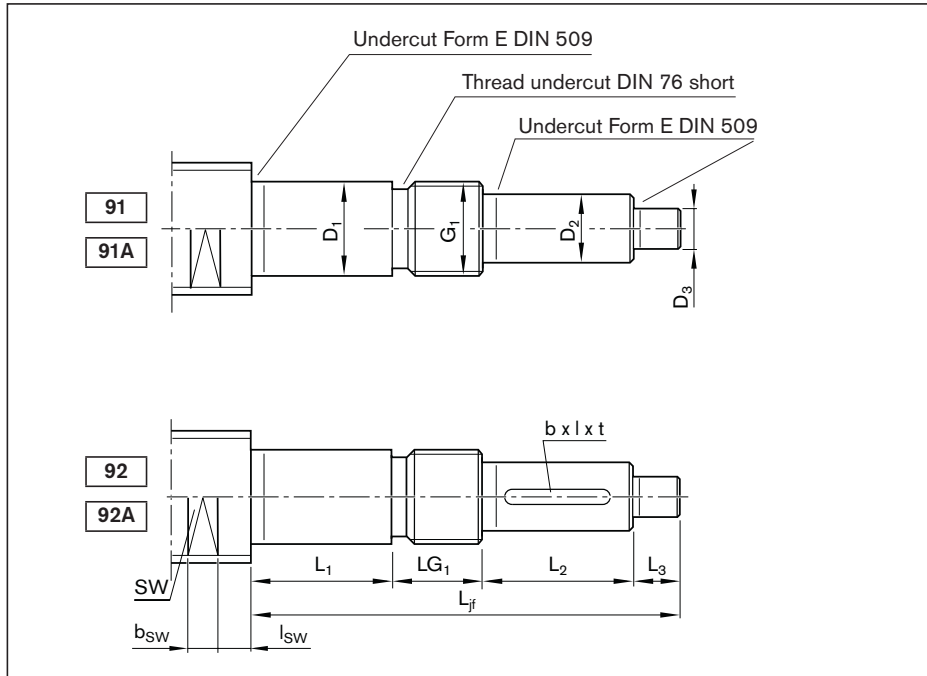
Shown with slotted nut NMG

Pillow block unit SEB-F assembly



| Version ¹⁾ | Hex socket | | Thread | | Wrench size | | | Keyway as per DIN 6885 | | | Bearing assembly | | | Pillow block unit SEB-F Part number |
|-----------------------|------------|----------------|--------|----------------|-------------|-----------------|-----------------|------------------------|----|-----|------------------|-----------------|-----------------|-------------------------------------|
| | S | t _s | G | t _G | SW | b _{sw} | l _{sw} | b P9 | l | t | LAF Part number | LAN Part number | LAL Part number | |
| 060 | - | - | - | - | - | - | - | - | - | - | - | - | - | R1591 106 20 |
| 061 | - | - | - | - | - | - | - | - | - | - | - | - | R1590 406 00 | - |
| 062 | - | - | - | - | - | - | - | - | - | - | - | - | R1590 406 00 | - |
| 065 | - | - | - | - | - | - | - | - | - | - | - | R1590 106 00 | - | - |
| 120 | 4 | 4 | M4 | 6 | - | - | - | - | - | - | - | R1590 112 00 | - | R1591 112 20 |
| 121 | 4 | 4 | M4 | 6 | - | - | - | - | - | - | - | - | R1590 412 00 | - |
| 122 | 4 | 4 | M4 | 6 | - | - | - | - | - | - | - | - | R1590 412 00 | - |
| 170 | 4 | 4 | M6 | 9 | - | - | - | - | - | - | R1590 017 30 | R1590 117 30 | - | R1591 117 30 |
| 200 | 5 | 5 | M6 | 9 | 15 | 10 | 8.5 | - | - | - | R1590 020 30 | R1590 120 30 | - | R1591 120 30 |
| 250 | 6 | 6 | M8 | 12 | 19 | 10 | 10.5 | - | - | - | - | - | - | - |
| 300 | 8 | 8 | M10 | 15 | 24 | 15 | 10.5 | - | - | - | R1590 030 30 | R1590 130 30 | - | R1591 130 30 |
| 400 | 12 | 12 | M12 | 18 | 30 | 15 | 12.5 | - | - | - | R1590 040 30 | R1590 140 30 | - | R1591 140 30 |
| 500 | 12 | 12 | M16 | 24 | 41 | 22 | 15.5 | - | - | - | R1590 050 30 | R1590 150 30 | - | R1591 150 30 |
| 120 | 4 | 4 | M4 | 6 | - | - | - | 3 | 20 | 1.8 | - | R1590 112 00 | - | R1591 112 20 |
| 170 | 4 | 4 | M6 | 9 | - | - | - | 5 | 25 | 3.0 | R1590 017 30 | R1590 117 30 | - | R1591 117 30 |
| 200 | 5 | 5 | M6 | 9 | 15 | 10 | 8.5 | 6 | 28 | 3.5 | R1590 020 30 | R1590 120 30 | - | R1591 120 30 |
| 250 | 6 | 6 | M8 | 12 | 19 | 10 | 10.5 | 6 | 36 | 3.5 | - | - | - | - |
| 300 | 8 | 8 | M10 | 15 | 24 | 15 | 10.5 | 8 | 36 | 4.0 | R1590 030 30 | R1590 130 30 | - | R1591 130 30 |
| 400 | 12 | 12 | M12 | 18 | 30 | 15 | 12.5 | 10 | 40 | 5.0 | R1590 040 30 | R1590 140 30 | - | R1591 140 30 |
| 500 | 12 | 12 | M16 | 24 | 41 | 22 | 15.5 | 12 | 50 | 5.0 | R1590 050 30 | R1590 150 30 | - | R1591 150 30 |

Form 91, 91A, 92, 92A



| Option (machining of end face) | |
|--------------------------------|------|
| K | None |

Ordering data:

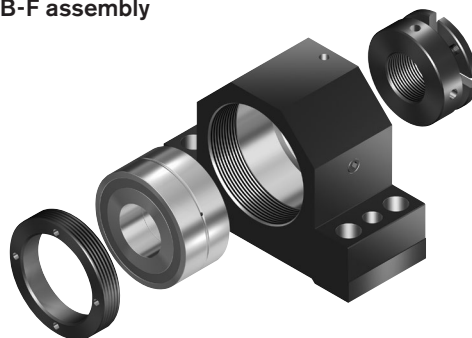
| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|---------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 92AK120 | 41Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|---------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | | | | | | | |
|--------|-----------------------|----------------|------------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------------|----------------|----------------|-----------------|
| | | d ₀ | P | L _{ff} | D ₁ h6 | L ₁ | D ₂ h7 | L ₂ | D ₃ h7 | L ₃ | G ₁ | LG ₁ |
| 91/91A | 060 | 12 | 2/5/10 | 50 | 6 | 14 | 5 | 16 | 4 | 10 | M6x0.5 | 10 |
| | 100 | 16 | 5/10/16 | 60 | 10 | 18 | 8 | 20 | 4 | 10 | M10x1 | 12 |
| | 120 | 20 | 5/10/20/40 | 75 | 12 | 23 | 10 | 25 | 6 | 15 | M12x1 | 12 |
| | 170 | 25 | 5/10/25 | 90 | 17 | 23 | 15 | 30 | 6 | 15 | M17x1 | 22 |
| | 200 | 32 | 5/10/20/32/64 | 103 | 20 | 26 | 18 | 40 | 6 | 15 | M20x1 | 22 |
| | 250 | 40 | 10/12/16/20/25/30/40 | 145 | 25 | 54 | 22 | 50 | 6 | 15 | M25x1.5 | 26 |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 116 | 30 | 25 | 25 | 50 | 6 | 15 | M30x1.5 | 26 |
| | 301 | 50 | 10/12/16/20/25/30/40 | 145 | 30 | 54 | 25 | 50 | 6 | 15 | M30x1.5 | 26 |
| | 350 | 50 | 5 | 125 | 35 | 32 | 30 | 50 | 6 | 15 | M35x1.5 | 28 |
| | 400 | 63 | 10/20/40 | 147 | 40 | 44 | 36 | 60 | 6 | 15 | M40x1.5 | 28 |
| 92/92A | 500 | 80 | 10/20/40 | 169 | 50 | 52 | 40 | 70 | 6 | 15 | M50x1.5 | 32 |
| | 100 | 16 | 5/10/16 | 60 | 10 | 18 | 8 | 20 | 4 | 10 | M10x1 | 12 |
| | 120 | 20 | 5/10/20/40 | 75 | 12 | 23 | 10 | 25 | 6 | 15 | M12x1 | 12 |
| | 170 | 25 | 5/10/25 | 90 | 17 | 23 | 15 | 30 | 6 | 15 | M17x1 | 22 |
| | 200 | 32 | 5/10/20/32/64 | 103 | 20 | 26 | 18 | 40 | 6 | 15 | M20x1 | 22 |
| | 250 | 40 | 10/12/16/20/25/30/40 | 145 | 25 | 54 | 22 | 50 | 6 | 15 | M25x1.5 | 26 |
| | 300 | 40 | 5/10/12/16/20/25/30/40 | 116 | 30 | 25 | 25 | 50 | 6 | 15 | M30x1.5 | 26 |
| | 301 | 50 | 10/12/16/20/25/30/40 | 145 | 30 | 54 | 25 | 50 | 6 | 15 | M30x1.5 | 26 |
| | 350 | 50 | 5 | 125 | 35 | 32 | 30 | 50 | 6 | 15 | M35x1.5 | 28 |
| | 400 | 63 | 10/20/40 | 147 | 40 | 44 | 36 | 60 | 6 | 15 | M40x1.5 | 28 |

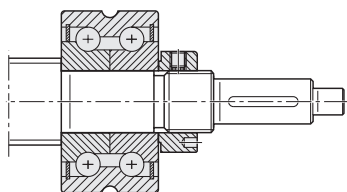
1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

**End bearings
for screw ends Form
91, 91A, 92, 92A**

Pillow block unit SEB-F assembly



Application



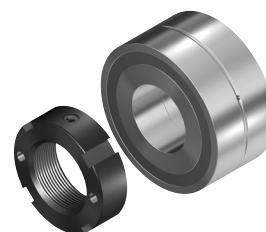
Separate technical dimensioning of the permissible drive torque is absolutely necessary.

Bearing assembly LAF



Shown with slotted nut NMA

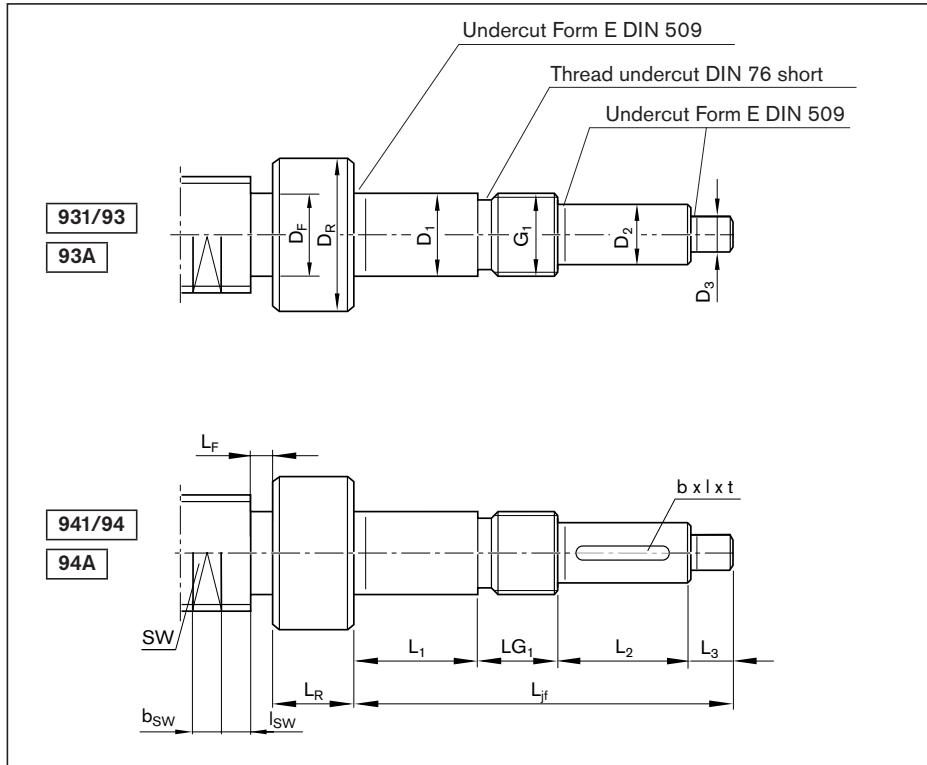
Bearing assembly LAN



Shown with slotted nut NMZ

| Version ¹⁾ | Keyway as per DIN 6885 | | | Wrench size | | | Module Pillow block unit SEB-F Part number | Bearing LAF Part number | LAN Part number |
|-----------------------|------------------------|----|-----|-------------|-----------------|-----------------|---|-------------------------------|--------------------|
| | b P9 | l | t | SW | b _{SW} | l _{SW} | | | |
| 060 | - | - | - | 9 | 10 | 8.5 | R1591 106 20 | - | R1590 106 00 |
| 100 | - | - | - | 11 | 10 | 8.5 | R1591 110 20 | - | R1590 110 00 |
| 120 | - | - | - | 15 | 10 | 8.5 | R1591 112 20 | R1590 012 00 | R1590 112 00 |
| 170 | - | - | - | 19 | 10 | 10.5 | R1591 117 30 | R1590 017 30 | R1590 117 30 |
| 200 | - | - | - | 24 | 15 | 10.5 | R1591 120 30 | R1590 020 30 | R1590 120 30 |
| 250 | - | - | - | 30 | 15 | 12.5 | R1591 225 30 | R1590 325 30 | R1590 225 30 |
| 300 | - | - | - | 30 | 15 | 12.5 | R1591 130 30 | R1590 030 30 | R1590 130 30 |
| 301 | - | - | - | 41 | 22 | 15.5 | R1591 230 30 | R1590 330 30 | R1590 230 30 |
| 350 | - | - | - | 41 | 22 | 15.5 | R1591 135 30 | R1590 035 30 | R1590 135 30 |
| 400 | - | - | - | 50 | 27 | 16.5 | R1591 140 30 | R1590 040 30 | R1590 140 30 |
| 500 | - | - | - | 60 | 27 | 18.5 | R1591 150 30 | R1590 050 30 | R1590 150 30 |
| 100 | 2 | 14 | 1.2 | 11 | 10 | 8.5 | R1591 110 20 | - | R1590 110 00 |
| 120 | 3 | 20 | 1.8 | 15 | 10 | 8.5 | R1591 112 20 | R1590 012 00 | R1590 112 00 |
| 170 | 5 | 25 | 3.0 | 19 | 10 | 10.5 | R1591 117 30 | R1590 017 30 | R1590 117 30 |
| 200 | 6 | 28 | 3.5 | 24 | 15 | 10.5 | R1591 120 30 | R1590 020 30 | R1590 120 30 |
| 250 | 6 | 36 | 3.5 | 30 | 15 | 12.5 | R1591 225 30 | R1590 325 30 | R1590 225 30 |
| 300 | 8 | 36 | 4.0 | 30 | 15 | 12.5 | R1591 130 30 | R1590 030 30 | R1590 130 30 |
| 301 | 8 | 36 | 4.0 | 41 | 22 | 15.5 | R1591 230 30 | R1590 330 30 | R1590 230 30 |
| 350 | 8 | 36 | 4.0 | 41 | 22 | 15.5 | R1591 135 30 | R1590 035 30 | R1590 135 30 |
| 400 | 10 | 40 | 5.0 | 50 | 27 | 16.5 | R1591 140 30 | R1590 040 30 | R1590 140 30 |
| 500 | 12 | 50 | 5.0 | 60 | 27 | 18.5 | R1591 150 30 | R1590 050 30 | R1590 150 30 |

Form 931, 93, 93A, 941, 94, 94A



| Option (machining of end face) | |
|--------------------------------|------|
| K | None |

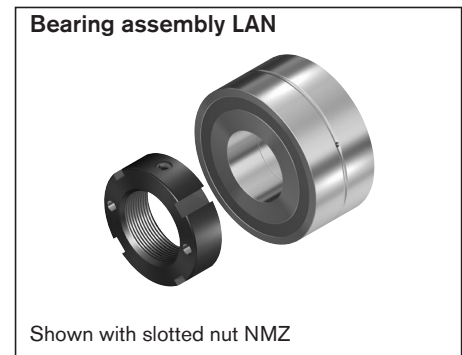
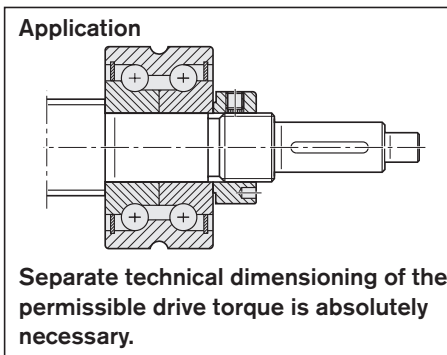
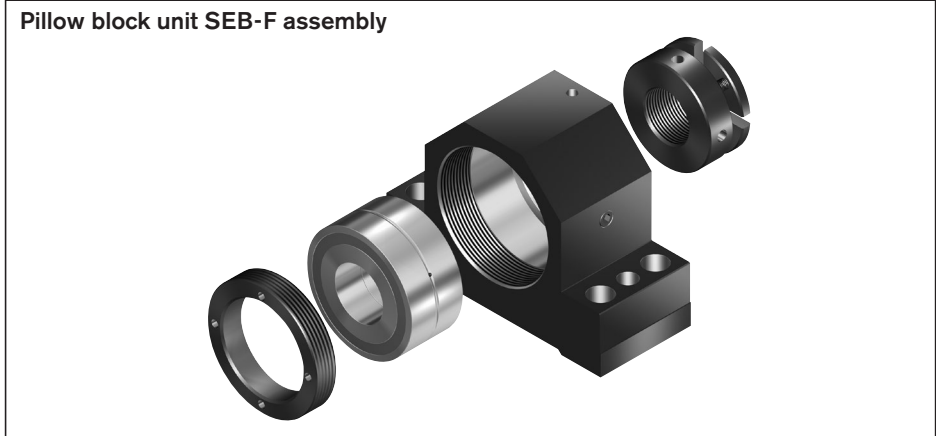
Ordering data:

| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 20x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | 93K200 | 41Z120 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | | | | | | | | | | | |
|--------|-----------------------|----------------|---------------|-----------------|----------------------|----------------|----------------------|----------------|----------------------|----------------|----------------|-----------------|----------------|----------------|----------------|--------------------|
| | | d ₀ | P | L _{jf} | D ₁ h6 | L ₁ | D ₂ h7 | L ₂ | D ₃ h7 | L ₃ | G ₁ | LG ₁ | D _R | L _R | D _F | L _{F max} |
| 931 | 060 | 8 | 1/2/2.5/5 | 50 | 6 | 14 | 5 | 16 | 4 | 10 | M6x0.5 | 10 | 12 | 15 | 6.0 | 1 |
| | 120 | 12 | 2/5/10 | 75 | 12 | 23 | 10 | 25 | 6 | 15 | M12x1 | 12 | 16 | 15 | 8.0 | 1 |
| | 170 | 16 | 5/10/16 | 90 | 17 | 23 | 15 | 30 | 6 | 15 | M17x1 | 22 | 23 | 17 | 12.0 | 1 |
| 93/93A | 200 | 20 | 5/10/20 | 103 | 20 | 26 | 18 | 40 | 6 | 15 | M20x1 | 22 | 25 | 15 | 16.5 | 8 |
| | 250 | 25 | 5/10/25 | 117 | 25 | 26 | 22 | 50 | 6 | 15 | M25x1.5 | 26 | 32 | 15 | 21.0 | 8 |
| | 300 | 32 | 5/10/20/32 | 116 | 30 | 25 | 25 | 50 | 6 | 15 | M30x1.5 | 26 | 40 | 20 | 28.0 | 8 |
| | 400 | 40 | 5/10/12/16/20 | 147 | 40 | 44 | 36 | 60 | 6 | 15 | M40x1.5 | 28 | 50 | 20 | 33.5 | 8 |
| | 500 | 50 | 10/12/20 | 169 | 50 | 52 | 40 | 70 | 6 | 15 | M50x1.5 | 32 | 60 | 20 | 43.5 | 10 |
| 941 | 120 | 12 | 2/5/10 | 75 | 12 | 23 | 10 | 25 | 6 | 15 | M12x1 | 12 | 16 | 15 | 8.0 | 1 |
| | 170 | 16 | 5/10/16 | 90 | 17 | 23 | 15 | 30 | 6 | 15 | M17x1 | 22 | 23 | 17 | 12.0 | 1 |
| 94/94A | 200 | 20 | 5/10/20 | 103 | 20 | 26 | 18 | 40 | 6 | 15 | M20x1 | 22 | 25 | 15 | 16.5 | 8 |
| | 250 | 25 | 5/10/25 | 117 | 25 | 26 | 22 | 50 | 6 | 15 | M25x1.5 | 26 | 32 | 15 | 21.0 | 8 |
| | 300 | 32 | 5/10/20/32 | 116 | 30 | 25 | 25 | 50 | 6 | 15 | M30x1.5 | 26 | 40 | 20 | 28.0 | 8 |
| | 400 | 40 | 5/10/12/16/20 | 147 | 40 | 44 | 36 | 60 | 6 | 15 | M40x1.5 | 28 | 50 | 20 | 33.5 | 8 |
| | 500 | 50 | 10/12/20 | 169 | 50 | 52 | 40 | 70 | 6 | 15 | M50x1.5 | 32 | 60 | 20 | 43.5 | 10 |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

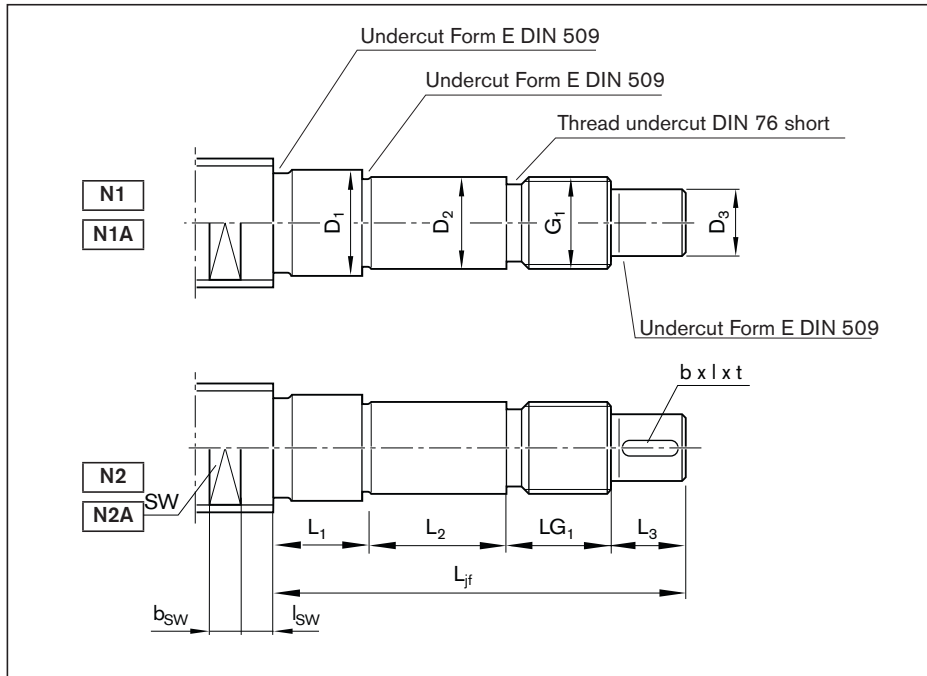
**End bearings
for screw ends Form
931, 93, 93A, 941, 94, 94A**



Ball screw assemblies BASA

| Version ¹⁾ | Keyway as per DIN 6885 | | | Wrench size | | | Module | Bearing LAF Part number | LAN Part number |
|-----------------------|------------------------|----|-----|-------------|-----------------|-----------------|---|-------------------------------|--------------------|
| | b P9 | l | t | SW | b _{SW} | l _{SW} | Pillow block unit SEB-F Part number | | |
| 060 | — | — | — | — | — | — | R1591 106 20 | — | R1591 106 00 |
| 120 | — | — | — | — | — | — | R1591 112 20 | — | R1591 112 00 |
| 170 | — | — | — | — | — | — | R1591 117 30 | R1590 017 30 | R1591 117 30 |
| 200 | — | — | — | 15 | 10 | 8.5 | R1591 120 30 | R1590 020 30 | R1591 120 30 |
| 250 | — | — | — | 19 | 10 | 10.5 | — | — | — |
| 300 | — | — | — | 24 | 15 | 10.5 | R1591 130 30 | R1590 030 30 | R1591 130 30 |
| 400 | — | — | — | 30 | 15 | 12.5 | R1591 140 30 | R1590 040 30 | R1591 140 30 |
| 500 | — | — | — | 41 | 22 | 15.5 | R1591 150 30 | R1590 050 30 | R1591 150 30 |
| 120 | 3 | 20 | 1.8 | — | — | — | R1591 112 20 | — | R1591 112 00 |
| 170 | 5 | 25 | 3.0 | — | — | — | R1591 117 30 | R1590 017 30 | R1591 117 30 |
| 200 | 6 | 28 | 3.5 | 15 | 10 | 8.5 | R1591 120 30 | R1590 020 30 | R1591 120 30 |
| 250 | 6 | 36 | 3.5 | 19 | 10 | 10.5 | — | — | — |
| 300 | 8 | 36 | 4.0 | 24 | 15 | 10.5 | R1591 130 30 | R1590 030 30 | R1591 130 30 |
| 400 | 10 | 40 | 5.0 | 30 | 15 | 12.5 | R1591 140 30 | R1590 040 30 | R1591 140 30 |
| 500 | 12 | 50 | 5.0 | 41 | 22 | 15.5 | R1591 150 30 | R1590 050 30 | R1591 150 30 |

Form N1, N1A, N2, N2A



| Option (machining of end face) | |
|--------------------------------|------|
| K | None |
| Z | |
| S | |
| G | |

Ordering data:

| | | | | | | | | | | | | |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|
| BASA | 25x5R x 3 | SEM-E-S - 4 | 00 | 1 | 2 | T7 | R | A1K170 | 41Z170 | 1250 | 0 | 1 |
|------|-----------|-------------|----|---|---|----|---|--------|--------|------|---|---|

| Form | Version ¹⁾ | Size | | (mm) | | | | | | | | |
|--------|-----------------------|----------------|----------------------|-----------------|-----------------------|----------------|----------------------|----------------|----------------------|----------------|----------------|-----------------|
| | | d ₀ | P | L _{jf} | D ₁ h11 | L ₁ | D ₂ h6 | L ₂ | D ₃ h7 | L ₃ | G ₁ | LG ₁ |
| N1/N1A | 170 | 25 | 5/10/25 | 85 | 21.0 | 10 | 17 | 23 | 15 | 30 | M17x1 | 22 |
| | 200 | 32 | 5/10/20/32 | 98 | 27.5 | 10 | 20 | 26 | 18 | 40 | M20x1 | 22 |
| | 250 | 40 | 10/12/16/20/25/30/40 | 140 | 33.5 | 10 | 25 | 54 | 22 | 50 | M25x1.5 | 26 |
| | 300 | 40 | 5 | 111 | 36.0 | 10 | 30 | 25 | 25 | 50 | M30x1.5 | 26 |
| | 301 | 50 | 10/12/16/20/25/30/40 | 103 | 43.0 | 10 | 30 | 25 | 25 | 50 | M30x1.5 | 18 |
| | 350 | 50 | 5 | 120 | 46.0 | 10 | 35 | 32 | 30 | 50 | M35x1.5 | 28 |
| | 400 | 63 | 10/20/40 | 142 | 56.0 | 10 | 40 | 44 | 36 | 60 | M40x1.5 | 28 |
| | 500 | 80 | 10/20/40 | 164 | 66.5 | 10 | 50 | 52 | 40 | 70 | M50x1.5 | 32 |
| N2/N2A | 170 | 25 | 5/10/25 | 85 | 21.0 | 10 | 17 | 23 | 15 | 30 | M17x1 | 22 |
| | 200 | 32 | 5/10/20/32 | 98 | 27.5 | 10 | 20 | 26 | 18 | 40 | M20x1 | 22 |
| | 250 | 40 | 10/12/16/20/25/30/40 | 140 | 33.5 | 10 | 25 | 54 | 22 | 50 | M25x1.5 | 26 |
| | 300 | 40 | 5 | 111 | 36.0 | 10 | 30 | 25 | 25 | 50 | M30x1.5 | 26 |
| | 301 | 50 | 10/12/16/20/25/30/40 | 103 | 43.0 | 10 | 30 | 25 | 25 | 50 | M30x1.5 | 18 |
| | 350 | 50 | 5 | 120 | 46.0 | 10 | 35 | 32 | 30 | 50 | M35x1.5 | 28 |
| | 400 | 63 | 10/20/40 | 142 | 56.0 | 10 | 40 | 44 | 36 | 60 | M40x1.5 | 28 |
| | 500 | 80 | 10/20/40 | 164 | 66.5 | 10 | 50 | 52 | 40 | 70 | M50x1.5 | 32 |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

Separate technical dimensioning of the permissible drive torque is absolutely necessary.

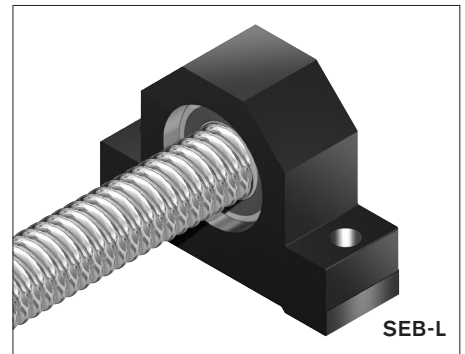
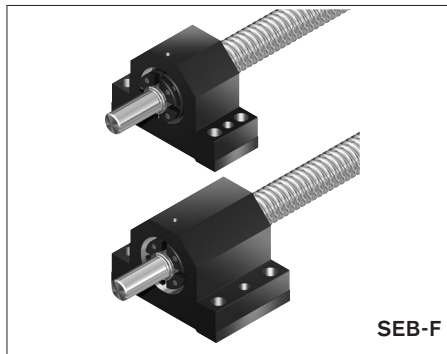
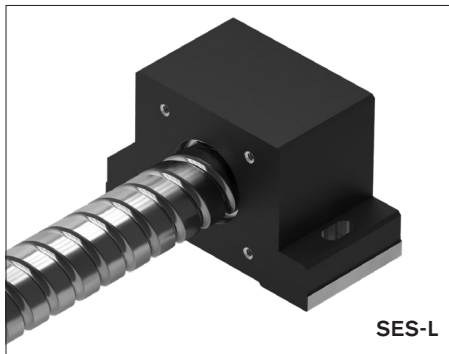
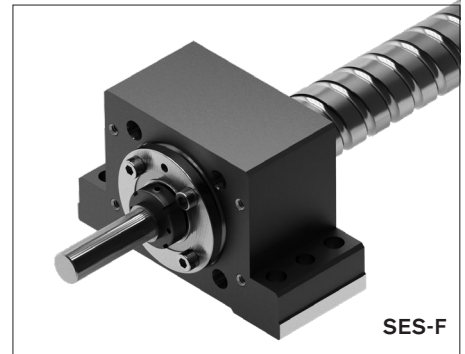
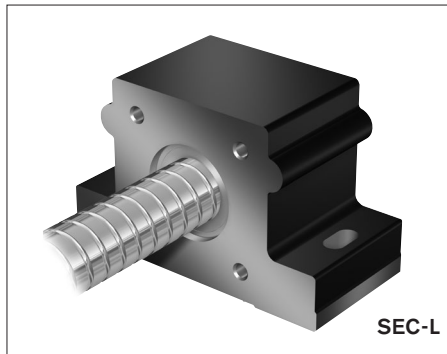
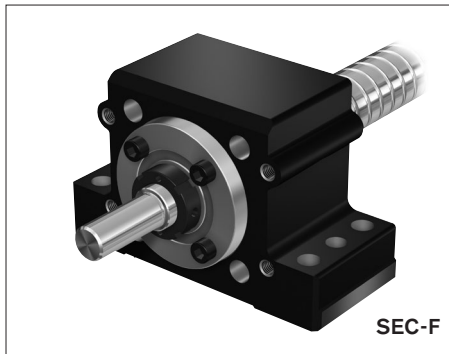
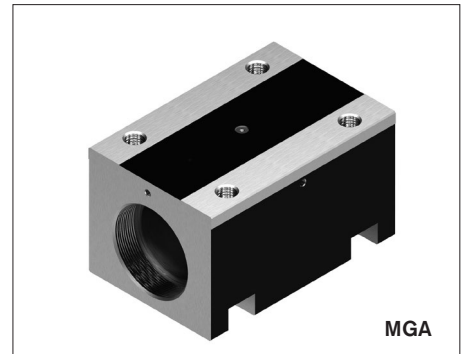
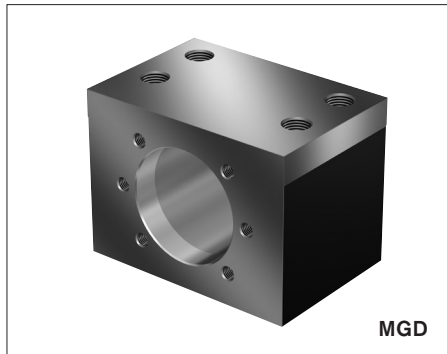
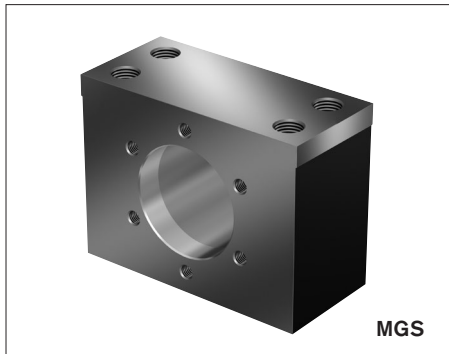
| Version ¹⁾ | Keyway | | | Centering hole | | Hex socket | | Thread | | Wrench size | | |
|-----------------------|---------|----|-----|----------------|----------------|------------|----------------|--------|----------------|-------------|-----------------|-----------------|
| | b P9 | l | t | Z | t _z | S | t _s | G | t _g | SW | b _{sw} | l _{sw} |
| 170 | - | - | - | M5 | 12.5 | 4 | 4 | M6 | 9 | 19 | 10 | 10.5 |
| 200 | - | - | - | M6 | 16.0 | 5 | 5 | M6 | 9 | 24 | 15 | 10.5 |
| 250 | - | - | - | M8 | 19.0 | 6 | 6 | M8 | 12 | 30 | 15 | 12.5 |
| 300 | - | - | - | M10 | 22.0 | 8 | 8 | M10 | 15 | 30 | 15 | 12.5 |
| 301 | - | - | - | M10 | 22.0 | 8 | 8 | M10 | 15 | 41 | 22 | 15.5 |
| 350 | - | - | - | M10 | 22.0 | 10 | 10 | M12 | 18 | 41 | 22 | 15.5 |
| 400 | - | - | - | M12 | 28.0 | 12 | 12 | M12 | 18 | 50 | 27 | 16.5 |
| 500 | - | - | - | M16 | 36.0 | 12 | 12 | M16 | 24 | 60 | 27 | 18.5 |
| 170 | 5 | 25 | 3.0 | M5 | 12.5 | 4 | 4 | M6 | 9 | 19 | 10 | 10.5 |
| 200 | 6 | 28 | 3.5 | M6 | 16.0 | 5 | 5 | M6 | 9 | 24 | 15 | 10.5 |
| 250 | 6 | 36 | 3.5 | M8 | 19.0 | 6 | 6 | M8 | 12 | 30 | 15 | 12.5 |
| 300 | 8 | 36 | 4.0 | M10 | 22.0 | 8 | 8 | M10 | 15 | 30 | 15 | 12.5 |
| 301 | 8 | 36 | 4.0 | M10 | 22.0 | 8 | 8 | M10 | 15 | 41 | 22 | 15.5 |
| 350 | 8 | 36 | 4.0 | M10 | 22.0 | 10 | 10 | M12 | 18 | 41 | 22 | 15.5 |
| 400 | 10 | 40 | 5.0 | M12 | 28.0 | 12 | 12 | M12 | 18 | 50 | 27 | 16.5 |
| 500 | 12 | 50 | 5.0 | M16 | 36.0 | 12 | 12 | M16 | 24 | 60 | 27 | 18.5 |

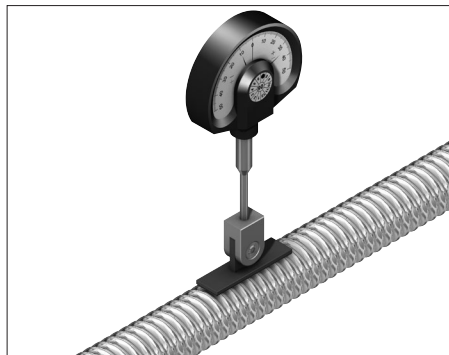
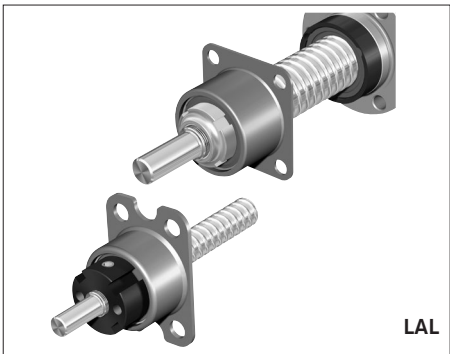
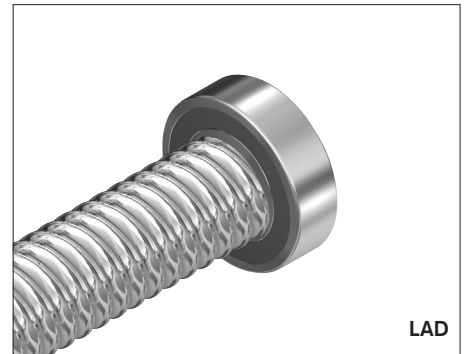
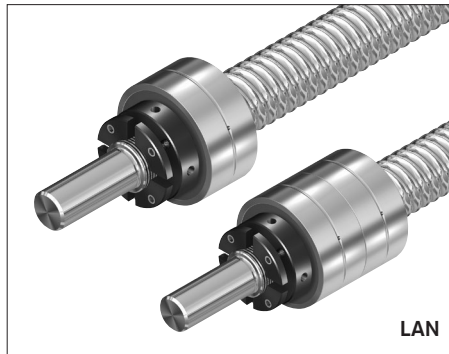
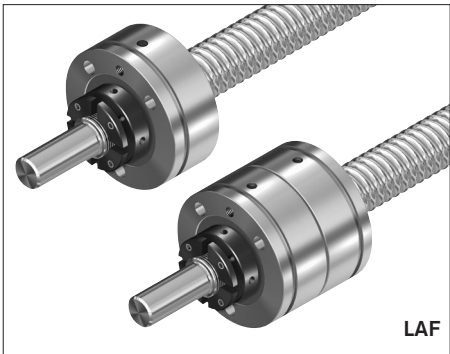
Overview

Rexroth offers an extensive range of accessories for ball screw assemblies.

These include nut housings, pillow block units, bearings, slotted nuts, and front lube units.

A reasonable ratio of the load capacities of the bearing and the ball screw drive should be taken into account when dimensioning. Further information is provided in this section.





Nut housing MGS

Steel nut housings MGS are designed for FEM-E-S, FDM-E-S, FEP-E-S and SEM-E-S nuts

In addition to bolting, the housings should be locked in place by positive means (e.g. two pins with a diameter equal to that of the screws S_2).

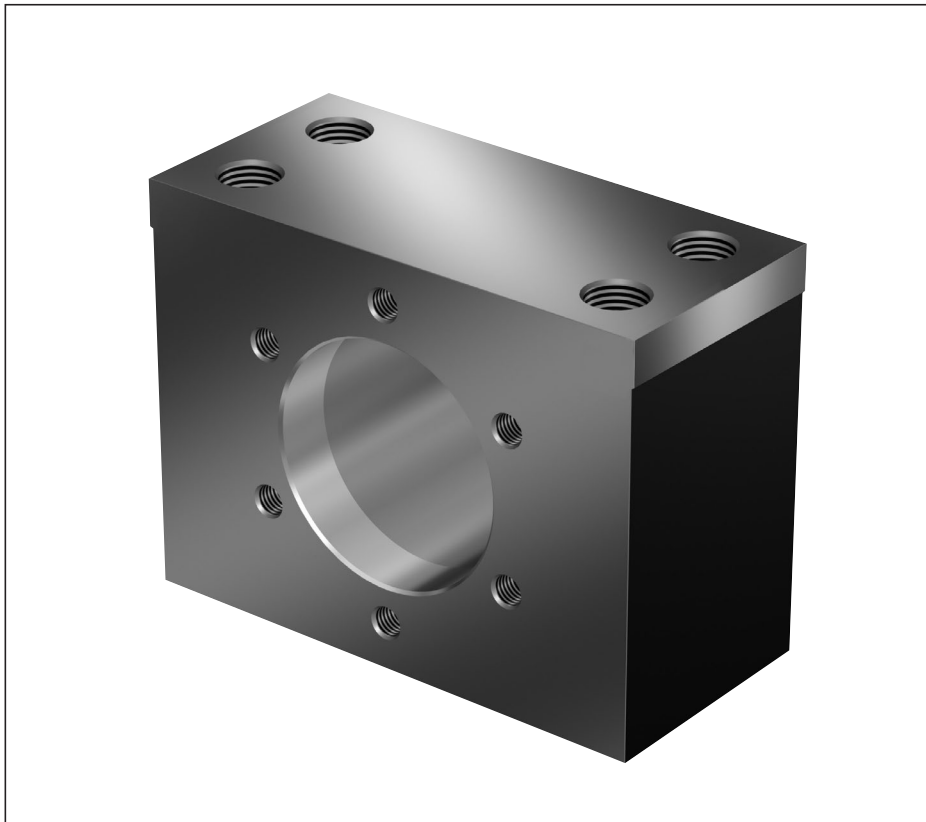
We recommend using screws with a strength class of 8.8.

Tightening torque

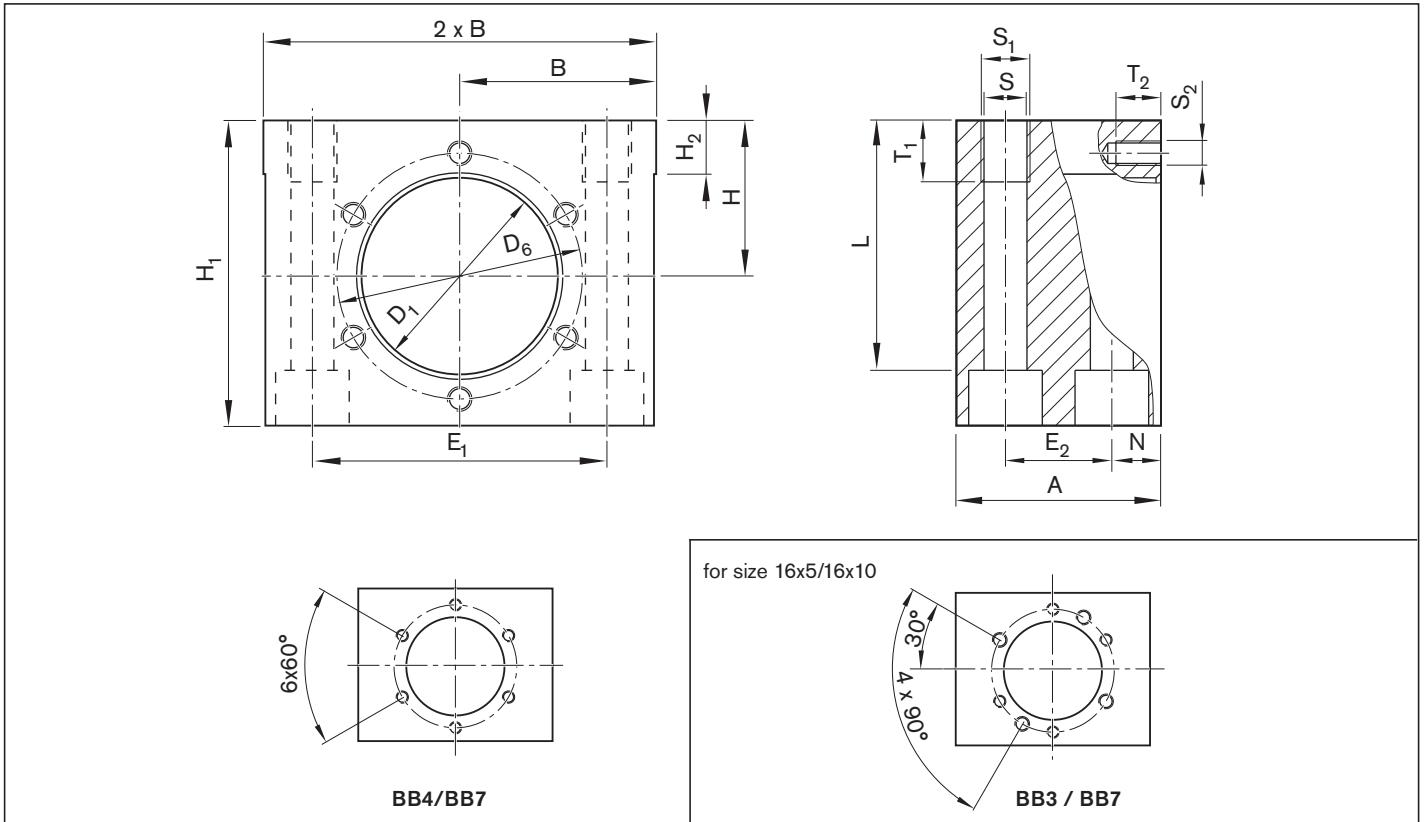
see "Installation in the machine" on page 147

Reference edges are formed on both sides.

⚠ If a ball screw assembly with a front lube unit is used, the front lube unit may project beyond the housing. This must be considered when calculating the stroke.



| Size $d_0 \times P \times D_w$ | Part number | Mass (kg) | Hole pattern FEM-E-B / FEM-E-S / FEP-E-S | SEM-E-S | Hex socket cap screw ISO 4762 |
|-----------------------------------|--------------|--------------|---|---------|----------------------------------|
| 16x5R/L x 3 | R1506 000 20 | 0.850 | BB3 | BB7 | M8 |
| 16x10R x 3 | | | | | |
| 16x16R x 3 | R1506 100 20 | 1.050 | BB4 | BB7 | M8 |
| 20x5R/L x 3 | | | | | |
| 20x10R x 3 | | | | | |
| 20x20R x 3.5 | | | | | |
| 20x40R x 3.5 | R1506 200 20 | 1.178 | BB4 | BB7 | M8 |
| 25x5R/L x 3 | | | | | |
| 25x10R x 3 | | | | | |
| 25x25R x 3.5 | | | | | |
| 32x5R/L x 3.5 | R1506 300 20 | 1.746 | BB4 | BB7 | M10 |
| 32x10R x 3.969 | | | | | |
| 32x20R x 3.969 | | | | | |
| 32x32R x 3.969 | | | | | |
| 32x64R x 3.969 | R1506 400 20 | 2.367 | BB4 | BB7 | M12 |
| 40x5R/L x 3.5 | | | | | |
| 40x10R/L x 6 | | | | | |
| 40x20R x 6 | | | | | |
| 40x40R x 6 | R1506 500 21 | 6.187 | BB4 | BB7 | M16 |
| 50x5R x 3.5 | R1506 500 20 | 4.000 | BB4 | BB7 | M14 |
| 50x10R x 6 | R1506 500 21 | 6.187 | BB4 | BB7 | M16 |
| 50x16R x 6 | R1506 600 20 | 7.173 | BB4 | BB7 | M16 |
| 50x20R x 6.5 | | | | | |
| 50x40R x 6.5 | | | | | |
| 63x10R x 6 | | | | | |
| 80x10R x 6.5 | R1506 700 20 | 9.334 | BB4 | BB7 | M16 |



| Size $d_0 \times P \times D_w$ | (mm) | | | | | | | | | | | | | | | |
|-----------------------------------|-------------|-------|----|-----------------|-----------------|-------|-------|----------------|---------------|----|------|-------|-------|-------|-------|----------------------|
| | D_1 H7 | D_6 | A | B ± 0.01 | H ± 0.01 | H_1 | H_2 | E_1 | E_2 | N | S | S_1 | T_1 | S_2 | T_2 | Clamping length L |
| 16x5R/L x 3 | 28 | 40 | 40 | 35.0 | 28 | 55 | 10 | 52 ± 0.1 | 20 ± 0.1 | 10 | 8.4 | M10 | 15 | M6 | 10 | 44.0 |
| 16x10R x 3 | | | | | | | | | | | | | | | | |
| 16x16R x 3 | 33 | 45 | 40 | 37.5 | 32 | 62 | 10 | 56 ± 0.1 | 20 ± 0.1 | 10 | 8.4 | M10 | 15 | M6 | 10 | 51.0 |
| 20x5R/L x 3 | | | | | | | | | | | | | | | | |
| 20x10R x 3 | | | | | | | | | | | | | | | | |
| 20x20R x 3.5 | 38 | 50 | 40 | 42.5 | 34 | 65 | 10 | 63 ± 0.1 | 20 ± 0.1 | 10 | 8.4 | M10 | 15 | M6 | 10 | 54.0 |
| 20x40R x 3.5 | | | | | | | | | | | | | | | | |
| 25x5R/L x 3 | | | | | | | | | | | | | | | | |
| 25x10R x 3 | | | | | | | | | | | | | | | | |
| 25x25R x 3.5 | 48 | 60 | 50 | 47.5 | 38 | 75 | 10 | 72 ± 0.1 | 26 ± 0.1 | 12 | 10.5 | M12 | 15 | M6 | 10 | 61.0 |
| 32x5R/L x 3.5 | | | | | | | | | | | | | | | | |
| 32x10R x 3.969 | | | | | | | | | | | | | | | | |
| 32x20R x 3.969 | 56 | 68 | 60 | 52.5 | 42 | 82 | 12 | 82 ± 0.1 | 30 ± 0.1 | 15 | 13.0 | M16 | 20 | M6 | 12 | 64.0 |
| 32x32R x 3.969 | | | | | | | | | | | | | | | | |
| 32x64R x 3.969 | | | | | | | | | | | | | | | | |
| 40x5R/L x 6 | | | | | | | | | | | | | | | | |
| 40x10R/L x 6 | 63 | 78 | 65 | 60.0 | 50 | 98 | 12 | 93 ± 0.1 | 35 ± 0.1 | 15 | 15.0 | M18 | 25 | M8 | 14 | 79.5 |
| 40x20R x 6 | | | | | | | | | | | | | | | | |
| 40x40R x 6 | 72 | 90 | 80 | 70.0 | 58 | 113 | 12 | 108 ± 0.15 | 46 ± 0.15 | 17 | 17.0 | M20 | 30 | M10 | 18 | 92.0 |
| 50x5R x 3.5 | 68 | 82 | 65 | 65.0 | 52 | 101 | 12 | 100 ± 0.15 | 35 ± 0.15 | 15 | 15.0 | M18 | 30 | M8 | 14 | 82.5 |
| 50x10R x 6 | 72 | 90 | 80 | 70.0 | 58 | 113 | 12 | 108 ± 0.15 | 46 ± 0.15 | 17 | 17.0 | M20 | 30 | M10 | 18 | 92.0 |
| 50x16R x 6 | | | | | | | | | | | | | | | | |
| 50x20R x 6.5 | 85 | 105 | 80 | 75.0 | 65 | 128 | 15 | 121 ± 0.15 | 46 ± 0.15 | 17 | 17.0 | M20 | 30 | M10 | 18 | 107.0 |
| 50x40R x 6.5 | | | | | | | | | | | | | | | | |
| 63x10R x 6 | | | | | | | | | | | | | | | | |
| 80x10R x 6.5 | 105 | 125 | 80 | 85.0 | 78 | 153 | 15 | 140 ± 0.20 | 46 ± 0.15 | 17 | 17.0 | M20 | 30 | M12 | 20 | 132.0 |

Nut housing MGD

Steel nut housings MGD are designed for FEM-E-B, FDM-E-B, SEM-E-C and FED-E-B nuts

In addition to bolting, the housings should be locked in place by positive means (for example, two pins with a diameter equal to that of the screws).

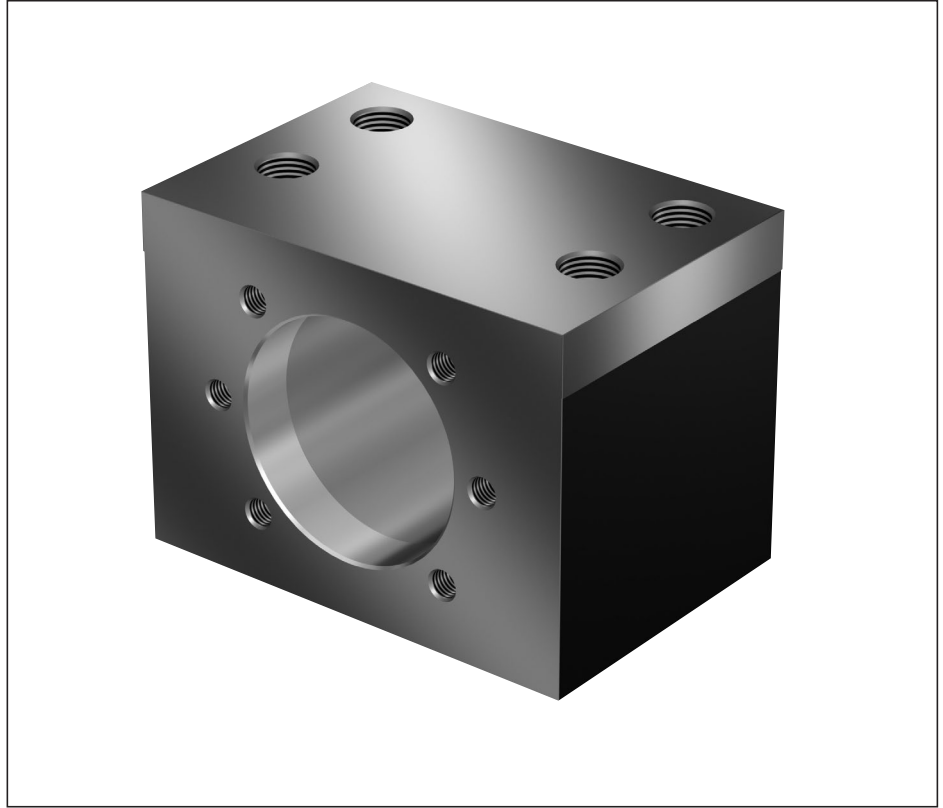
We recommend using screws with a strength class of 8.8.

Tightening torque

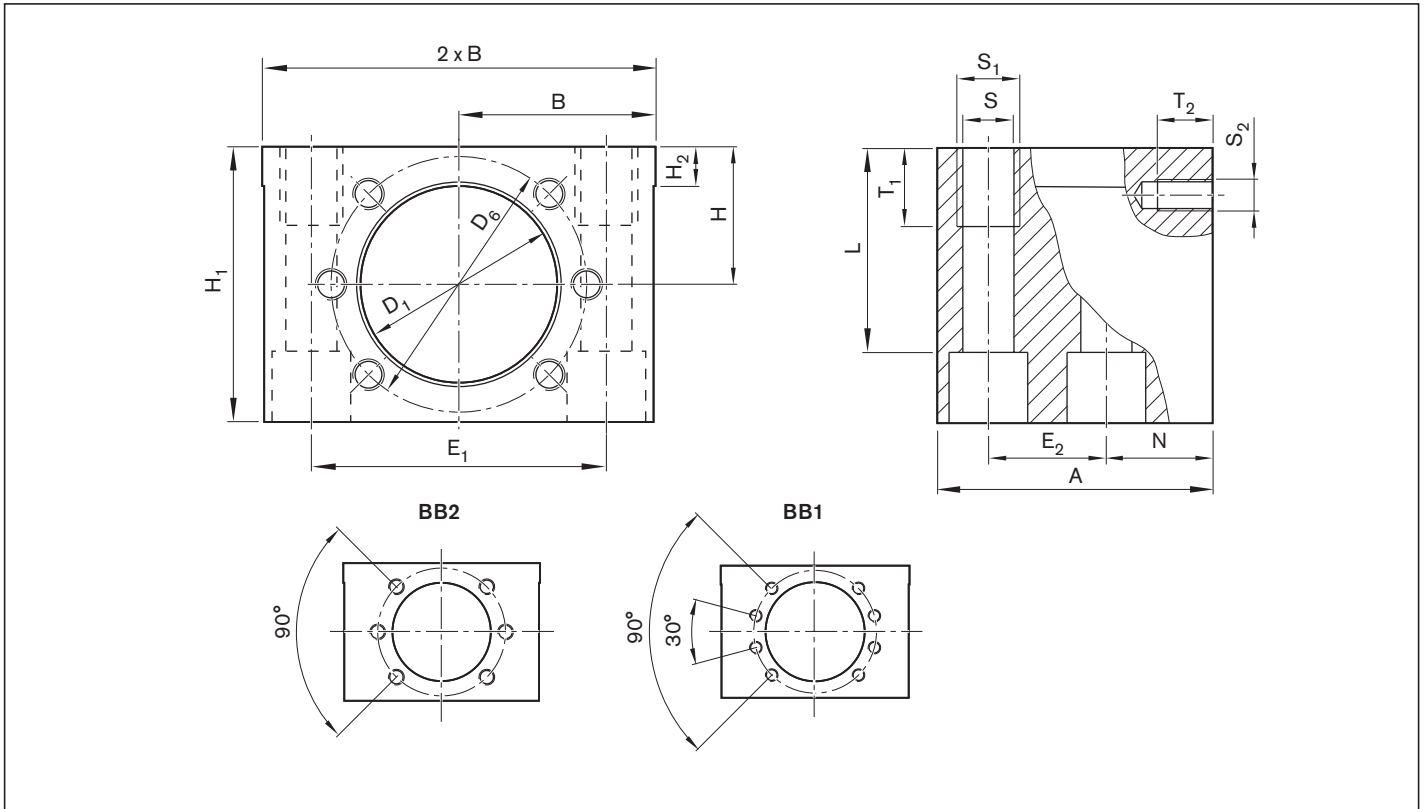
see "Installation in the machine" on page 147

Reference edges are formed on both sides.

⚠ If a ball screw assembly with a front lube unit is used, the front lube unit may project beyond the housing. This must be considered when calculating the stroke.



| Size | Part number | Mass | Hole pattern | Hex socket cap screw ISO 4762 |
|---------------------------|--------------|-------|--------------|-------------------------------|
| $d_0 \times P \times D_w$ | | (kg) | | |
| 16 x 5R/L x 3 | R1506 000 50 | 0.91 | BB2 | M8 |
| 16 x 10R x 3 | | | | |
| 16 x 16R x 3 | | | | |
| 20 x 5R/L x 3 | R1506 100 50 | 1.18 | BB2 | M8 |
| 20 x 10R x 3 | | | | |
| 20 x 20R x 3.5 | | | | |
| 25 x 5R/L x 3 | R1506 200 50 | 1.33 | BB2 | M8 |
| 25 x 10R x 3 | | | | |
| 25 x 25R x 3.5 | | | | |
| 32 x 5R/L x 3.5 | R1506 300 50 | 2.27 | BB2 | M12 |
| 32 x 10R x 3.969 | | | | |
| 32 x 20R x 3.969 | | | | |
| 32 x 32R x 3.969 | | | | |
| 40 x 5R/L x 3.5 | R1506 400 50 | 3.61 | BB1 | M14 |
| 40 x 10R/L x 6 | | | | |
| 40 x 12R x 6 | | | | |
| 40 x 16R x 6 | | | | |
| 40 x 20R x 6 | | | | |
| 40 x 25R x 6 | | | | |
| 40 x 30R x 6 | | | | |
| 40 x 40R x 6 | | | | |
| 50 x 5R x 3.5 | R1506 500 50 | 5.63 | BB1 | M16 |
| 50 x 10R x 6 | | | | |
| 50 x 12R x 6 | | | | |
| 50 x 16R x 6 | | | | |
| 50 x 20R x 6.5 | | | | |
| 50 x 25R x 6.5 | | | | |
| 50 x 30R x 6.5 | | | | |
| 50 x 40R x 6.5 | | | | |
| 63 x 10R x 6 | R1506 600 50 | 6.72 | BB1 | M16 |
| 63 x 20R x 6.5 | R1506 600 51 | 7.67 | BB1 | M16 |
| 63 x 40R x 6.5 | | | | |
| 80 x 10R x 6.5 | R1506 700 50 | 8.60 | BB1 | M16 |
| 80 x 20R x 12.7 | R1506 700 51 | 10.53 | BB1 | M16 |
| 80 x 40R x 12.7 | | | | |



| Size | (mm) | | | | | | | | | | | | | | | |
|------------------|----------------------|----------------|-----|------------|------------|----------------|----------------|----------------|----------------|----|------|----------------|----------------|----------------|----------------|----------------------|
| | D ₁ H7 | D ₆ | A | B ±0.01 | H ±0.01 | H ₁ | H ₂ | E ₁ | E ₂ | N | S | S ₁ | T ₁ | S ₂ | T ₂ | Clamping length L |
| 16 x 5R/L x 3 | 28 | 38 | 50 | 35 | 24 | 48 | 10 | 50 ±0.1 | 20 ±0.1 | 20 | 8.4 | M10 | 15 | M5 | 10 | 37.0 |
| 16 x 10R x 3 | | | | | | | | | | | | | | | | |
| 16 x 16R x 3 | | | | | | | | | | | | | | | | |
| 20 x 5R/L x 3 | 36 | 47 | 55 | 37.5 | 28 | 56 | 10 | 55 ±0.1 | 23 ±0.1 | 22 | 8.4 | M10 | 15 | M6 | 11 | 45.0 |
| 20 x 10R x 3 | | | | | | | | | | | | | | | | |
| 20 x 20R x 3.5 | | | | | | | | | | | | | | | | |
| 25 x 5R x 3 | 40 | 51 | 55 | 40 | 30 | 60 | 10 | 60 ±0.1 | 23 ±0.1 | 22 | 8.4 | M10 | 15 | M6 | 11 | 49.0 |
| 25 x 10R x 3 | | | | | | | | | | | | | | | | |
| 25 x 25R x 3.5 | | | | | | | | | | | | | | | | |
| 32 x 5R/L x 3.5 | 50 | 65 | 70 | 50 | 35 | 70 | 10 | 75 ±0.1 | 30 ±0.1 | 27 | 13.0 | M16 | 20 | M8 | 14 | 52.0 |
| 32 x 10R x 3.969 | | | | | | | | | | | | | | | | |
| 32 x 20R x 3.969 | | | | | | | | | | | | | | | | |
| 32 x 32R x 3.969 | | | | | | | | | | | | | | | | |
| 40 x 5R/L x 3.5 | 63 | 78 | 80 | 60 | 42 | 84 | 12 | 90 ±0.1 | 35 ±0.1 | 31 | 15.0 | M18 | 25 | M8 | 17 | 65.5 |
| 40 x 10R/L x 6 | | | | | | | | | | | | | | | | |
| 40 x 12R x 6 | | | | | | | | | | | | | | | | |
| 40 x 16R x 6 | | | | | | | | | | | | | | | | |
| 40 x 20R x 6 | | | | | | | | | | | | | | | | |
| 40 x 25R x 6 | | | | | | | | | | | | | | | | |
| 40 x 30R x 6 | | | | | | | | | | | | | | | | |
| 40 x 40R x 6 | | | | | | | | | | | | | | | | |
| 50 x 5R x 3.5 | 75 | 93 | 95 | 70 | 48 | 96 | 12 | 110 ±0.15 | 45 ±0.15 | 34 | 17.0 | M20 | 30 | M10 | 17 | 75.0 |
| 50 x 10R x 6 | | | | | | | | | | | | | | | | |
| 50 x 12R x 6 | | | | | | | | | | | | | | | | |
| 50 x 16R x 6 | | | | | | | | | | | | | | | | |
| 50 x 20R x 6.5 | | | | | | | | | | | | | | | | |
| 50 x 25R x 6.5 | | | | | | | | | | | | | | | | |
| 50 x 30R x 6.5 | | | | | | | | | | | | | | | | |
| 50 x 40R x 6.5 | | | | | | | | | | | | | | | | |
| 63 x 10R x 6 | 90 | 108 | 100 | 75 | 55 | 110 | 15 | 120 ±0.2 | 46 ±0.15 | 37 | 17.0 | M20 | 30 | M10 | 20 | 89.0 |
| 63 x 20R x 6.5 | | | | | | | | | | | | | | | | |
| 63 x 40R x 6.5 | | | | | | | | | | | | | | | | |
| 80 x 10R x 6.5 | 105 | 125 | 100 | 85 | 63 | 126 | 15 | 140 ±0.2 | 46 ±0.15 | 37 | 17.0 | M20 | 30 | M12 | 20 | 105.0 |
| 80 x 20R x 12.7 | | | | | | | | | | | | | | | | |
| 80 x 40R x 12.7 | | | | | | | | | | | | | | | | |
| | 125 | 145 | 100 | 95 | 73 | 146 | 15 | 160 ±0.2 | 46 ±0.15 | 37 | 17.0 | M20 | 30 | M12 | 22 | 125.0 |

Nut housing MGA

Aluminum nut housings MGA are designed for ZEM-E-S, ZEM-E-K and ZEM-E-A nuts

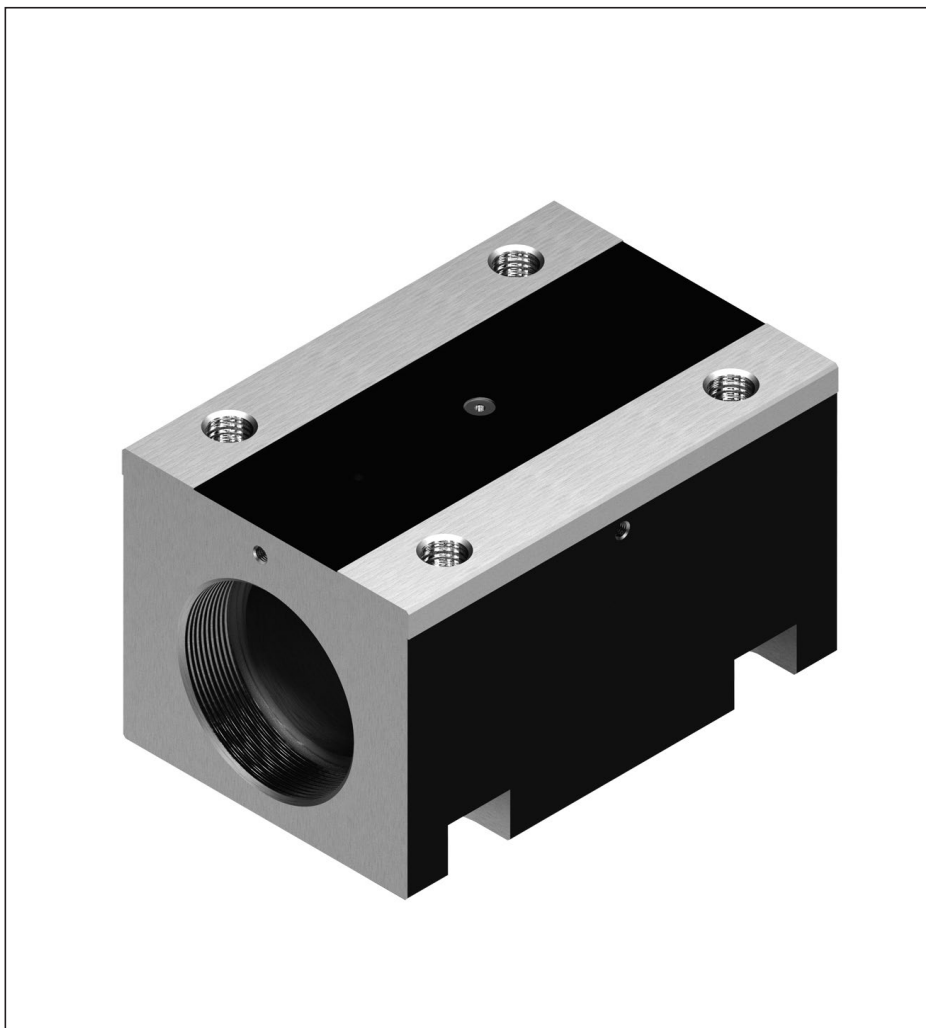
We recommend using screws with a strength class of 8.8.

Tightening torque

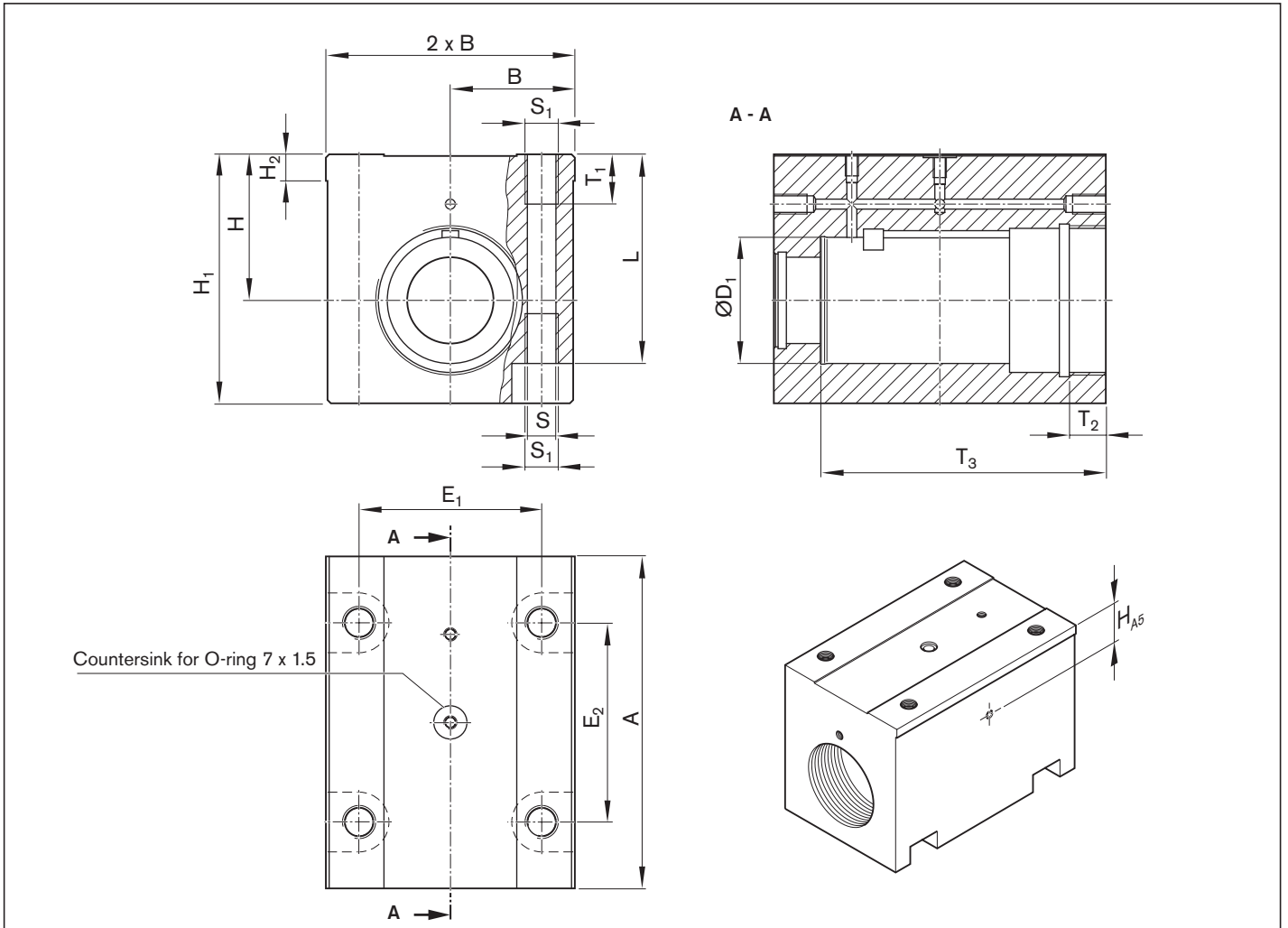
see "Installation in the machine" on page 147

Reference edges are formed on both sides.

Scope of delivery: Includes set screws, spacer ring, ring nut, washer key



| Size | | Mass | Hex socket cap screw for screwing from below ISO 4762 |
|---------------------------|--------------|------|---|
| $d_0 \times P \times D_W$ | Part number | (kg) | |
| 20 x 5R x 3 | R1506 100 70 | 1.10 | M8 |
| 20 x 10R x 3 | | | |
| 20 x 20R x 3.5 | | | |
| 32 x 5R x 3.5 | R1506 300 70 | 2.31 | M10 |
| 32 x 10R x 3.969 | | | |
| 32 x 20R x 3.969 | | | |
| 32 x 32R x 3.969 | | | |
| 40 x 5R x 3.5 | R1506 400 70 | 4.32 | M14 |
| 40 x 10R x 6 | | | |
| 40 x 20R x 6 | | | |
| 40 x 40R x 6 | | | |



| (mm) | | | | | | | | | | | | | | |
|------|------------|-----------------------|----------------|----------------|------------|----------------|----------------|-----------------|------|----------------|----------------|----------------|----------------|----------------------|
| A | B ±0.01 | ØD ₁ H6 | E ₁ | E ₂ | H ±0.01 | H ₁ | H ₂ | H _{A5} | S | S ₁ | T ₁ | T ₂ | T ₃ | Clamping length L |
| 100 | 37.5 | 38 | 55 | 60 | 44 | 75 | 8 | 15 | 8.6 | M10 | 15 | 11 | 86 | 63 |
| 150 | 50.0 | 50 | 75 | 100 | 49 | 80 | 9 | 16 | 10.5 | M12 | 18 | 15 | 131 | 66 |
| 180 | 60.0 | 63 | 90 | 120 | 59 | 105 | 10 | 18 | 14.5 | M16 | 24 | 20 | 155 | 86 |

Pillow block unit SEC-F assembly, aluminum

Fixed bearing with angular-contact thrust ball bearing LGF-B-...

The pillow block unit consists of:

- Precision pillow block housing made of aluminum with reference edges on both sides
- Angular-contact thrust ball bearing LGF-..
- Slotted nut NMZ

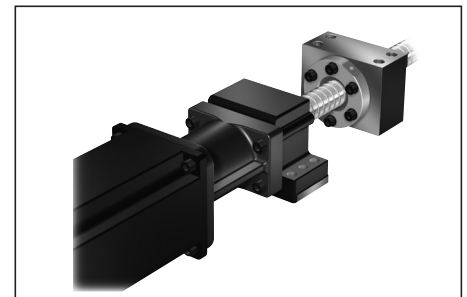
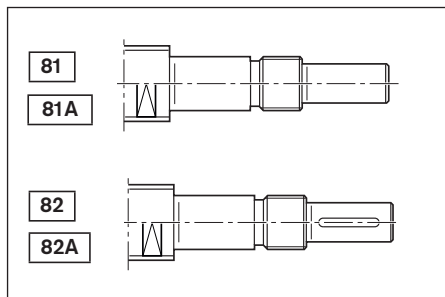
The slotted nut is delivered unmounted.

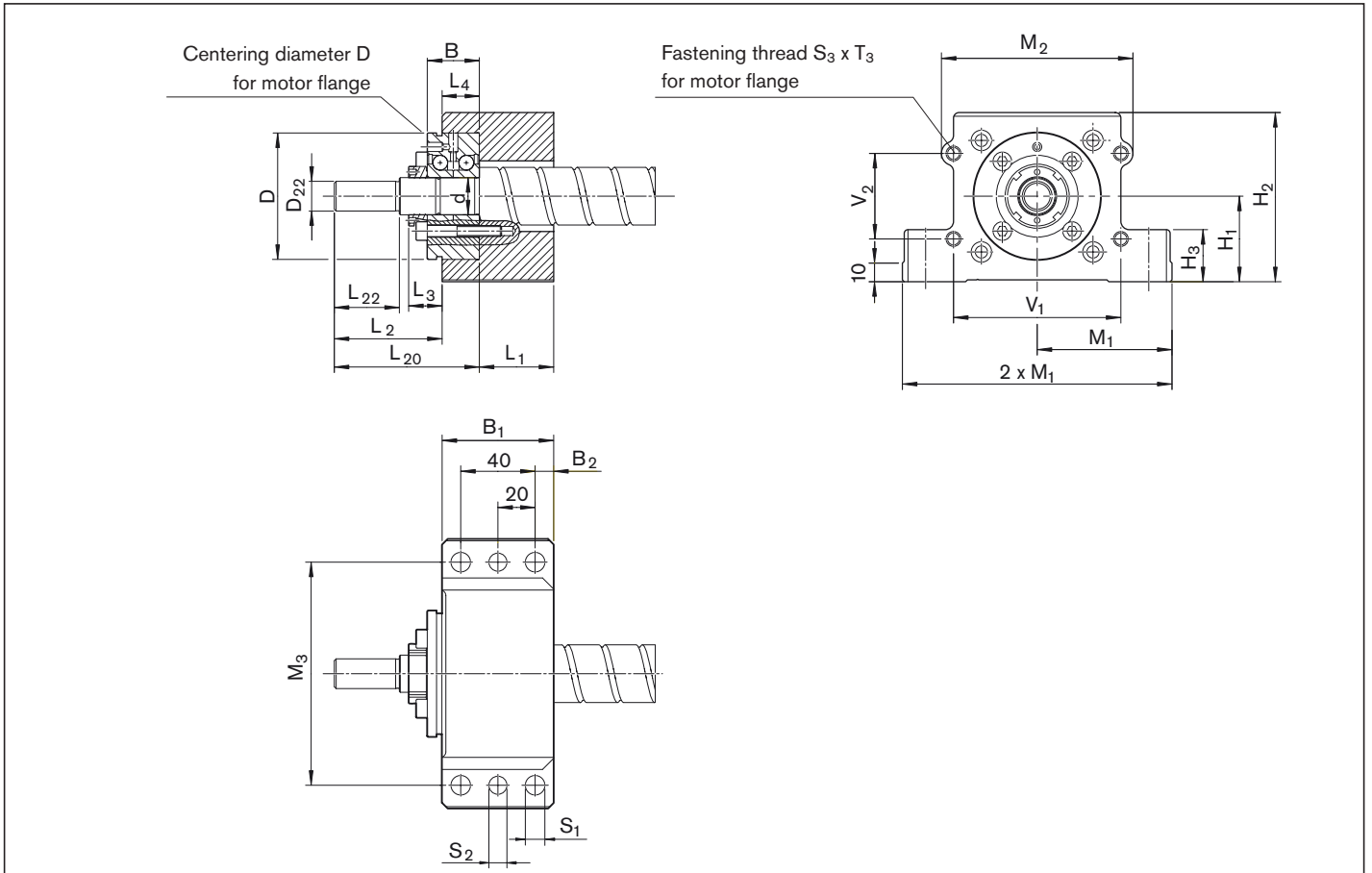
Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)



| Size | Complete pillow block | Angular-contact thrust ball bearing | | | | | Abbreviation | Slotted nut | | Weight complete |
|---------------------------|-----------------------|-------------------------------------|-----------------------------|------|----|----|--------------|-------------|--------------|-----------------|
| | | Load ratings (axial) | | (mm) | | | | M_A | Abbreviation | |
| $d_0 \times P$ | Part number | dyn. C (N) | stat. C ₀ (N) | d | D | B | (Nm) | | (kg) | |
| 20x5/10/20/40 | R1594 012 00 | 17,000 | 24,700 | 12 | 55 | 25 | 8.0 | NMZ 12x1 | 1.49 | |
| 32x5/10/20/32/64 | R1594 020 00 | 26,000 | 47,000 | 20 | 68 | 28 | 18.0 | NMZ 20x1 | 1.88 | |
| 40x5/10/12/16/20/25/30/40 | R1594 030 00 | 29,000 | 64,000 | 30 | 80 | 28 | 32.0 | NMZ 30x1.5 | 2.75 | |

Screw end Form 81, 81A, 82, 82A designed for motor mounting.





| Size | (mm) | | | | | | | | | | | | | | | | | | | | | |
|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--|
| | B ₁ | B ₂ | L ₁ | L ₂ | L ₃ | L ₄ | L ₂₀ | L ₂₂ | D ₂₂ | M ₁ | M ₂ | M ₃ | H ₁ | H ₂ | H ₃ | S ₁ | S ₂ | S ₃ | T ₃ | V ₁ | V ₂ | |
| d ₀ x P | | | | | | | | | | ±0.015 | | | ±0.015 | | | | | | | | | |
| 20x5/10/20/40 | 60 | 10.0 | 42 | 42 | 15 | 18 | 60 | 25 | 10 | 72.5 | 80 | 120 | 41 | 81 | 28 | 10.5 | 9.7 | M8 | 15 | 66 | 50 | |
| 32x5/10/20/32/64 | 60 | 10.0 | 40 | 58 | 18 | 20 | 78 | 35 | 16 | 72.5 | 103 | 120 | 46 | 91 | 28 | 10.5 | 9.7 | M8 | 15 | 90 | 46 | |
| 40x5/10/12/16/20/25/30/40 | 65 | 12.5 | 45 | 73 | 20 | 20 | 93 | 50 | 25 | 90.0 | 116 | 150 | 56 | 111 | 33 | 13.0 | 11.7 | M10 | 20 | 100 | 65 | |

Pillow block unit SEC-L assembly, aluminum

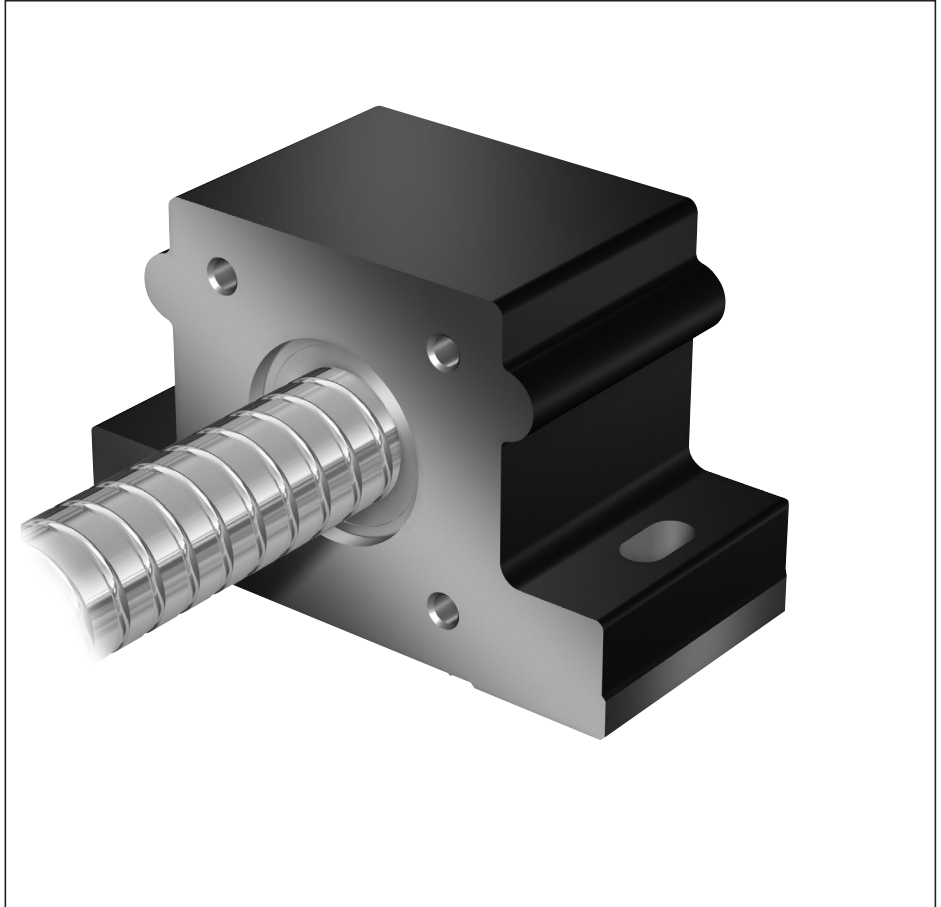
Floating bearing with DIN 625 deep-groove ball bearing

The pillow block unit consists of:

- Precision pillow block housing made of aluminum with reference edges on both sides
- Deep-groove ball bearing as per DIN 625
- Retaining ring DIN 471
- Cover

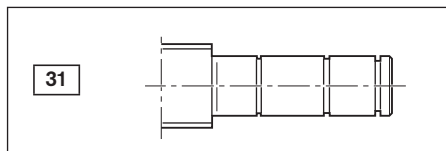
All parts are delivered unmounted.

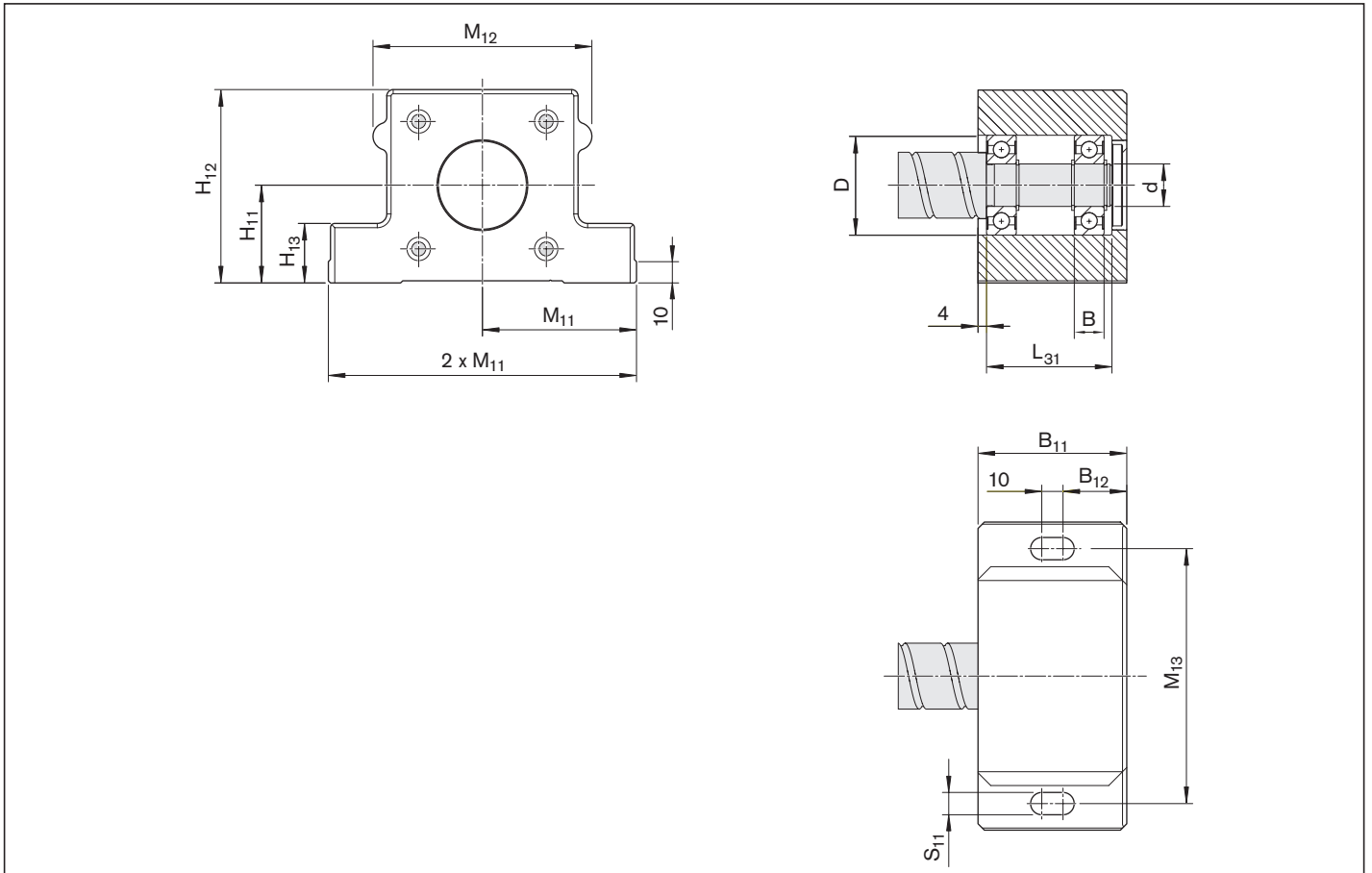
Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)



| Size | Complete pillow block | Deep-groove ball bearing as per DIN 625 | | | | | Designation DIN 625... | Retaining ring as per DIN 471 | Weight complete (kg) |
|---------------------------|-----------------------|---|--------------------------|------|----|----|------------------------|-------------------------------|----------------------|
| | | Load ratings (radial) | | (mm) | | | | | |
| $d_0 \times P$ | Part number | dyn. C (N) | stat. C ₀ (N) | d | D | B | | | |
| 20x5/10/20/40 | R1594 615 00 | 7,800 | 3,250 | 15 | 35 | 11 | 6202.2RS | 15x1 | 1.24 |
| 32x5/10/20/32/64 | R1594 620 00 | 12,700 | 5,700 | 20 | 47 | 14 | 6204.2RS | 20x1.2 | 1.66 |
| 40x5/10/12/16/20/25/30/40 | R1594 630 00 | 19,300 | 9,800 | 30 | 62 | 16 | 6206.2RS | 30x1.5 | 2.74 |

Suitable for screw ends: Form





| Size | (mm) | | | | | | | | | | |
|---------------------------|-----------------|-----------------|-----------------|---------------------------|-----------------|-----------------|---------------------------|-----------------|-----------------|-----------------|--|
| | B ₁₁ | B ₁₂ | L ₃₁ | M ₁₁ ±0.015 | M ₁₂ | M ₁₃ | H ₁₁ ±0.015 | H ₁₂ | H ₁₃ | S ₁₁ | |
| d ₀ x P | | | | | | | | | | | |
| 20x5/10/20/40 | 60 | 25 | 47 | 72.5 | 80 | 120 | 41 | 81 | 28 | 10.5 | |
| 32x5/10/20/32/64 | 70 | 30 | 60 | 72.5 | 103 | 120 | 46 | 91 | 28 | 10.5 | |
| 40x5/10/12/16/20/25/30/40 | 80 | 35 | 68 | 90.0 | 116 | 150 | 56 | 111 | 33 | 13.0 | |

Pillow block unit SES-F assembly, steel

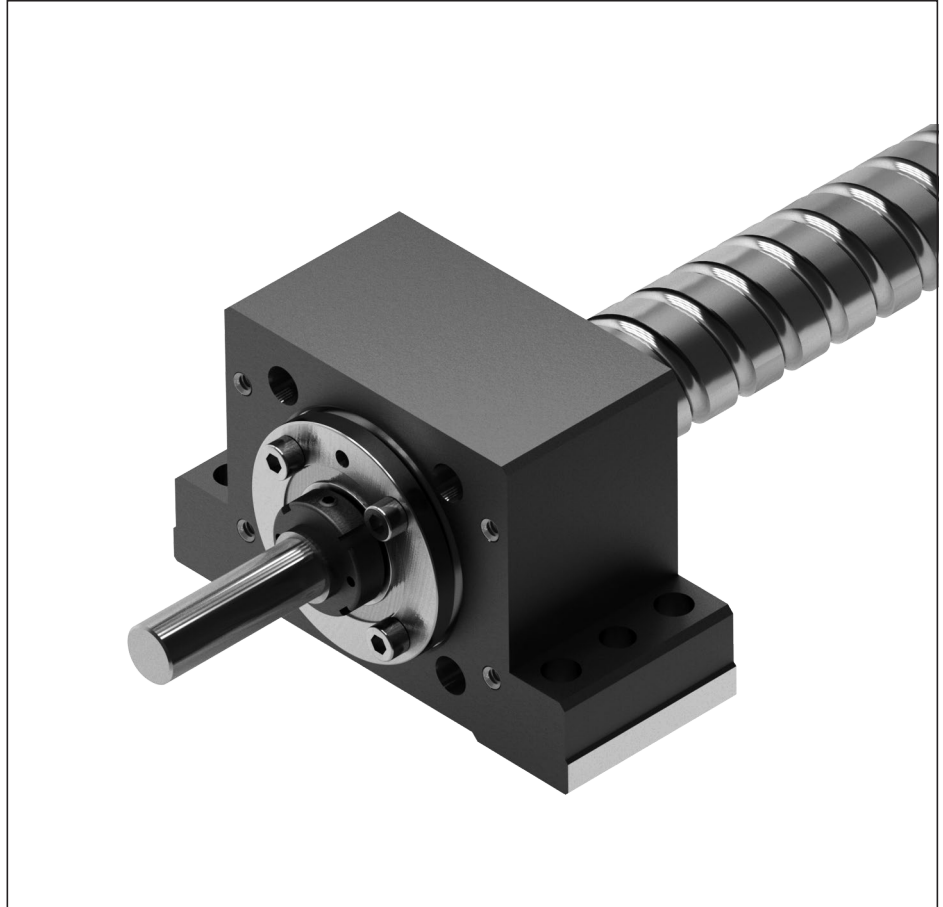
Fixed bearing with angular-contact thrust ball bearing LGF-B-..., LGF-C-...

The pillow block unit consists of:

- Precision pillow block housing made of steel with reference edges on both sides
- Angular-contact thrust ball bearing LGF...
- Slotted nut NMZ

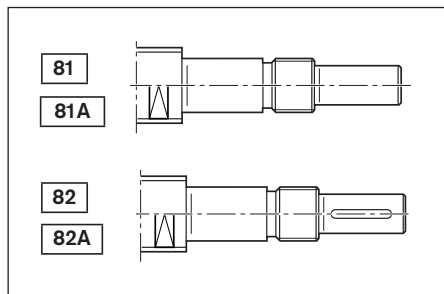
The slotted nut is delivered unmounted.

Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)

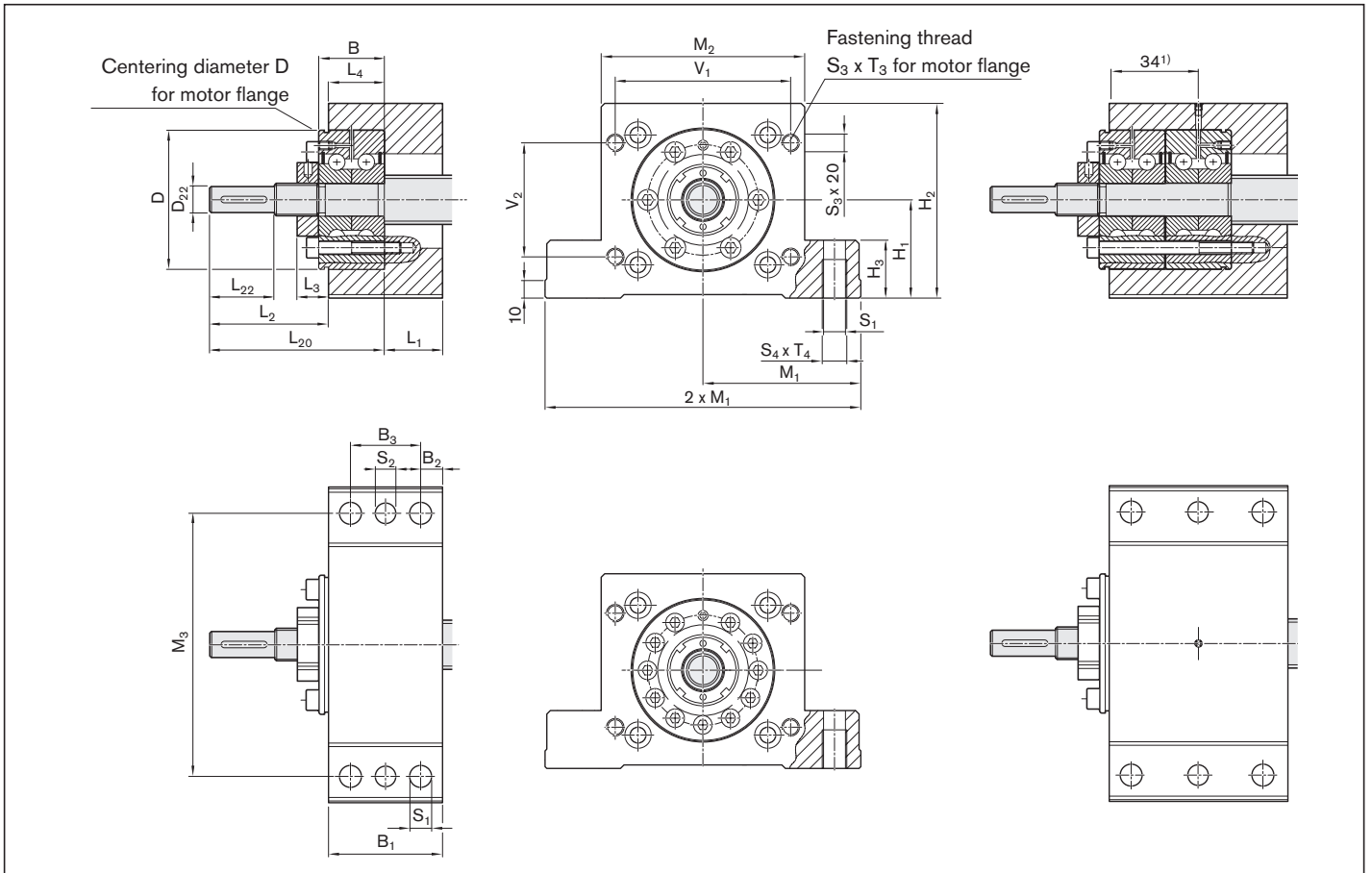


| Size $d_0 \times P$ | Complete pillow block Part number | Angular-contact thrust ball bearing | | | | | Abbreviation | Slotted nut | | Weight complete (kg) |
|-------------------------|--------------------------------------|-------------------------------------|-----------------------------|------|----|----|--------------|---------------|--------------|-------------------------|
| | | Load ratings (axial) | | (mm) | | | | M_A (Nm) | Abbreviation | |
| | | dyn. C (N) | stat. C ₀ (N) | d | D | B | | | | |
| 20x5/10/20/40 | R1595 012 20 | 17,000 | 24,700 | 12 | 55 | 25 | LGF-B-1255 | 8 | NMZ 12x1 | 3.37 |
| 25x5/10/25 | R1595 017 20 | 18,800 | 31,000 | 17 | 62 | 25 | LGF-B-1762 | 15 | NMZ 17x1 | 3.38 |
| 32x5/10/20/32/64 | R1595 020 20 | 26,000 | 47,000 | 20 | 68 | 28 | LGF-B-2068 | 18 | NMZ 20x1 | 4.31 |
| 40x5 | R1595 030 20 | 29,000 | 64,000 | 30 | 80 | 28 | LGF-B-3080 | 32 | NMZ 30x1.5 | 6.31 |
| 40x10/12/16/20/25/30/40 | R1595 330 20 | 47,500 | 127,000 | 30 | 80 | 56 | LGF-C-3080 | 32 | NMZ 30x1.5 | 7.53 |

Screw end Form 81, 81A, 82, 82A
designed for motor mounting.



Further information on the bearing pair can be found on page 114.



| Size d ₀ xP | (mm) | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----|
| | B ₁ | B ₂ | B ₃ | L ₁ | L ₂ | L ₃ | L ₄ | L ₂₀ | L ₂₂ | D ₂₂ | M ₁ | M ₂ | M ₃ | H ₁ | H ₂ | H ₃ | S ₁ | S ₂ | S ₃ | S ₄ | T ₃ | T ₄ | V ₁ | V ₂ | |
| 20x5/10/20/40 | 60 | 10.0 | 40 | 42 | 42 | 15 | 18 | 60 | 25 | 10 | ±0.015 | 80 | 120 | ±0.015 | 41 | 81 | 28 | 10.5 | 9.7 | M8 | M12 | 20 | 20 | 66 | 50 |
| 25x5/10/25 | 60 | 10.0 | 40 | 42 | 57 | 17 | 18 | 75 | 30 | 15 | ±0.015 | 80 | 120 | ±0.015 | 41 | 81 | 28 | 10.5 | 9.7 | M8 | M12 | 20 | 20 | 66 | 50 |
| 32x5/10/20/32/64 | 60 | 10.0 | 40 | 40 | 58 | 18 | 20 | 78 | 35 | 16 | ±0.015 | 103 | 120 | ±0.015 | 46 | 91 | 28 | 10.5 | 9.7 | M8 | M12 | 20 | 20 | 90 | 46 |
| 40x5 | 65 | 12.5 | 40 | 45 | 73 | 20 | 20 | 93 | 50 | 25 | ±0.015 | 116 | 150 | ±0.015 | 56 | 111 | 33 | 12.5 | 11.7 | M10 | M14 | 20 | 22 | 100 | 65 |
| 40x10/12/16/20/25/30/40 | 85 | 12.5 | 60 | 37 | 82 | 20 | 48 | 130 | 50 | 25 | ±0.015 | 116 | 150 | ±0.015 | 56 | 111 | 33 | 12.5 | 11.7 | M10 | M14 | 20 | 22 | 100 | 65 |

1) With part number R1595 330 20 only

Pillow block unit SES-L assembly, steel

Floating bearing with DIN 625 deep-groove ball bearing

The pillow block unit consists of:

- Precision pillow block housing made of steel with reference edges on both sides
- Deep-groove ball bearing as per DIN 625
- Retaining ring DIN 471
- Cover

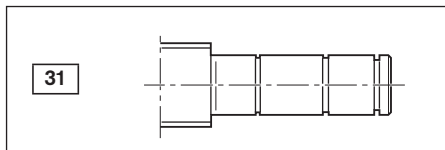
All parts are delivered unmounted.

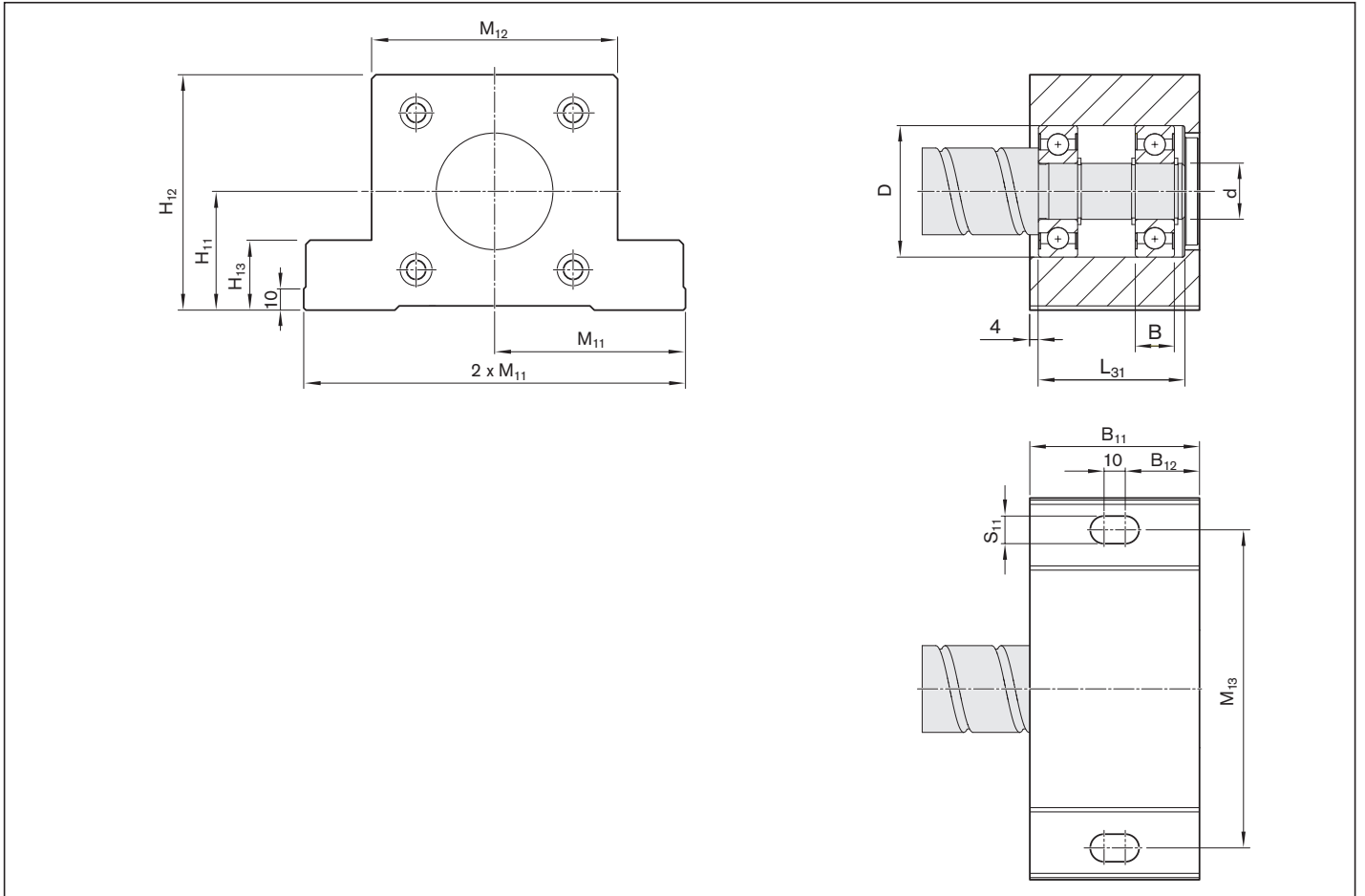
Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)



| Size | Complete pillow block | Deep-groove ball bearing as per DIN 625 | | | | | Designation DIN 625... | Retaining ring as per DIN 471 | Weight complete (kg) |
|---------------------------|-----------------------|---|--------------------------|------|----|----|------------------------|-------------------------------|----------------------|
| | | Load ratings (radial) | | (mm) | | | | | |
| $d_0 \times P$ | Part number | dyn. C (N) | stat. C ₀ (N) | d | D | B | | | |
| 20x5/10/20/40 | R1595 615 00 | 7,800 | 3,250 | 15 | 35 | 11 | 6202.2RS | 15x1 | 3.26 |
| 25x5/10/25 | R1595 617 00 | 9,500 | 4,150 | 17 | 40 | 12 | 6203.2RS | 17x1 | 3.39 |
| 32x5/10/20/32/64 | R1595 620 00 | 12,700 | 5,700 | 20 | 47 | 14 | 6204.2RS | 20x1.2 | 4.74 |
| 40x5/10/12/16/20/25/30/40 | R1595 630 00 | 19,300 | 9,800 | 30 | 62 | 16 | 6206.2RS | 30x1.5 | 7.30 |

Suitable for screw ends: Form





| Size | (mm) | | | | | | | | | |
|---------------------------|-----------------|-----------------|-----------------|---------------------------|-----------------|-----------------|---------------------------|-----------------|-----------------|-----------------|
| | B ₁₁ | B ₁₂ | L ₃₁ | M ₁₁ ±0.015 | M ₁₂ | M ₁₃ | H ₁₁ ±0.015 | H ₁₂ | H ₁₃ | S ₁₁ |
| d ₀ x P | | | | | | | | | | |
| 20x5/10/20/40 | 60 | 25.0 | 47 | 72.5 | 80 | 120 | 41 | 81 | 28 | 10.5 |
| 25x5/10/25 | 64 | 27.0 | 51 | 72.5 | 80 | 120 | 41 | 81 | 28 | 10.5 |
| 32x5/10/20/32/64 | 70 | 30.0 | 60 | 72.5 | 103 | 120 | 46 | 91 | 28 | 10.5 |
| 40x5/10/12/16/20/25/30/40 | 80 | 35.0 | 68 | 90.0 | 116 | 150 | 56 | 111 | 33 | 13.0 |

Pillow block unit SEB-F assembly

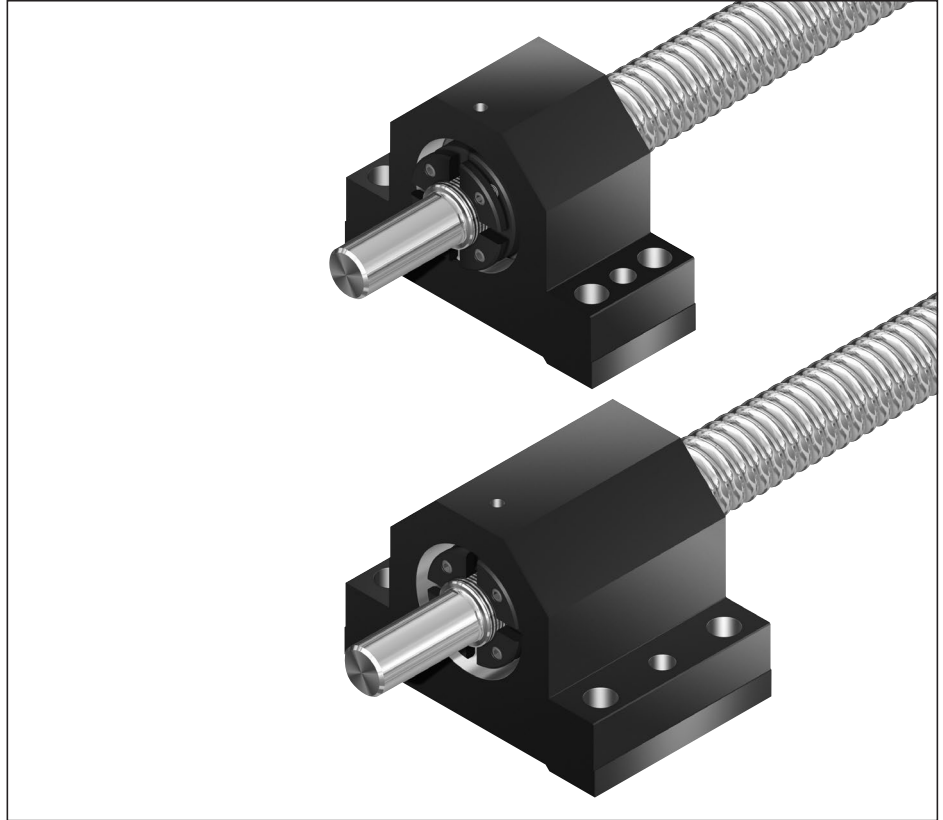
Fixed bearing with angular-contact thrust ball bearing LGN-B-... LGN-C-...

The pillow block unit consists of:

- Precision pillow block housing made of steel with reference edges on both sides
- Angular-contact thrust ball bearing LGN
- Slotted nut NMA or NMZ
- Ring nut GWR

The slotted nut is delivered unmounted.

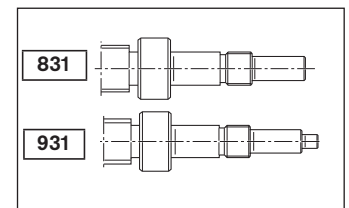
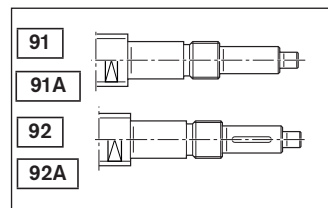
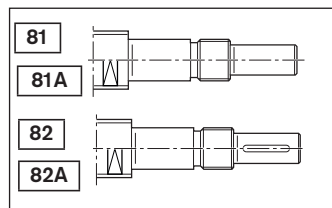
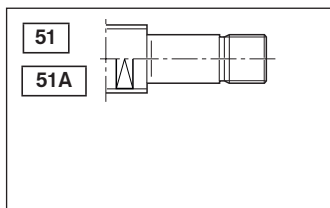
Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)

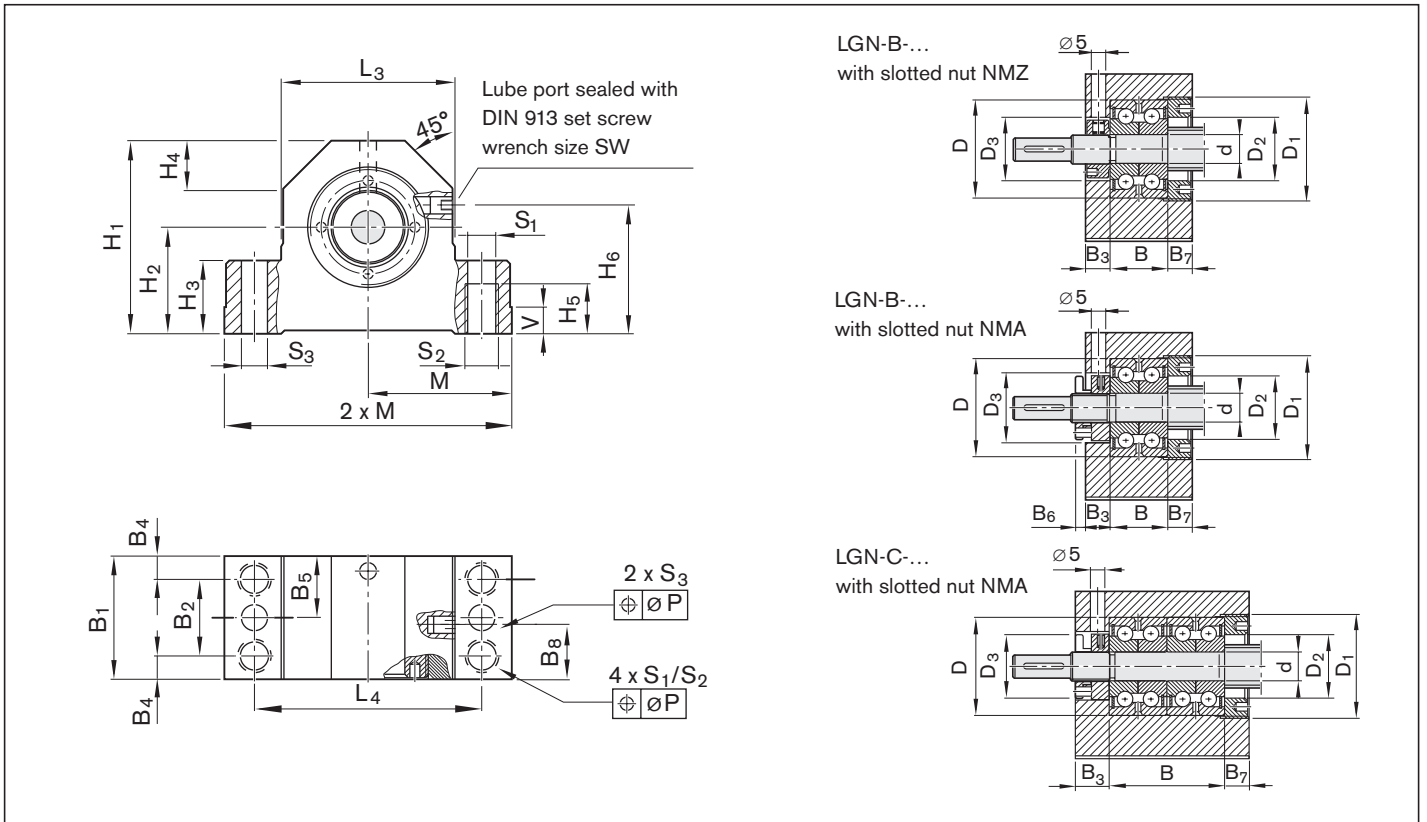


| Size $d_0 \times P$ | Complete pillow block Part number | Angular-contact thrust ball bearing | | | Slotted nut | | | Weight complete (kg) | | |
|---------------------------|--------------------------------------|-------------------------------------|-----------------------------|-----------------|-------------|----|------------------------|-------------------------|------------|-------|
| | | Load ratings (axial) | | Dimensions (mm) | | | Abbreviation | | | |
| | | dyn. C (N) | stat. C ₀ (N) | d | D | B | M _A (Nm) | | | |
| 6 x 1/2 | R1591 106 00 | 6,900 | 8,500 | 6 | 24 | 15 | LGN-B-0624 | 2.0 | NMZ 6x0.5 | 0.38 |
| 8 x 1/2/2.5/5 | R1591 106 00 | 6,900 | 8,500 | 6 | 24 | 15 | LGN-B-0624 | 2.0 | NMZ 6x0.5 | 0.38 |
| 12 x 2/5/10 | R1591 106 20 | 6,900 | 8,500 | 6 | 24 | 15 | LGN-B-0624 | 2.0 | NMZ 6x0.5 | 0.38 |
| 16 x 5/10/16 | R1591 110 20 | 13,400 | 18,800 | 10 | 34 | 20 | LGN-B-1034 | 6.0 | NMZ 10x1 | 0.87 |
| 20 x 5/10/20/40 | R1591 112 20 | 17,000 | 24,700 | 12 | 42 | 25 | LGN-B-1242 | 8.0 | NMZ 12x1 | 1.12 |
| 25 x 5/10/25 | R1591 117 20 | 18,800 | 31,000 | 17 | 47 | 25 | LGN-B-1747 | 15.0 | NMZ 17x1 | 1.65 |
| 25 x 5/10/25 | R1591 117 30 | 18,800 | 31,000 | 17 | 47 | 25 | LGN-B-1747 | 15.0 | NMA 17x1 | 1.69 |
| 32 x 5/10/20/32/64 | R1591 120 20 | 26,000 | 47,000 | 20 | 52 | 28 | LGN-B-2052 | 18.0 | NMZ 20x1 | 1.93 |
| 32 x 5/10/20/32/64 | R1591 120 30 | 26,000 | 47,000 | 20 | 52 | 28 | LGN-B-2052 | 18.0 | NMA 20x1 | 2.03 |
| 40 x 10/12/16/20/25/30/40 | R1591 225 30 | 44,500 | 111,000 | 25 | 57 | 56 | LGN-C-2557 | 25.0 | NMA 25x1.5 | 5.13 |
| 40 x 5 | R1591 130 20 | 29,000 | 64,000 | 30 | 62 | 28 | LGN-B-3062 | 32.0 | NMZ 30x1.5 | 2.64 |
| 40 x 5 | R1591 130 30 | 29,000 | 64,000 | 30 | 62 | 28 | LGN-B-3062 | 32.0 | NMA 30x1.5 | 2.77 |
| 50 x 5 | R1591 135 30 | 41,000 | 89,000 | 35 | 72 | 34 | LGN-B-3572 | 40.0 | NMA 35x1.5 | 4.66 |
| 50 x 10/12/16/20/25/30/40 | R1591 230 30 | 47,500 | 127,000 | 30 | 62 | 56 | LGN-C-3062 | 32.0 | NMA 30x1.5 | 7.04 |
| 63 x 10/20/40 | R1591 140 30 | 72,000 | 149,000 | 40 | 90 | 46 | LGN-A-4090 | 55.0 | NMA 40x1.5 | 10.49 |
| 80 x 10/20/40 | R1591 150 30 | 113,000 | 250,000 | 50 | 110 | 54 | LGN-A-50110 | 85.0 | NMA 50x1.5 | 15.61 |

Suitable for screw ends: Form

For screws 6 x 1/2 and 8 x 1/2/2.5/5:
Form 831, 931





| Size | (mm) | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------|-------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----|----------------|----------------|----------------|----|----------------|----------------|----------------|------|--|
| | M | L ₃ | L ₄ | H ₁ | H ₂ | H ₃ | H ₄ | H ₅ | H ₆ | B ₁ | B ₂ | B ₃ | B ₄ | B ₅ | B ₆ | B ₇ | B ₈ | V | S ₁ | S ₂ | S ₃ | SW | D ₁ | D ₂ | D ₃ | P | |
| d ₀ x P | js7 | | | | ±0.02 | | | | | | | | | | | | | | | H12 | | | | | | | |
| 6 x 1/2 | 31.0 | 38 | 50 | 34 | 18 | 13 | 8 | 9 | 22 | 32 | 16 | 8.5 | 8.0 | 16.0 | - | 8.5 | 16.0 | 6 | 5.3 | M6 | 3.7 | 3 | M26x1.5 | 16.5 | 18 | 0.10 | |
| 8 x 1/2/2.5/5 | 31.0 | 38 | 50 | 34 | 18 | 13 | 8 | 9 | 22 | 32 | 16 | 8.5 | 8.0 | 16.0 | - | 8.5 | 16.0 | 6 | 5.3 | M6 | 3.7 | 3 | M26x1.5 | 16.5 | 18 | 0.10 | |
| 12 x 2/5/10 | 31.0 | 38 | 50 | 41 | 22 | 13 | 8 | 9 | 22 | 32 | 16 | 8.5 | 8.0 | 16.0 | - | 8.5 | 16.0 | 6 | 5.3 | M6 | 3.7 | 3 | M26x1.5 | 16.5 | 18 | 0.10 | |
| 16 x 5/10/16 | 43.0 | 52 | 68 | 58 | 32 | 22 | 14 | 15 | 37 | 37 | 23 | 8.5 | 7.0 | 18.5 | - | 8.5 | 18.5 | 8 | 8.4 | M10 | 7.7 | 4 | M36x1.5 | 22.0 | 27 | 0.15 | |
| 20 x 5/10/20/40 | 47.0 | 60 | 77 | 64 | 34 | 22 | 16 | 15 | 40 | 42 | 25 | 8.5 | 8.5 | 21.0 | - | 8.5 | 21.0 | 8 | 8.4 | M10 | 7.7 | 4 | M45x1.5 | 28.0 | 32 | 0.15 | |
| 25 x 5/10/25 | 54.0 | 66 | 88 | 72 | 39 | 27 | 18 | 18 | 45 | 46 | 29 | 10.5 | 8.5 | 23.0 | - | 10.5 | 23.0 | 10 | 10.5 | M12 | 9.7 | 4 | M50x1.5 | 31.0 | 36 | 0.20 | |
| 25 x 5/10/25 | 54.0 | 66 | 88 | 72 | 39 | 27 | 18 | 18 | 45 | 46 | 29 | 10.5 | 8.5 | 23.0 | 7.5 | 10.5 | 23.0 | 10 | 10.5 | M12 | 9.7 | 4 | M50x1.5 | 31.0 | 36 | 0.20 | |
| 32 x 5/10/20/32/64 | 56.0 | 70 | 92 | 77 | 42 | 27 | 19 | 18 | 48 | 49 | 29 | 10.5 | 10.0 | 24.5 | - | 10.5 | 24.5 | 10 | 10.5 | M12 | 9.7 | 4 | M55x1.5 | 36.0 | 42 | 0.20 | |
| 32 x 5/10/20/32/64 | 56.0 | 70 | 92 | 77 | 42 | 27 | 19 | 18 | 48 | 49 | 29 | 10.5 | 10.0 | 24.5 | 7.5 | 10.5 | 24.5 | 10 | 10.5 | M12 | 9.7 | 4 | M55x1.5 | 36.0 | 42 | 0.20 | |
| 40 x 10/12/16/20/25/30/40 | 63.0 | 80 | 105 | 98 | 58 | 32 | 23 | 21 | 64 | 89 | 62 | 20.5 | 13.5 | 44.5 | - | 12.5 | 54.5 | 12 | 12.6 | M14 | 9.7 | 4 | M62x1.5 | 43.0 | 48 | 0.20 | |
| 40 x 5 | 63.0 | 80 | 105 | 90 | 50 | 32 | 22 | 21 | 56 | 53 | 32 | 12.5 | 10.5 | 26.5 | - | 12.5 | 26.5 | 12 | 12.6 | M14 | 9.7 | 4 | M65x1.5 | 47.0 | 53 | 0.20 | |
| 40 x 5 | 63.0 | 80 | 105 | 90 | 50 | 32 | 22 | 21 | 56 | 53 | 32 | 12.5 | 10.5 | 26.5 | 7.5 | 12.5 | 26.5 | 12 | 12.6 | M14 | 9.7 | 4 | M65x1.5 | 47.0 | 53 | 0.20 | |
| 50 x 5 | 72.0 | 92 | 118 | 105 | 58 | 38 | 25 | 22 | 63 | 70 | 43 | 20.5 | 13.5 | 35.0 | - | 15.5 | 32.5 | 12 | 12.5 | M14 | 9.7 | 4 | M78x2 | 54.0 | 60 | 0.20 | |
| 50 x 10/12/16/20/25/30/40 | 72.0 | 92 | 118 | 112 | 65 | 38 | 25 | 22 | 70 | 92 | 65 | 20.5 | 13.5 | 46.0 | - | 15.5 | 57.5 | 12 | 12.5 | M14 | 9.7 | 4 | M78x2 | 54.0 | 53 | 0.20 | |
| 63 x 10/20/40 | 95.0 | 130 | 160 | 138 | 73 | 50 | 35 | 22 | 78 | 85 | 58 | 22.5 | 13.5 | 42.5 | - | 16.5 | 39.5 | 16 | 12.5 | M14 | 9.7 | 4 | M95x2 | 68.0 | 72 | 0.20 | |
| 80 x 10/20/40 | 102.5 | 145 | 175 | 165 | 93 | 50 | 40 | 36 | 98 | 98 | 58 | 25.5 | 20.0 | 49.0 | - | 18.5 | 45.5 | 16 | 17.3 | M20 | 11.7 | 4 | M115x2 | 85.0 | 90 | 0.20 | |

Pillow block unit SEB-L assembly

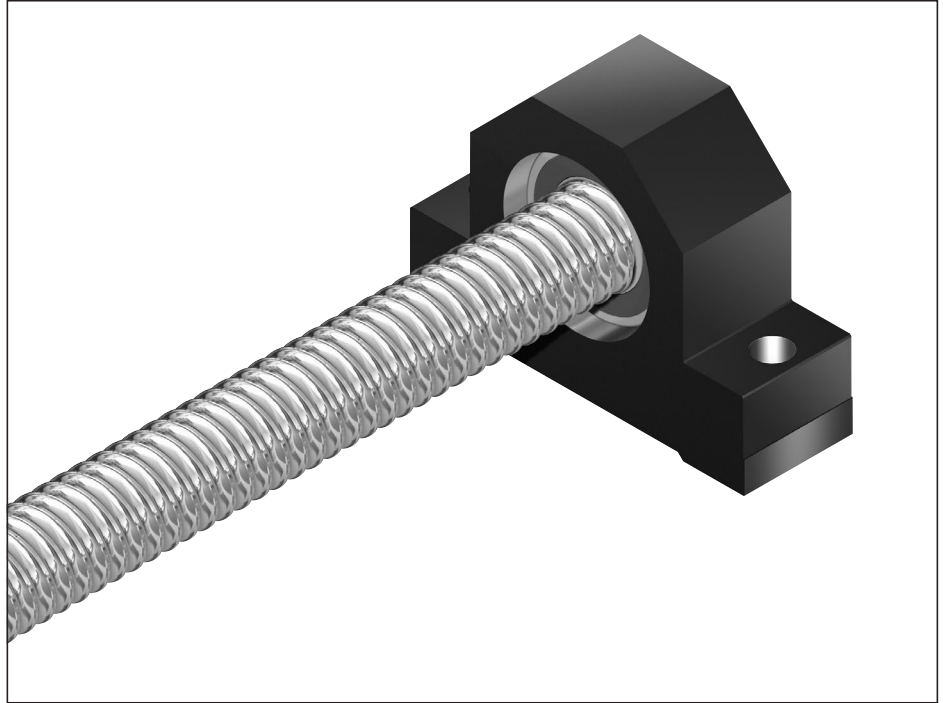
Floating bearing with DIN 625 deep-groove ball bearing

The pillow block unit consists of:

- Precision pillow block housing made of steel with reference edge on one side
- Deep-groove ball bearing as per DIN 625
- Retaining ring DIN 471
- Cover

All parts are delivered unmounted.

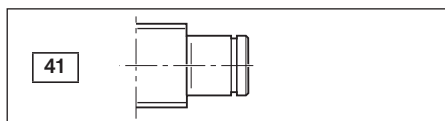
Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)

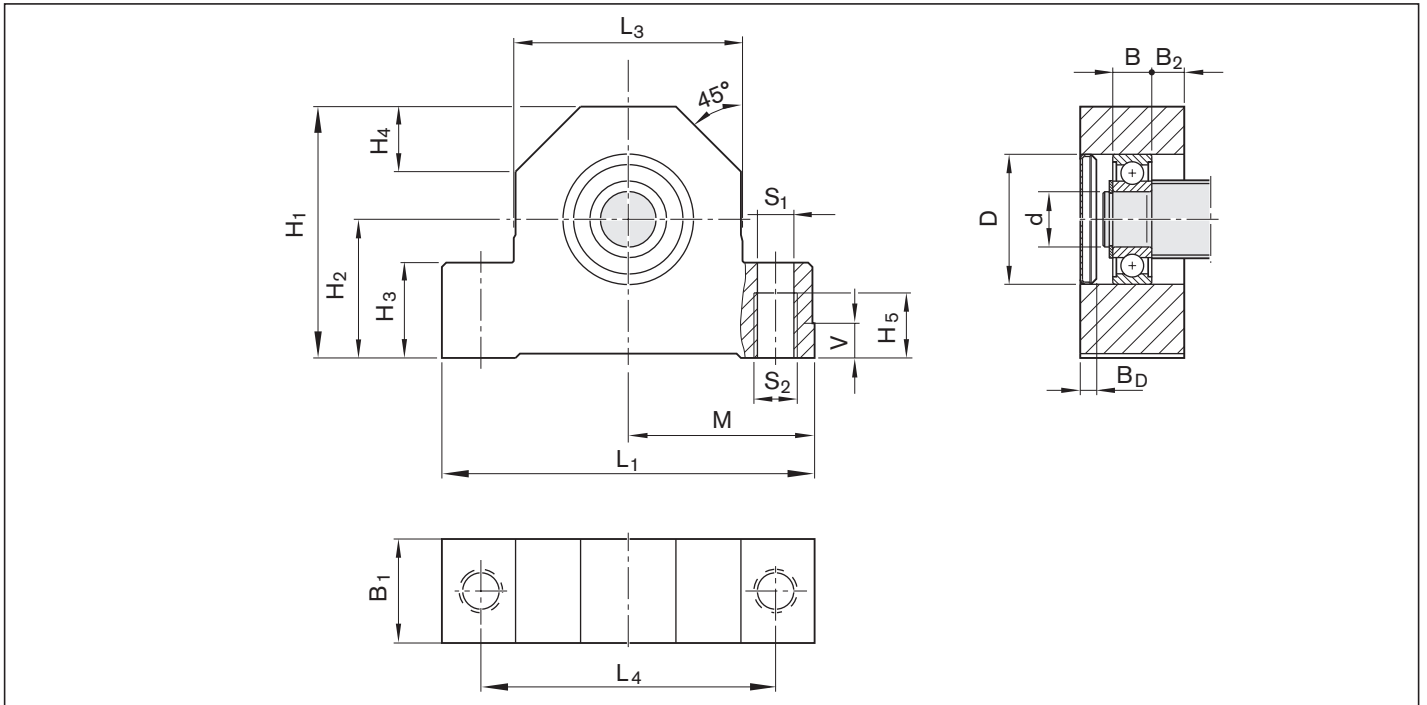


| Size $d_0 \times P$ | Complete pillow block Part number | Deep-groove ball bearing as per DIN 625 Load ratings (radial) (mm) | | | | | Designation DIN 625... | Retaining ring as per DIN 471 | Weight complete (kg) |
|---|--------------------------------------|---|-----------------------------|----|-----|----|---------------------------|----------------------------------|----------------------------|
| | | dyn. C (N) | stat. C ₀ (N) | d | D | B | | | |
| 8 x 1/2/2.5/5 | R1591 605 00 | 1,900 | 590 | 5 | 16 | 5 | 625.2RS | 5x0.6 | 0.14 |
| 12 x 2/5/10 | R1591 606 20 | 2,450 | 900 | 6 | 19 | 6 | 626.2RS | 6x0.7 | 0.18 |
| 16 x 5/10/16 | R1591 610 20 | 6,000 | 2,240 | 10 | 30 | 9 | 6200.2RS | 10x1 | 0.54 |
| 20 x 5/10/20/40 | R1591 612 20 | 6,950 | 2,650 | 12 | 32 | 10 | 6201.2RS | 12x1 | 0.73 |
| 25 x 5/10/25 | R1591 617 20 | 9,500 | 4,150 | 17 | 40 | 12 | 6203.2RS | 17x1 | 0.96 |
| 32 x 5/10/20/32/64 | R1591 620 20 | 12,700 | 5,700 | 20 | 47 | 14 | 6204.2RS | 20x1.2 | 1.24 |
| 40 x 5 | R1591 630 20 | 19,300 | 9,800 | 30 | 62 | 16 | 6206.2RS | 30x1.5 | 1.66 |
| 40 x 10/12/16/20/25/30/40 | R1591 630 10 | 19,300 | 9,800 | 30 | 62 | 16 | 6206.2RS | 30x1.5 | 1.82 |
| 50 x 5 ¹⁾ | R1591 635 10 | 25,500 | 13,200 | 35 | 72 | 17 | 6207.2RS | 35x1.5 | 2.66 |
| 50 x 10/12/16/20/25/30/40 ¹⁾ | R1591 635 20 | 25,500 | 13,200 | 35 | 72 | 17 | 6207.2RS | 35x1.5 | 2.87 |
| 63 x 10/20/40 ¹⁾ | R1591 650 20 | 36,500 | 20,800 | 50 | 90 | 20 | 6210.2RS | 50x2 | 5.39 |
| 80 x 10/20/40 ¹⁾ | R1591 660 20 | 52,000 | 31,000 | 60 | 110 | 22 | 6212.2RS | 60x2 | 7.09 |

1) without cover

Suitable for screw ends: Form





| Size | (mm) | | | | | | | | | | | | | | | |
|----------------------------------|-------|-------|-------|-------|---------------------|-------|-------|-------|-------|-------|--------------|-----|----------------|-------|----------------|--|
| | L_1 | L_3 | L_4 | H_1 | H_2 ± 0.02 | H_3 | H_4 | H_5 | B_1 | B_2 | M $js7$ | V | S_1 $H12$ | S_2 | Cover B_D | |
| $8 \times 1/2/2.5/5$ | 62 | 38 | 50 | 34 | 18 | 13 | 11 | 9 | 13 | 4.0 | 31.0 | 6 | 5.3 | M6 | 2.6 | |
| $12 \times 2/5/10$ | 62 | 38 | 50 | 41 | 22 | 13 | 11 | 9 | 15 | 4.5 | 31.0 | 6 | 5.3 | M6 | 2.6 | |
| $16 \times 5/10/16$ | 86 | 52 | 68 | 58 | 32 | 22 | 15 | 15 | 24 | 7.5 | 43.0 | 8 | 8.4 | M10 | 3.8 | |
| $20 \times 5/10/20/40$ | 94 | 60 | 77 | 64 | 34 | 22 | 17 | 15 | 26 | 8.0 | 47.0 | 8 | 8.4 | M10 | 3.8 | |
| $25 \times 5/10/25$ | 108 | 66 | 88 | 72 | 39 | 27 | 19 | 18 | 28 | 8.0 | 54.0 | 10 | 10.5 | M12 | 3.7 | |
| $32 \times 5/10/20/32/64$ | 112 | 70 | 92 | 77 | 42 | 27 | 20 | 18 | 34 | 10.0 | 56.0 | 10 | 10.5 | M12 | 4.8 | |
| 40×5 | 126 | 80 | 105 | 90 | 50 | 32 | 23 | 21 | 38 | 11.0 | 63.0 | 12 | 12.6 | M14 | 4.5 | |
| $40 \times 10/12/16/20/25/30/40$ | 126 | 80 | 105 | 98 | 58 | 32 | 23 | 21 | 38 | 11.0 | 63.0 | 12 | 12.6 | M14 | 4.5 | |
| 50×5 | 144 | 92 | 118 | 105 | 58 | 38 | 25 | 22 | 41 | 12.0 | 72.0 | 12 | 12.5 | M14 | - | |
| $50 \times 10/12/16/20/25/30/40$ | 144 | 92 | 118 | 112 | 65 | 38 | 25 | 22 | 41 | 12.0 | 72.0 | 12 | 12.5 | M14 | - | |
| $63 \times 10/20/40$ | 190 | 130 | 160 | 138 | 73 | 50 | 35 | 22 | 46 | 13.0 | 95.0 | 16 | 12.5 | M14 | - | |
| $80 \times 10/20/40$ | 205 | 145 | 175 | 165 | 93 | 50 | 40 | 36 | 50 | 14.0 | 102.5 | 16 | 17.3 | M20 | - | |

Flange bearing assembly SEE-F-Z

Fixed bearing with angular-contact thrust ball bearing

The bearing assembly consists of:

- precision flanged housing made of steel
- 2 pre-tensioned angular-contact thrust ball bearings
- Slotted nut
- Cover
- Radial shaft seal

Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)

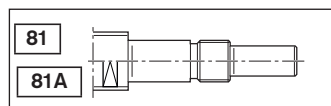


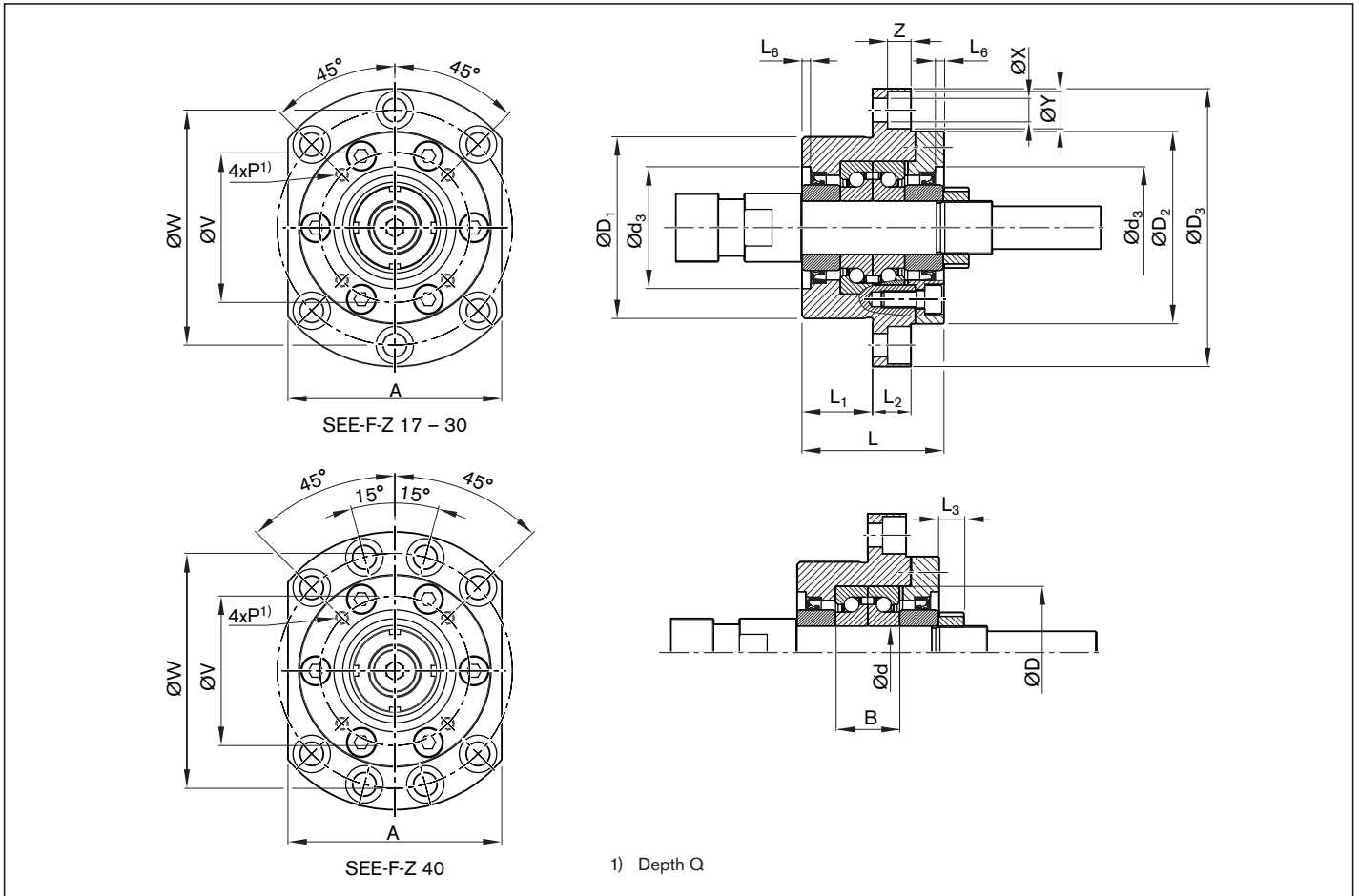
| Size | Complete pillow block | Angular-contact thrust ball bearing | | | | Slotted nut | | |
|----------------|-----------------------|-------------------------------------|----------------------|-----------------|------|-------------|----|----|
| | | dyn. C | stat. C ₀ | max. axial load | (mm) | d | D | B |
| d ₀ | Part number | (N) | (N) | (N) | | | | |
| 25 | R159751700 | 25,900 | 40,500 | 32,000 | 17 | 47 | 30 | 15 |
| 32 | R159752000 | 25,900 | 40,500 | 32,000 | 20 | 47 | 30 | 18 |
| 10 | R159752500 | 29,900 | 58,500 | 46,400 | 25 | 62 | 30 | 25 |
| 40 | R159753000 | 29,900 | 58,500 | 46,400 | 30 | 62 | 30 | 32 |

| Form | Version ¹⁾ | Size (mm) | | | | | | | | | | Centering Hole | | Hex Socket | | Threat | |
|--------|-----------------------|----------------|------------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------|-----------------|-----|----------------|---|----------------|-----|----------------|--|
| | | d ₀ | P | L _{ff} | D ₁ h6 | L ₁ | D ₂ h7 | L ₂ | G ₁ | LG ₁ | Z | t _z | S | t _s | G | t _g | |
| 81/81A | 176 | 25 | 5/10/25 | 110.0 | 17 | 58.0 | 12 | 29.0 | M17x1 | 23.0 | M4 | 10.0 | 4 | 4 | M5 | 8 | |
| | 207 | 32 | 5/10/20/32/64 | 120.0 | 20 | 58.0 | 15 | 39.0 | M20x1 | 23.0 | M5 | 12.0 | 4 | 4 | M6 | 9 | |
| | 252 | 40 | 5/10/12/16/20/25/30/40 | 140.0 | 25 | 63.0 | 20 | 51.0 | M25x1.5 | 26.0 | M6 | 16.0 | 5 | 5 | M8 | 12 | |
| | 311 | 40 | 5/10/12/16/20/25/30/40 | 150.0 | 30 | 63.0 | 25 | 61.0 | M30x1.5 | 26.0 | M10 | 22.0 | 8 | 8 | M10 | 15 | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version

Suitable for screw ends: Form





| Size | (mm) | | | | | | | | | | | | | | | | | Weight complete m (kg) |
|------|-------|-------------|-------|-------|----|-------|-------|-------|----|-------------|-------|----|------|------|----|----|----|------------------------------|
| | d_0 | D_1 g6 | D_2 | D_3 | L | L_1 | L_2 | L_3 | A | d_3 H8 | L_6 | W | X | Y | Z | V | P | |
| 25 | 70 | 72 | 106 | 60 | 32 | 15 | 10 | 80 | 45 | 3 | 88 | 9 | 14.0 | 8.5 | 58 | M5 | 10 | 1.84 |
| 32 | 70 | 72 | 106 | 60 | 32 | 15 | 10 | 80 | 45 | 3 | 88 | 9 | 14.0 | 8.5 | 58 | M5 | 10 | 1.81 |
| 40 | 85 | 90 | 130 | 66 | 33 | 18 | 12 | 100 | 57 | 4 | 110 | 11 | 17.5 | 11.0 | 70 | M6 | 12 | 3.13 |
| 40 | 85 | 90 | 130 | 66 | 33 | 18 | 12 | 100 | 57 | 4 | 110 | 11 | 17.5 | 11.0 | 70 | M6 | 12 | 3.03 |

| Version | Wrench size | | |
|---------|-------------|----------|----------|
| | SW | b_{SW} | l_{SW} |
| 176 | 19 | 10 | 10.5 |
| 207 | 24 | 15 | 10.5 |
| 252 | 30 | 15 | 12.5 |
| 311 | 30 | 15 | 45.0 |

Bearing assembly LAF

Fixed bearing with angular-contact thrust ball bearing LGF

Double-thrust, screw-down,

series LGF-B-...

LGF-A-...

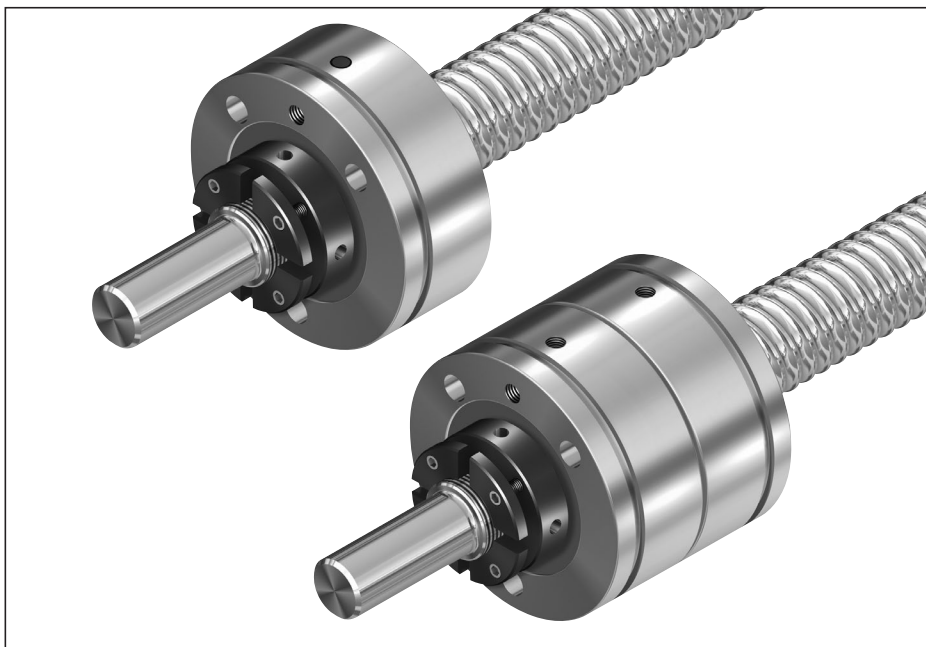
Double-thrust, screw-on,

Series LGF-C-...

The fixed bearing consists of:

- Angular-contact thrust ball bearing LGF
- Slotted nut NMA..., NMZ...

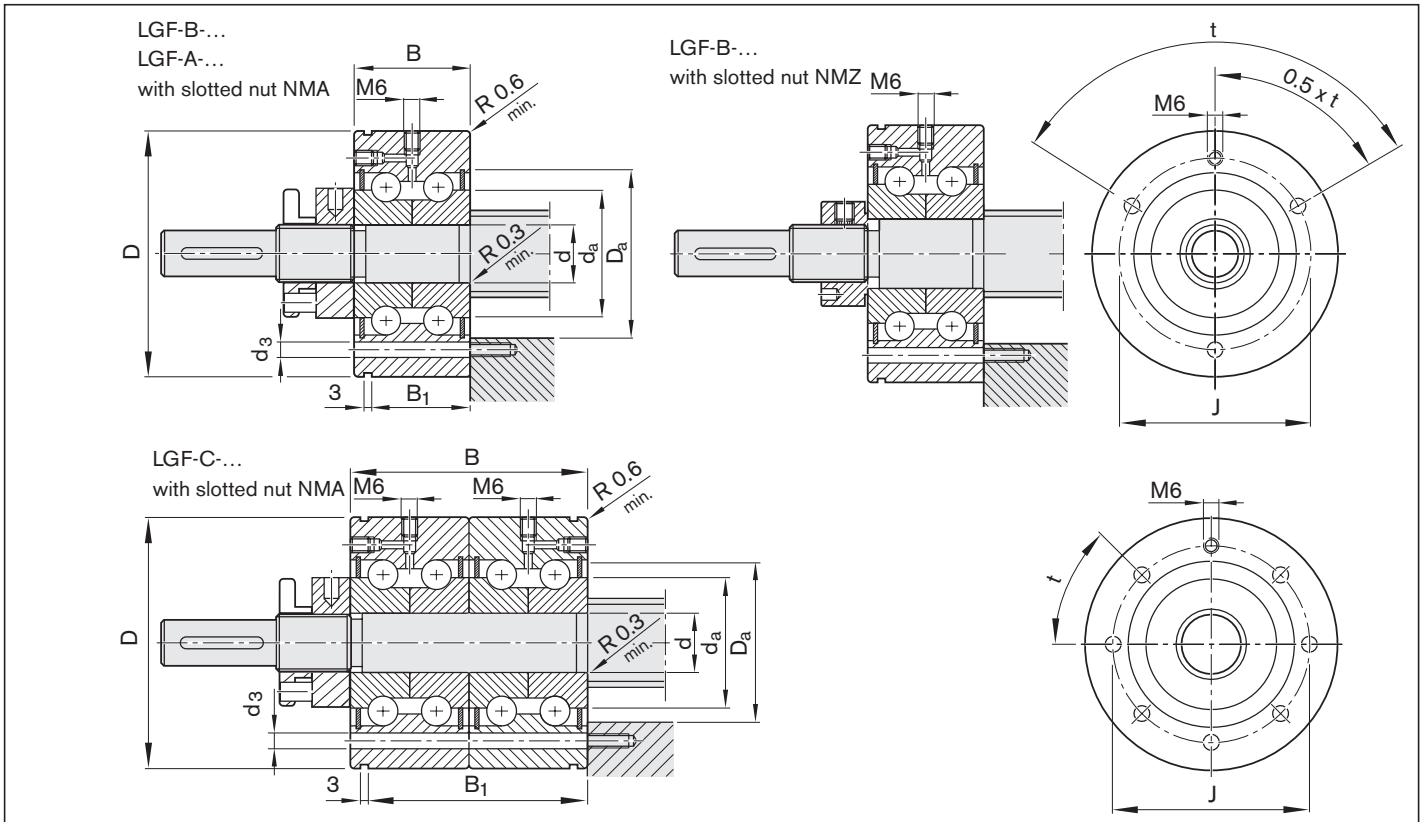
Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)



| Size | Module | Single parts | | | | Weight complete |
|---------------------------|--------------|-------------------------------------|--------------|--------------|--------------|-----------------|
| | | Angular-contact thrust ball bearing | | Slotted nut | | |
| $d_0 \times P$ | Part number | Abbreviation | Part number | Abbreviation | Part number | (kg) |
| 20 x 5/10/20/40 | R1590 012 00 | LGF-B-1255 | R3414 009 06 | NMZ 12x1 | R3446 003 04 | 0.385 |
| 25 x 5/10/25 | R1590 017 00 | LGF-B-1762 | R3414 010 06 | NMZ 17x1 | R3446 004 04 | 0.485 |
| | R1590 017 30 | | | NMA 17x1 | R3446 014 04 | 0.520 |
| 32 x 5/10/20/32/64 | R1590 020 00 | LGF-B-2068 | R3414 001 06 | NMZ 20x1 | R3446 005 04 | 0.645 |
| | R1590 020 30 | | | NMA 20x1 | R3446 015 04 | 0.740 |
| 40 x 5 | R1590 030 00 | LGF-B-3080 | R3414 011 06 | NMZ 30x1.5 | R3446 006 04 | 0.855 |
| | R1590 030 30 | | | NMA 30x1.5 | R3446 016 04 | 0.980 |
| 40 x 10/12/16/20/25/30/40 | R1590 325 30 | LGF-C-2575 | R3414 015 06 | NMA 25x1.5 | R3446 011 04 | 1.600 |
| 50 x 5 | R1590 035 30 | LGF-B-3590 | R3414 026 06 | NMA 35x1.5 | R3446 012 04 | 1.360 |
| 50 x 10/12/16/20/25/30/40 | R1590 330 30 | LGF-C-3080 | R3414 027 06 | NMA 30x1.5 | R3446 016 04 | 1.760 |
| 63 x 10/20/40 | R1590 040 30 | LGF-B-40115 | R3414 028 06 | NMA 40x1.5 | R3446 018 04 | 2.500 |
| 80 x 10/20/40 | R1590 050 30 | LGF-A-50140 | R3414 029 06 | NMA 50x1.5 | R3446 019 04 | 5.130 |

| Size | Load ratings ¹⁾ | | Bearing friction torque with sealing disk | Rigidity (axial) | Rigidity against tilting | Limit speed (grease) |
|---------------------------|----------------------------|--------------------------|---|------------------|--------------------------|----------------------|
| | dyn. C (N) | stat. C ₀ (N) | | | | |
| 20x5/10/20/40 | 17,000 | 24,700 | 0.16 | 375 | 50 | 3,800 |
| 25x5/10/25 | 18,800 | 31,000 | 0.24 | 450 | 80 | 3,300 |
| 32x5/10/20/32/64 | 26,000 | 47,000 | 0.30 | 650 | 140 | 3,000 |
| 40x5 | 29,000 | 64,000 | 0.50 | 850 | 300 | 2,200 |
| 40 x 10/12/16/20/25/30/40 | 44,500 | 111,000 | 0.60 | 1 300 | 450 | 2,600 |
| 50x5 | 41,000 | 89,000 | 0.60 | 900 | 400 | 2,000 |
| 50 x 10/12/16/20/25/30/40 | 47,500 | 127,000 | 0.75 | 1 500 | 620 | 2,200 |
| 63x10/20/40 | 72,000 | 149,000 | 1.30 | 1 200 | 750 | 1,600 |
| 80x10/20/40 | 113,000 | 250,000 | 2.60 | 1 400 | 1 500 | 1,200 |

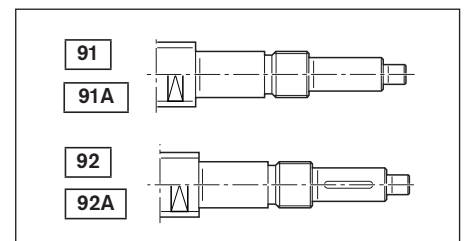
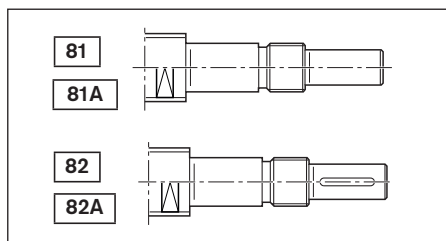
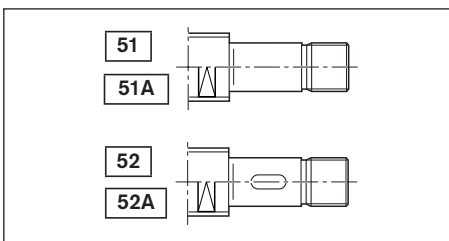
1) See page 187 for load on bearing



| Size $d_0 \times P$ | Dimensions (mm) | | | | Mounting dimensions (mm) | | | | | Mounting holes | | |
|---------------------------|----------------------|-----------------------|---------------------|----------------|--------------------------|-----|-----------------------|-----|-----------------------|------------------------------|------------------------|----------|
| | d | D | B | B ₁ | J | min | D _a max | min | d _a max | Minimum number ¹⁾ | d ₃ (mm) | t (°) |
| 20x5/10/20/40 | 12 _{-0.010} | 55 _{-0.013} | 25 _{-0.25} | 17 | 42 | 30 | 33 | 16 | 29 | 3 | 6.8 | 120 |
| 25x5/10/25 | 17 _{-0.010} | 62 _{-0.013} | 25 _{-0.25} | 17 | 48 | 34 | 37 | 23 | 33 | 3 | 6.8 | 120 |
| 32x5/10/20/32/64 | 20 _{-0.010} | 68 _{-0.013} | 28 _{-0.25} | 19 | 53 | 40 | 43 | 25 | 39 | 4 | 6.8 | 90 |
| 40x5 | 30 _{-0.010} | 80 _{-0.013} | 28 _{-0.25} | 19 | 63 | 50 | 53 | 40 | 49 | 6 | 6.8 | 60 |
| 40 x 10/12/16/20/25/30/40 | 25 _{-0.005} | 75 _{-0.010} | 56 _{-0.50} | 47 | 58 | 45 | 48 | 32 | 44 | 7 | 6.5 | 45 |
| 50x5 | 35 _{-0.010} | 90 _{-0.015} | 34 _{-0.25} | 25 | 75 | 59 | 62 | 45 | 58 | 4 | 8.8 | 90 |
| 50 x 10/12/16/20/25/30/40 | 30 _{-0.005} | 80 _{-0.010} | 56 _{-0.50} | 47 | 63 | 50 | 53 | 40 | 49 | 11 | 6.5 | 30 |
| 63x10/20/40 | 40 _{-0.010} | 115 _{-0.015} | 46 _{-0.25} | 36 | 94 | 71 | 80 | 56 | 70 | 12 | 8.5 | 30 |
| 80x10/20/40 | 50 _{-0.005} | 140 _{-0.010} | 54 _{-0.25} | 45 | 113 | 88 | 100 | 63 | 87 | 12 | 10.5 | 30 |

1) The number of mounting holes can vary upwards

Suitable for screw ends: Form



Bearing assembly LAN

Fixed bearing with angular-contact thrust ball bearing LGN

Double-thrust

Series LGN-B-...

LGN-A-...

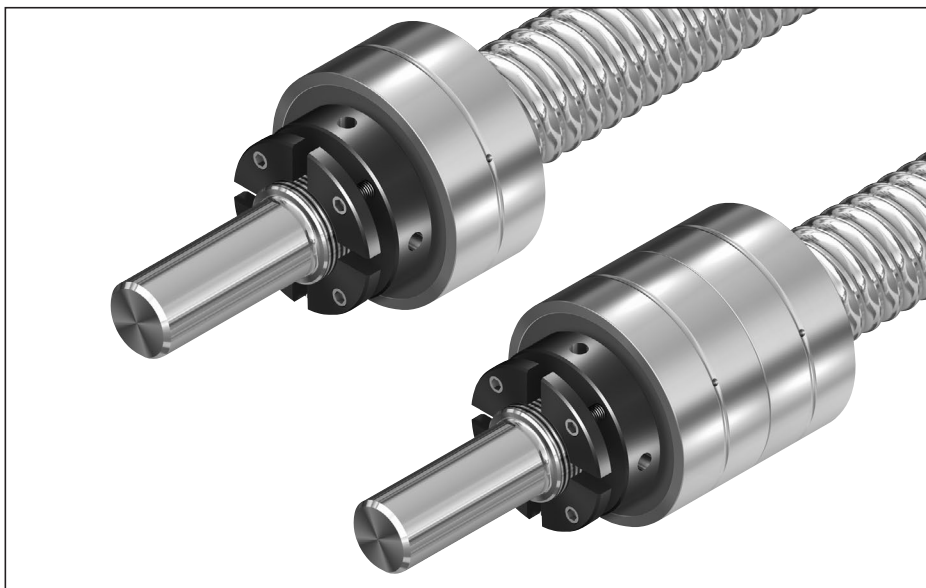
Double-thrust, in pairs,

Series LGN-C-...

The fixed bearing consists of:

- Angular-contact thrust ball bearing LGN
- Slotted nut NMA..., NMZ...

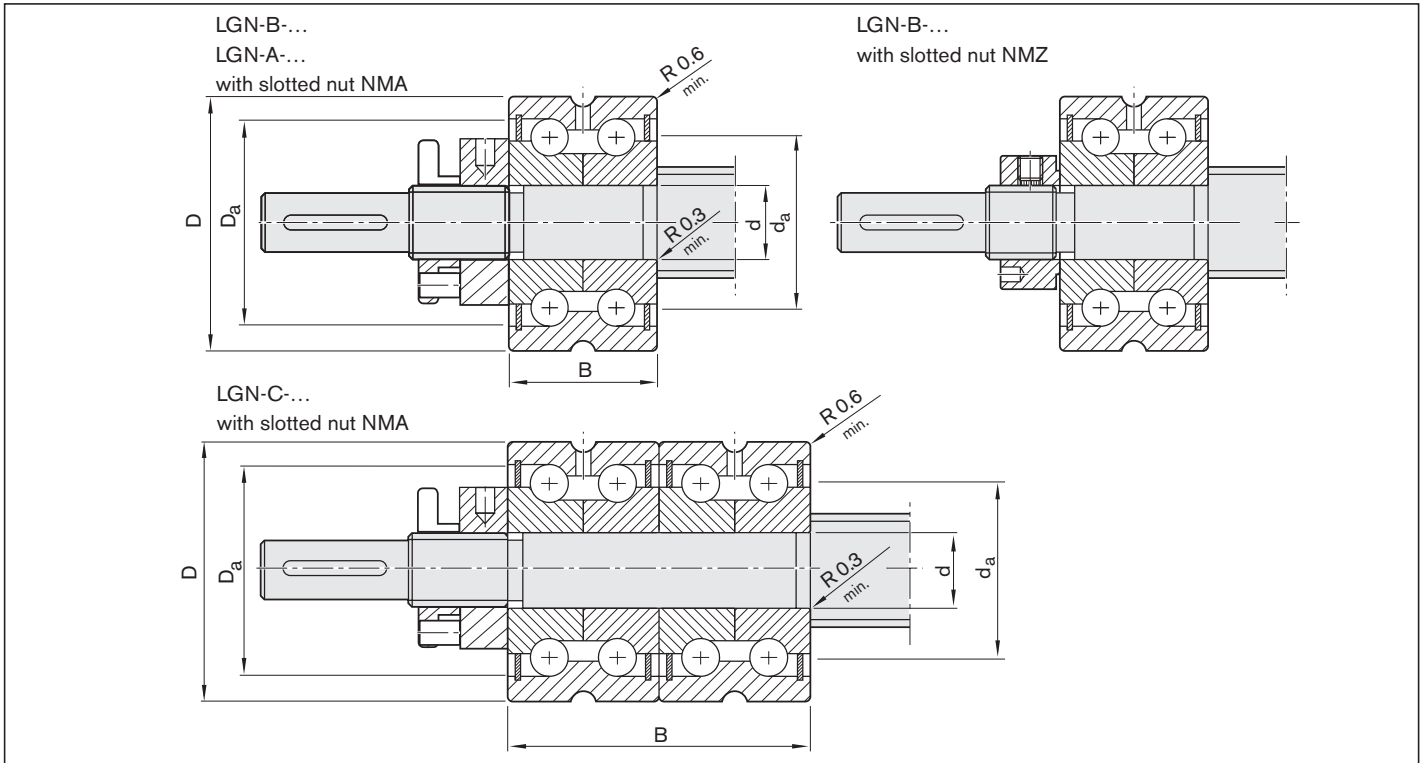
Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)



| Size | Module | Single parts | | | | Weight complete |
|---------------------------|--------------|-------------------------------------|--------------|--------------|--------------|-----------------|
| | | Angular-contact thrust ball bearing | | Slotted nut | | |
| $d_0 \times P$ | Part number | Abbreviation | Part number | Abbreviation | Part number | (kg) |
| 6 x 1/2 | R1590 106 00 | LGN-B-0624 | R3414 002 06 | NMZ 6x0.5 | R3446 001 04 | 0.040 |
| 8 x 1/2/2.5/5 | R1590 106 00 | LGN-B-0624 | R3414 002 06 | NMZ 6x0.5 | R3446 001 04 | 0.040 |
| 12 x 2/5/10 | R1590 106 00 | LGN-B-0624 | R3414 002 06 | NMZ 6x0.5 | R3446 001 04 | 0.040 |
| 16 x 5/10/16 | R1590 110 00 | LGN-B-1034 | R3414 003 06 | NMZ 10x1 | R3446 002 04 | 0.110 |
| 20 x 5/10/20/40 | R1590 112 00 | LGN-B-1242 | R3414 004 06 | NMZ 12x1 | R3446 003 04 | 0.215 |
| | R1590 117 00 | | | LGN-B-1747 | R3414 005 06 | NMZ 17x1 |
| 25 x 5/10/25 | R1590 117 30 | | | NMA 17x1 | R3446 014 04 | 0.290 |
| | R1590 120 00 | LGN-B-2052 | R3414 006 06 | NMZ 20x1 | R3446 005 04 | 0.345 |
| R1590 120 30 | NMA 20x1 | | | R3446 015 04 | 0.440 | |
| 40 x 5 | R1590 130 00 | LGN-B-3062 | R3414 007 06 | NMZ 30x1.5 | R3446 006 04 | 0.465 |
| | R1590 130 30 | | | NMA 30x1.5 | R3446 016 04 | 0.590 |
| 40 x 10/12/16/20/25/30/40 | R1590 225 30 | LGN-C-2557 | R3414 014 06 | NMA 25x1.5 | R3446 011 04 | 0.840 |
| 50 x 5 | R1590 135 30 | LGN-B-3572 | R3414 022 06 | NMA 35x1.5 | R3446 012 04 | 0.740 |
| 50 x 10/12/16/20/25/30/40 | R1590 230 30 | LGN-C-3062 | R3414 023 06 | NMA 30x1.5 | R3446 016 04 | 0.980 |
| 63 x 10/20/40 | R1590 140 30 | LGN-A-4090 | R3414 024 06 | NMA 40x1.5 | R3446 018 04 | 1.250 |
| 80 x 10/20/40 | R1590 150 30 | LGN-A-50110 | R3414 025 06 | NMA 50x1.5 | R3446 019 04 | 2.930 |

| Size | Load ratings ¹⁾ | | Bearing friction torque with sealing disk | Rigidity (axial) | Rigidity against tilting | Limit speed (grease) |
|---------------------------|----------------------------|-----------------------------|---|------------------|--------------------------|----------------------|
| | dyn. C (N) | stat. C ₀ (N) | | | | |
| 6x1/2 | 6,900 | 8,500 | 0.04 | 200 | 8 | 6,800 |
| 8x1/2/2.5/5 | 6,900 | 8,500 | 0.04 | 200 | 8 | 6,800 |
| 12x2/5/10 | 6,900 | 8,500 | 0.04 | 200 | 8 | 6,800 |
| 16x5/10/16 | 13,400 | 18,800 | 0.12 | 325 | 25 | 4,600 |
| 20x5/10/20/40 | 17,000 | 24,700 | 0.16 | 375 | 50 | 3,800 |
| 25x5/10/25 | 18,800 | 31,000 | 0.24 | 450 | 80 | 3,300 |
| 32x5/10/20/32/64 | 26,000 | 47,000 | 0.30 | 650 | 140 | 3,000 |
| 40x5 | 29,000 | 64,000 | 0.50 | 850 | 300 | 2,200 |
| 40 x 10/12/16/20/25/30/40 | 44,500 | 111,000 | 0.60 | 1,300 | 450 | 2,600 |
| 50x5 | 41,000 | 89,000 | 0.60 | 900 | 400 | 2,000 |
| 50 x 10/12/16/20/25/30/40 | 47,500 | 127,000 | 0.75 | 1,500 | 620 | 2,200 |
| 63x10/20/40 | 72,000 | 149,000 | 1.30 | 1,200 | 750 | 1,600 |
| 80x10/20/40 | 113,000 | 250,000 | 2.60 | 1,400 | 1,500 | 1,200 |

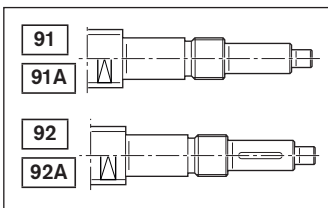
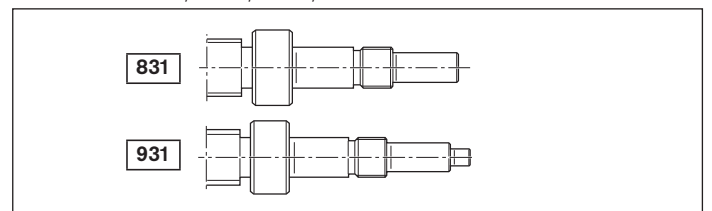
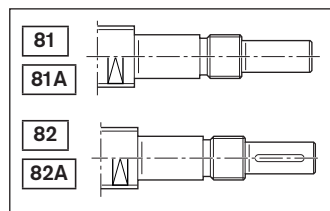
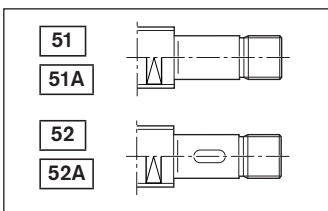
1) See page 187 for load on bearing



| Size | (mm) | | | Mounting dimensions (mm) | | | | |
|----------------------------------|----------------------|-----------------------|---------------------|--------------------------|-----------------------|-----|-----------------------|--|
| | d | D | B | min | D _a max | min | d _a max | |
| d₀ x P | | | | | | | | |
| 6 x 1/2 | 6 ^{-0.010} | 24 ^{-0.010} | 15 ^{-0.25} | 16 | 19 | 9 | 15 | |
| 8 x 1/2/2.5/5 | 6 ^{-0.010} | 24 ^{-0.010} | 15 ^{-0.25} | 16 | 19 | 9 | 15 | |
| 12 x 2/5/10 | 6 ^{-0.010} | 24 ^{-0.010} | 15 ^{-0.25} | 16 | 19 | 9 | 15 | |
| 16 x 5/10/16 | 10 ^{-0.010} | 34 ^{-0.010} | 20 ^{-0.25} | 25 | 28 | 14 | 24 | |
| 20 x 5/10/20/40 | 12 ^{-0.010} | 42 ^{-0.010} | 25 ^{-0.25} | 30 | 33 | 16 | 29 | |
| 25 x 5/10/25 | 17 ^{-0.010} | 47 ^{-0.010} | 25 ^{-0.25} | 34 | 37 | 23 | 33 | |
| 32 x 5/10/20/32/64 | 20 ^{-0.010} | 52 ^{-0.010} | 28 ^{-0.25} | 40 | 43 | 25 | 39 | |
| 40 x 5 | 30 ^{-0.010} | 62 ^{-0.010} | 28 ^{-0.25} | 50 | 53 | 40 | 49 | |
| 40 x 10/12/16/20/25/30/40 | 25 ^{-0.005} | 57 ^{-0.010} | 56 ^{-0.05} | 45 | 48 | 32 | 44 | |
| 50 x 5 | 35 ^{-0.010} | 72 ^{-0.011} | 34 ^{-0.25} | 59 | 62 | 45 | 58 | |
| 50 x 10/12/16/20/25/30/40 | 30 ^{-0.005} | 62 ^{-0.010} | 56 ^{-0.50} | 50 | 53 | 40 | 49 | |
| 63 x 10/20/40 | 40 ^{-0.005} | 90 ^{-0.010} | 46 ^{-0.25} | 71 | 80 | 56 | 70 | |
| 80 x 10/20/40 | 50 ^{-0.005} | 110 ^{-0.010} | 54 ^{-0.25} | 88 | 100 | 63 | 87 | |

Suitable for screw ends: Form

For screws 8 x 2.5: Form 831, 931
For screws 6 x 1; 6 x 2; 8 x 1; 8 x 2: Form 831



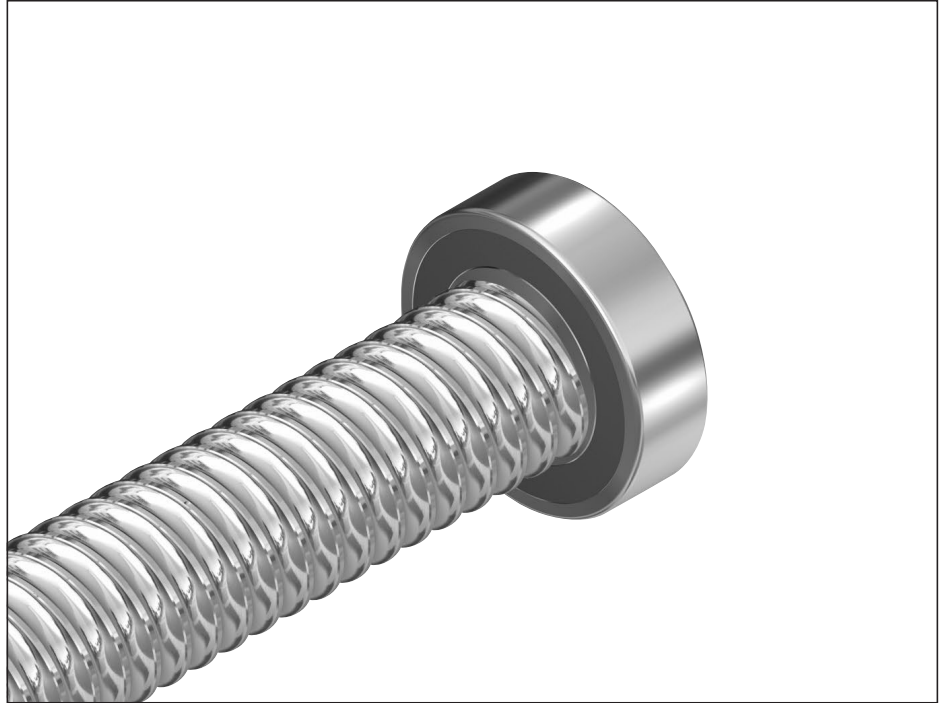
Bearing assembly LAD

Floating bearing with deep-groove ball bearing

The floating bearing system consists of:

- deep-groove ball bearing as per DIN 625... .2RS
- retaining ring DIN 471 (2 pcs)

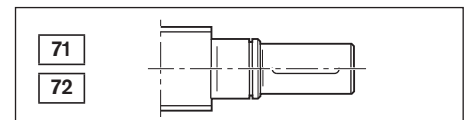
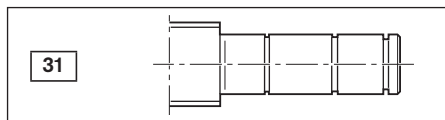
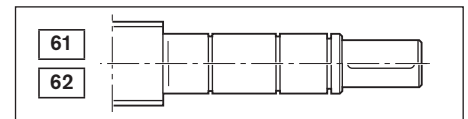
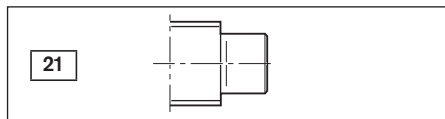
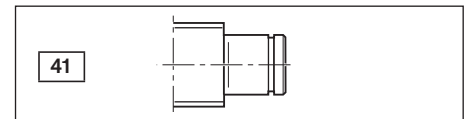
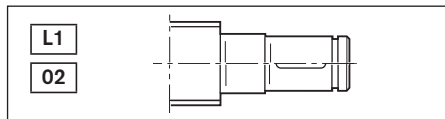
Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)

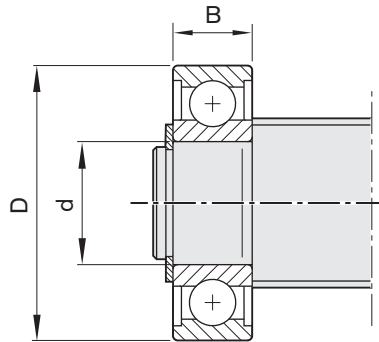


| Size | Part number | Single parts | | | | Load ratings | |
|-----------------------------|--------------|----------------------------------|--------------|------------------------|--------------|--------------|--------------------------|
| | | Deep-groove ball bearing DIN 625 | | Retaining ring DIN 471 | | dyn. C (N) | stat. C ₀ (N) |
| d ₀ x P | | Abbreviation | Part number | Abbreviation | Part number | | |
| 8 x 1/2/2.5/5 | R1590 605 00 | 625.2RS | R3414 048 00 | 5x0.6 | R3410 742 00 | 1,140 | 380 |
| 12 x 2/5/10 | R1590 606 00 | 626.2RS | R3414 043 00 | 6x0.7 | R3410 736 00 | 2,450 | 900 |
| 16 x 5/10/16 | R1590 610 00 | 6200.2RS | R3414 049 00 | 10x1 | R3410 745 00 | 6,000 | 2,240 |
| 20 x 5/10/20/40 | R1590 612 00 | 6201.2RS | R3414 042 00 | 12x1 | R3410 712 00 | 6,950 | 2,650 |
| | R1590 615 00 | 6202.2RS | R3414 074 00 | 15x1 | R3410 748 00 | 7,800 | 3,250 |
| 25 x 5/10/25 | R1590 617 00 | 6203.2RS | R3414 050 00 | 17x1 | R3410 749 00 | 9,500 | 4,150 |
| 32 x 5/10/20/32/64 | R1590 620 00 | 6204.2RS | R3414 038 00 | 20x1.2 | R3410 735 00 | 12,700 | 5,700 |
| | R1590 625 00 | 6205.2RS | R3414 063 00 | 25x1.2 | R3410 750 00 | 14,300 | 6,950 |
| 40 x 5/10/12/16/20/25/30/40 | R1590 630 00 | 6206.2RS | R3414 051 00 | 30x1.5 | R3410 724 00 | 19,300 | 9,800 |
| 50 x 5/10/12/16/20/25/30/40 | R1590 635 00 | 6207.2RS | R3414 075 00 | 35x1.5 | R3410 725 00 | 25,500 | 13,200 |
| 63 x 10/20/40 | R1590 650 00 | 6210.2RS | R3414 077 00 | 50x2 | R3410 727 00 | 36,500 | 20,800 |
| 80 x 10/20/40 | R1590 660 00 | 6212.2RS | R3414 078 00 | 60x2 | R3410 764 00 | 52,000 | 31,000 |

Suitable for screw ends: Form

For screws 8 x 1; 8 x 2: Form 41





| Size | (mm) | | | Weight complete (kg) |
|------------------------------------|------|-----|----|-------------------------|
| | d | D | B | |
| d₀ x P | | | | |
| 8 x 1/2/2.5/5 | 5 | 16 | 5 | 0.005 |
| 12 x 2/5/10 | 6 | 19 | 6 | 0.008 |
| 16 x 5/10/16 | 10 | 30 | 9 | 0.030 |
| 20 x 5/10/20/40 | 12 | 32 | 10 | 0.035 |
| | 15 | 35 | 11 | 0.043 |
| 25 x 5/10/25 | 17 | 40 | 12 | 0.064 |
| 32 x 5/10/20/32/64 | 20 | 47 | 14 | 0.106 |
| | 25 | 52 | 15 | 0.125 |
| 40 x 5/10/12/16/20/25/30/40 | 30 | 62 | 16 | 0.195 |
| 50 x 5/10/12/16/20/25/30/40 | 35 | 72 | 17 | 0.288 |
| 63 x 10/20/40 | 50 | 90 | 20 | 0.453 |
| 80 x 10/20/40 | 60 | 110 | 22 | 0.783 |

Bearing assembly LAL

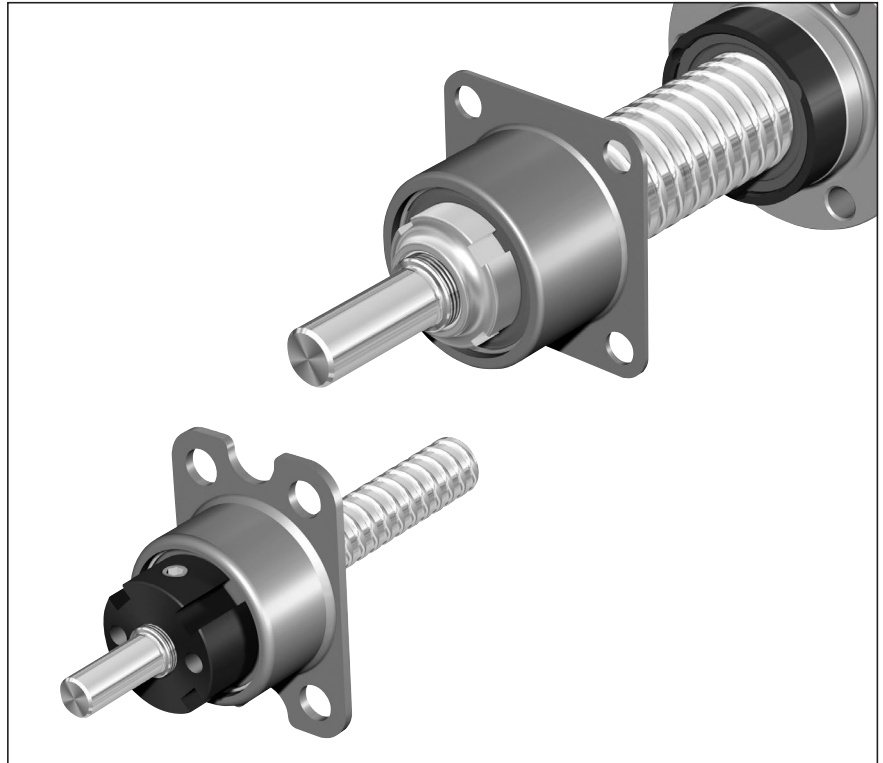
Fixed bearing with angular-contact thrust ball bearing LGL

Double-thrust, screw-down, for inexpensive designs

The fixed bearing consists of:

- Angular-contact thrust ball bearing LGL
- Slotted nut NMG..., NMZ...

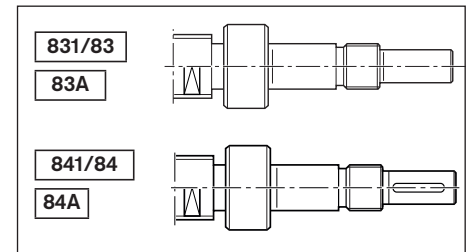
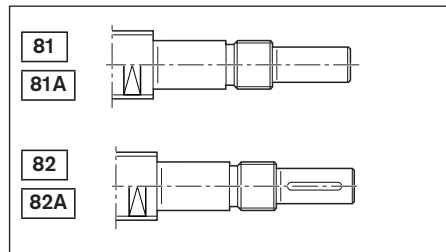
Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)

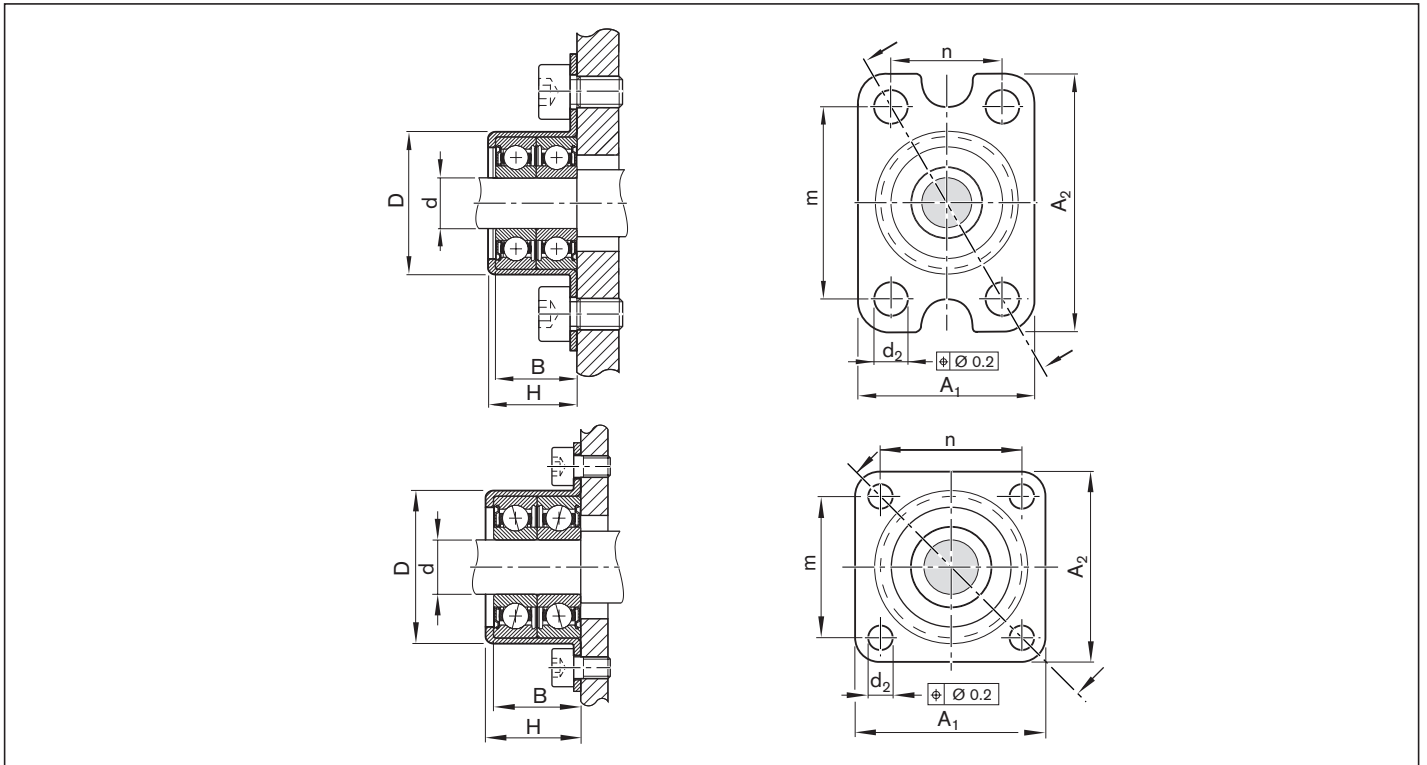


| Size | Module | Single parts | | | | Slotted nut | |
|--------------------|--------------|--|--------------|----------------------------|--------------------------|--------------|--------------|
| | | Angular-contact thrust ball bearing unit | | Load ratings ¹⁾ | | | |
| d ₀ x P | Part number | Abbreviation | Part number | dyn. C (N) | stat. C ₀ (N) | Abbreviation | Part number |
| 6 x 1/2 | R1590 406 00 | LGL-D-0624 | R3414 038 06 | 1,340 | 1,250 | NMZ 6x0.5 | R3446 001 04 |
| 8 x 1/2/2.5/5 | R1590 406 00 | LGL-D-0624 | R3414 038 06 | 1,340 | 1,250 | NMZ 6x0.5 | R3446 001 04 |
| 12 x 2/5/10 | R1590 406 00 | LGL-D-0624 | R3414 038 06 | 1,340 | 1,250 | NMZ 6x0.5 | R3446 001 04 |
| 12 x 5/10 | R1590 412 00 | LGL-A-1244 | R3414 040 06 | 13,200 | 17,900 | NMG 12x1 | R3446 002 02 |
| 16 x 5/10 | R1590 412 00 | LGL-A-1244 | R3414 040 06 | 13,200 | 17,900 | NMG 12x1 | R3446 002 02 |
| 20 x 5 | R1590 412 00 | LGL-A-1244 | R3414 040 06 | 13,200 | 17,900 | NMG 12x1 | R3446 002 02 |
| 25 x 5/10 | R1590 415 00 | LGL-A-1547 | R3414 041 06 | 16,400 | 22,400 | NMG 15x1 | R3446 011 02 |
| 32 x 5/10 | R1590 420 00 | LGL-A-2060 | R3414 042 06 | 27,500 | 40,000 | NMG 20x1 | R3446 005 02 |

1) See page 187 for load on bearing

Suitable for screw ends: Form





| Size | (mm) | | | | | | | | | | Weight of bearing (kg) |
|----------------|------|-----------------------|-------|-------|-----|-----|--------------|-----|-------|-------|---------------------------|
| | d | D +0.03 -0.01 | A_1 | A_2 | n | m | H -0.25 | B | d_2 | | |
| $d_0 \times P$ | | | | | | | | | | | |
| 6 x 1/2 | 6 | 20.50 | 24 | 35 | 15 | 26 | 13 | 12 | 4.5 | 0.023 | |
| 8 x 1/2/2.5/5 | 6 | 20.50 | 24 | 35 | 15 | 26 | 13 | 12 | 4.5 | 0.023 | |
| 12 x 2/5/10 | 6 | 20.50 | 24 | 35 | 15 | 26 | 13 | 12 | 4.5 | 0.023 | |
| 12 x 5/10 | 12 | 35.45 | 44 | 50 | 32 | 38 | 22 | 20 | 6.6 | 0.120 | |
| 16 x 5/10 | 12 | 35.45 | 44 | 50 | 32 | 38 | 22 | 20 | 6.6 | 0.120 | |
| 20 x 5 | 12 | 35.45 | 44 | 50 | 32 | 38 | 22 | 20 | 6.6 | 0.120 | |
| 25 x 5/10 | 15 | 38.45 | 47 | 51 | 35 | 39 | 24 | 22 | 6.6 | 0.140 | |
| 32 x 5/10 | 20 | 50.45 | 60 | 60 | 47 | 47 | 30 | 28 | 6.6 | 0.300 | |

Bearing assembly LAS

Fixed bearing with angular-contact thrust ball bearing LGS

Double-thrust, series LAS-E

The fixed bearing consists of:

- Angular-contact ball bearing LGS as per DIN 628. Not available as a separate part.
- Slotted nut NMA

Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, assembly group bearing unit, etc.).

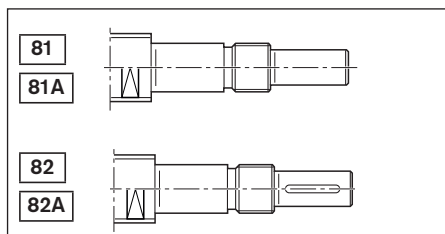


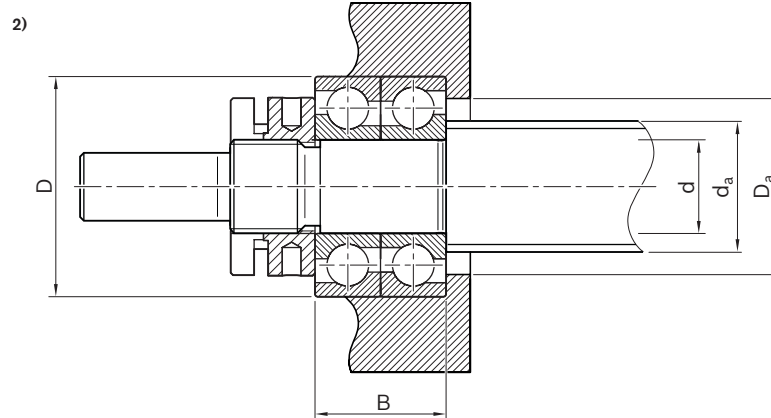
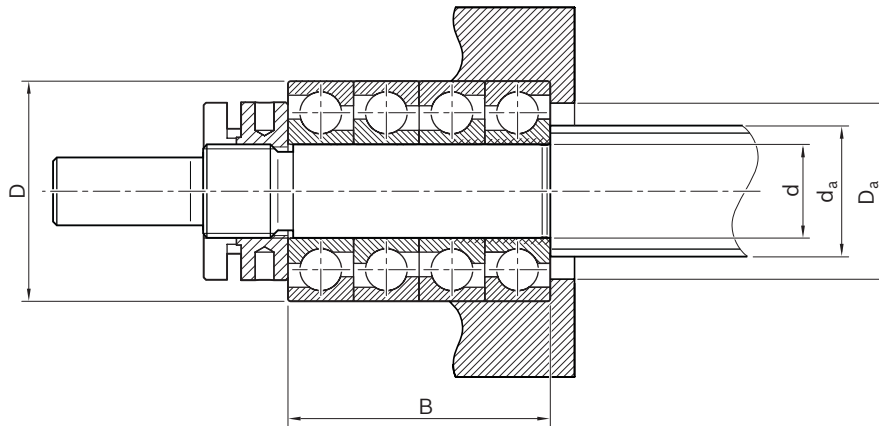
| Size $d_o \times P$ | LAS Part number | LGS Abbreviation | Slotted nut | | Weight complete m (kg) | C (kN) | C ₀ (kN) | n_G ¹⁾ (min ⁻¹) |
|-----------------------------|--------------------|---------------------|--------------|--------------|------------------------------|-----------|------------------------|---|
| | | | Abbreviation | Part number | | | | |
| 16 x 5/10/16 | R159A 410 01 | LGS-E-1030 | NMZ 10x1 | R3446 002 04 | 0.13 | 20 | 25.8 | 13,500 |
| 20 x 5/10/20/40 | R159A 412 01 | LGS-E-1232 | NMZ 12x1 | R3446 003 04 | 0.16 | 21.7 | 29.2 | 11,700 |
| 25 x 5/10/25 ²⁾ | R159A 417 01 | LGS-E-1747 | NMA 17x1 | R3446 014 04 | 0.29 | 27.9 | 31.9 | 8,550 |
| 32 x 5/10/20/32/64 | R159A 420 01 | LGS-E-2047 | NMA 20x1 | R3446 015 04 | 0.57 | 39.9 | 63.8 | 8,550 |
| 40 x 5/10/12/16/20/25/30/40 | R159A 430 01 | LGS-E-3072 | NMA 30x1.5 | R3446 016 04 | 1.68 | 98.3 | 163.1 | 5,850 |
| 50 x 5/10/12/16/20/25/30/40 | R159A 435 01 | LGS-E-3580 | NMA 35x1.5 | R3446 012 04 | 2.19 | 111.2 | 188.5 | 4,950 |
| 63 x 10/20/40 | R159A 440 01 | LGS-E-4090 | NMA 40x1.5 | R3446 016 08 | 2.74 | 140.8 | 257.7 | 4,500 |
| 80 x 10/20/40 | R159A 450 01 | LGS-E-50110 | NMA 50x1.5 | R3446 019 04 | 4.95 | 211.2 | 392.3 | 3,600 |
| 80 x 10/20/40 | R159A 460 01 | LGS-E-60130 | NMA 60x2 | R9130 342 16 | 7.49 | 272.5 | 534.6 | 3,015 |

1) Values as a guide for low bearing load, good heat dissipation and suitable lubricating greases with low consistency

2) Version 1+1

Suitable for screw ends: Form





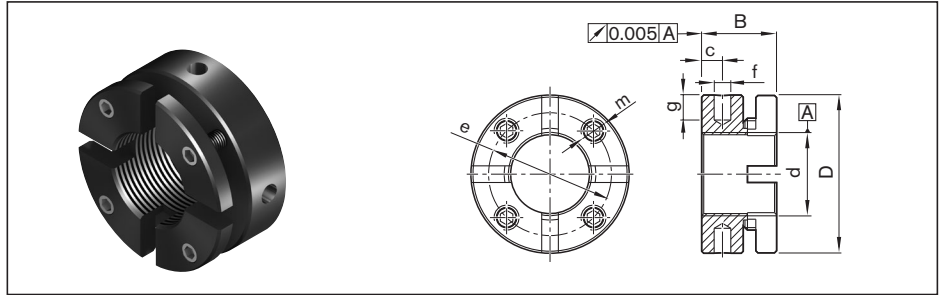
| $d_0 \times P$ | (mm) | | B | D_a | | d_a | |
|-----------------------------|----------------------|-----------------------|-----|-------|-------|-------|-------|
| | d | D | | min. | max. | min. | max. |
| 16 x 5/10/16 | 10 _{-0.008} | 30 _{-0.009} | 36 | 22.9 | 25.8 | 14.2 | 22.0 |
| 20 x 5/10/20/40 | 12 _{-0.008} | 32 _{-0.011} | 40 | 25.0 | 27.8 | 16.2 | 24.0 |
| 25 x 5/10/25 | 17 _{-0.008} | 47 _{-0.011} | 28 | 36.2 | 41.4 | 22.6 | 35.0 |
| 32 x 5/10/20/32/64 | 20 _{-0.010} | 47 _{-0.011} | 56 | 36.0 | 41.0 | 25.6 | 35.0 |
| 40 x 5/10/12/16/20/25/30/40 | 30 _{-0.010} | 72 _{-0.013} | 76 | 56.5 | 65.0 | 37.0 | 55.5 |
| 50 x 5/10/12/16/20/25/30/40 | 35 _{-0.012} | 80 _{-0.013} | 84 | 63.0 | 71.0 | 44.0 | 62.0 |
| 63 x 10/20/40 | 40 _{-0.012} | 90 _{-0.015} | 92 | 72.0 | 81.0 | 49.0 | 71.0 |
| 80 x 10/20/40 | 50 _{-0.012} | 110 _{-0.015} | 108 | 89.0 | 100.0 | 61.0 | 88.0 |
| 80 x 10/20/40 | 60 _{-0.015} | 130 _{-0.018} | 124 | 106.0 | 118.0 | 72.0 | 102.0 |

Slotted Nuts NMA, NMZ and NMG for fixed bearings

Slotted nut NMA

- For maximum vibratory loads
- For new designs

M_A = tightening torque for slotted nut
 F_{aB} = axial breaking load of slotted nut
 M_{AG} = tightening torque for set screw



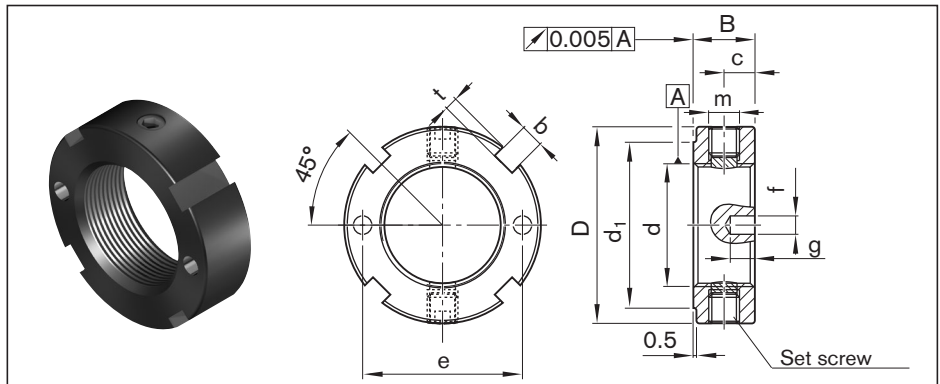
| Abbreviation | Part number | (mm) | | | | | | | | M_A | F_{aB} | M_{AG} | Mass |
|--------------|--------------|---------|-----|----|----|-----|-----|---|----|-------|----------|----------|-------|
| | | d | D | B | c | m | e | f | g | (Nm) | (kN) | (Nm) | (g) |
| NMA 15x1 | R3446 020 04 | M15x1 | 30 | 18 | 5 | M5 | 24 | 4 | 5 | 10 | 100 | 3 | 60 |
| NMA 17x1 | R3446 014 04 | M17x1 | 32 | 18 | 5 | M5 | 26 | 4 | 5 | 15 | 120 | 3 | 70 |
| NMA 20x1 | R3446 015 04 | M20x1 | 38 | 18 | 5 | M6 | 31 | 4 | 6 | 18 | 145 | 5 | 130 |
| NMA 25x1.5 | R3446 011 04 | M25x1.5 | 45 | 20 | 6 | M6 | 38 | 5 | 6 | 25 | 205 | 5 | 160 |
| NMA 30x1.5 | R3446 016 04 | M30x1.5 | 52 | 20 | 6 | M6 | 45 | 5 | 7 | 32 | 250 | 5 | 200 |
| NMA 35x1.5 | R3446 012 04 | M35x1.5 | 58 | 20 | 6 | M6 | 51 | 5 | 7 | 40 | 280 | 5 | 230 |
| NMA 40x1.5 | R3446 018 04 | M40x1.5 | 65 | 22 | 6 | M6 | 58 | 6 | 8 | 55 | 350 | 5 | 300 |
| NMA 45x1.5 | R9130 342 15 | M45x1.5 | 70 | 22 | 6 | M6 | 63 | 6 | 8 | 65 | 360 | 5 | 340 |
| NMA 50x1.5 | R3446 019 04 | M50x1.5 | 75 | 25 | 8 | M6 | 68 | 6 | 8 | 85 | 450 | 5 | 430 |
| NMA 60x2 | R9130 342 16 | M60x2.0 | 90 | 26 | 8 | M8 | 80 | 6 | 8 | 100 | 550 | 15 | 650 |
| NMA 70x2 | R9130 342 17 | M70x2.0 | 100 | 28 | 9 | M8 | 90 | 8 | 10 | 130 | 650 | 15 | 790 |
| NMA 90x2 | R9163 113 51 | M90x2.0 | 130 | 32 | 13 | M10 | 118 | 8 | 10 | 200 | 900 | 20 | 1,530 |

NMA 15 to NAM 40 with 4 segments
 NMA 45 to NAM 90 with 6 segments

Slotted nut NMZ

- For existing designs
- For timing belt side drive
- For driven nuts

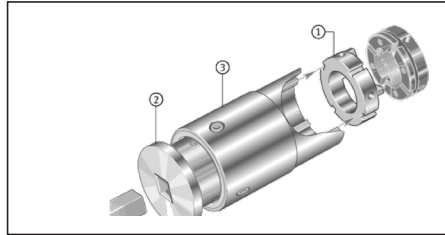
M_A = tightening torque for slotted nut
 F_{aB} = axial breaking load of slotted nut
 M_{AG} = tightening torque for set screw



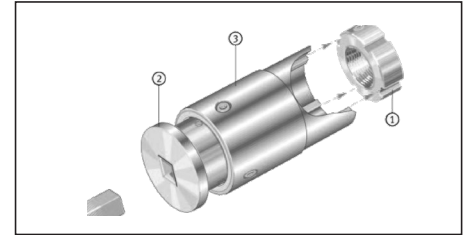
| Abbreviation | Part number | (mm) | | | | | | | | | | | M_A | F_{aB} | M_{AG} | Mass |
|--------------|--------------|---------|-----|----|----------------|----|----|----|-----|------|-----|-----|-------|----------|----------|------|
| | | d | D | B | d ₁ | c | m | b | t | e | f | g | (Nm) | (kN) | (Nm) | (g) |
| NMZ 6x0.5 | R3446 001 04 | M6x0.5 | 16 | 8 | 12 | 4 | M4 | 3 | 2.0 | 11.0 | 2.5 | 3.5 | 2 | 17 | 1 | 10 |
| NMZ 10x1 | R3446 002 04 | M10x1 | 18 | 8 | 14 | 4 | M4 | 3 | 2.0 | 14.0 | 2.5 | 3.5 | 6 | 31 | 1 | 10 |
| NMZ 12x1 | R3446 003 04 | M12x1 | 22 | 8 | 18 | 4 | M4 | 3 | 2.0 | 17.0 | 2.5 | 3.5 | 8 | 38 | 1 | 15 |
| NMZ 17x1 | R3446 004 04 | M17x1 | 28 | 10 | 23 | 5 | M5 | 4 | 2.0 | 22.5 | 3.0 | 4.0 | 15 | 57 | 3 | 28 |
| NMA 20x1 | R3446 005 04 | M20x1 | 32 | 10 | 27 | 5 | M5 | 4 | 2.0 | 26.0 | 3.0 | 4.0 | 18 | 69 | 3 | 35 |
| NMZ 25x1.5 | R3446 007 04 | M25x1.5 | 45 | 20 | 40 | 10 | M6 | 5 | 2.0 | 35.0 | 4.0 | 5.0 | 25 | 211 | 5 | 55 |
| NMA 30x1.5 | R3446 006 04 | M30x1.5 | 45 | 12 | 40 | 6 | M6 | 5 | 2.0 | 37.5 | 4.0 | 5.0 | 32 | 112 | 5 | 75 |
| NMZ 45x1.5 | R3446 032 04 | M45x1.5 | 65 | 14 | 59 | 7 | M6 | 6 | 2.5 | - | - | - | 65 | 181 | 5 | 170 |
| NMZ 55x2 | R3446 033 04 | M55x2 | 75 | 16 | 68 | 8 | M6 | 7 | 3.0 | - | - | - | 95 | 229 | 5 | 230 |
| NMZ 60x2 | R3446 031 04 | M60x2 | 80 | 16 | 73 | 8 | M6 | 7 | 3.0 | - | - | - | 100 | 255 | 5 | 250 |
| NMZ 70x2 | R3446 034 04 | M70x2 | 92 | 18 | 85 | 9 | M8 | 8 | 3.5 | - | - | - | 130 | 305 | 15 | 360 |
| NMZ 80x2 | R3446 035 04 | M80x2 | 105 | 18 | 95 | 9 | M8 | 8 | 3.5 | - | - | - | 160 | 355 | 15 | 460 |
| NMZ 90x2 | R3446 036 04 | M90x2 | 120 | 20 | 108 | 10 | M8 | 10 | 4.0 | - | - | - | 200 | 410 | 15 | 700 |

Assembly tool for slotted nut

General-purpose socket wrench insert for slotted nuts NMA / NMZ
– Available on request



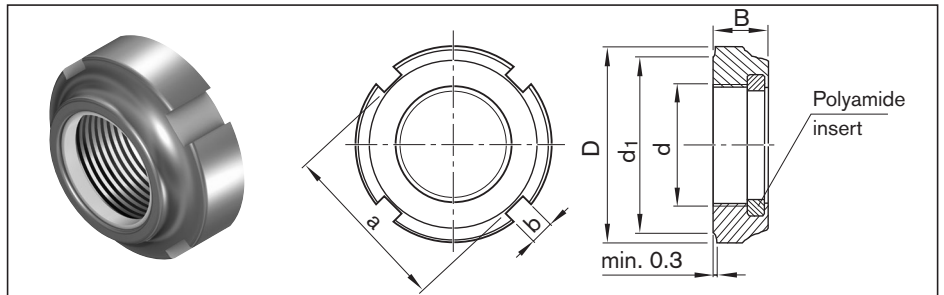
NMA: consisting of components: AMS, ZMS and ZME



NMZ: consisting of components: ZMS and ZME

Slotted nut NMG

– For inexpensive designs



| Abbreviation | Part number | Dimensions (mm) | | | | | | M_A (Nm) | Mass (g) |
|--------------|--------------|-----------------|----|-----|-------|----|---|---------------|-------------|
| | | d | D | B | d_1 | a | b | | |
| NMG 12x1 | R3446 002 02 | M12x1 | 21 | 7.6 | 18 | 18 | 3 | 8 | 10 |
| NMG 15x1 | R3446 011 02 | M15x1 | 24 | 8.6 | 21 | 21 | 4 | 10 | 13 |
| NMG 20x1 | R3446 005 02 | M20x1 | 32 | 9.6 | 27 | 27 | 4 | 18 | 24 |

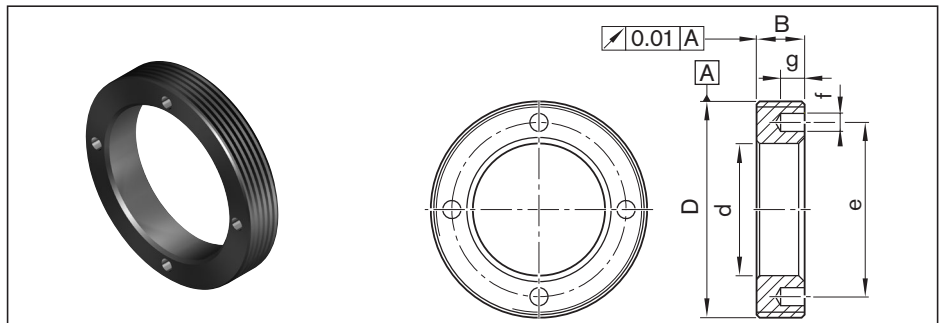
M_A = tightening torque for slotted nut

Ring nut GWR

– For angular-contact thrust ball bearing LGN
– For cylindrical single nut ZEM-E-S

Attention:
Use a threadlocker (for example, Loctite 638) to secure against loosening

M_A = tightening torque for housing nut



| Abbreviation | Part number | Dimensions (mm) | | | | | | | M_A (Nm) | Mass (g) |
|--------------|--------------|-----------------|------|----|-------|-----|---|-----|---------------|-------------|
| | | D | d | B | e | f | g | | | |
| GWR 18x1 | R1507 040 33 | M18x1 | 8.5 | 8 | 12.5 | 2.5 | 3 | 6 | 10.0 | |
| GWR 23x1 | R1507 240 35 | M23x1 | 13.0 | 8 | 18.0 | 2.5 | 3 | 8 | 15.0 | |
| GWR 26x1.5 | R1507 240 22 | M26x1.5 | 16.5 | 8 | 20.5 | 2.5 | 3 | 10 | 16.5 | |
| GWR 30x1.5 | R1507 340 34 | M30x1.5 | 17.0 | 8 | 23.0 | 3.0 | 4 | 20 | 29.0 | |
| GWR 36x1.5 | R1507 040 23 | M36x1.5 | 22.0 | 8 | 29.0 | 3.0 | 4 | 25 | 35.0 | |
| GWR 40x1.5 | R1507 140 03 | M40x1.5 | 25.0 | 8 | 33.0 | 3.0 | 4 | 28 | 39.5 | |
| GWR 45x1.5 | R1507 240 04 | M45x1.5 | 28.0 | 8 | 38.0 | 3.0 | 4 | 30 | 55.0 | |
| GWR 50x1.5 | R1507 240 25 | M50x1.5 | 31.0 | 10 | 40.0 | 4.0 | 5 | 45 | 86.0 | |
| GWR 55x1.5 | R1507 340 05 | M55x1.5 | 36.0 | 10 | 46.0 | 4.0 | 5 | 50 | 96.0 | |
| GWR 58x1.5 | R1507 440 32 | M58x1.5 | 43.0 | 10 | 50.0 | 4.0 | 5 | 58 | 84.0 | |
| GWR 60x1 | R1507 440 28 | M60x1 | 43.0 | 10 | 51.0 | 4.0 | 5 | 60 | 97.0 | |
| GWR 62x1.5 | R1507 440 29 | M62x1.5 | 43.0 | 12 | 53.0 | 5.0 | 6 | 60 | 127.0 | |
| GWR 65x1.5 | R1507 440 26 | M65x1.5 | 47.0 | 12 | 55.0 | 4.0 | 5 | 70 | 136.0 | |
| GWR 70x1.5 | R1507 440 06 | M70x1.5 | 42.0 | 12 | 58.0 | 4.0 | 5 | 75 | 216.0 | |
| GWR 78x2 | R1507 567 27 | M78x2 | 54.0 | 15 | 67.0 | 6.0 | 7 | 90 | 286.0 | |
| GWR 92x2 | R1507 640 09 | M92x2 | 65.0 | 16 | 82.0 | 6.0 | 7 | 125 | 385.0 | |
| GWR 95x2 | R1507 667 28 | M95x2 | 68.0 | 16 | 82.0 | 6.0 | 7 | 130 | 425.0 | |
| GWR 112x2 | R1507 740 11 | M112x2 | 82.0 | 18 | 100.0 | 8.0 | 8 | 175 | 596.0 | |
| GWR 115x2 | R1507 767 29 | M115x2 | 85.0 | 18 | 100.0 | 8.0 | 8 | 200 | 664.0 | |

Ball screw assembly with front lube unit

Characteristic features

Equipped with Rexroth's functionally reliable, series-made front lube unit, a ball screw assembly can attain an exceptionally long travel life without relubrication. Thanks to intensive development work and thorough testing under realistic conditions, the use of front lube units combined with prelubricated nuts enables you to achieve lifelong, optimal lubrication of Rexroth precision ball screw assemblies.

From its built-in oil reservoir, the front lube unit delivers the precise amount of oil required to replenish the used amounts of oil in the soap matrix of the grease. The oil is applied directly to the raceway of the ball screws via the low-friction point-contact zone of the open-pored foam. This optimized delivery minimizes lubricant consumption and allows you to achieve lifelong lubrication.

Ecologically sound

The front lube unit ideally combines eco-friendliness with cost-efficiency. It minimizes oil consumption and keeps the surroundings clean. This helps to conserve resources.

Further highlights

- Delivered with the ball screw assembly ready-mounted.
- Attaches to one side of the nut, thus saving space.
- Can be used in all mounting positions, both in horizontal and vertical installations.
- Available for almost all nut types with diameters 20 to 40
- Easy to integrate in constructions by attaching it either on the flange side or on the opposite side of the single-start nuts.
- When attached to both sides, it also meets the lubrication needs of high-capacity two-start nuts (FED-E-B).
- Can be used in all normal ambient conditions, except in wet or dusty environments.



Lubrication concept

This logo indicates that the Rexroth ball screw assembly with prelubed nut and front lube unit are lubed for life.

Note: The front lube unit is not suitable for use with driven nuts.

Lifelong lubrication

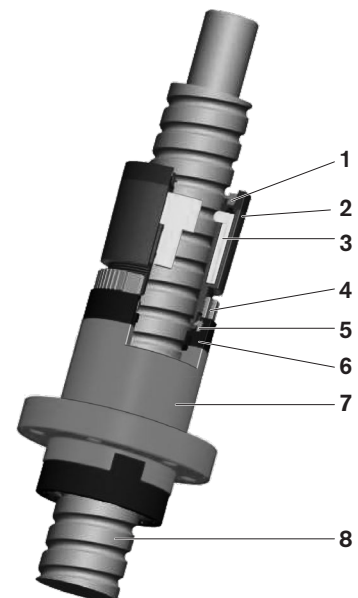
The effective life of the Rexroth front lube unit matches the service life curve of the Ball Screw Assembly. When operated within the recommended load limits, a ball screw assembly equipped with a Front Lube Unit will require no relubrication, thanks to the optimal delivery of lubricant. Based on our extensive tests, the lubrication performance of the front lube unit can now be reliably predicted for the first time. With a Front Lube Unit from Rexroth, a ball screw assembly can run trouble-free for **five years** or **300 million revolutions** without any relubrication.

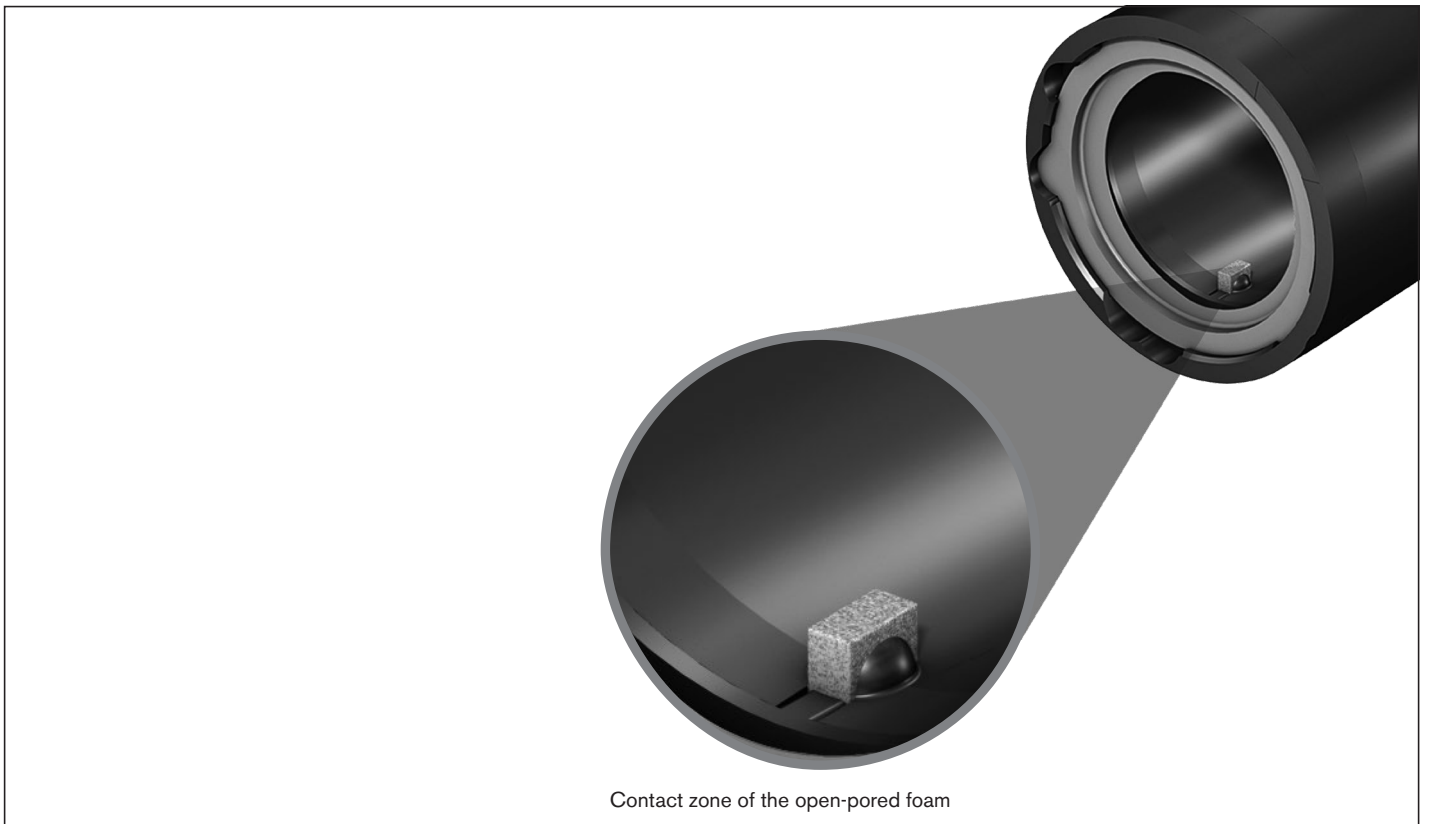
Structural design of front lube units

- 1 Seal
- 2 Housing and cover
 - Material: special plastic
- 3 Open-pored foam
- 4 Housing nut
- 5 Intermediate ring
- 6 Recirculation cap
- 7 Ball nut
- 8 Ball screw

Notes

When selecting the size for the stroke, consider the dimensions of the VSE.
When setting up a system, do not allow the VSE to collide with a stop or other components.





Contact zone of the open-pored foam

Ball nut with front lube unit

Front lube unit

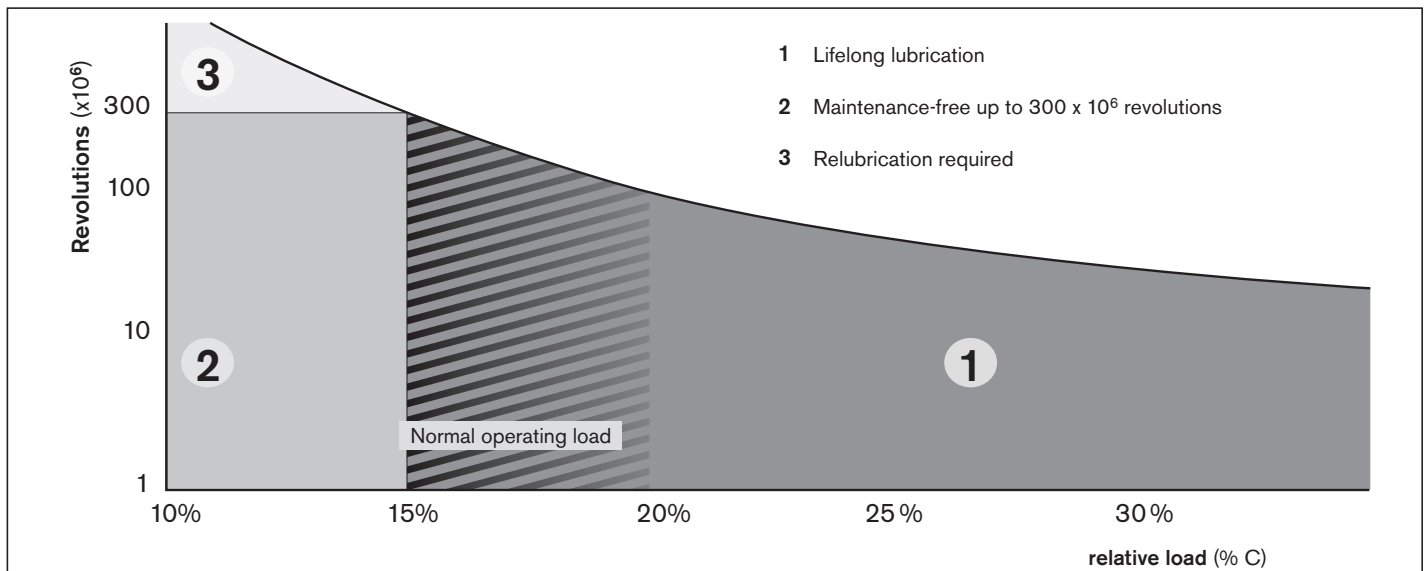
The front lube unit (VSE) has been designed for the long-term, maintenance-free operation of the ball screw assembly. It is attached to the nut and delivers lube oil continuously to the rolling elements.

For travel up to 300 million revolutions without relubrication.

The front lube unit can be combined with the following nut types:

- FEM-E-S
- FEM-E-B
- SEM-E-S
- SEM-E-C
- FED-E-B
- FDM-E-S
- FDM-E-B

Lifelong lubrication



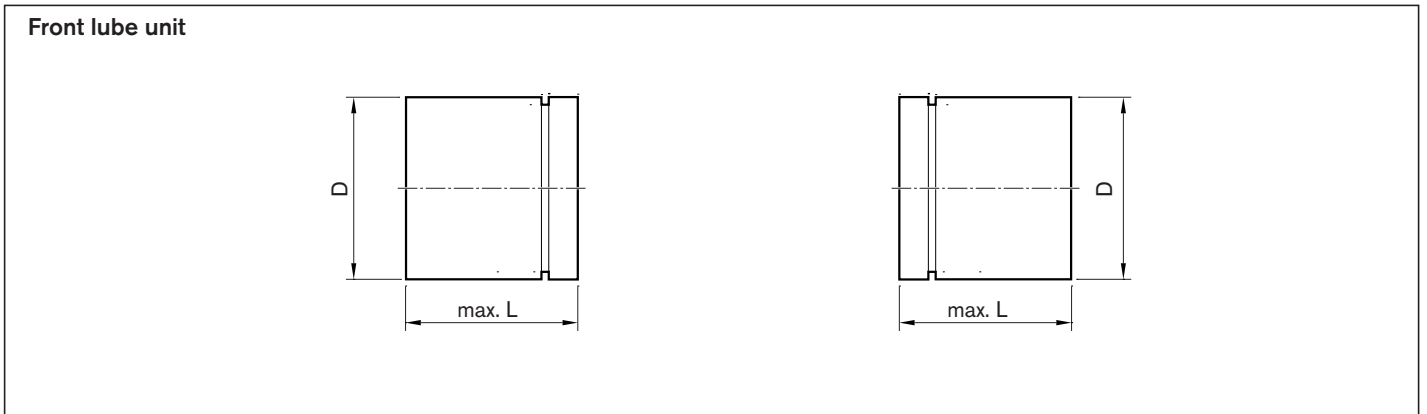
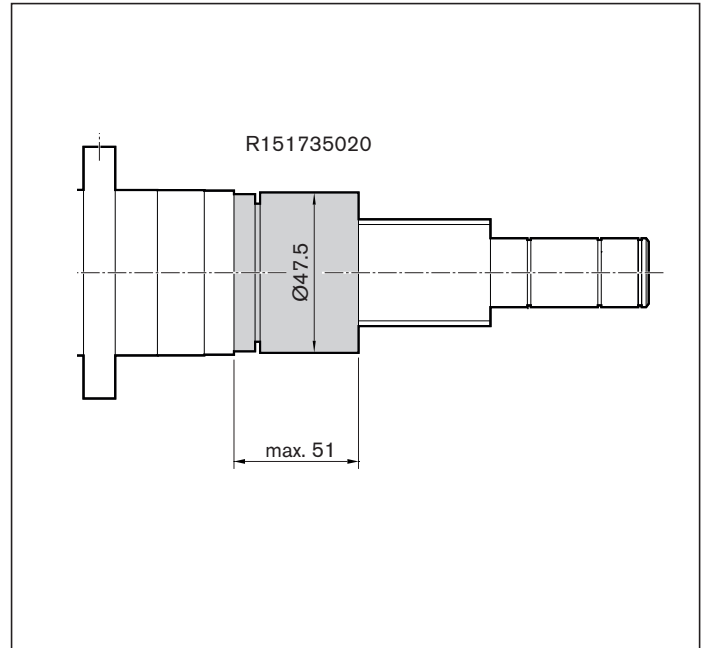
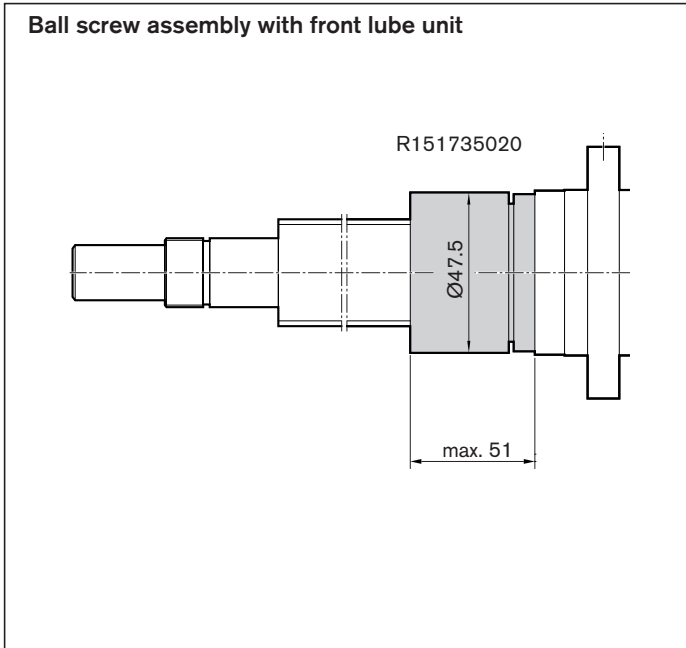
Results confirmed by our extensive tests:

- 1** For axial loads of 15-35% of the dynamic load rating C, the ball nut will be lubed for life.
- 2** For axial loads of < 15% of the dynamic load rating C, the ball screw assembly will require no maintenance for up to 300 million revolutions.
- 3** After 300 million revolutions, the ball nut should be relubricated as usual. The front lube unit does not have to be removed from the nut.

| Lead (mm) | Travel s with front lube units ¹⁾ (km) |
|-----------|---|
| 5 | 1,500 |
| 10 | 3,000 |
| 20 | 6,000 |
| 32 | 9,600 |
| 40 | 12,000 |

1) max. load up to 0.15C

Technical data



Note: The front lube unit is delivered ready-mounted to the ball screw assembly. Only installation by the manufacturer is permitted.

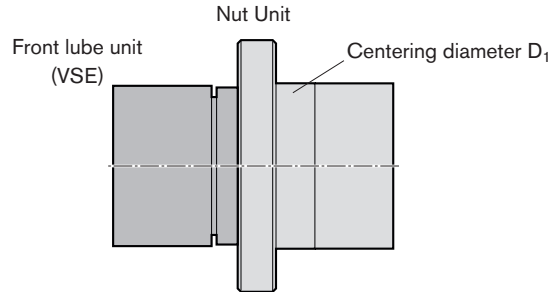
| Size of VSE $d_0 \times P$ | Part number | (mm) | | Weight (kg) | |
|-------------------------------|-------------|-------|-------|-------------|-------|
| | | D | L | m | |
| 20 x 5 R | R151715000 | 32.60 | 51.00 | | 0.021 |
| 20 x 20 R | | | | | |
| 25 x 5 R | R151725010 | 37.50 | 51.00 | | 0.027 |
| 25 x 10 R | | | | | |
| 25 x 25 R | | | | | |
| 32 x 5 R | R151735030 | 47.50 | 51.00 | | 0.042 |
| 32 x 10 R | | | | | |
| 32 x 20 R | | | | | |
| 32 x 32 R | | | | | |
| 40 x 5 R | R151745030 | 55.50 | 53.00 | | 0.055 |
| 40 x 10 R | R151745050 | 62.30 | 51.00 | | 0.070 |
| 40 x 20 R | | | | | |
| 40 x 40 R | | | | | |

Ball nut with front lube unit

Ordering example for front lube unit with illustration of mounting orientation

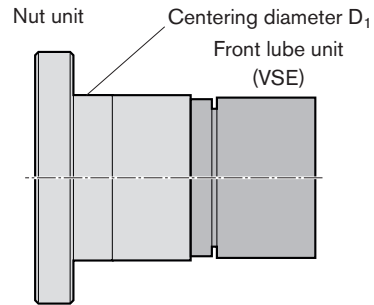
BASA 32 x 10R x 3,969 **FEM-E-S - 5** 00 1 3 T7 R 81K203 31K200 1000 0 2

Front lube unit on left, nut with initial greasing



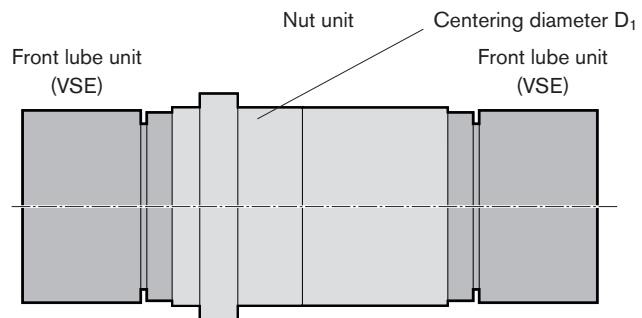
BASA 32 x 10R x 3,969 **FEM-E-S - 5** 00 1 3 T7 R 81K203 31K200 1000 0 3

Front lube unit on right, nut with initial greasing



BASA 40 x 20R x 6 **FED-E-B - 8** 00 1 3 T7 R 81K250 31K300 1000 0 4

Front lube unit on two sides, nut with initial greasing



Mounting orientation of the front lube unit on nut types

| Nut type | Mounting orientation |
|----------|----------------------|
| FEM-E-S | 2, 3 |
| FEM-E-B | 2, 3 |
| SEM-E-S | 2, 3 |
| SEM-E-C | 2, 3 |
| FED-E-B | 4 |
| FDM-E-S | 2, 3 |
| FDM-E-B | 2, 3 |

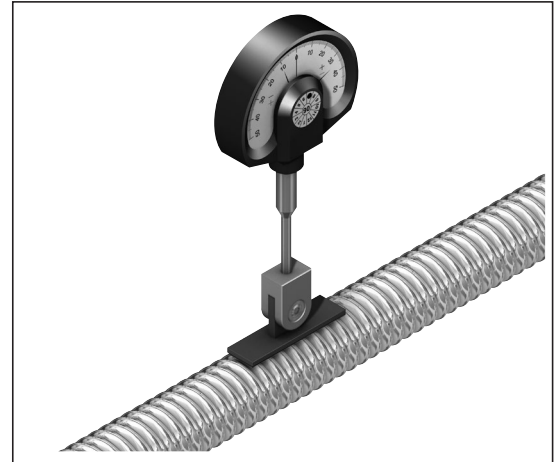
Measuring pads

Alignment of the ball screw assembly in the machine

A gauge with a self-aligning contact pad is available from Rexroth for easy alignment of the ball screw assembly.

Two pads of different lengths are available which can be used depending on the screw lead:

- Part number R3305 131 19, length 33 mm for leads < 20
- Part number R3305 131 21, length 50 mm for leads > 20



Dial gauge not supplied as standard with the ball screw assembly

Arrestor nut

Assembly/set-up/ features

- Installation on flange with hexagon socket screws for fixing the arrestor nut
- Centering diameter prevents radial displacement
- Wiper seal is not mounted on the nut, but on the arrestor nut. (This keeps dirt out of the space between the arrestor nut and the screw)
- Length of the safety nut determines the safety factor (Standard: 2-fold safety as against the static load capacity)
- Multiple-thread arrestor nuts are used for multiple-thread screws

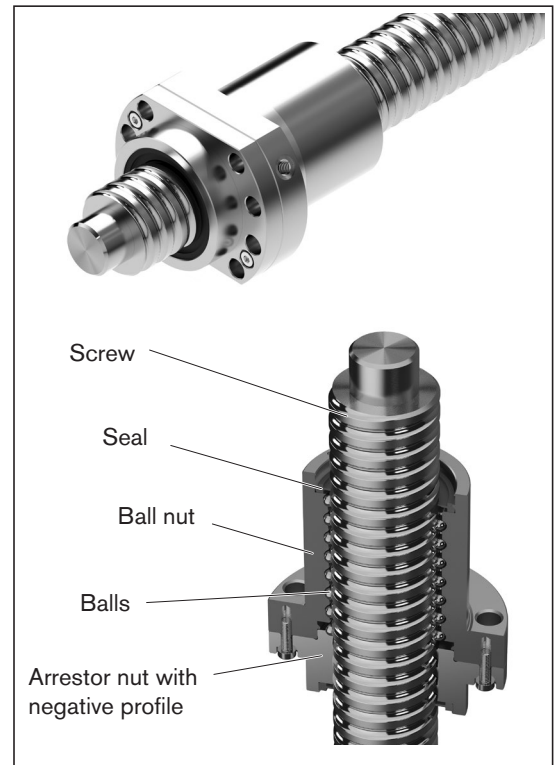
Recommended installation

The force or mass must always lie on the arrestor nut so that there is no tensile loading of the fastening screws.

The fixed bearing of the screw should be located at the bottom. Inspection may only be carried out by trained service engineers.

Design

Please consult our staff



Mode of operation

The ball nut with arrestor nut comprises the ball nut (for example, FEM-E-B) and an additional arrestor nut whose negative profile locks into the screw raceway. The ball nut with arrestor nut basically works in the same way as a normal ball nut. If the ball nut fails to work (for example, owing to a loss of balls), the arrestor nut thread comes into contact with the screw. This prevents an uncontrolled dropping of the nut.

Use

In critical applications in non-horizontal operation (for example, in order to prevent damage to property). The arrestor nut is fitted to the nut from below in the direction of force.

Arrestor nuts are not safety components within the meaning of the European Machinery Directive 2006/42/EC. Responsibility for the safety of the structural design / specific application therefore still lies with you and the manufacturer. Particular attention must be paid to ensuring that there are no hazards to people. Therefore, in particular in the case of vertically loaded axes, the structure must incorporate an additional safety catch/holding device which prevents a drive component failure! The falling of the nut must be prevented in all cases.

Technical notes

ISO 3408-1 defines a ball screw assembly as follows:

A ball screw drive (BASA) is a unit consisting of a ball screw shaft, ball nut, and balls that is able to convert rotary motion into linear motion, and vice versa.

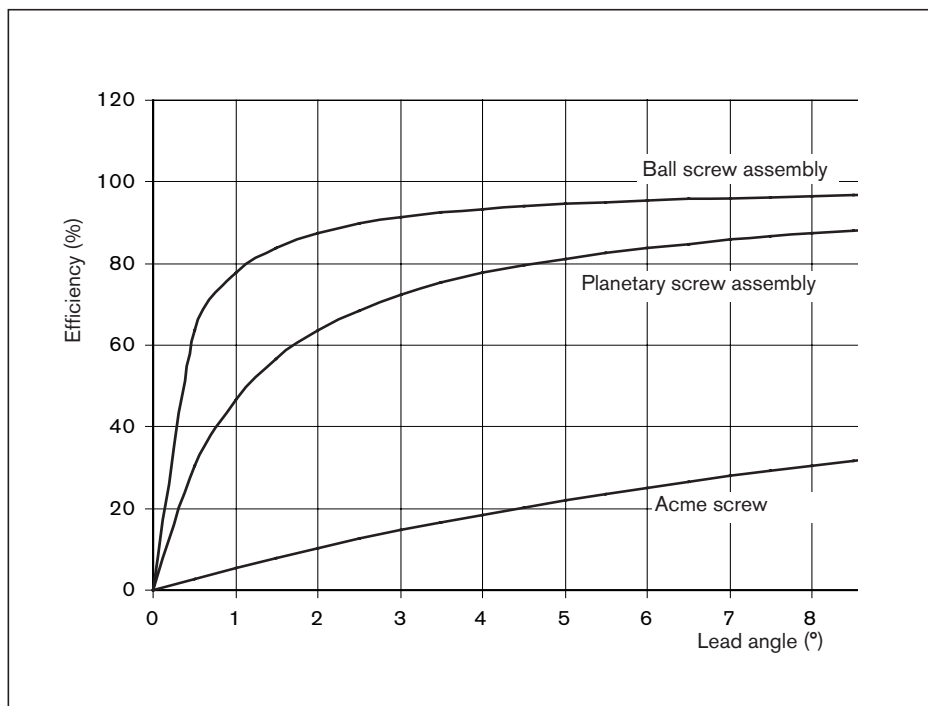
Advantages over the acme screw drive

- The maximum mechanical efficiency of an Acme screw drive is 50%, whereas a planetary screw assembly can achieve 90%, and a ball screw assembly 98%.
- Higher life expectancy due to negligible wear during operation
- Less drive power required
- No stick-slip effect
- More precise positioning
- Higher travel speed
- Less heat-up

Due to the high level of effectivity (low friction level between the screw and the nut), ball screw drives are not self-locking.

⚠ Safety information

If installing in a non-horizontal position, customers should check whether separate protection against falling loads is necessary, e.g. an arrestor nut. With particularly critical applications in vertical operation, we recommend installing arrestor nuts. Please consult us.



Selection criteria for ball screw drives

The factors below are significant when rating a ball screw drive:

- Degree of accuracy required (lead deviation)
- Load
- Service life
- critical speed
- buckling load
- rigidity/permissible clearance or desired preload
- characteristic speed (max. permissible linear speed)

The following points should be taken into consideration when selecting a PLSA that is to be both cost-efficient and optimally designed:

- The lead is a crucial factor in the load-bearing capacity (conditional on the maximum possible ball diameter) and the drive torque.
- The calculation of the service life should be based on average loads and average speeds, not on maximum values.
- In order for us to provide you with a customized solution, installation drawings or sketches of the nut environment should be enclosed.

⚠ Note

Radial and eccentric forces relative to the screw must be avoided, as they can negatively affect the ball screw drive's performance and shorten its service life.

Where special conditions of use are involved, please consult us.

Load ratings and service life

The calculations for the load capacities and service lives are based on ISO 3408-5. The dynamic load capacities in the tables are above the ISO 3408-5 values. These values have been confirmed in tests.

Static load rating C_0

The static load rating is an axial, concentrically acting force that induces a permanent deformation of $0.0001 \times$ the ball diameter between the ball and the ball track.

Dynamic load rating C

The dynamic load rating is an axial, concentrically acting force of constant magnitude and direction under which 90% of a sufficiently large number of identical BASAs can achieve a nominal service life of one million revolutions.

Correction factor for tolerance grades

The static load rating C_0 and the dynamic load rating C must be multiplied by the correction factor f_{ac} as appropriate for the specific tolerance grade of the screw.

| Tolerance grade T | 3 | 5 | 7 | 9 |
|-------------------|---|---|-----|-----|
| f_{ac} | 1 | 1 | 0,9 | 0,8 |

Service life

The nominal service life is expressed by the number of revolutions (or number of operating hours at constant speed) that will be attained or exceeded by 90% of a representative sample of identical BASAs before the first signs of material fatigue become evident. The nominal life is designated as L or L_h h, depending on whether it is specified in revolutions or hours.

Short stroke

Short stroke applications = stroke \leq nut length

Lubrication:

During a short stroke, the planets do not make a real turn. It is therefore impossible for an adequate lubricating film to form. This may result in premature wear.

To avoid this, it is sufficient to perform longer strokes at regular intervals with simultaneous relubrication as "lubricating strokes".

Please consult our regional centers regarding short stroke applications. You can find your local contact person at: www.boschrexroth.com/contact

Load rating:

Short stroke applications will increase the number of times a rolling load passes over each point within the load zone. This reduces the load rating.

Critical speed and buckling load

The critical speed and buckling load can be checked using the corresponding charts. For precise calculations see formula 12 15, in the section "Design Calculations3."

Characteristic speed $d_0 \cdot n$

Due to their structural design, Rexroth ball screw assemblies can be operated at very high speeds. Characteristic speeds of up to 150,000 are possible depending on the nut type.

$$d_0 \cdot n \leq 150,000$$

$$d_0 = \text{nominal diameter (mm)}$$

$$n = \text{speed (rpm)}$$

The theoretically possible maximum linear speed v_{max} (m/min) is specified on the page featuring the relevant nut. Actually attainable speeds are heavily dependent among other factors on preload and duty cycle.

They are generally restricted by the critical speed. (See "Design Calculations").

Material, hardness

BASAs are made of high-quality, heat-treatable steel, carbon chrome alloy steels or case-hardened steels. The screw and nut raceways have a minimum Rockwell hardness of HRC 58.

Ball screw drives made from stainless steel (DIN EN 10088) are available on request.

Normally, the screw ends are not hardened.

Sealing

Ball screw drives need protection from contamination. Flat protective covers, bellows-type dust boots, or the AGK drive unit are particularly suitable for this. Since there are many applications in which these methods do not provide sufficient protection, we have developed a gapless lip-type seal which ensures an optimal sealing effect and maintains high efficiency due to the low friction level. This means that the standard versions of our ball screw drives are supplied with seals. At the customer's request, the seals can be omitted entirely or special seals are used. For applications where it appears that it is not possible to avoid severe contamination of the screw, we have developed a reinforced variant of the standard seal. The sealing effect has been enhanced even further by increasing the preload. You should note the considerably higher frictional torque (see the technical data) compared to standard seals which leads to greater heat generation. You can easily recognize the reinforced seal by its dark-green color.

Permissible operating temperatures

Ball screw drives permit operation at continuous temperatures of up to 80 °C with temporary peaks of 100 °C (measurements taken on the outer shell of the nut in each case).

Permissible operating temperatures:

$$-10 \text{ °C} \leq T_{\text{operation}} \leq 80 \text{ °C}$$

Permissible storage temperature

$$-15 \text{ °C} \leq T_{\text{bearing}} \leq 80 \text{ °C}$$

Bearing

When calculating the life expectancy of the overall system, the end bearings must be considered separately.

Acceptance Conditions and Tolerance Grades

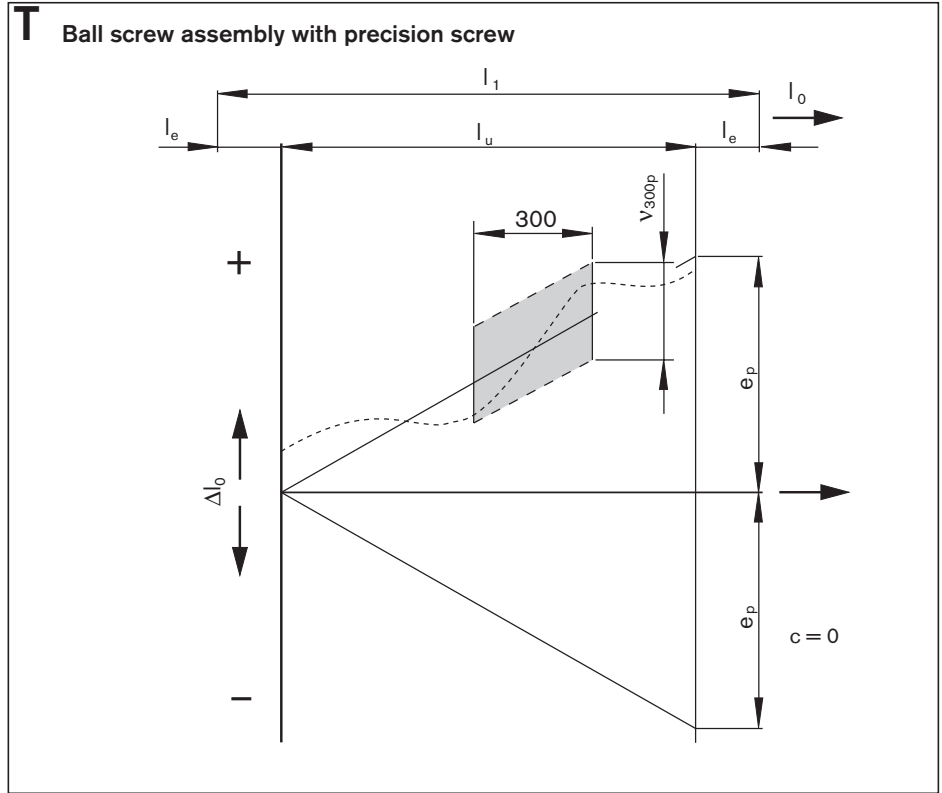
Permissible travel deviation

According to ISO 3408-3

Symbol definitions:

(excerpt)

- l_0 = nominal travel
- l_1 = thread length
- Δl_0 = travel deviation
- l_u = Useful travel
- l_e = excess travel (the closer tolerances for travel and hardness do not apply here)
- c = travel compensation (target travel deviation) (standard: $c = 0$)
- e_p = tolerance mean target travel deviation
- v_{300p} = permissible travel deviation within 300 mm travel
- a = actual
- p = permissible



Tolerance grades of precision screws

| Tolerance grade | | | |
|-----------------|---|---|---|
| 3 | 5 | 7 | 9 |

Permissible travel deviation within 300 mm travel

| v_{300p} (μm) | | | |
|------------------------------|----|----|-----|
| Tolerance grade | | | |
| 3 | 5 | 7 | 9 |
| 12 | 23 | 52 | 130 |

Permissible target travel deviation

| Useful travel l_u | | Tolerance for target travel e_p (μm) | | | |
|---------------------|--------|---|----|----|-----|
| | | Tolerance grade | | | |
| > | \leq | 3 | 5 | 7 | 9 |
| 0 | 100 | 8 | 18 | 44 | 110 |
| 100 | 200 | 10 | 20 | 48 | 120 |
| 200 | 315 | 12 | 23 | 52 | 130 |
| 315 | | $e_p = \frac{l_u}{300} \cdot v_{300p}$ | | | |

Non-usable length l_e

(Excess travel)

Modified compared to ISO 3408-3

| d_0 (mm) | l_e (mm) |
|----------------|------------|
| 6, 8 | 15 |
| 12, 16 | 20 |
| 20, 25, 32, 40 | 40 |
| 50, 63, 80 | 50 |

Minimum number of measurements within 300 mm (measuring interval) and excess travel to be taken into consideration.

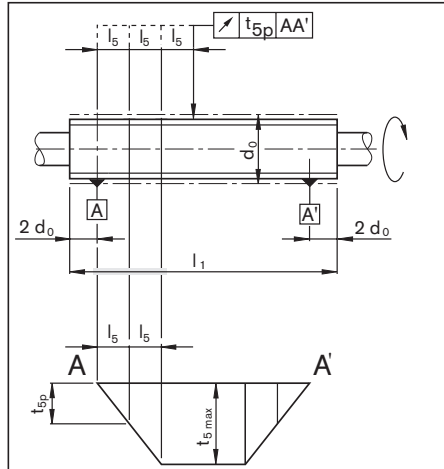
| Lead P (mm) | Minimum number of measurements for tolerance grade | | | |
|----------------|--|---|---|---|
| | 3 | 5 | 7 | 9 |
| 1 | 10 | 6 | 3 | 2 |
| 2 | 10 | 6 | 3 | 2 |
| 2.5 | 10 | 6 | 3 | 2 |
| 5 | 10 | 6 | 3 | 2 |
| 10 | 5 | 3 | 1 | 1 |
| 12 | 5 | 3 | 1 | 1 |
| 16 | 5 | 3 | 1 | 1 |
| 20 | 4 | 3 | 1 | 1 |
| 25 | 4 | 3 | 1 | 1 |
| 30 | 3 | 2 | 1 | 1 |
| 32 | 3 | 2 | 1 | 1 |
| 40 | 2 | 1 | 1 | 1 |
| 64 | 2 | 1 | 1 | 1 |

Acceptance conditions and tolerance grades

Run-outs and location deviations

Based on DIN ISO 3408-3

Radial run-out t_5 of the outer diameter of the screw over the length l_5 used to determine the straightness relative to AA'.

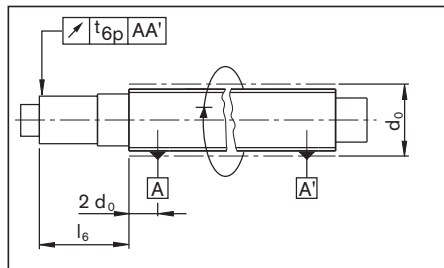


| d_0 | | l_5 | t_{5p} in μm for l_5 for tolerance grade | | | |
|-------|-------|-------|--|----|----|----|
| Over | Up to | | 3 | 5 | 7 | 9 |
| = 6 | 12 | 80 | 25 | 32 | 40 | 60 |
| 12 | 25 | 160 | | | | |
| 25 | 50 | 315 | | | | |
| 50 | 100 | 630 | | | | |

| l_1/d_0 | | $t_{5\text{max}}$ in μm for $l_1 \geq 4 l_5$ Tolerance grade | | | |
|-----------|-------|---|-----|-----|-----|
| Over | Up to | 3 | 5 | 7 | 9 |
| | 40 | 50 | 64 | 80 | 120 |
| 40 | 60 | 75 | 96 | 120 | 180 |
| 60 | 80 | 125 | 160 | 200 | 300 |
| 80 | 100 | 200 | 256 | 320 | 480 |

Coaxial deviation t_6 of the bearing journal in relation to AA' where $l_6 \leq l$.
 Table value t_{6p} applies if $l_6 \leq$ reference length l .

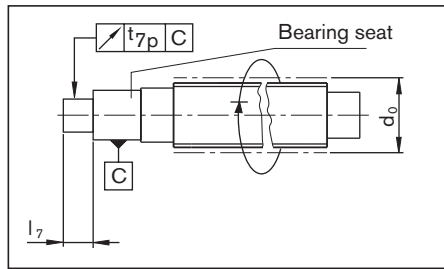
Where $l_6 > l$, then
$$t_{6a} \leq t_{6p} \cdot \frac{l_{6a}}{l}$$



| Nominal diameter d_0 | | Reference length l | t_{6p} in μm for $l_6 \leq l$ Tolerance grade | | | |
|------------------------|-------|----------------------|---|----|----|----|
| Over | Up to | | 3 | 5 | 7 | 9 |
| = 6 | 20 | 80 | 12 | 20 | 40 | 50 |
| 20 | 50 | 125 | 16 | 25 | 50 | 63 |
| 50 | 125 | 200 | 20 | 32 | 63 | 80 |

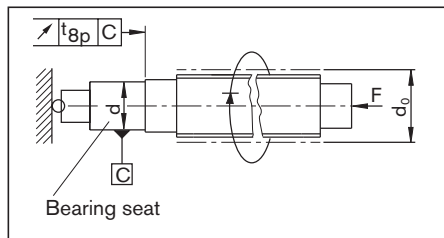
Radial run-out t_7 of the journal diameter of the ball screw shaft relative to the bearing diameter for $l_7 \leq l$.
 Table value t_{7p} applies if $l_7 \leq$ reference length l .

Where $l_7 > l$, then
$$t_{7a} \leq t_{7p} \cdot \frac{l_{7a}}{l}$$



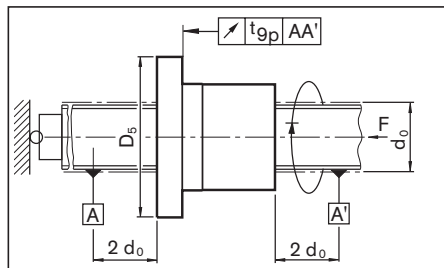
| Nominal diameter d_0 | | Reference length l | t_{7p} in μm for $l_7 \leq l$ Tolerance grade | | | |
|------------------------|-------|----------------------|---|----|----|----|
| Over | Up to | | 3 | 5 | 7 | 9 |
| = 6 | 20 | 80 | 6 | 8 | 12 | 14 |
| 20 | 50 | 125 | 8 | 10 | 16 | 18 |
| 50 | 125 | 200 | 10 | 12 | 20 | 23 |

Axial run-out t_8 of the shaft (bearing) face of the ball screw shaft relative to the bearing diameter.



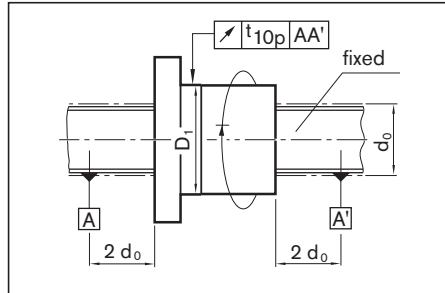
| Nominal diameter d_0 | | Reference length l | t_{8p} in μm for tolerance grade | | | |
|------------------------|-------|----------------------|--|---|---|----|
| Over | Up to | | 3 | 5 | 7 | 9 |
| = 6 | 63 | 63 | 4 | 5 | 6 | 8 |
| 63 | 125 | 125 | 5 | 6 | 8 | 10 |

Axial run-out t_9 of the ball nut location face in relation to A and A' (for preloaded ball nuts only).



| Flange diameter D_5 | | Reference length l | t_{9p} in μm for tolerance grade | | | |
|-----------------------|-------|----------------------|--|----|----|---|
| Over | Up to | | 3 | 5 | 7 | 9 |
| 16 | 32 | 32 | 12 | 16 | 20 | - |
| 32 | 63 | 63 | 16 | 20 | 25 | - |
| 63 | 125 | 125 | 20 | 25 | 32 | - |
| 125 | 250 | 250 | 25 | 32 | 40 | - |

Radial run-out t_{10} of the outer diameter D_1 of the ball nut relative to **A** and **A'** (for preloaded and rotating ball nuts only). When measuring, fix the ball screw shaft to prevent rotation.



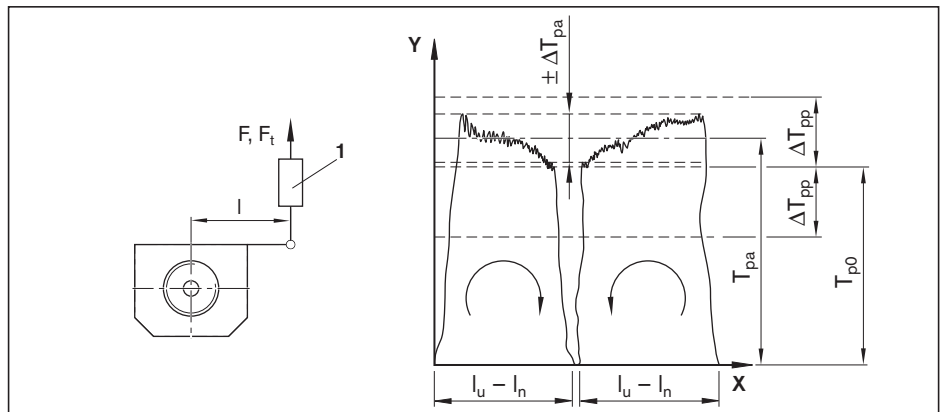
| Outer diameter D_1 | | t_{10p} in μm for tolerance grade | | | |
|----------------------|-------|--|----|----|---|
| Over | Up to | 3 | 5 | 7 | 9 |
| 16 | 32 | 12 | 16 | 20 | - |
| 32 | 63 | 16 | 20 | 25 | - |
| 63 | 125 | 20 | 25 | 32 | - |
| 125 | 250 | 25 | 32 | 40 | - |

Please contact us for the permissible axial and radial run-out with a driven nut

Limiting deviation ΔT_{pp} for the dynamic drag torque T_{p0} resulting from preloading (for preloaded ball nuts only)

Symbol definitions:

- X** = travel
- Y** = Dynamic drag torque with preload
- 1** = Dynamometer
- T_p = $F \cdot l$ without wiper
- T_t = $F_t \cdot l$ with wiper
- l_n = Length of ball nut

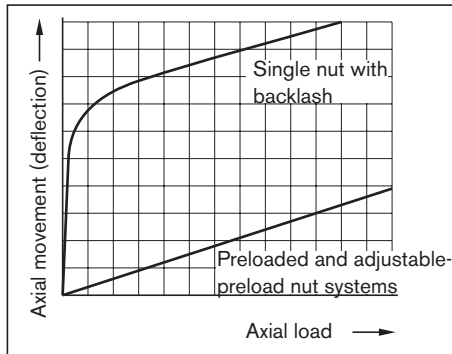


| l_u / d_0 applies to | T_{p0} (Nm) | | Tolerance grade | | | | | | | |
|------------------------|---------------|--------|--|----|----|---|---|----|----|---|
| | > | \leq | 3 | 5 | 7 | 9 | 3 | 5 | 7 | 9 |
| ≤ 40 | 0 | 0.4 | ΔT_{pp} (% of T_{p0}); $l_u \leq 4000$ mm | | | | ΔT_{pp} (% of T_{p0}); $l_u > 4000$ mm | | | |
| | 0.4 | 0.6 | 40 | 50 | 50 | - | 60 | 60 | 70 | - |
| | 0.6 | 1.0 | 35 | 40 | 40 | - | 50 | 50 | 60 | - |
| | 1.0 | 2.5 | 30 | 35 | 40 | - | 40 | 45 | 50 | - |
| | 2.5 | 6.3 | 25 | 30 | 35 | - | 35 | 40 | 45 | - |
| | 6.3 | 10.0 | 20 | 25 | 30 | - | 30 | 35 | 40 | - |
| | 10.0 | | 15 | 20 | 30 | - | 25 | 30 | 35 | - |
| > 40 | 0 | 0.4 | 50 | 60 | 60 | - | 60 | 60 | 70 | - |
| | 0.4 | 0.6 | 40 | 45 | 45 | - | 50 | 50 | 60 | - |
| | 0.6 | 1.0 | 35 | 40 | 45 | - | 40 | 45 | 50 | - |
| | 1.0 | 2.5 | 30 | 35 | 40 | - | 35 | 40 | 45 | - |
| | 2.5 | 6.3 | 25 | 30 | 35 | - | 30 | 35 | 40 | - |
| | 6.3 | 10.0 | 20 | 25 | 35 | - | 25 | 30 | 35 | - |
| | 10.0 | | 20 | 25 | 35 | - | 25 | 30 | 35 | - |

Preload and rigidity

Nut system preload

In addition to single nuts with reduced backlash, Rexroth supplies preloaded or adjustable-preload nut systems.



With the same preload, the rigidity behavior of these different Rexroth nut systems is virtually identical. The reason: Installation of adjustable-preload single nuts and preloaded single nuts is much more compact. The screw is typically far less rigid than the nut unit (for details see "Overall axial rigidity...").

Preloaded single nut

Single nuts can be preloaded in an optimum way with preload classes C1, C2 or C3 by means of ball size selection.



Adjustable-preload single nut

Using adjustable-preload single nuts, the design process can be more favorably priced for many applications.

You set the zero backlash or the preloading radially by means of a slot that is approximately 0.1 mm wide; refer to the section entitled "Installation".

Depending on the application, we preload the nut system with preload classes C1, C2 or C3. The maximum preload is preload class C3.



Single nut with flange FED

The HP series single nut with flange is preloaded in an optimum way with preload classes C1 or C2 by means of ball size selection.



Double nut

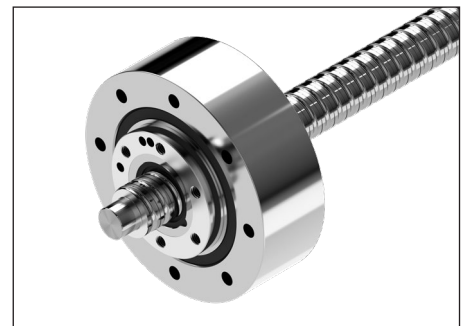
Bracing two single nuts eliminates the axial play due to production-related issues and increases rigidity, which improves positioning accuracy.

To prevent the service life from being shortened, the preload should not amount to $\frac{1}{3}$ of the average operating load. Depending on the application, we preload the nut system with preload classes C4 or C5.



Driven nut FAR

You can preload Series HP driven nuts like a single nut using preload classes C1, C2 or C3 by means of ball size selection.



Rigidity

The rigidity of a ball screw assembly is also affected by all adjoining parts such as bearings, housing bores, nut housings, etc.

Overall axial rigidity R_{bs} of the ball screw assembly

The overall axial rigidity R_{bs} is made up of the component rigidity of the bearing R_{fb} , the screw R_S and the nut unit R_{nu} .

$$\frac{1}{R_{bs}} = \frac{1}{R_{fb}} + \frac{1}{R_S} + \frac{1}{R_{nu}} \quad 16$$

Note:

Please note that in most cases the rigidity R_S of the screw will be significantly lower than the rigidity R_{nu} of the nut unit. With size 40 x 10, for example, the rigidity R_{nu} of the nut unit is two to three times greater than the rigidity R_S of a 500 mm-long screw.

Rigidity of the bearing R_{fb}

The rigidity of the bearings corresponds to the values in the bearing manufacturer's catalog.

See the dimension tables in this catalog for the rigidity values of the bearings that Rexroth can provide.

Rigidity in the area of the nut unit R_{nu}

The rigidity in the area of the preloaded nut unit is calculated on the basis of ISO 3408-4.

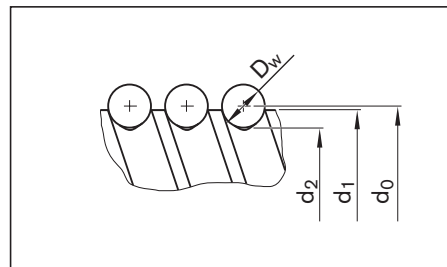
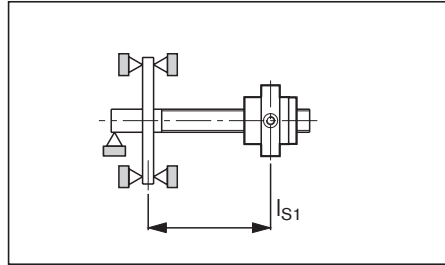
See the corresponding tables for rigidity values.

Rigidity of the screw R_S

The rigidity of the screw R_S depends on the type of bearing used.

See the corresponding tables for rigidity values.

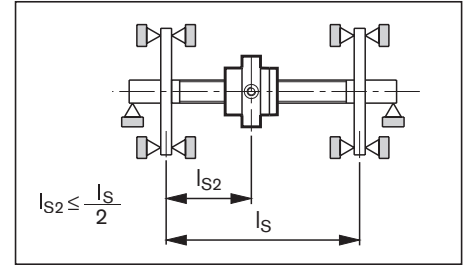
- 1 Fixed bearing of the ball screw shaft on one end.



$$R_{S1} = 165 \cdot \frac{(d_0 - 0.71 \cdot D_w)^2}{l_{S1}} \quad (\text{N}/\mu\text{m}) \quad 17$$

R_{S1} = rigidity of the screw (N/μm)
 d_0 = nominal diameter (mm)
 D_w = ball diameter (mm)
 l_{S1} = Bearing - nut distance (mm)

- 2 Fixed bearing of the ball screw shaft on both ends.



$$R_{S2} = 165 \cdot \frac{(d_0 - 0.71 \cdot D_w)^2}{l_{S2}} \cdot \frac{l_S}{l_S - l_{S2}} \quad (\text{N}/\mu\text{m}) \quad 18$$

The lowest screw rigidity occurs at the center of the screw R_{S2min} ($l_{S2} = l_S/2$) and thus equals:

$$R_{S2min} = 660 \cdot \frac{(d_0 - 0.71 \cdot D_w)^2}{l_S} \quad (\text{N}/\mu\text{m}) \quad 19$$

R_{S2} = rigidity of the screw (N/μm)
 d_0 = nominal diameter (mm)
 D_w = ball diameter (mm)
 l_S = distance between bearing and bearing (mm)
 l_{S2} = distance between bearing and nut (mm)

Preload and rigidity of single nuts

Dynamic drag torque, preload, and rigidity for screws of tolerance grades 3, 5, 7 with single nuts ZEV-E-S, FEP-E-S (C1 only), FEM-E-S, FEM-E-B, SEM-E-S and SEM-E-C (pay attention to the centering diameter D_1 that is to be set) ZEM-E-S, ZEM-E-K, ZEM-E-A, FED-E-B, FAR-B-S

- T_0 = overall dynamic drag torque
- $T_0 = T_{p0} + T_{RD}$
- C = dynamic axial load capacity
- C_0 = static load rating
- F_{PR} = pre-tensioning force
- T_{RD} = dynamic drag torque of the 2 seals
- R_S = rigidity of the screw
- R_{nu} = rigidity of the nut
- T_{p0} = dynamic drag torque without seals
- d_0 = nominal diameter
- P = lead
- D_w = ball diameter
- i = Number of load-bearing gears

The values given for dynamic drag torque are proven practical indicators for the nut preloading.

Note:
 To measure the dynamic drag torque, see the "Installation" section page 147.

| Size | Load ratings | | Backlash of single nut | | Rigidity of the screw R_S ($\frac{N \cdot m}{\mu m}$) |
|-------------------------------|---------------|--------------------|--------------------------|--------------------------|---|
| | dyn. C (N) | stat. C_0 (N) | Standard (C0) (mm) | Reduced (C00) (mm) | |
| $d_0 \times P \times D_w - i$ | | | | | |
| 6 x 1R x 0.8 - 3 | 1 080 | 1 030 | 0.01 | 0.005 | 5 |
| 6 x 2R x 0.8 - 3 | 1 070 | 1 020 | 0.01 | 0.005 | 5 |
| 8 x 1R x 0.8 - 4 | 1 310 | 1 850 | 0.01 | 0.005 | 9 |
| 8 x 2R x 1.2 - 4 | 2 360 | 2 950 | 0.01 | 0.005 | 9 |
| 8 x 2.5R x 1.588 - 3 | 2 640 | 2 800 | 0.02 | 0.010 | 8 |
| 8 x 2.5R x 1.588 - 4 | 3 490 | 3 910 | 0.02 | 0.010 | 8 |
| 8 x 5R x 1.588 - 3 | 2 500 | 2 650 | 0.02 | 0.010 | 8 |
| 12 x 2R x 1.2 - 4 | 2 690 | 4 160 | 0.01 | 0.005 | 21 |
| 12 x 5R x 2 - 3 | 4 560 | 5 800 | 0.02 | 0.010 | 18 |
| 12 x 10R x 2 - 2 | 3 000 | 3 600 | 0.02 | 0.010 | 18 |
| 16 x 5R x 3 - 3 | 11 300 | 11 800 | 0.04 | 0.020 | 32 |
| 16 x 5R/L x 3 - 4 | 14 800 | 16 100 | 0.04 | 0.020 | 32 |
| 16 x 10R x 3 - 3 | 11 500 | 12 300 | 0.04 | 0.020 | 32 |
| 16 x 16R x 3 - 2 | 7 560 | 7 600 | 0.04 | 0.020 | 32 |
| 16 x 16R x 3 - 3 | 11 200 | 12 000 | 0.04 | 0.020 | 32 |
| 16 x 16R x 3 - 6 | 17 800 | 24 200 | 0.04 | 0.020 | 32 |
| 20 x 5R/L x 3 - 4 | 17 200 | 21 500 | 0.04 | 0.020 | 53 |
| 20 x 5R x 3 - 5 | 21 000 | 27 300 | 0.04 | 0.020 | 53 |
| 20 x 10R x 3 - 4 | 16 900 | 21 300 | 0.04 | 0.020 | 53 |
| 20 x 20R x 3.5 - 2 | 10 900 | 12 100 | 0.04 | 0.020 | 52 |
| 20 x 20R x 3.5 - 3 | 16 000 | 18 800 | 0.04 | 0.020 | 52 |
| 20 x 20R x 3.5 - 6 | 25 700 | 38 100 | 0.04 | 0.020 | 52 |
| 20 x 40R x 3.5 - 4 | 14 000 | 26 200 | 0.04 | 0.020 | 52 |
| 25 x 5R/L x 3 - 4 | 19 100 | 27 200 | 0.04 | 0.020 | 86 |
| 25 x 5R x 3 - 7 | 31 400 | 48 700 | 0.04 | 0.020 | 86 |
| 25 x 10R x 3 - 4 | 18 800 | 27 000 | 0.04 | 0.020 | 86 |
| 25 x 10R x 3 - 5 | 23 200 | 34 200 | 0.04 | 0.020 | 86 |
| 25 x 25R 3.5 - 2 | 12 100 | 15 100 | 0.04 | 0.020 | 84 |
| 25 x 25R x 3.5 - 3 | 17 600 | 23 300 | 0.04 | 0.020 | 84 |
| 25 x 25R x 3.5 - 4.8 | 19 700 | 39 400 | 0.04 | 0.020 | 84 |
| 25 x 25R x 3.5 - 6 | 28 500 | 47 100 | 0.04 | 0.020 | 84 |
| 32 x 5R/L x 3.5 - 4 | 25 900 | 40 000 | 0.04 | 0.020 | 144 |
| 32 x 5R x 3.5 - 5 | 31 700 | 50 600 | 0.04 | 0.020 | 144 |
| 32 x 10R x 3.969 - 5 | 38 000 | 58 300 | 0.04 | 0.020 | 141 |
| 32 x 20R x 3.969 - 2 | 16 200 | 21 800 | 0.04 | 0.020 | 141 |
| 32 x 20R x 3.969 - 3 | 23 600 | 33 700 | 0.04 | 0.020 | 141 |
| 32 x 20R x 3.969 - 6 | 38 300 | 67 300 | 0.04 | 0.020 | 141 |
| 32 x 32R x 3.969 - 2 | 16 100 | 22 000 | 0.04 | 0.020 | 141 |
| 32 x 32R x 3.969 - 3 | 23 400 | 34 000 | 0.04 | 0.020 | 141 |
| 32 x 32R x 3.969 - 4.8 | 26 300 | 57 600 | 0.04 | 0.020 | 141 |
| 32 x 32R x 3.969 - 6 | 37 900 | 68 000 | 0.04 | 0.020 | 141 |
| 32 x 64R x 3.969 - 4 | 21 100 | 49 000 | 0.04 | 0.020 | 141 |
| 40 x 5R/L x 3.5 - 5 | 34 900 | 64 100 | 0.04 | 0.020 | 232 |
| 40 x 10R/L x 6 - 4 | 60 000 | 86 400 | 0.07 | 0.035 | 211 |
| 40 x 10R x 6 - 5 | 73 400 | 109 300 | 0.07 | 0.035 | 211 |
| 40 x 10R x 6 - 6 | 86 500 | 132 200 | 0.07 | 0.035 | 211 |
| 40 x 12R x 6 - 4 | 59 900 | 86 200 | 0.07 | 0.035 | 211 |
| 40 x 16R x 6 - 4 | 59 600 | 85 900 | 0.07 | 0.035 | 211 |
| 40 x 20R x 6 - 3 | 45 500 | 62 800 | 0.07 | 0.035 | 211 |
| 40 x 20R x 6 - 8 | 95 500 | 171 100 | 0.07 | 0.035 | 211 |
| 40 x 25R x 6 - 4 | 56 900 | 85 800 | 0.07 | 0.035 | 211 |
| 40 x 25R x 6 - 8 | 91 400 | 171 700 | 0.07 | 0.035 | 211 |
| 40 x 30R x 6 - 4 | 56 300 | 85 100 | 0.07 | 0.035 | 211 |
| 40 x 30R x 6 - 8 | 90 400 | 170 300 | 0.07 | 0.035 | 211 |
| 40 x 40R x 6 - 2 | 30 600 | 40 300 | 0.07 | 0.035 | 211 |
| 40 x 40R x 6 - 3 | 44 400 | 62 300 | 0.07 | 0.035 | 211 |
| 40 x 40R x 6 - 6 | 71 500 | 124 500 | 0.07 | 0.035 | 211 |
| 50 x 5R x 3.5 - 5 | 38 400 | 81 300 | 0.04 | 0.020 | 373 |
| 50 x 10R x 6 - 6 | 95 600 | 166 500 | 0.07 | 0.035 | 345 |
| 50 x 12R x 6 - 6 | 95 500 | 166 400 | 0.07 | 0.035 | 345 |
| 50 x 16R x 6 - 6 | 95 300 | 166 000 | 0.07 | 0.035 | 345 |
| 50 x 20R x 6.5 - 3 | 57 500 | 87 900 | 0.07 | 0.035 | 340 |
| 50 x 20R x 6.5 - 5 | 90 800 | 149 700 | 0.07 | 0.035 | 340 |
| 50 x 20R x 6.5 - 8 | 116 500 | 240 000 | 0.07 | 0.035 | 340 |
| 50 x 25R x 6.5 - 4 | 56 900 | 85 800 | 0.07 | 0.035 | 211 |
| 50 x 25R x 6.5 - 6 | 92 600 | 175 100 | 0.07 | 0.035 | 340 |
| 50 x 30R x 6.5 - 4 | 71 300 | 118 800 | 0.07 | 0.035 | 340 |
| 50 x 30R x 6.5 - 8 | 114 500 | 237 700 | 0.07 | 0.035 | 340 |
| 50 x 40R x 6.5 - 2 | 38 500 | 55 800 | 0.07 | 0.035 | 340 |
| 50 x 40R x 6.5 - 3 | 55 800 | 85 900 | 0.07 | 0.035 | 340 |
| 50 x 40R x 6.5 - 6 | 89 300 | 171 500 | 0.07 | 0.035 | 340 |

For sizes 63 and 80, see the next page.

| Size | Rigidity and dynamic drag torque of the single nuts with preload class C1 | | | Preload class C2 | | | Preload class C3 | | |
|---|--|------------------------|-------------------------|---------------------------|------------------------|-------------------------|---------------------------|------------------------|-------------------------|
| | R _{nu} (N/μm) | F _{pr} (N) | T _{p0} (Nm) | R _{nu} (N/μm) | F _{pr} (N) | T _{p0} (Nm) | R _{nu} (N/μm) | F _{pr} (N) | T _{p0} (Nm) |
| d ₀ x P x D _w - i | | | Tolerance grade 3; 5; 7 | | | Tolerance grade 3; 5; 7 | | | Tolerance grade 3; 5; 7 |
| 6 x 1R x 0.8 - 3 | - | - | - | - | - | - | - | - | - |
| 6 x 2R x 0.8 - 3 | - | - | - | - | - | - | - | - | - |
| 8 x 1R x 0.8 - 4 | - | - | - | - | - | - | - | - | - |
| 8 x 2R x 1.2 - 4 | - | - | - | - | - | - | - | - | - |
| 8 x 2.5R x 1.588 - 3 | 70 | 44 | 0.004 | - | - | - | - | - | - |
| 8 x 2.5R x 1.588 - 4 | 90 | 58 | 0.005 | - | - | - | - | - | - |
| 8 x 5R x 1.588 - 3 | 70 | 42 | 0.003 | - | - | - | - | - | - |
| 12 x 2R x 1.2 - 4 | - | - | - | - | - | - | - | - | - |
| 12 x 5R x 2 - 3 | 100 | 76 | 0.009 | - | - | - | - | - | - |
| 12 x 10R x 2 - 2 | 60 | 50 | 0.006 | - | - | - | - | - | - |
| 16 x 5R x 3 - 3 | 160 | 190 | 0.030 | - | - | - | - | - | - |
| 16 x 5R/L x 3 - 4 | 210 | 250 | 0.040 | 240 | 370 | 0.060 | 290 | 620 | 0.100 |
| 16 x 10R x 3 - 3 | 160 | 190 | 0.030 | 190 | 290 | 0.050 | 220 | 480 | 0.080 |
| 16 x 16R x 3 - 2 | 100 | 130 | 0.020 | 120 | 190 | 0.030 | 140 | 320 | 0.050 |
| 16 x 16R x 3 - 3 | 160 | 190 | 0.030 | 180 | 280 | 0.050 | 210 | 470 | 0.070 |
| 16 x 16R x 3 - 6 | 250 | 280 | 0.050 | 290 | 430 | 0.070 | - | - | - |
| 20 x 5R/L x 3 - 4 | 270 | 290 | 0.060 | 310 | 430 | 0.090 | 360 | 720 | 0.140 |
| 20 x 5R x 3 - 5 | 340 | 350 | 0.070 | 390 | 530 | 0.110 | 450 | 880 | 0.180 |
| 20 x 10R x 3 - 4 | 270 | 280 | 0.060 | 300 | 420 | 0.090 | 360 | 710 | 0.140 |
| 20 x 20R x 3.5 - 2 | 130 | 180 | 0.040 | 150 | 270 | 0.060 | 180 | 460 | 0.090 |
| 20 x 20R x 3.5 - 3 | 200 | 270 | 0.050 | 230 | 400 | 0.080 | 280 | 670 | 0.130 |
| 20 x 20R x 3.5 - 6 | 330 | 410 | 0.080 | 380 | 620 | 0.130 | - | - | - |
| 20 x 40R x 3.5 - 4 | 230 | 280 | 0.060 | - | - | - | - | - | - |
| 25 x 5R/L x 3 - 4 | 320 | 320 | 0.080 | 360 | 480 | 0.120 | 430 | 800 | 0.200 |
| 25 x 5R x 3 - 7 | 560 | 520 | 0.130 | - | - | - | - | - | - |
| 25 x 10R x 3 - 4 | 320 | 310 | 0.080 | 370 | 470 | 0.120 | 430 | 790 | 0.200 |
| 25 x 10R x 3 - 5 | 400 | 390 | 0.100 | - | - | - | - | - | - |
| 25 x 25R 3.5 - 2 | 160 | 200 | 0.050 | 180 | 300 | 0.080 | 220 | 510 | 0.130 |
| 25 x 25R x 3.5 - 3 | 240 | 290 | 0.070 | 270 | 440 | 0.110 | 320 | 740 | 0.180 |
| 25 x 25R x 3.5 - 4.8 | 370 | 390 | 0.100 | - | - | - | - | - | - |
| 25 x 25R x 3.5 - 6 | 400 | 440 | 0.110 | 450 | 680 | 0.170 | - | - | - |
| 32 x 5R/L x 3.5 - 4 | 390 | 430 | 0.140 | 440 | 650 | 0.210 | 520 | 1 080 | 0.350 |
| 32 x 5R x 3.5 - 5 | 490 | 530 | 0.170 | - | 790 | - | - | - | - |
| 32 x 10R x 3.969 - 5 | 510 | 630 | 0.200 | 580 | 950 | 0.300 | 690 | 1 590 | 0.510 |
| 32 x 20R x 3.969 - 2 | 200 | 270 | 0.090 | 230 | 410 | 0.130 | 270 | 680 | 0.220 |
| 32 x 20R x 3.969 - 3 | 300 | 390 | 0.130 | 350 | 590 | 0.190 | 410 | 990 | 0.320 |
| 32 x 20R x 3.969 - 6 | 500 | 610 | 0.200 | 570 | 920 | 0.290 | - | - | - |
| 32 x 32R x 3.969 - 2 | 200 | 270 | 0.090 | 220 | 400 | 0.130 | 270 | 670 | 0.210 |
| 32 x 32R x 3.969 - 3 | 300 | 390 | 0.120 | 340 | 590 | 0.190 | 400 | 980 | 0.310 |
| 32 x 32R x 3.969 - 4.8 | 470 | 530 | 0.170 | - | - | - | - | - | - |
| 32 x 32R x 3.969 - 6 | 490 | 610 | 0.190 | 560 | 910 | 0.290 | - | - | - |
| 32 x 64R x 3.969 - 4 | 350 | 420 | 0.140 | - | - | - | - | - | - |
| 40 x 5R/L x 3.5 - 5 | 580 | 580 | 0.230 | 660 | 870 | 0.350 | 770 | 1 460 | 0.580 |
| 40 x 10R/L x 6 - 4 | 510 | 1 000 | 0.400 | 580 | 1 500 | 0.600 | 690 | 2 500 | 1.000 |
| 40 x 10R x 6 - 5 | 650 | 1 230 | 0.490 | 740 | 1 850 | 0.730 | 870 | 3 080 | 1.220 |
| 40 x 10R x 6 - 6 | 770 | 1 440 | 0.580 | 880 | 2 160 | 0.870 | 1 030 | 3 610 | 1.440 |
| 40 x 12R x 6 - 4 | 510 | 1 000 | 0.400 | 590 | 1 500 | 0.600 | 690 | 2 500 | 1.000 |
| 40 x 16R x 6 - 4 | 510 | 990 | 0.400 | 590 | 1 490 | 0.600 | 690 | 2 490 | 0.990 |
| 40 x 20R x 6 - 3 | 380 | 760 | 0.300 | 440 | 1 140 | 0.460 | 510 | 1 900 | 0.760 |
| 40 x 20R x 6 - 8 | 850 | 1 530 | 0.610 | 960 | 2 290 | 0.920 | - | - | - |
| 40 x 25R x 6 - 4 | 500 | 950 | 0.380 | 570 | 1 420 | 0.568 | 680 | 2 350 | 0.940 |
| 40 x 25R x 6 - 8 | 830 | 1 460 | 0.584 | 940 | 2 190 | 0.876 | - | - | - |
| 40 x 30R x 6 - 4 | 490 | 940 | 0.376 | 570 | 1 410 | 0.564 | 670 | 2 350 | 0.940 |
| 40 x 30R x 6 - 8 | 810 | 1 450 | 0.580 | 930 | 2 170 | 0.868 | - | - | - |
| 40 x 40R x 6 - 2 | 240 | 510 | 0.200 | 280 | 770 | 0.310 | 330 | 1 280 | 0.510 |
| 40 x 40R x 6 - 3 | 370 | 740 | 0.300 | 420 | 1 110 | 0.440 | 500 | 1 850 | 0.740 |
| 40 x 40R x 6 - 6 | 600 | 1 140 | 0.460 | 690 | 1 720 | 0.690 | - | - | - |
| 50 x 5R x 3.5 - 5 | 690 | 640 | 0.320 | 780 | 960 | 0.480 | 910 | 1 600 | 0.800 |
| 50 x 10R x 6 - 6 | 910 | 1 590 | 0.800 | 1 040 | 2 390 | 1.200 | 1 220 | 3 990 | 1.990 |
| 50 x 12R x 6 - 6 | 920 | 1 590 | 0.800 | 1 050 | 2 390 | 1.190 | 1 230 | 3 980 | 1.990 |
| 50 x 16R x 6 - 6 | 920 | 1 590 | 0.790 | 1 050 | 2 380 | 1.190 | 1 240 | 3 970 | 1.990 |
| 50 x 20R x 6.5 - 3 | 480 | 960 | 0.480 | 540 | 1 440 | 0.720 | 640 | 2 400 | 1.200 |
| 50 x 20R x 6.5 - 5 | 790 | 1 510 | 0.760 | 900 | 2 270 | 1.140 | 1 060 | 3 790 | 1.890 |
| 50 x 20R x 6.5 - 8 | 1 030 | 1 860 | 0.930 | 1 180 | 2 800 | 1.400 | - | - | - |
| 50 x 25R x 6.5 - 4 | 620 | 1 200 | 0.600 | 710 | 1 790 | 0.90 | 840 | 2 990 | 1.500 |
| 50 x 25R x 6.5 - 6 | 780 | 1 480 | 0.740 | 890 | 2 220 | 1.110 | - | - | - |
| 50 x 30R x 6.5 - 4 | 620 | 1 190 | 0.595 | 700 | 1 780 | 0.890 | 830 | 2 970 | 1.485 |
| 50 x 30R x 6.5 - 8 | 1 020 | 1 830 | 0.915 | 1 160 | 2 750 | 1.375 | - | - | - |
| 50 x 40R x 6.5 - 2 | 300 | 640 | 0.320 | 350 | 960 | 0.480 | 410 | 1 610 | 0.800 |
| 50 x 40R x 6.5 - 3 | 460 | 930 | 0.470 | 520 | 1 400 | 0.700 | 620 | 2 330 | 1.160 |
| 50 x 40R x 6.5 - 6 | 750 | 1 430 | 0.710 | 860 | 2 140 | 1.070 | - | - | - |

For sizes 63 and 80, see the next page.

Preload and rigidity of single nuts

| Size | Load ratings | | Backlash of single nut | | Rigidity of the screw R_S ($\frac{N \cdot m}{\mu m}$) |
|-------------------------------|---------------|-----------------------------|--------------------------|--------------------------|---|
| | dyn. C (N) | stat. C ₀ (N) | Standard (C0) (mm) | Reduced (C00) (mm) | |
| $d_0 \times P \times D_w - i$ | | | | | |
| 63 x 10R x 6 - 6 | 106,600 | 214,300 | 0.07 | 0.035 | 569 |
| 63 x 20R x 6.5 - 3 | 63,800 | 112,100 | 0.07 | 0.035 | 563 |
| 63 x 20R x 6.5 - 5 | 100,700 | 190,300 | 0.07 | 0.035 | 563 |
| 63 x 20R x 6.5 - 8 | 130,800 | 292,000 | 0.07 | 0.035 | 563 |
| 63 x 40R x 6.5 - 2 | 44,300 | 74,300 | 0.07 | 0.035 | 563 |
| 63 x 40R x 6.5 - 3 | 64,100 | 114,100 | 0.07 | 0.035 | 563 |
| 63 x 40R x 6.5 - 6 | 100,000 | 230,600 | 0.07 | 0.035 | 563 |
| 80 x 10R x 6.5 - 6 | 130,100 | 291,700 | 0.07 | 0.035 | 938 |
| 80 x 20R x 12.7 - 6 | 315,200 | 534,200 | 0.11 | 0.055 | 832 |
| 80 x 40R x 12.7 - 4 | 216,600 | 367,600 | 0.11 | 0.055 | 832 |

Preload and rigidity of double nuts

Dynamic drag torque, preload, and rigidity for screws of tolerance grades 3, 5, 7 with double nuts
FDM-E-S, FDM-E-B

T_0 = overall dynamic drag torque

$T_0 = T_{p0} + T_{RD}$

C = dynamic axial load capacity

C_0 = static load rating

T_{RD} = dynamic drag torque of the 2 seals

R_S = rigidity of the screw

R_{nu} = rigidity of the nut

T_{p0} = dynamic drag torque without seals

d_0 = nominal diameter

P = lead

D_w = ball diameter

i = number of ball track turns

| Size | Load ratings | | Rigidity of the screw R_S ($\frac{N \cdot m}{\mu m}$) |
|-------------------------------|---------------|-----------------------------|---|
| | dyn. C (N) | stat. C ₀ (N) | |
| $d_0 \times P \times D_w - i$ | | | |
| 16 x 5R x 3 - 4 | 14,800 | 16,100 | 32 |
| 20 x 5R x 3 - 4 | 17,200 | 21,500 | 53 |
| 25 x 5R x 3 - 4 | 19,100 | 27,200 | 86 |
| 25 x 10R x 3 - 4 | 18,800 | 27,000 | 86 |
| 32 x 5R x 3.5 - 4 | 25,900 | 40,000 | 144 |
| 32 x 10R x 3.969 - 5 | 38,000 | 58,300 | 141 |
| 40 x 5R x 3.5 - 5 | 34,900 | 64,100 | 232 |
| 40 x 10R x 6 - 4 | 60,000 | 86,400 | 211 |
| 40 x 10R x 6 - 6 | 86,500 | 132,200 | 211 |
| 40 x 20R x 6 - 3 | 45,500 | 62,800 | 211 |
| 50 x 5R x 3.5 - 5 | 38,400 | 81,300 | 373 |
| 50 x 10R x 6 - 4 | 66,500 | 109,000 | 345 |
| 50 x 10R x 6 - 6 | 95,600 | 166,500 | 345 |
| 50 x 20R x 6.5 - 5 | 90,800 | 149,700 | 340 |
| 63 x 10R x 6 - 4 | 74,200 | 140,500 | 569 |
| 63 x 10R x 6 - 6 | 106,600 | 214,300 | 569 |
| 63 x 20R x 6.5 - 5 | 100,700 | 190,300 | 563 |
| 80 x 10R x 6.5 - 6 | 130,100 | 291,700 | 938 |
| 80 x 20R x 12.7 - 6 | 315,200 | 534,200 | 832 |

The values given for dynamic drag torque are proven practical indicators for the nut preloading.

Note:

To measure the dynamic drag torque, see the "Installation" section page 147.

| Size $d_0 \times P \times D_w - i$ | Rigidity and dynamic drag torque of the single nuts | | | | | | | | |
|---------------------------------------|---|-----------------|------------------|--------------------------|-----------------|------------------|--------------------------|-----------------|------------------|
| | with preload class C1 | | | Preload class C2 | | | Preload class C3 | | |
| | R_{nu} (N/ μ m) | F_{pr} (N) | T_{p0} (Nm) | R_{nu} (N/ μ m) | F_{pr} (N) | T_{p0} (Nm) | R_{nu} (N/ μ m) | F_{pr} (N) | T_{p0} (Nm) |
| | Tolerance grade 3; 5; 7 | | | Tolerance grade 3; 5; 7 | | | Tolerance grade 3; 5; 7 | | |
| 63 x 10R x 6 - 6 | 1,100 | 1,780 | 1.120 | 1,250 | 2,660 | 1.68 | 1,460 | 4,440 | 2.800 |
| 63 x 20R x 6.5 - 3 | 570 | 1,060 | 0.670 | 650 | 1,600 | 1.01 | 770 | 2,660 | 1.680 |
| 63 x 20R x 6.5 - 5 | 950 | 1,680 | 1.060 | 1,080 | 2,520 | 1.59 | 1,280 | 4,200 | 2.640 |
| 63 x 20R x 6.5 - 8 | 1,250 | 2,090 | 1.320 | 1,430 | 3,140 | 1.98 | - | - | - |
| 63 x 40R x 6.5 - 2 | 390 | 740 | 0.460 | 440 | 1,110 | 0.70 | 520 | 1,850 | 1.160 |
| 63 x 40R x 6.5 - 3 | 580 | 1,070 | 0.670 | 660 | 1,600 | 1.01 | 780 | 2,670 | 1.680 |
| 63 x 40R x 6.5 - 6 | 950 | 1,600 | 1.010 | 1,080 | 2,400 | 1.51 | - | - | - |
| 80 x 10R x 6.5 - 6 | 1,290 | 2,170 | 1.730 | 1,460 | 3,250 | 2.60 | 1,700 | 5,420 | 4.340 |
| 80 x 20R x 12.7 - 6 | 1,430 | 5,250 | 4.200 | 1,620 | 7,880 | 6.31 | 1,910 | 13,100 | 10.510 |
| 80 x 40R x 12.7 - 4 | 980 | 3,610 | 2.888 | 1,120 | 5,420 | 4.336 | 1,320 | 9,030 | 7.224 |

| Size $d_0 \times P \times D_w - i$ | Rigidity and dynamic drag torque of the double nuts | | | | | | | | |
|---------------------------------------|---|-----------------|-------------------------|-------|--------------------------|-----------------|-------------------------|--|--|
| | with preload class C5 | | | | with preload class C4 | | | | |
| | R_{nu} (N/ μ m) | F_{pr} (N) | Tolerance grade 3; 5; 7 | | R_{nu} (N/ μ m) | F_{pr} (N) | Tolerance grade 3; 5; 7 | | |
| | | | T_{p0} (Nm) | | | | T_{p0} (Nm) | | |
| 16 x 5R x 3 - 4 | 320 | 860 | 0.06 | 360 | 1,230 | 0.08 | 0.11 | | |
| 20 x 5R x 3 - 4 | 400 | 1,000 | 0.08 | 450 | 1,430 | 0.11 | 0.16 | | |
| 25 x 5R x 3 - 4 | 470 | 1,110 | 0.11 | 330 | 1,590 | 0.11 | 0.16 | | |
| 25 x 10R x 3 - 4 | 480 | 1,100 | 0.11 | 440 | 1,570 | 0.11 | 0.16 | | |
| 32 x 5R x 3.5 - 4 | 570 | 1,510 | 0.19 | 640 | 2,160 | 0.28 | 0.28 | | |
| 32 x 10R x 3.969 - 5 | 770 | 2,220 | 0.28 | 860 | 3,170 | 0.33 | 0.41 | | |
| 40 x 5R x 3.5 - 5 | 850 | 2,040 | 0.33 | 950 | 2,910 | 0.56 | 0.47 | | |
| 40 x 10R x 6 - 4 | 760 | 3,500 | 0.56 | 850 | 5,000 | 0.81 | 0.80 | | |
| 40 x 10R x 6 - 6 | 1,150 | 5,050 | 0.81 | 1,280 | 7,210 | 0.42 | 1.15 | | |
| 40 x 20R x 6 - 3 | 570 | 2,650 | 0.42 | 640 | 3,790 | 0.45 | 0.61 | | |
| 50 x 5R x 3.5 - 5 | 1,000 | 2,240 | 0.45 | 1,110 | 3,200 | 0.78 | 0.64 | | |
| 50 x 10R x 6 - 4 | 900 | 3,880 | 0.78 | 1,010 | 5,540 | 1.12 | 1.11 | | |
| 50 x 10R x 6 - 6 | 1,350 | 5,580 | 1.12 | 1,510 | 7,970 | 1.06 | 1.59 | | |
| 50 x 20R x 6.5 - 5 | 1,180 | 5,300 | 1.06 | 1,320 | 7,570 | 1.09 | 1.51 | | |
| 63 x 10R x 6 - 4 | 1,080 | 4,330 | 1.09 | 1,200 | 6,180 | 1.57 | 1.56 | | |
| 63 x 10R x 6 - 6 | 1,620 | 6,220 | 1.57 | 1,800 | 8,880 | 1.48 | 2.24 | | |
| 63 x 20R x 6.5 - 5 | 1,420 | 5,870 | 1.48 | 1,590 | 8,390 | 2.43 | 2.11 | | |
| 80 x 10R x 6.5 - 6 | 1,870 | 7,590 | 2.43 | 2,070 | 10,800 | 5.88 | 3.47 | | |
| 80 x 20R x 12.7 - 6 | 2,130 | 18,400 | 5.88 | 2,380 | 26,300 | | 8.41 | | |

Frictional torques of the seals

Seal torque for single and double nuts

T_0 = overall dynamic drag torque

$T_0 = T_{p0} + T_{RD}$

T_{RD} = dynamic drag torque of the 2 seals

T_{p0} = dynamic drag torque without seals

d_0 = nominal diameter

P = lead

D_w = ball diameter

Note:

To measure the dynamic drag torque, see the "Installation" section page 147.

| Size $d_0 \times P \times D_w$ | Dynamic drag torque | | |
|-----------------------------------|---|---|--------------------------------------|
| | Standard seal T_{RD} approx. (Nm) | reinforced seal T_{RD} approx. (Nm) | Low-friction seal $T_{RD} = 0$ Nm |
| 6 x 1R x 0.8 | - | - | ✓ |
| 6 x 2R x 0.8 | - | - | ✓ |
| 8 x 1R x 0.8 | - | - | ✓ |
| 8 x 2R x 1.2 | - | - | ✓ |
| 8 x 2.5R x 1.588 | 0.015 | - | ✓ |
| 8 x 5R x 1.588 | 0.015 | - | - |
| 12 x 2R x 1.2 | 0.030 | - | ✓ |
| 12 x 5R x 2 | 0.030 | - | ✓ |
| 12 x 10R x 2 | 0.030 | - | ✓ |
| 16 x 5R x 3 | 0.080 | - | ✓ |
| 16 x 5L x 3 | 0.080 | - | ✓ |
| 16 x 10R x 3 | 0.080 | - | ✓ |
| 16 x 16R x 3 | 0.080 | - | ✓ |
| 20 x 5R x 3 | 0.100 | - | ✓ |
| 20 x 5L x 3 | 0.100 | - | - |
| 20 x 10R x 3 | 0.120 | - | - |
| 20 x 20R x 3.5 | 0.120 | - | ✓ |
| 20 x 40R x 3.5 | 0.040 | - | ✓ |
| 25 x 5R x 3 | 0.120 | 0.34 | ✓ |
| 25 x 5L x 3 | 0.120 | - | - |
| 25 x 10R x 3 | 0.150 | 0.29 | ✓ |
| 25 x 25R x 3.5 | 0.200 | 0.25 | ✓ |
| 32 x 5R x 3.5 | 0.250 | 0.51 | ✓ |
| 32 x 5L x 3.5 | 0.250 | - | - |
| 32 x 10R x 3.969 | 0.250 | 0.46 | ✓ |
| 32 x 20R x 3.969 | 0.250 | 0.49 | ✓ |
| 32 x 32R x 3.969 | 0.250 | 0.45 | ✓ |
| 32 x 64R x 3.969 | 0.250 | 0.45 | ✓ |
| 40 x 5R x 3.5 | 0.400 | 0.85 | ✓ |
| 40 x 5L x 3.5 | 0.400 | - | - |
| 40 x 10R x 6 | 0.400 | 0.91 | ✓ |
| 40 x 10L x 6 | 0.400 | - | - |
| 40 x 12R x 6 | 0.400 | - | - |
| 40 x 16R x 6 | 0.400 | - | - |
| 40 x 20R x 6 | 0.400 | 0.54 | ✓ |
| 40 x 25R x 6 | 0.400 | 0.54 | - |
| 40 x 30R x 6 | 0.400 | 0.54 | - |
| 40 x 40R x 6 | 0.400 | 0.54 | ✓ |
| 50 x 5R x 3.5 | 0.500 | - | - |
| 50 x 10R x 6 | 0.600 | 0.95 | - |
| 50 x 12R x 6 | 0.600 | - | - |
| 50 x 16R x 6 | 0.600 | - | - |
| 50 x 20R x 6.5 | 0.600 | 0.95 | - |
| 50 x 25R x 6.5 | 0.700 | - | - |
| 50 x 30R x 6.5 | 0.700 | 0.95 | - |
| 50 x 40R x 6.5 | 0.700 | - | - |
| 63 x 10R x 6 | 1.200 | - | - |
| 63 x 20R x 6.5 | 1.200 | 1.40 | - |
| 63 x 40R x 6.5 | 1.200 | 1.40 | - |
| 80 x 10R x 6.5 | 1.400 | - | - |
| 80 x 20R x 12.7 | 2.200 | - | - |
| 80 x 40R x 12.7 | 2.300 | - | - |

When retrofitting and changing over the seals, please note:

All precision screws with small leads are single-start (Figure 1). There is thus no ball raceway on the screw. Precision screws with higher leads, however, are 2-start or 4-start (Figs. 2 and 3).

“Reinforced seals” for precision screws are optionally available. This version can be identified by the opal-green coloring of the component and the material number.

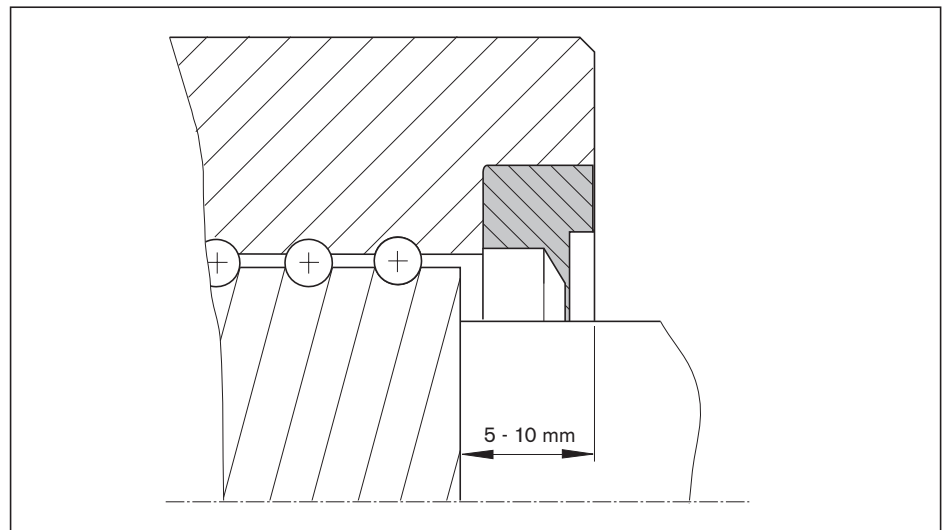
Low-friction seals for precision screws are available on request. This version can be identified by the red-brown coloring of the component and the material number.

| | Standard nuts | FED nut |
|---|---------------|---------|
| Fig. 1 Single-start seal | | |
| Fig. 2 Seal for the 2-start precision screw with medium lead | | |
| Fig. 3 Seal for the 4-start precision screw with high lead | | |

Installing the seal

Position the nut on the screw according to the Figure. Lay the wiper seal with the nose in the recess and press until it snaps into the groove. When turning the nut on the screw, monitor the sealing lip and align it by pressing on the end face if need be. Please make sure that the sealing lip does not get damaged.

Detailed assembly instructions are included with the delivery.



Installation

Delivery condition

Normally, Rexroth ball screws are supplied initially greased with Dynalub grease. This makes possible relubrication using oil or grease. and cartridges and cans of this grease are available. If another lubricant is used, you will need to check that it is compatible with the initial lubrication grease. In special cases, a ball screw assembly with only a preservative coating can be ordered and supplied using the appropriate ordering code.

Note

The selected lubricant must be in the nut before the machine is started.

Cleaning

Various cleaning agents can be used to degrease and wash the assembly:

- aqueous cleaning agents
- organic cleaning agents

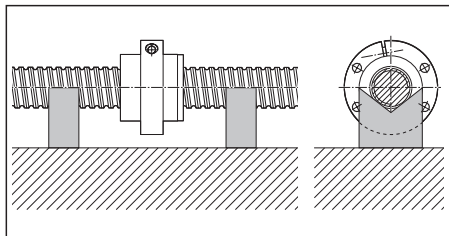
Note

Immediately after cleaning, thoroughly dry all parts and apply a preservative coating or anti-corrosion oil.

In all cases, take care to observe the appropriate legal regulations (environmental protection, health and safety at work, etc.) as well as the specifications for the cleaning agent (e.g. handling).

Storage

Ball screw assemblies are high-quality systems that must be treated with due care. In order to prevent damage and contamination, the elements should not be removed from the protective wrapping until immediately before installation. Once they have been removed from the packaging, they must be set down on V-shaped cradles.



Nut mounting

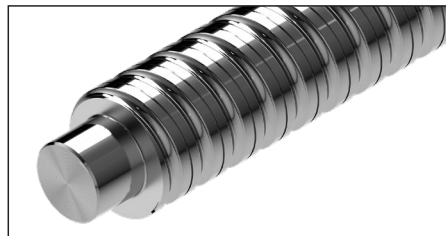
Preloaded single nut double nut

These versions are always supplied on the ready-mounted nut unit on the screw. You must not disassemble the nut unit and the screw. If this is unavoidable, please contact us.

Note: In the case of ball screw assemblies with a front lube unit, do not rotate the nut and the front lube unit from the screw.

Single nut with standard backlash Single nut with reduced backlash Adjustable-preload single nut

You must only mount the nut unit on an end-machined screw using a mounting arbor. The screw journal is then used to center the mounting arbor. In the case of screw ends of Form "00", you can use a centering bore "Z" on the end face to place an auxiliary spigot in position for mounting. The external diameter of the arbor should be approximately 0.1 mm less than the root diameter of the screw. In most cases, you can use the supplied arbor with nut units. The start of the screw's thread must be rounded off carefully to avoid damage to the seal and the individual inner parts of the nut unit.



The individual mounting steps are described below. Disassembly is carried out in the reverse order. Be particularly careful; otherwise, the nut or its individual internal parts could be damaged, which would lead to premature failure of the ball screw assembly.

Individual mounting steps

Carry out installation as follows:
Remove the retaining ring (→ mounting instructions) on one side of the mounting arbor.



Push the mounting arbor with the nut to the start of the thread.

The arbor must be in contact on an axially backlash-free basis.

Now, carefully turn the nut unit onto the thread with slight axial pressure.



Do not remove the mounting arbor until the nut unit is located completely on the screw thread.



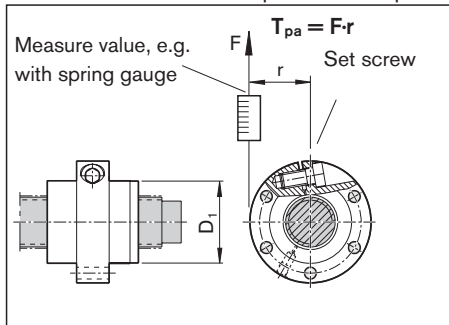
Preloading of the adjustable-preload single nut

Measuring of the dynamic drag torque with SEM-E-S and SEM-E-C.

Use an adjusting screw to restrict the clearance of the nut that is ready-mounted on the screw such that the dynamic drag torque T_{p0} achieves the value in the table \Rightarrow page 140 (with the ball screw assembly lightly oiled).

You must carry out the inspection across the entire length of the thread; if the values are different from the ones in the table, correct the setting.

After you make the setting, the centering diameter D_1 must match the values in the tables \Rightarrow page 38 and 40. Cover the head of the screw with a protective cap.



T_{pa} = currently measured dynamic drag torque

Assembly instructions are included with each delivery. If you need additional copies, please ask us.

Installation in the machine

It is not normally necessary to remove the preservative coating before installation.

- If the ball screw assembly is contaminated, you must clean it first (see "Cleaning") and re-oil it
- Push the nut unit into the mounting bore, taking care to avoid any impact force or misalignment.
- Tighten the mounting screws using a torque wrench if necessary. Maximum tightening torque for the steel/steel material pairing ($R_m \geq 370 \text{ N/mm}^2$), see table.

| Steel/steel material pairing | | | |
|------------------------------|-------------------------------------|-------|-------|
| Screw diameter (mm) | Tightening torque (Nm) | | |
| | Strength classes as per DIN ISO 898 | | |
| | 8.8 | 10.9 | 12.9 |
| M3 | 1.3 | 1.8 | 2.1 |
| M4 | 2.7 | 3.8 | 4.6 |
| M5 | 5.5 | 8.0 | 9.5 |
| M6 | 9.5 | 13.0 | 16.0 |
| M8 | 23.0 | 32.0 | 39.0 |
| M10 | 46.0 | 64.0 | 77.0 |
| M12 | 80.0 | 110.0 | 135.0 |
| M14 | 125.0 | 180.0 | 215.0 |
| M16 | 195.0 | 275.0 | 330.0 |
| M18 | 280.0 | 400.0 | 470.0 |
| M20 | 390.0 | 560.0 | 650.0 |

- The maximum tightening torques specified in the table below apply to the steel/aluminum or aluminum/aluminum material pairings ($R_m \geq 280 \text{ N/mm}^2$). When driving screws into aluminum, the length of thread engagement should be at least 1.5 times the screw diameter.

Mounting screws

⚠ Always make sure the screws are secure where there are high screw loads!

| Steel/aluminum and aluminum/aluminum material pairings | | | |
|--|-------------------------------------|-------|-------|
| Screw diameter (mm) | Tightening torque (Nm) | | |
| | Strength classes as per DIN ISO 898 | | |
| | 8.8 | 10.9 | 12.9 |
| M3 | 1.2 | 1.2 | 1.2 |
| M4 | 2.4 | 2.4 | 2.4 |
| M5 | 4.8 | 4.8 | 4.8 |
| M6 | 8.5 | 8.5 | 8.5 |
| M8 | 20.0 | 20.0 | 20.0 |
| M10 | 41.0 | 41.0 | 41.0 |
| M12 | 70.0 | 70.0 | 70.0 |
| M14 | 110.0 | 110.0 | 110.0 |
| M16 | 175.0 | 175.0 | 175.0 |
| M18 | 250.0 | 250.0 | 250.0 |
| M20 | 345.0 | 345.0 | 345.0 |

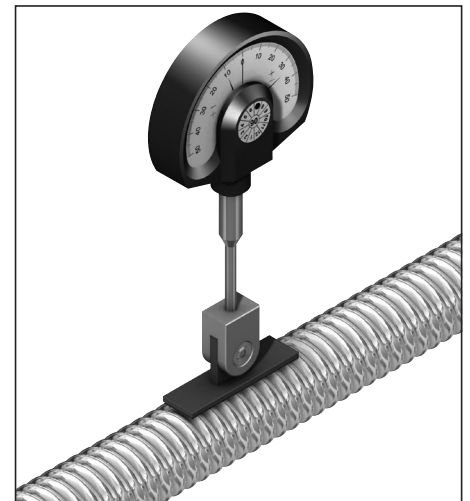
Tightening torques for fastening screws according to VDI 2230 where $\mu_G = \mu_K = 0.125$

Aligning the ball screw assembly in the machine

A gauge¹⁾ with a self-aligning contact pad is available from Rexroth for easy alignment of the ball screw assembly.

Two pads of different lengths are available which can be used depending on the screw lead:

- Part number R3305 131 19 length 33 mm for leads < 20
- Part number R3305 131 21 length 50 mm for leads > 20



1) The dial gauge is not supplied

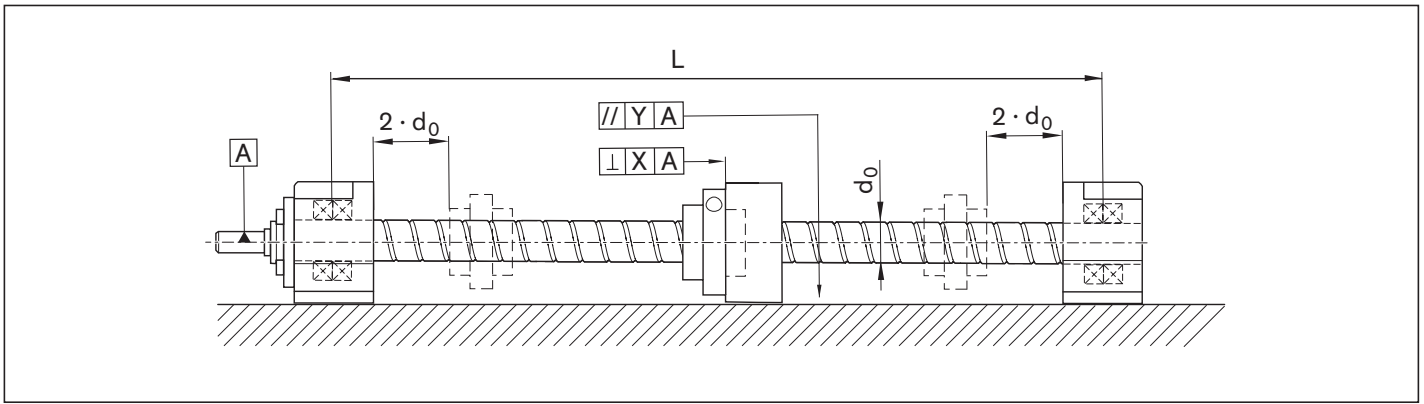
Installation tolerances

▲ Note

Any alignment errors can lead to premature failure of the ball screw assembly, which means that they are not allowed!

To ensure that a BASA can actually achieve the calculated service life and performance, its system-related requirements and limitations must be taken into account at the design stage. Screw assemblies are not suitable for transferring radial forces and torques, such as may be caused by misalignments during installation. The following sections illustrate the most important principles for achieving designs that will be compatible with the screw drive system and its requirements.

When using BASAs, the specified installation tolerances must be observed when designing and building the adjoining structures. The first basic principle is: The higher the BASA's precision and preload, the more accurate the adjoining structures must be. This applies in particular to applications in which the nut travels close up to the end bearings since, in this area, the risk of distortive stresses and therefore of additional loads is very high.



Parallelism offset and details of the rectangularity between the screw shaft axis and the location face of the nut housing.

- L = distance between end bearings (mm)
- d_0 = nominal diameter of screw (mm)
- X = permissible deviation from rectangularity:
The tolerance applies to a surface that must lie between two planes spaced at a distance X from each other which are perpendicular to the reference axis A. (mm)
- Y = Permissible parallelism offset between the guide and the ball screw assembly (mm)

The adjacent table shows the most important recommended tolerances for ball screw assemblies as a function of the preload.

These tolerances include the rectangularity of the nut housing (or adjoining structure) relative to the screw axis. The tolerances for parallelism between the guide and the ball screw assembly must also be complied with.

Minimum distance of the nut from the end bearings $> 2 \cdot d_0$

Any alignment errors can lead to premature breakdown of the ball screw assembly!

| Preload option | X (mm) | Y (mm) |
|----------------|--------|--------|
| Backlash | 0.04 | 0.04 |
| Preloaded | 0.02 | 0.02 |

Lubrication

General lubrication instructions

- ▶ All informations on lubrication is based on test values and field experience and are recommendations from Bosch Rexroth.
- ⚠ Do not use greases containing solid particles (e.g. graphite or MoS₂)!
- ⚠ If other lubricants are used, this may lead to a reduction in the relubrication intervals, the achievable travel in short-stroke applications, and the load capacities. Possible chemical interactions between the plastic materials, lubricants and preservative oils must also be taken into account.
- ⚠ If your application makes greater environmental demands (i.e. cleanroom, vacuum, foodstuff application, strong or aggressive metal-working fluids, or extreme temperatures) please contact us, since a special test, and possibly a special lubricant, will be required. Please have all information about your application to hand.
- ⚠ When using in other sectors, e.g.: food industry, clean room, vacuum etc. or at extreme temperatures, or if the lubrication is exposed to process media, the standard initial lubrication and anti-corrosion agents used prior to shipment may not be suitable, or they may be incompatible with the relubrication lubricant. In this case, please consult us in advance!
- ⚠ Even under normal operating conditions, the system must be relubricated at the latest after 2 years due to aging of the grease. Please note the reduced load ratings according to the technical notes.
- ▶ In general, you should not apply the lubricant all in one go; rather, apply several smaller amounts.
- ▶ In the case of a short stroke, (stroke \leq nut length, L), it is advisable to carry out a lubricating stroke more often. In this case, there is a risk, amongst other things, that low-viscosity lubricants drop out. Please note the information about reducing the load rating in "Technical notes" on page 133. Please consult our regional centers regarding short stroke applications. You can find your local contact person at: www.boschrexroth.com/contact

Grease lubrication With a grease gun or a progressive lubrication system in the case of ball screw assemblies > Ø 12 mm

Lubricating grease

We recommend using **Dynalub 510** with the following properties:

- NLGI grade 2 lithium-based high-performance grease as per DIN 51818 (KP2K-20 according to DIN 51825)
- Good water resistance
- Corrosion protection
- Temperature range: –20 to +80 °C

Under conventional environmental conditions, this ground-fiber, homogeneous grease is ideally suited for the lubrication of linear elements:

- For loads of up to 50% C
- For short-stroke applications ≥ 1 mm
- For the permissible speed range of ball screw assemblies

You can download product and safety data sheets from our website at: www.boschrexroth.de.

Please also observe the information on page 168.

Material numbers for Dynalub 510:

- R3416 037 00 (cartridge 400 g)
- R3416 035 00 (hobbock 25 kg)

Initial lubrication of the ball screw assemblies (basic lubrication)

Fully assembled BASAs with a diameter greater than 12 mm are prelubricated at the factory with Dynalub 510.

When individual parts are supplied (nut on mounting arbor) or with versions without basic lubrication at the factory, you must apply double the quantity of lubricant stated in the “Lubricant quantities - Relubrication” table via the nut’s lube hole before commissioning.

The positioning and traversing instructions (see figure below) must be complied with.

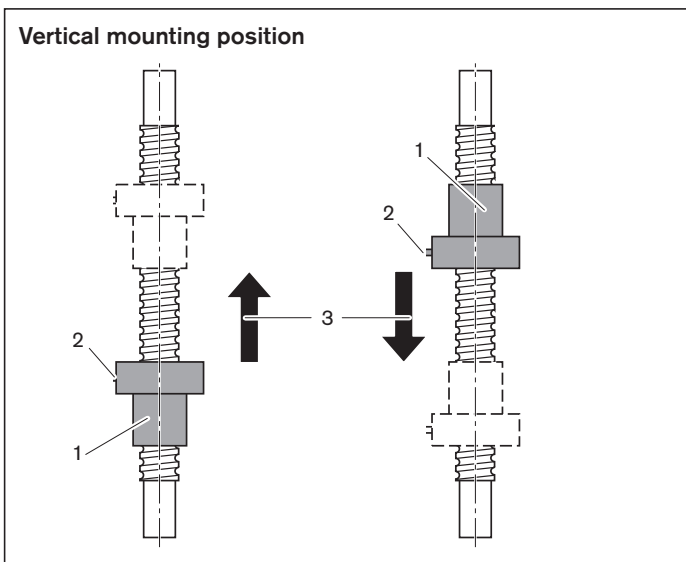
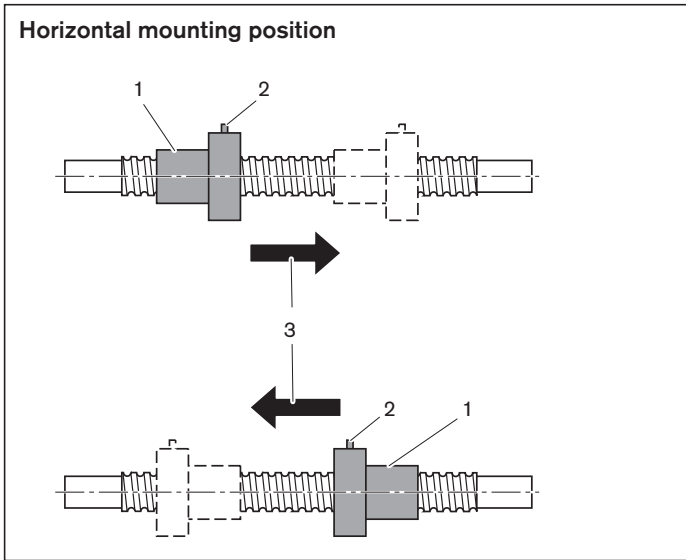
When using progressive lubrication systems, ensure that all the lines and distributors (including the connection to the BASA nut unit) are filled before carrying out basic lubrication or relubrication.

Relubricating the ball screw assemblies

If the relubrication interval according to the diagram on page 152 has been reached, relubricate the amount stated in Table “Amount of lubricant for relubrication” on page 154.

In this connection, you must comply with the nut position and traversing path shown in the “Positioning and traversing instructions” illustration.

Positioning and traversing instructions



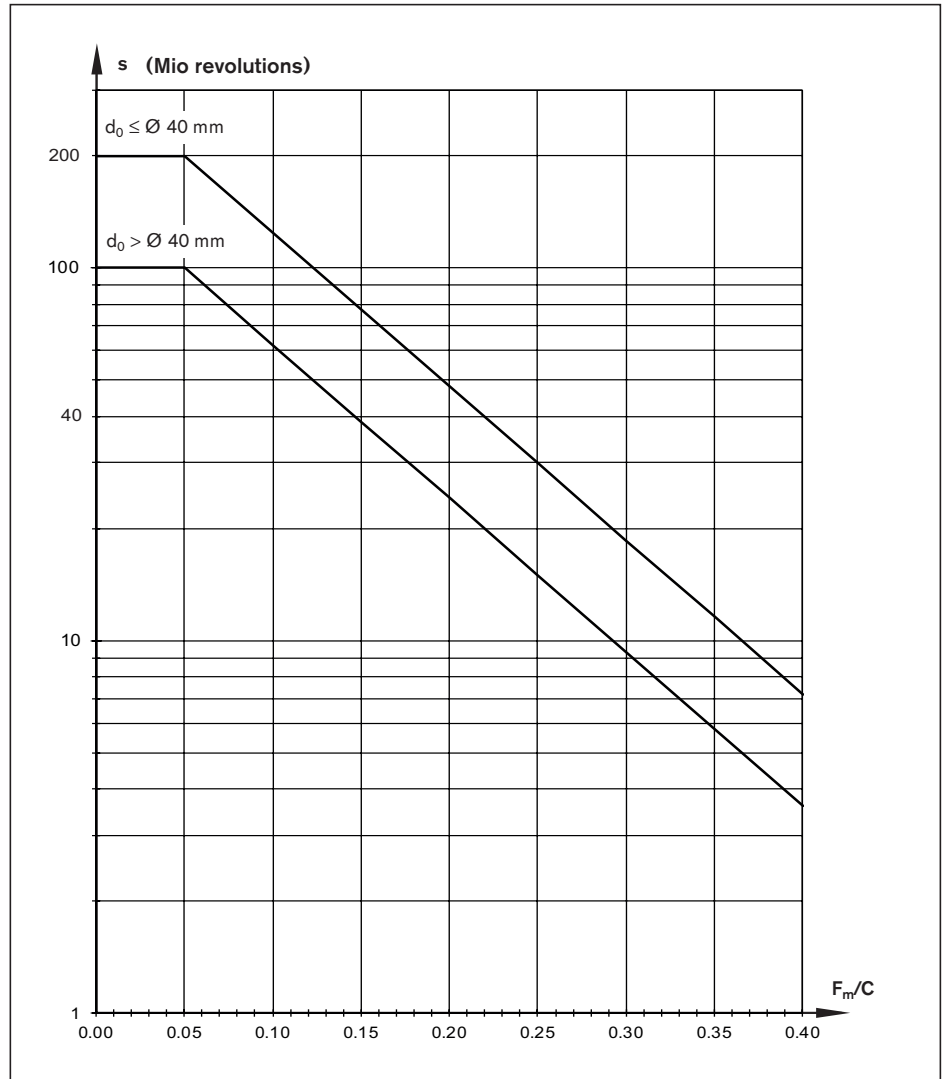
- 1 Position of the nut during lubrication
- 2 Flange with lube port (if installed horizontally, the port should be at the top if possible)
- 3 Direction of travel after lubrication. Traversing path should be at least 3x the nut length.

Load-dependent re-greasing intervals in the case of grease lubrication with a grease gun or a progressive lubrication system in the case of ball screw assemblies > Ø 12 mm ("dry axes")

This applies to the following conditions:

- Dynalub 510 grease or, alternatively, Castrol Longtime PD 2, Elkalub GLS 135/N2 grease
- No exposure to media
- Standard seals
- Driven screws
- Not mission critical operation
- Ambient temperature: $T = 10$ to 40 °C

s = relubrication interval
in millions of revolutions (10^6 revolutions)
 C = dynamic load rating (N)
 F_m = equivalent dynamic axial load (N)
 d_0 = nominal diameter (mm)



Conversion of the relubrication interval s from millions of revolutions to kilometers:

$$s \text{ in kilometers} = \frac{s \text{ in millions (of revs)} \cdot \text{lead } P \text{ (mm)}}{10^6}$$

Example:

$$s \text{ in kilometers} = \frac{200 \cdot 10^6 \text{ (revs)} \cdot 16 \text{ (mm)}}{10^6} = 3200 \text{ km}$$

Notes

The load ratio F_m/C is the quotient of the equivalent dynamic axial load F_m and the dynamic load rating C (see "Calculation").

At extreme operating conditions, please consult us as special consideration may be required for the lubrication intervals.

These operating conditions include low medium rotary speeds n_m , increased ambient temperatures and high loads $F_m/C > 0.4$.

If you are using a progressive lubrication system, please take into account the minimum metering quantity of 0.03 cm³.

Please also note the general lubrication information on page 149.

Grease lubrication With a grease gun or a progressive lubrication system in the case of ball screw assemblies > Ø 12 mm

Amount of lubricant for relubrication

| Size $d_0 \times P \times D_w - i$ | Amount of lubricant for relubrication (cm ³) | | |
|---------------------------------------|--|---------|-------------------|
| | FED-E-B / FEM-E-B / FEM-E-S / FEP-E-S SEM-E-C / SEM-E-S / ZEM-E-S / ZEM-E-K / ZEM-E-A | ZEV-E-S | FDM-E-B / FDM-E-S |
| 16x5Rx3 - 3 | – | 0.9 | – |
| 16x5R/Lx3 - 4 | 0.70 | – | 1.75 |
| 16x10Rx3 - 3 | 0.85 | 1.10 | – |
| 16x16Rx3 - 2 | 0.95 | – | – |
| 16x16Rx3 - 3 | 1.20 | – | – |
| 16x16Rx3 - 6 | 1.35 | – | – |
| 20x5R/Lx3 - 4 | 1.00 | 1.30 | 2.95 |
| 20x5Rx3 - 5 | 1.15 | – | – |
| 20x10Rx3 - 4 | 1.50 | – | – |
| 20x20Rx3.5 - 2 | 1.85 | – | – |
| 20x20Rx3.5 - 3 | 2.40 | – | – |
| 20x20Rx3.5 - 6 | 2.50 | – | – |
| 20x40Rx3.5 - 4 | 1.75 | – | – |
| 25x5R/Lx3 - 4 | 1.50 | – | 3.50 |
| 25x5Rx3 - 7 | – | 1.95 | – |
| 25x10Rx3 - 4 | 1.85 | – | 4.15 |
| 25x10Rx3 - 5 | – | 2.05 | – |
| 25x25Rx3.5 - 2 | 2.65 | – | – |
| 25x25Rx3.5 - 3 | 3.45 | – | – |
| 25x25Rx3.5 - 4.8 | 1.65 | – | – |
| 25x25Rx3.5 - 6 | 3.90 | – | – |
| 32x5Lx3.5 - 4 | 2.50 | – | – |
| 32x5Rx3.5 - 4 | 2.15 | – | 4.90 |
| 32x5Rx3.5 - 5 | – | 2.40 | – |
| 32x10Rx3.969 - 5 | 3.05 | 3.25 | 6.65 |
| 32x20Rx3.969 - 2 | 2.80 | – | – |
| 32x20Rx3.969 - 3 | 3.55 | – | – |
| 32x20Rx3.969 - 6 | 3.70 | – | – |
| 32x32Rx3.969 - 2 | 4.05 | – | – |
| 32x32Rx3.969 - 3 | 5.45 | – | – |
| 32x32Rx3.969 - 4.8 | 2.85 | – | – |
| 32x32Rx3.969 - 6 | 6.20 | – | – |
| 32x64Rx3.969 - 4 | 3.35 | – | – |
| 40x5Lx3.5 - 5 | 3.35 | – | – |
| 40x5Rx3.5 - 5 | 2.95 | – | 7.60 |
| 40x10Lx6 - 4 | 6.50 | – | – |
| 40x10Rx6 - 4 | 6.65 | – | 16.75 |
| 40x10Rx6 - 5 | 7.70 | – | – |
| 40x10Rx6 - 6 | 8.15 | – | 19.70 |
| 40x12Rx6 - 4 | 6.75 | – | – |
| 40x16Rx6 - 4 | 9.15 | – | 21.35 |
| 40x20Rx6 - 3 | 8.70 | – | 20.55 |
| 40x20Rx6 - 8 | 9.35 | – | – |
| 40x25Rx6 - 4 | 10.84 | – | – |
| 40x25Rx6 - 8 | 10.99 | – | – |
| 40x30Rx6 - 4 | 11.95 | – | – |
| 40x30Rx6 - 8 | 12.29 | – | – |
| 40x40Rx6 - 2 | 10.40 | – | – |
| 40x40Rx6 - 3 | 14.30 | – | – |

| Size $d_0 \times P \times D_w - i$ | Amount of lubricant for relubrication (cm ³) | | |
|---------------------------------------|--|---------|-------------------|
| | FED-E-B / FEM-E-B / FEM-E-S / FEP-E-S SEM-E-C / SEM-E-S / ZEM-E-S / ZEM-E-K / ZEM-E-A | ZEV-E-S | FDM-E-B / FDM-E-S |
| 40x40Rx6 - 6 | 15.00 | - | - |
| 50x5Rx3.5 - 5 | 4.65 | - | 11.70 |
| 50x10Rx6 - 4 | - | - | 21.90 |
| 50x10Rx6 - 6 | 10.75 | - | 25.55 |
| 50x12Rx6 - 6 | 11.60 | - | - |
| 50x16Rx6 - 6 | 16.15 | - | - |
| 50x20Rx6.5 - 3 | 12.65 | - | - |
| 50x20Rx6.5 - 5 | 17.35 | - | 34.75 |
| 50x20Rx6.5 - 8 | 9.90 | - | - |
| 50x25Rx6.5 - 4 | 14.20 | - | - |
| 50x25Rx6.5 - 6 | 10.45 | - | - |
| 50x30Rx6.5 - 4 | 14.73 | - | - |
| 50x30Rx6.5 - 8 | 14.81 | - | - |
| 50x40Rx6.5 - 2 | 15.45 | - | - |
| 50x40Rx6.5 - 3 | 20.65 | - | - |
| 50x40Rx6.5 - 6 | 19.15 | - | - |
| 63x10Rx6 - 4 | - | - | 25.55 |
| 63x10Rx6 - 6 | 12.15 | - | 30.00 |
| 63x20Rx6.5 - 3 | 15.45 | - | - |
| 63x20Rx6.5 - 5 | 21.35 | - | 43.75 |
| 63x20Rx6.5 - 8 | 14.35 | - | - |
| 63x40Rx6.5 - 2 | 18.90 | - | - |
| 63x40Rx6.5 - 3 | 25.40 | - | - |
| 63x40Rx6.5 - 6 | 26.95 | - | - |
| 80x10Rx6.5 - 6 | 19.10 | - | 66.00 |
| 80x20Rx12.7 - 6 | 65.50 | - | 132.75 |
| 80x40Rx12.7 - 4 | 72.84 | - | - |

Note: The sizes that are listed in the table are not available for all nut types.
 You can find the respective size range in the chapter entitled "Nuts" from page 24 onward.

Relubrication for driven nut FAR

For NLGI grade 2 greases (using grease gun)

The driven nut can be supplied with grease via the outer race of the angular-contact thrust ball bearing. It must simply be noted that the nut must be stationary during the lubricating procedure. The nut can however be in any position on the screw.
 This provides a very simple solution to the problem of a rotating lube port on the nut unit itself. Two lube ports (M6) with radial or axial access are provided. On delivery, both are sealed by setscrews. The lube port can be opened by removing the set screw.

For FAR with or without timing belt side drive the following applies:

- Can be relubricated with NLGI Class 2 grease when stationary via the stationary lube port of the bearing outer race
- screw liquid-cooled on request
- optional lubrication via screw

| FAR size | BASA size $d_0 \times P \times D_w - i$ | Relubrication quantity (cm ³) |
|----------|--|---|
| 32 | 32 x 10R x 3.969 - 5 | 3.5 |
| | 32 x 20R x 3.969 - 3 | 4.0 |
| | 32 x 32R x 3.969 - 3 | 6.0 |
| 40 | 40 x 10R x 6 - 5 | 8.4 |
| | 40 x 20R x 6 - 3 | 9.8 |
| | 40 x 40R x 6 - 3 | 16.1 |
| 50 | 50 x 10R x 6 - 6 | 12.2 |
| | 50 x 20R x 6.5 - 5 | 19.5 |
| | 50 x 40R x 6.5 - 3 | 23.3 |
| 63 | 63 x 10R x 6 - 6 | 13.8 |
| | 63 x 20R x 6.5 - 5 | 24.0 |
| | 63 x 40R x 6.5 - 3 | 28.7 |

Liquid grease lubrication with a single-line piston distributor system and Liquid grease lubrication with ball screw assemblies $\leq \varnothing 12$ mm

Lubricating grease

We recommend using **Dynalub 520** with the following properties:

- Lithium-based, high-performance grease of NLGI grade 00 according to DIN 51818 (GP00K-20 according to DIN 51826)
- Good water resistance
- Corrosion protection
- Temperature range: -20 to +80 °C

Under conventional environmental conditions, this ground-fiber, homogeneous grease is ideally suited for the lubrication of linear elements:

- In single-line one-point lubrication systems
- For loads of up to 50% C
- For short-stroke applications ≥ 1 mm
- For the permissible speed range of ball screw assemblies
- With miniature versions

You can download product and safety data sheets from our website at: www.boschrexroth.de.

Please also observe the information on page 168

Material numbers for Dynalub 520:

- R3416 043 00 (cartridge 400 g)
- R3416 042 00 (bucket 5 kg)
- R0419 090 01 (5 ml maintenance kit)

Initial lubrication of the ball screw assemblies (basic lubrication)

Fully assembled BASAs with a diameter less than or equal to 12 mm are prelubricated at the factory with Dynalub 520.

When individual parts are supplied (nut on mounting arbor) or with versions without basic lubrication at the factory, you must apply double the quantity of lubricant stated in table “Amount of lubricant for relubrication” on page 160 via the nut’s lube hole before commissioning.

The positioning and traversing instructions in the illustration below must be complied with.

When using single-line distributor systems, care should be taken that all lines and the piston distributors (including the connection to the BASA nut) are filled before performing basic lubrication or relubrication. In the case of ball screw assemblies $\leq \varnothing 12$ mm, it is advisable to use the maintenance set.

Relubricating the ball screw assemblies

Apply the relubrication quantity according to Table “Amount of lubricant for relubrication” on page 160 to the lube port until the specified relubrication interval shown in the diagram on page 158 has been reached.

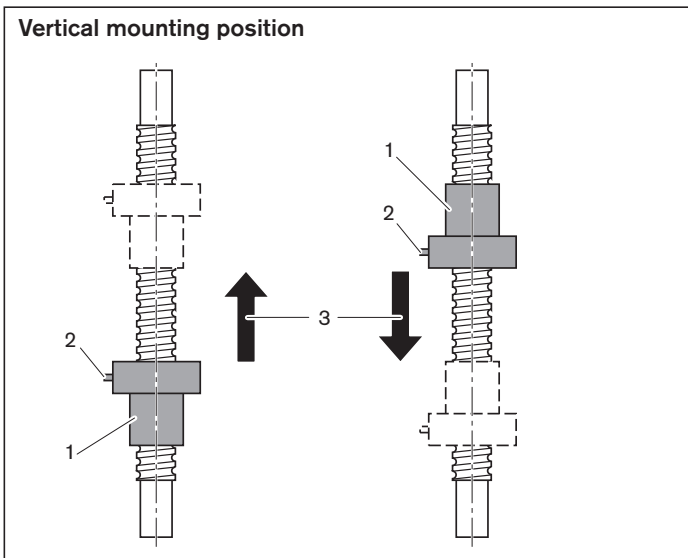
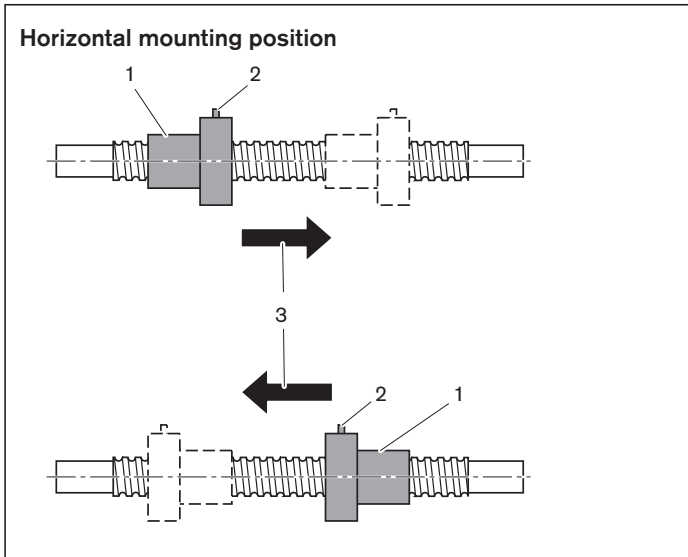
The pulse count that is needed for this is the integer quotient of the relubrication amount according to table “Amount of lubricant for relubrication” on page 160 and the piston distributor size.

In this connection, you must ensure that the smallest piston distributor size of 0.03 cm³ is not fallen short of.

The lubricant cycle time can then be obtained by dividing the relubrication interval by the calculated pulse count.

In this connection, you must comply with the nut position and traversing path shown in the “Positioning and traversing instructions” illustration.

Positioning and traversing instructions



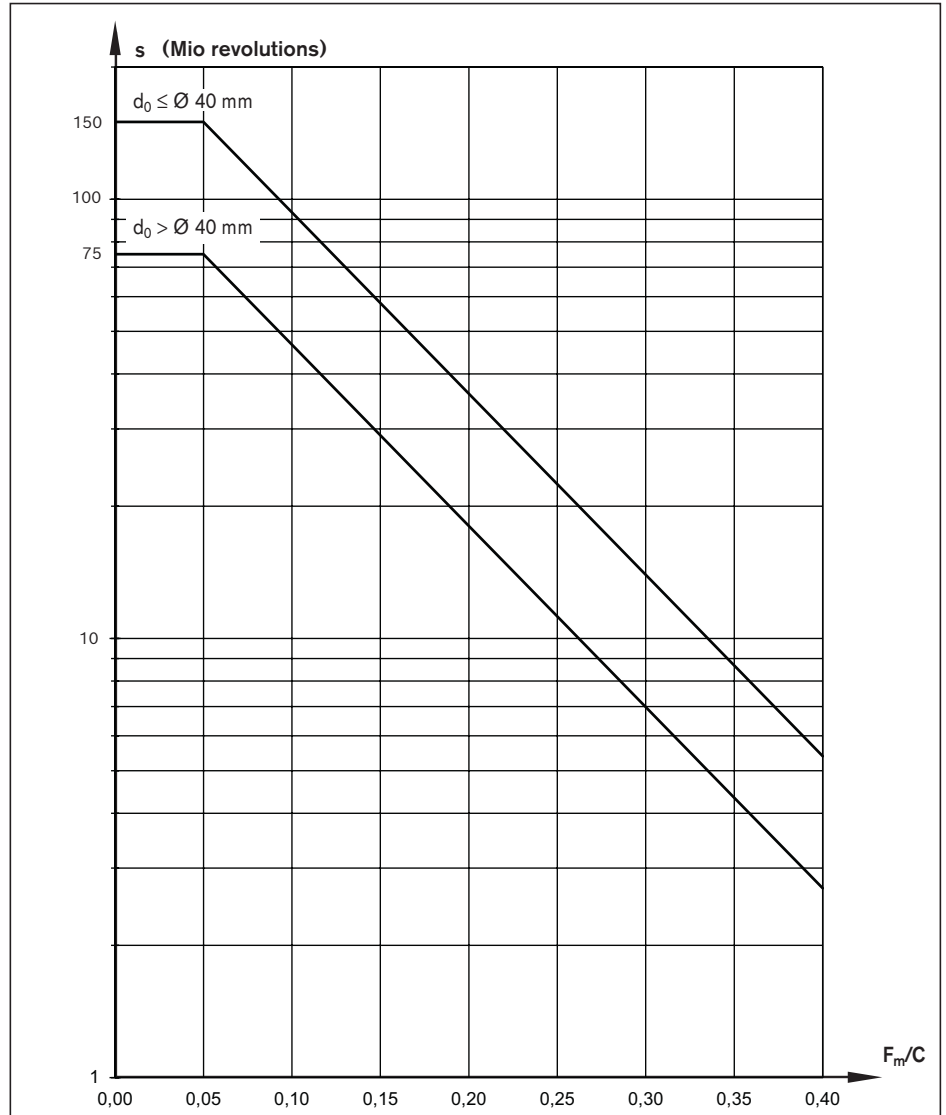
- 1 Position of the nut during lubrication
- 2 Flange with lube port (if installed horizontally, the port should be at the top if possible)
- 3 Direction of travel after lubrication. Traversing path should be at least 3x the nut length.

Load-dependent re-greasing intervals in the case of a single-line piston distributor system and liquid grease lubrication with ball screw assemblies $\leq \varnothing 12$ mm ("dry axes")

This applies to the following conditions:

- Dynalub 520 grease or, alternatively, Castrol Longtime PD 00, Elkalub GLS 135/N00 grease
- No exposure to media
- Standard seals
- Driven screws
- Not mission critical operation
- Ambient temperature: $T = 10$ to 40 °C

s = relubrication interval in millions of revolutions (10^6 revolutions)
 C = dynamic load rating (N)
 F_m = equivalent dynamic axial load (N)
 d_0 = nominal diameter (mm)



Conversion of the relubrication interval s from millions of revolutions to kilometers:

$$s \text{ in kilometers} = \frac{s \text{ in millions (of revs)} \cdot \text{lead } P \text{ (mm)}}{10^6}$$

Example:

$$s \text{ in kilometers} = \frac{37,5 \cdot 10^6 \text{ (revs)} \cdot 16 \text{ (mm)}}{10^6} = 600 \text{ km}$$

Notes

The load ratio F_m/C is the quotient of the equivalent dynamic axial load F_m and the dynamic load rating C (see "Calculation").

At extreme operating conditions, please consult us as special consideration may be required for the lubrication intervals.

These operating conditions include low medium rotary speeds n_m , increased ambient temperatures and high loads $F_m/C > 0.4$.

When using a single-line distributor system, you must ensure that the smallest piston distributor size of 0.03 cm^3 is not fallen short of.

We recommend using piston distributors from SKF. They should be installed as close as possible to the lube ports of the ball screw assembly nut.

Long lines and small line diameters should be avoided, and the lines should be laid on an upward slant.

If other consumers are connected to the single-line centralized lubrication system, the weakest link in the chain determines the lubrication cycle time.

Pumping or storage tanks for the lubricant should be fitted either with a stirrer or a follower piston to guarantee the flow of lubricant (to avoid funneling in the tank).

Please also note the general lubrication information on page 149.

Liquid grease lubrication with a single-line piston distributor system and Liquid grease lubrication with ball screw assemblies $\leq \varnothing 12$ mm

Amount of lubricant for relubrication

| Size $d_0 \times P \times D_w - i$ | Amount of lubricant for relubrication (cm ³) | | |
|---------------------------------------|--|---------|-------------------|
| | FED-E-B / FEM-E-B / FEM-E-S / FEP-E-S SEM-E-C / SEM-E-S / ZEM-E-S / ZEM-E-K / ZEM-E-A | ZEV-E-S | FDM-E-B / FDM-E-S |
| 6x1Rx0.8-3 | 0.05 | – | – |
| 6x2Rx0.8-3 | 0.05 | – | – |
| 8x1Rx0.8-4 | 0.06 | – | – |
| 8x2Rx1.2-4 | 0.07 | – | – |
| 8x2.5Rx1.588-3 | 0.11 | – | – |
| 8x2.5Rx1.588-4 | – | 0.14 | – |
| 8x5Rx1.588-3 | 0.12 | – | – |
| 12x2Rx1.2-4 | 0.17 | – | – |
| 12x5Rx2-3 | 0.33 | 0.33 | – |
| 12x10Rx2-2 | 0.33 | 0.33 | – |
| 16x5Rx3-3 | – | 0.90 | – |
| 16x5R/Lx3-4 | 0.70 | – | 1.75 |
| 16x10Rx3-3 | 0.85 | 1.10 | – |
| 16x16Rx3-2 | 0.95 | – | – |
| 16x16Rx3-3 | 1.20 | – | – |
| 16x16Rx3-6 | 1.35 | – | – |
| 20x5R/Lx3-4 | 1.00 | 1.30 | 2.95 |
| 20x5Rx3-5 | 1.15 | – | – |
| 20x10Rx3-4 | 1.50 | – | – |
| 20x20Rx3.5-2 | 1.85 | – | – |
| 20x20Rx3.5-3 | 2.40 | – | – |
| 20x20Rx3.5-6 | 2.50 | – | – |
| 20x40Rx3.5-4 | 1.75 | – | – |
| 25x5R/Lx3-4 | 1.50 | – | 3.50 |
| 25x5Rx3-7 | – | 1.95 | – |
| 25x10Rx3-4 | 1.85 | – | 4.15 |
| 25x10Rx3-5 | – | 2.05 | – |
| 25x25Rx3.5-2 | 2.65 | – | – |
| 25x25Rx3.5-3 | 3.45 | – | – |
| 25x25Rx3.5-4.8 | 1.65 | – | – |
| 25x25Rx3.5-6 | 3.90 | – | – |
| 32x5Lx3.5-4 | 2.50 | – | – |
| 32x5Rx3.5-4 | 2.15 | – | 4.90 |
| 32x5Rx3.5-5 | – | 2.40 | – |
| 32x10Rx3.969-5 | 3.05 | 3.25 | 6.65 |
| 32x20Rx3.969-2 | 2.80 | – | – |
| 32x20Rx3.969-3 | 3.55 | – | – |
| 32x20Rx3.969-6 | 3.70 | – | – |
| 32x32Rx3.969-2 | 4.05 | – | – |
| 32x32Rx3.969-3 | 5.45 | – | – |
| 32x32Rx3.969-4.8 | 2.85 | – | – |
| 32x32Rx3.969-6 | 6.20 | – | – |
| 32x64Rx3.969-4 | 3.35 | – | – |
| 40x5Lx3.5-5 | 3.35 | – | – |
| 40x5Rx3.5-5 | 2.95 | – | 7.60 |
| 40x10Lx6-4 | 6.50 | – | – |
| 40x10Rx6-4 | 6.65 | – | 16.75 |
| 40x10Rx6-5 | 7.70 | – | – |
| 40x10Rx6-6 | 8.15 | – | 19.70 |
| 40x12Rx6-4 | 6.75 | – | – |
| 40x16Rx6-4 | 9.15 | – | 21.35 |
| 40x20Rx6-3 | 8.70 | – | 20.55 |
| 40x20Rx6-8 | 9.35 | – | – |
| 40x25Rx6-4 | 10.85 | – | – |
| 40x25Rx6-8 | 11.00 | – | – |

| Size $d_0 \times P \times D_w - i$ | Amount of lubricant for relubrication (cm ³) | | |
|---------------------------------------|--|---------|-------------------|
| | FED-E-B / FEM-E-B / FEM-E-S / FEP-E-S SEM-E-C / SEM-E-S / ZEM-E-S / ZEM-E-K / ZEM-E-A | ZEV-E-S | FDM-E-B / FDM-E-S |
| 40x30Rx6-4 | 11.95 | - | - |
| 40x30Rx6-8 | 12.20 | - | - |
| 40x40Rx6-2 | 10.40 | - | - |
| 40x40Rx6-3 | 14.30 | - | - |
| 40x40Rx6-6 | 15.00 | - | - |
| 50x5Rx3.5-5 | 4.65 | - | 11.70 |
| 50x10Rx6-4 | - | - | 21.90 |
| 50x10Rx6-6 | 10.75 | - | 25.55 |
| 50x12Rx6-6 | 11.60 | - | - |
| 50x16Rx6-6 | 16.15 | - | - |
| 50x20Rx6.5-3 | 12.65 | - | - |
| 50x20Rx6.5-5 | 17.35 | - | 34.75 |
| 50x20Rx6.5-8 | 9.90 | - | - |
| 50x25Rx6.5-6 | 10.45 | - | - |
| 50x30Rx6.5-4 | 14.73 | - | - |
| 50x30Rx6.5-6 | 14.80 | - | - |
| 50x40Rx6.5-2 | 15.45 | - | - |
| 50x40Rx6.5-3 | 20.65 | - | - |
| 50x40Rx6.5-6 | 19.15 | - | - |
| 63x10Rx6-4 | - | - | 25.55 |
| 63x10Rx6-6 | 12.15 | - | 30.00 |
| 63x20Rx6.5-3 | 15.45 | - | - |
| 63x20Rx6.5-5 | 21.35 | - | 43.75 |
| 63x20Rx6.5-8 | 14.35 | - | - |
| 63x40Rx6.5-2 | 18.90 | - | - |
| 63x40Rx6.5-3 | 25.40 | - | - |
| 63x40Rx6.5-6 | 26.95 | - | - |
| 80x10Rx6.5-6 | 19.10 | - | 66.00 |
| 80x20Rx12.7-6 | 65.50 | - | 132.75 |
| 80x40Rx12.7-4 | 72.84 | - | - |

Note: The sizes that are listed in the table are not available for all nut types.
You can find the respective size range in the chapter entitled “Nuts” from page 24 onward.

Oil lubrication with a single-line piston distributor system

Oil lubricant

We recommend using **Shell Tonna S 220** with the following properties:

- Special demulsifying oil CLP or CGLP as per DIN 51517-3 for machine bed tracks and tool guides
- A blend of highly refined mineral oils and additives
- Can be used even when mixed with significant quantities of metalworking fluids

Initial lubrication of the ball screw assemblies (basic lubrication)

Fully assembled BASAs with a diameter less than or equal to 12 mm are prelubricated at the factory with Dynalub 520.

Fully assembled BASAs with a diameter greater than 12 mm are prelubricated at the factory with Dynalub 510.

When individual parts are supplied (nut on mounting arbor) or in the case of special designs without basic lubrication at the factory, you must apply double the quantity of lubricant stated in table "Amount of lubricant for oil lubrication" on page 162 via the nut's lube hole before commissioning.

The positioning and traversing instructions in the illustration below must be complied with.

When using single-line distributor systems, care should be taken that all lines and the piston distributors (including the connection to the BASA nut) are filled before performing basic lubrication or relubrication.

Relubricating the ball screw assemblies

Apply the relubrication quantity according to Table "Amount of lubricant for oil lubrication" on page 162 to the lube port until the specified relubrication interval in the diagrams on page 164 has been reached.

The pulse count that is needed for this is the integer quotient of the relubrication amount according to table "Amount of lubricant for oil lubrication" on page 162 and the piston distributor size.

In this connection, you must ensure that the smallest piston distributor size of 0.03 cm³ is not fallen short of.

The lubricant cycle time can then be obtained by dividing the relubrication interval by the calculated pulse count.

In this connection, you must comply with the nut position and traversing path shown in the "Positioning and traversing instructions" illustration.

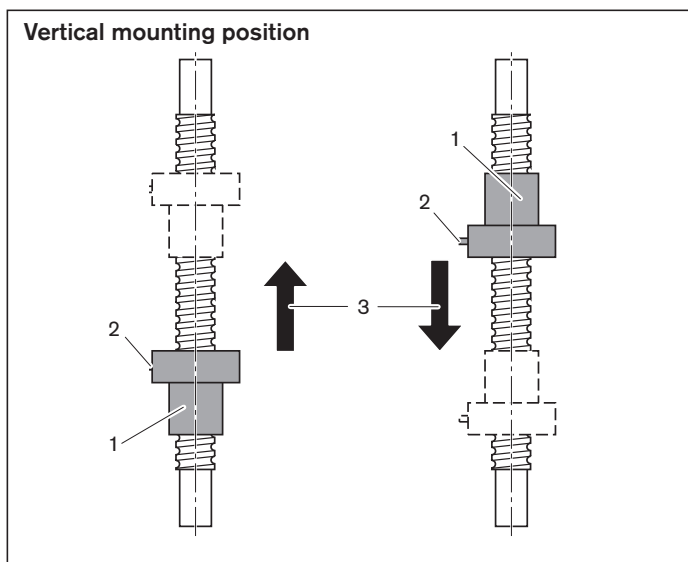
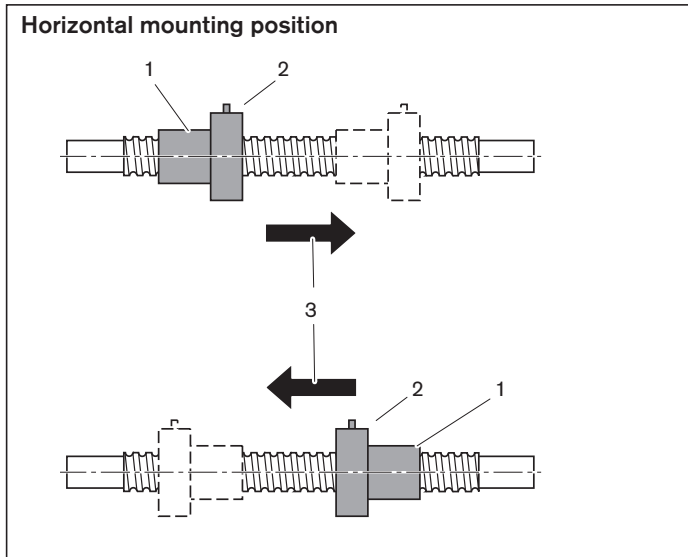
Amount of lubricant for oil lubrication

Note:

In the case of double-threaded FED-E-B single flange nuts and oil lubrication, the quantities for initial and relubrication increase by 20%.

| Nominal diameter d ₀ (mm) | Initial lubrication V _e (cm ³) | Relubrication V _n (cm ³) |
|---|--|--|
| 6 / 8 / 12 / 16 | 0.3 | 0.03 |
| 20 / 25 / 32 | 0.6 | 0.06 |
| 40 | 2.0 | 0.40 |
| 50 / 63 | 4.0 | 0.80 |
| 80 | 8.0 | 1.60 |

Positioning and traversing instructions



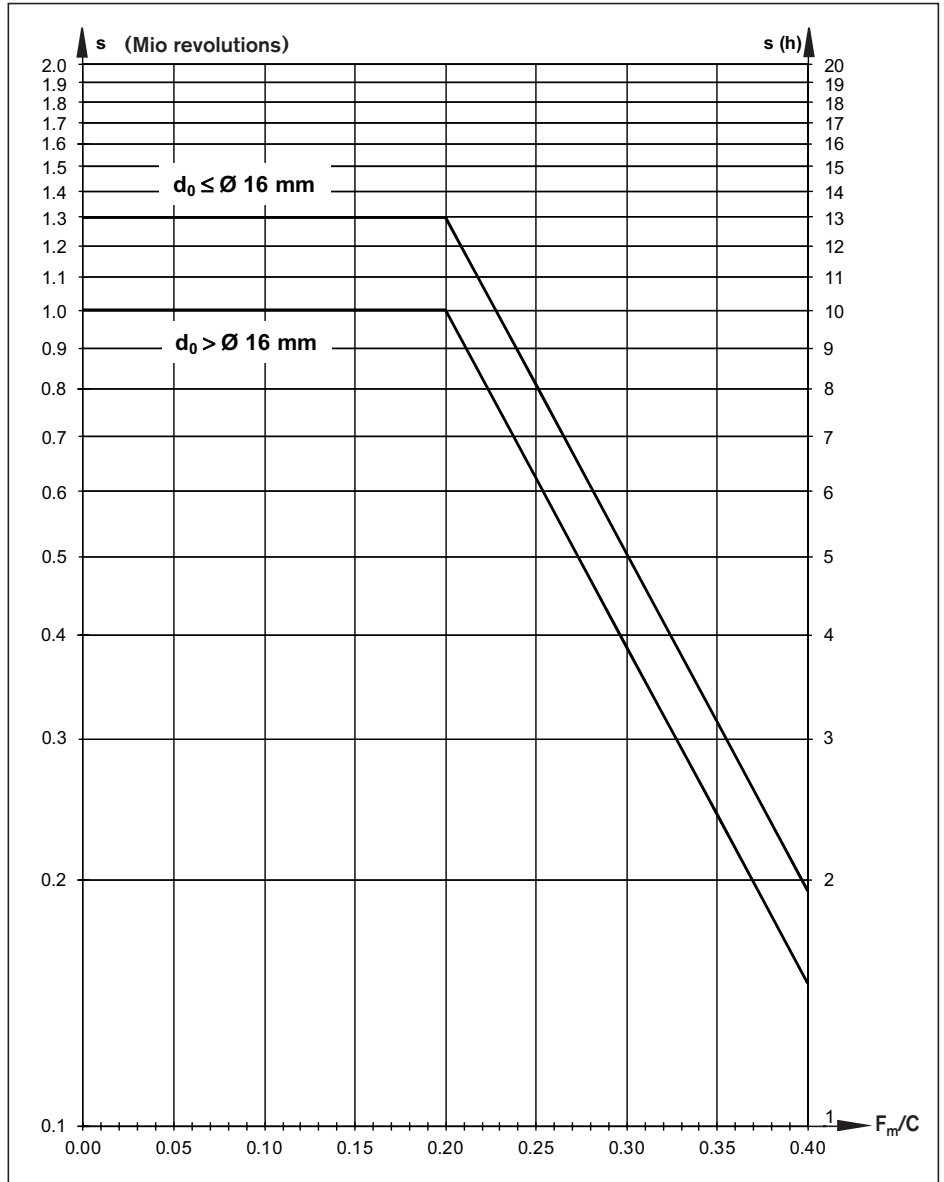
- 1 Position of the nut during lubrication
- 2 Flange with lube port (if installed horizontally, the port should be at the top if possible)
- 3 Direction of travel after lubrication. Traversing path should be at least 3x the nut length.

Load-dependent lubrication in the case of oil lubrication with single-line piston distributor systems ("dry axes")

This applies to the following conditions:

- Lubricating oil is Shell Tonna S 220
- No exposure to media
- Standard seals
- Driven screws
- Not mission critical operation
- Ambient temperature: $T = 10$ to 40 °C

s = relubrication interval
 in millions of revolutions 10^6 rev.
 or hours (h)
 C = dynamic load rating (N)
 F_m = equivalent dynamic axial load (N)



The relubrication interval s is defined either by the number of revolutions in millions or the operating time in h . The value that is reached first defines the lubrication interval.

Conversion of the relubrication interval s from millions of revolutions to kilometers:

$$s \text{ in kilometers} = \frac{s \text{ in millions (of revs)} \cdot \text{lead } P \text{ (mm)}}{10^6}$$

Example:

$$s \text{ in kilometers} = \frac{1.3 \cdot 10^6 \text{ (revs)} \cdot 16 \text{ (mm)}}{10^6} = 20.8 \text{ km}$$

Notes

The load ratio F_m/C is the quotient of the equivalent dynamic axial load F_m and the dynamic load rating C (see "Calculation").

At extreme operating conditions, please consult us as special consideration may be required for the lubrication intervals. These operating conditions include low medium rotary speeds n_m , increased ambient temperatures and high loads $F_m/C > 0.4$.

When using a single-line distributor system, you must ensure that the smallest piston distributor size of 0.03 cm^3 is not fallen short of.

We recommend using piston distributors from SKF. They should be installed as close as possible to the lube ports of the ball screw assembly nut.

Long lines and small line diameters should be avoided, and the lines should be laid on an upward slant.

If other consumers are connected to the single-line centralized lubrication system, the weakest link in the chain determines the lubrication cycle time.

Please also note the general lubrication information on page 149.

Oil lubrication with a single-line piston distributor system

Design example of lubrication a typical two-axis application using central lubrication

X axis

| Component or characteristic value | Specifications |
|-----------------------------------|--|
| Ball screw assembly | FEM-E-S 32x10Rx3.969-5; C = 38000 N; Part no.: R 1512 340 13 (page 34) |
| Equivalent dynamic axial load | $F_m = 9\,510\text{ N}$ |
| Stroke | 1,000 mm |
| Average speed | $n_m = 1,000\text{ rpm}$ |
| Ambient temperature | 10 to 40 °C |
| Mounting orientation | Horizontal |
| Lubrication | Single-line distributor system for all axes with Shell Tonna S 220 oil |
| Exposure | No exposure to media, chips, dust |

| Design sizes | Design | Sources of information |
|-------------------------------------|--|---|
| 1. Normal stroke or short stroke | Normal stroke: Stroke > nut length L; 1,000 mm > 77 mm! i.e. normal stroke applies! | For short stroke information, see page 133, for L see page 34 |
| 2. Initial lubrication amount | Initial lubrication amount: At the factory with Dynalub 510 | See basic lubrication on page page 162 |
| 3. Relubrication amount | Relubrication amount: 0.06 cm ³ | Relubrication amount from table page 154 |
| 4. Mounting orientation | Pay attention to the positioning and traversing instructions for the horizontal mounting orientation! | see "Positioning and traversing instructions" on page 163 |
| 5. Piston distributor size | Permitted piston distributor size: 0.03 cm ³ | see page 163 |
| 6. Number of pulses | Number of pulses = $\frac{0.06\text{ cm}^3}{0.03\text{ cm}^3} = 2$ | Number of pulses = $\frac{\text{Relubrication amount}}{\text{Permissible piston distributor size}}$ |
| 7. Load ratio | Load ratio = $\frac{9,510\text{ N}}{38,000\text{ N}} = 0.25$ | Load ratio = $\frac{F_m}{C}$ F_m and C from specifications |
| 8. Relubrication interval | Relubrication interval: 0.63 · 10 ⁶ revs or every 6.3 h | From diagram on page 164 with a load ratio of 0.25 |
| 9. Effective relubrication interval | Since at $n_m = 1,000\text{ rpm}$ the 0.63 · 10 ⁶ revs is only reached after 10.5 h, the read-off 6.3 h is effective as the lubrication interval. | n_m from specifications is the effective relubrication interval, see the "Note" on page 162 |
| 10. Lube cycle | Lube cycle = $\frac{6.3\text{ h}}{2} = 3.15\text{ h}$ | Lube cycle = $\frac{\text{Eff. Relubrication interval}}{\text{Number of pulses}}$ |

Interim result (X-axis)

In the case of the X-axis, the system must supply the nut of the ball screw assembly with a minimum amount of 0.03 cm³ of Shell Tonna S 220 every two hours.

Y axis

| Component or characteristic value | Specifications |
|-----------------------------------|--|
| Ball screw assembly | FEM-E-B 16x16Rx3-3; C = 11,200 N; Part no.: R 1502 060 63 (page 36) |
| Equivalent dynamic axial load | $F_m = 1,200 \text{ N}$ |
| Stroke | 500 mm |
| Average speed | $n_m = 1,500 \text{ rpm}$ |
| Ambient temperature | 10 to 40 °C |
| Mounting orientation | Horizontal |
| Lubrication | Single-line distributor system for all axes with Shell Tonna S 220 oil |
| Exposure | No exposure to media, chips, dust |

| Design sizes | Design | Sources of information |
|-------------------------------------|--|---|
| 1. Normal stroke or short stroke? | Normal stroke: Stroke > nut length L; 500 mm > 61 mm! i.e. normal stroke applies! | For short stroke information, see page 133, for L see page 36 |
| 2. Initial lubrication amount | Initial lubrication amount: At the factory with Dynalub 510 | See basic lubrication on page page 162 |
| 3. Relubrication amount | Relubrication amount: 0.03 cm ³ | Relubrication amount from table page 162 |
| 4. Mounting orientation | Pay attention to the positioning and traversing instructions for the horizontal mounting orientation! | see "Positioning and traversing instructions" on page 163 |
| 5. Piston distributor size | Permitted piston distributor size: 0.03 cm ³ | see page 163 |
| 6. Number of pulses | Number of pulses = $\frac{0.03 \text{ cm}^3}{0.03 \text{ cm}^3} = 1$ | Number of pulses = $\frac{\text{Relubrication amount}}{\text{Permissible piston distributor size}}$ |
| 7. Load ratio | Load ratio = $\frac{1,200 \text{ N}}{11,200 \text{ N}} = 0.11$ | Load ratio = $\frac{F_m}{C}$ F _m and C from specifications |
| 8. Relubrication interval | Relubrication interval: 1.3 · 10 ⁶ revs or every 13 h | From diagram on page 164 with a load ratio of 0.11 |
| 9. Effective relubrication interval | Since at n _m = 1,500 rpm the 1.3 · 10 ⁶ revs is only reached after 14.4 h, the read-off 13 h is effective as the lubrication interval. | n _m from specifications is the effective relubrication interval, see the "Note" on page page 162 |
| 10. Lube cycle | Lube cycle = $\frac{13 \text{ h}}{1} = 13 \text{ h}$ | Lube cycle = $\frac{\text{Eff. relubrication interval}}{\text{Number of pulses}}$ |

**Interim result
(Y-axis)**

In the case of the Y-axis, the system must supply the nut of the ball screw assembly with a minimum amount of 0.03 cm³ of Shell Tonna S 220 every 13 hours.

**Final result
(Two-axis lubrication)**

Since the axes in this example are both to be supplied by a single-line distributor system, the X-axis – with its lower (two-hour) lubrication cycle – determines the overall lubrication cycle of the system, i.e. the Y-axis is lubricated every 3.15 hours too.

Lubricants

Dynalub high-performance lubricant for linear motion technology

(Approved in the countries of the EU only; not approved outside of the EU)

Product description of Dynalub 510

| Part number | Packaging unit |
|--------------|----------------|
| R3416 037 00 | 1 x 400 g |
| R3416 035 00 | Hobbock 25 kg |

Dynalub 510 is a lithium-based high-performance grease of NLGI grade 2 that has been specially designed for linear motion technology applications. It is characterized by its good water resistance and corrosion protection properties and can be used at temperatures ranging from $-20\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$.

Application area

Under conventional environmental conditions, this ground-fiber, homogeneous grease is ideally suited for the lubrication of linear elements:

- At loads of up to $0.5\text{ }C_{\text{dyn}}$
- Also with short-stroke applications $\geq 1\text{ (mm)}$

Technical data

For additional information, see the "Dynalub 510 safety data sheet"
R310DE 2052 (2004.04)

| | | |
|--|--|--------------------|
| Chemical composition | Mineral base oil, special lithium soap, active ingredients | |
| Identification | KP2K-20 | DIN 51 825 |
| Appearance | Light brown-beige, ground-fiber | |
| Service temperature range | $-20\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$ | |
| NLGI grade | 2 | |
| Worked penetration | 265-295 1/10 mm | DIN ISO 2137 |
| Water resistance | 0-60, 1-90 | DIN 51 807 T1 |
| Melting point in $^{\circ}\text{C}$ | > 165 | DIN ISO 2176 |
| Flash point in $^{\circ}\text{C}$ | > 200 base oil | DIN ISO 2592 |
| Basic oil viscosity | 100 mm^2/s $40\text{ }^{\circ}\text{C}$ | DIN 51 562 |
| | 10 mm^2/s $100\text{ }^{\circ}\text{C}$ | |
| Flow pressure at $-20\text{ }^{\circ}\text{C}$ | $< 1,400$ hPa | DIN 51 805 |
| EMCOR test | 0/0 | DIN 51 802 |
| Density at $+25\text{ }^{\circ}\text{C}$ | Approx. 0.92 g/cm^3 | DIN 51 757 |
| Copper corrosion | 2 (24 h/120 $^{\circ}\text{C}$) | DIN 51 811 |
| Four ball tester welding load | $> 2,000$ N | DIN 51 350 T4 |
| Four ball tester impression diameter | 0.93 (400 N, 1 h) | DIN 51 350, part 5 |
| Shelf life in container | 2 years | |

Product description of Dynalub 520

| Part number | Packaging unit |
|--------------|----------------------|
| R3416 043 00 | 1 x 400 g |
| R3416 042 00 | Bucket 5 kg |
| R0419 090 01 | 5 ml maintenance kit |

Dynalub 520 is a lithium-based high-performance grease of NLGI grade 00 that has been specially designed for linear motion technology applications. It is characterized by its good water resistance and corrosion protection properties and can be used at temperatures ranging from $-20\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$.

Application area

Under conventional environmental conditions, this ground-fiber, homogeneous grease is ideally suited for the lubrication of linear elements in miniature versions and for use in central lubrication systems.

Technical data

For additional information, see the "Dynalub 520 safety data sheet"
R310DE 2053 (2004.04)

| | | |
|--|--|---------------|
| Chemical composition | Mineral base oil, special lithium soap, active ingredients | |
| Identification | KP00K-20 | DIN 51 825 |
| Appearance | Light brown-beige, ground-fiber | |
| Service temperature range | $-20\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$ | |
| NLGI grade | 00 | |
| Worked penetration | 400-430 1/10 mm | DIN ISO 2137 |
| Water resistance | 1-90 | DIN 51 807 T1 |
| Melting point in $^{\circ}\text{C}$ | > 160 | DIN ISO 2176 |
| Flash point in $^{\circ}\text{C}$ | > 200 base oil | DIN ISO 2592 |
| Basic oil viscosity | 100 mm^2/s $40\text{ }^{\circ}\text{C}$ | DIN 51 562 |
| | 10 mm^2/s $100\text{ }^{\circ}\text{C}$ | |
| Flow pressure at $-20\text{ }^{\circ}\text{C}$ | < 700 hPa | DIN 51 805 |
| EMCOR test | 0 | DIN 51 802 |
| Density at $+25\text{ }^{\circ}\text{C}$ | Approx. 0.92 g/cm^3 | DIN 51 757 |
| Copper corrosion | 0-1 (24 h/100 $^{\circ}\text{C}$) | DIN 51 811 |
| Four ball tester welding load | 1,800 N | DIN 51 350 T4 |
| Four ball tester impression diameter | 0.80 (400 N, 1 h) | DIN 51 350 T5 |
| Shelf life in container | 2 years | |

Calculation

On request, we can perform all calculations to your specifications.

See "Design Calculation Service Form" on page 169

Average speed and average load

Where the operating conditions vary (fluctuating speed and load), the service life must be calculated using the average values F_m and n_m .

- Where the speed fluctuates, the average speed n_m is calculated as follows:

$$n_m = \frac{|n_1| \cdot q_{t1} + |n_2| \cdot q_{t2} + \dots + |n_n| \cdot q_{tn}}{100\%} \quad 1$$

n_1, n_2, \dots, n_n = speeds in phases 1 ... n (rpm)
 n_m = average speed (rpm)
 $q_{t1}, q_{t2}, \dots, q_{tn}$ = discrete time step in phases 1 ... n (%)

- The following applies to the effective equivalent bearing load:

$$|F_n| > 2.8 \cdot F_{pr} \quad F_{eff\ n} = |F_n|$$

$$|F_n| \leq 2.8 \cdot F_{pr} \quad F_{eff\ n} = \left[\frac{|F_n|}{2.8 \cdot F_{pr}} + 1 \right]^{\frac{3}{2}} \cdot F_{pr}$$

C = dynamic load rating (N)
 $F_{eff\ n}$ = effective equivalent axial load during phase n (N)
 F_n = axial load during phase n (N)
 F_{pr} = pre-tensioning force (see tables on pages 148/151) (N)

- Where the load fluctuates and the speed is constant, the equivalent dynamic axial load F_m is calculated as follows:

$$F_m = \sqrt[3]{|F_{eff\ 1}|^3 \cdot \frac{q_{t1}}{100\%} + |F_{eff\ 2}|^3 \cdot \frac{q_{t2}}{100\%} + \dots + |F_{eff\ n}|^3 \cdot \frac{q_{tn}}{100\%}} \quad 2$$

$F_{eff\ 1}, F_{eff\ 2}, \dots, F_{eff\ n}$ = effective equivalent axial load during phases 1 ... n (N)
 F_m = equivalent dynamic axial load (N)
 $q_{t1}, q_{t2}, \dots, q_{tn}$ = discrete time step for $F_{eff\ 1}, \dots, F_{eff\ n}$ (%)

- Where both the load and the speed fluctuate, the equivalent dynamic axial load F_m is calculated as follows:

$$F_m = \sqrt[3]{|F_{eff\ 1}|^3 \cdot \frac{|n_1|}{n_m} \cdot \frac{q_{t1}}{100\%} + |F_{eff\ 2}|^3 \cdot \frac{|n_2|}{n_m} \cdot \frac{q_{t2}}{100\%} + \dots + |F_{eff\ n}|^3 \cdot \frac{|n_n|}{n_m} \cdot \frac{q_{tn}}{100\%}} \quad 3$$

$F_{eff\ 1}, F_{eff\ 2}, \dots, F_{eff\ n}$ = effective equivalent axial load during phases 1 ... n (N)
 F_m = equivalent dynamic axial load (N)
 n_1, n_2, \dots, n_n = speeds in phases 1 ... n (rpm)
 n_m = average speed (rpm)
 $q_{t1}, q_{t2}, \dots, q_{tn}$ = discrete time step for $F_{eff\ 1}, \dots, F_{eff\ n}$ (%)

Nominal service life

Service life in revolutions L

$$L = \left[\frac{f_{ac} \cdot C}{F_m} \right]^3 \cdot 10^6 \quad 4 \Rightarrow C = \frac{F_m}{f_{ac}} \cdot \sqrt[3]{\frac{L}{10^6}} \quad 5 \Rightarrow F_m = \frac{f_{ac} \cdot C}{\sqrt[3]{\frac{L}{10^6}}} \quad 6$$

C = dynamic load rating (N)
 F_m = equivalent dynamic axial load (N)
 L = nominal service life in revolutions (-)
 f_{ac} = Correction factor for tolerance grades (see page 141)

Service life in hours L_h

$$L_h = \frac{L}{n_m \cdot 60} \quad 7$$

L_h = Service life (hrs)
 L = service life in revolutions (-)
 n_m = average speed (rpm)

$$L_{h \text{ machine}} = L_h \cdot \frac{DC_{\text{machine}}}{DC_{\text{BASA}}} \quad 8$$

DC_{machine} = duty cycle of the machine (%)
 DC_{BASA} = duty cycle of the BASA (%)
 $L_{h \text{ machine}}$ = nominal service life of the machine (h)
 L_h = nominal service life of the ball screw assembly (h)

Drive torque and drive power

You must check end machining for the maximum permissible torque

Drive torque M_{ta}

For conversion of rotary motion to linear motion

$$M_{ta} = \frac{F_L \cdot P}{2000 \cdot \pi \cdot \eta} \quad 9$$

$M_{ta} \leq M_p$

F_L = thrust force (N)
 M_p = maximum permissible drive torque (Nm)
 M_{ta} = drive torque (Nm)
 P = lead (mm)
 η = mech. efficiency ($\eta \approx 0.9$) (-)

Transmitted torque M_{te}

for conversion of linear motion into rotary motion:

$$M_{te} = \frac{F_L \cdot P \cdot \eta'}{2000 \cdot \pi} \quad 10$$

$M_{te} \leq M_p$

F_L = thrust force (N)
 M_p = maximum permissible drive torque (Nm)
 M_{te} = transmitted torque (Nm)
 P = lead (mm)
 η' = mech. efficiency ($\eta' \approx 0.8$) (-)

The dynamic drag torque must be taken into account for preloaded nut units.

Drive power P_a

$$P_a = \frac{M_{ta} \cdot n}{9\,550} \quad 11$$

M_{ta} = drive torque (Nm)
 n = speed (rpm)
 P_a = drive power (kW)

⚠ With critical applications, you must pay attention to the information below.

Static load safety factor S_0

You must verify mathematically any structural design involving rolling contact with regard to the static load safety factor.

In this connection, $F_{0 \text{ max}}$ represents the maximum load amplitude that can occur, which can affect the screw drive. It does not matter whether this load is exerted only for a short period. It may represent the peak amplitude of an overall dynamic loading. For design purposes, the data shown in the table applies.

$$S_0 = C_0 / (F_{0 \text{ max}}) \quad 12$$

C_0 = Static load rating (N)
 $F_{0 \text{ max}}$ = Maximum static load (N)
 S_0 = Static load safety factor (-)

Design of the static load safety factor in relation to the operating conditions

| Operating conditions | Static load safety factor S_0 |
|---|---------------------------------|
| Overhead arrangements and applications representing a high hazard potential | ≥ 12 |
| High dynamic load when at standstill, contamination. | 8 - 12 |
| Normal design of machinery and plant without full knowledge of the load parameters or connection details. | 5 - 8 |
| Full knowledge of all the load data. Vibration-free operation is ensured. | 3 - 5 |

If there are health and safety hazards, protection against falling loads must be provided (see the chapter entitled "Arrestor nut")

Calculation

Calculation example service life

Operating conditions

The service life of the machine should be 40,000 operating hours with the BASA operating 60% of the time.

Proposed BASA: 63 x 10

| | | | | | |
|--------------------------|----|-------------------------|-----|--------------|-------------------|
| $F_1 = 50\,000\text{ N}$ | at | $n_1 = 10\text{ rpm}$ | for | $q_1 = 6\%$ | of the duty cycle |
| $F_2 = 25\,000\text{ N}$ | at | $n_2 = 30\text{ rpm}$ | for | $q_2 = 22\%$ | of the duty cycle |
| $F_3 = 8\,000\text{ N}$ | at | $n_3 = 100\text{ rpm}$ | for | $q_3 = 47\%$ | of the duty cycle |
| $F_4 = 2\,000\text{ N}$ | at | $n_4 = 1000\text{ rpm}$ | for | $q_4 = 25\%$ | of the duty cycle |
| 100% | | | | | |

Calculation procedure

Average torque n_m

$$n_m = \frac{6}{100} \cdot |10| + \frac{22}{100} \cdot |30| + \frac{47}{100} \cdot |100| + \frac{25}{100} \cdot |1000| \quad 1$$

$$n_m = 304\text{ rpm}$$

Equivalent dynamic axial load F_m for variable load and variable speed

$$F_m = \sqrt[3]{|50000|^3 \cdot \frac{|10|}{304} \cdot \frac{6}{100} + |25000|^3 \cdot \frac{|30|}{304} \cdot \frac{22}{100} + |8000|^3 \cdot \frac{|100|}{304} \cdot \frac{47}{100} + |2000|^3 \cdot \frac{|1000|}{304} \cdot \frac{25}{100}} \quad 3$$

$$F_m = 8\,757\text{ N}$$

Required service life L
(revolutions)

The service life L can be calculated by transposing formulas 7 and 8:

$$L = L_h \cdot n_m \cdot 60$$

$$L_h = L_{h\text{ machine}} \cdot \frac{DC_{\text{BASA}}}{DC_{\text{machine}}}$$

$$L_h = 40\,000 \cdot \frac{60}{100} = 24\,000\text{ h}$$

$$L = 24\,000 \cdot 304 \cdot 60$$

$$L = 437\,760\,000\text{ revolutions}$$

Basic dynamic load rating C

$$C = 8\,757 \cdot \sqrt[3]{\frac{437\,760\,000}{10^6}} \quad 5 \quad C \approx 66\,492\text{ N}$$

Result and selection

Now a selection can be made from the dimension tables:

e.g. ball screw assembly,
size 63 x 10 R x 6-6, with preloaded
FEM-E-S single flange nut,
dyn. load capacity $C = 106,600\text{ N}$,
part no. R1512 640 13,
with screw tolerance grade 7.

Attention:
Take into account the dynamic load rating
of the screw end bearing used!

⚠ Take into account correction factor f_{ac} of the tolerance grade! See page 141.

Cross-check

Now the following can be selected from the product tables:

Size 63 x 10 R x 6-6

Backlash (C0)

FEM-E-S, with standard backlash
Load rating $C_{dyn} = 106,560$ N
correction factor $f_{ac} = 0.9$
Cross-check
Service life of the selected ball screw drive in revolutions

$$L = \left[\frac{0.9 \cdot 106\,560}{8\,757} \right]^3 \cdot 10^6$$

$L \approx 1314 \cdot 10^6$ revolutions

Service life in hours L_h

$$L_h = \frac{1\,314 \cdot 10^6}{304 \cdot 60}$$

$L_h \approx 72,039$ hours

Preload (preload class C3)

FEM-E-S, with preload class C3
Load rating $C_{dyn} = 106,560$ N
Correction factor $f_{ac} = 0.9$
Pre-tensioning force = 4400 N
Cross-check
The following applies to the effective equivalent bearing load:

$$|F_n| > 2.8 \cdot F_{pr} \quad F_{eff\ n} = |F_n|$$

$$|F_n| \leq 2.8 \cdot F_{pr} \quad F_{eff\ n} = \left[\frac{|F_n|}{2.8 \cdot F_{pr}} + 1 \right]^{\frac{3}{2}} \cdot F_{pr}$$

C = dynamic load rating (N)
 $F_{eff\ n}$ = effective equivalent axial load during phase n (N)
 F_n = axial load during phase n (N)
 F_{pr} = pre-tensioning force (see tables on pages 148/151) (N)

$2.8 \times F_{pr} = 2.8 \times 4\,440\text{ N} = 12\,432\text{ N}$

- $F_1 = 50\,000\text{ N} > 12\,432\text{ N} \Rightarrow F_{eff1} = 50\,000\text{ N}$
- $F_2 = 25\,000\text{ N} > 12\,432\text{ N} \Rightarrow F_{eff2} = 25\,000\text{ N}$
- $F_3 = 8\,000\text{ N} < 12\,432\text{ N} \Rightarrow F_{eff3} = \left[\frac{8\,000}{12\,432} + 1 \right]^{1.5} \cdot 4\,440\text{ N} = 9\,355\text{ N}$
- $F_4 = 2\,000\text{ N} < 12\,432\text{ N} \Rightarrow F_{eff4} = \left[\frac{2\,000}{12\,432} + 1 \right]^{1.5} \cdot 4\,440\text{ N} = 5\,553\text{ N}$

$$F_m = \sqrt[3]{\left[50000 \right]^3 \cdot \frac{10}{304} \cdot \frac{6}{100} + \left[25000 \right]^3 \cdot \frac{30}{304} \cdot \frac{22}{100} + \left[9355 \right]^3 \cdot \frac{100}{304} \cdot \frac{47}{100} + \left[5553 \right]^3 \cdot \frac{1000}{304} \cdot \frac{25}{100}}$$

$F_m = 9\,485\text{ N}$

$$L = \left[\frac{0.9 \cdot 106\,560}{9\,485} \right]^3 \cdot 10^6 = 1034 \cdot 10^6 \text{ revolutions}$$

$$L_h = \frac{1\,034 \cdot 10^6}{304 \cdot 60} = 56,689 \text{ hours}$$

The service life of both BASAs (with standard backlash C0/with preload class C3) exceeds the required service life of $40,000 \times 60\% = 24,000$ hours. This means that it is possible to choose a smaller BASA, subject to a review of it being undertaken.

Critical speed n_{cr}

The critical speed n_{cr} depends on the diameter of the screw, the type of end fixity, and the free length l_{cr} . No allowance must be

made for guidance by a nut with backlash. The operating speed should not be more than 80% of the critical speed.

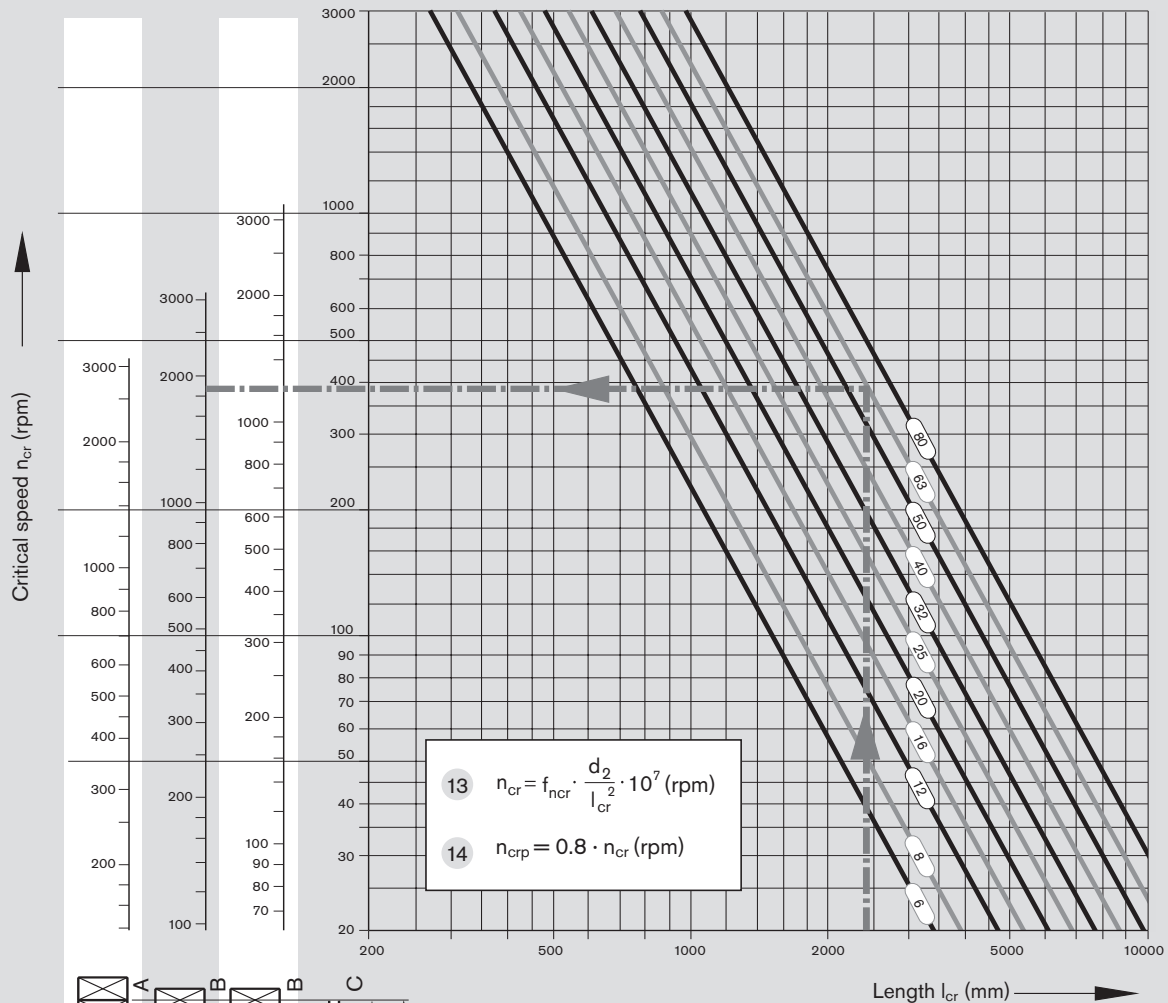
The characteristic speed and the max. permissible linear speed must be taken into account, see "Technical notes" on page 132.

Example

Screw diameter = 63 mm
Length l_{cr} = 2.4 m
End fixity II (fixed bearing - floating bearing)

According to the graph, the critical speed is 1850 rpm.
The permissible operating speed is 1850 rpm x 0.8 = 1480 rpm.

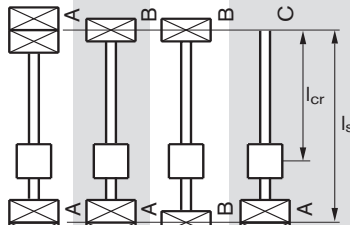
The maximum operating speed in our calculation example of $n_4 = 1000$ rpm is therefore below the permissible operating speed.



13 $n_{cr} = f_{ncr} \cdot \frac{d_2}{l_{cr}^2} \cdot 10^7$ (rpm)
14 $n_{crp} = 0.8 \cdot n_{cr}$ (rpm)

End fixity:

- A = fixed bearing
- B = floating bearing
- C = without bearing



| End fixity | I | II | III | IV |
|-------------------|------|------|------|-----|
| f_{ncr} - value | 27.4 | 18.9 | 12.1 | 4.3 |

- n_{cr} = Critical speed (rpm)
- n_{crp} = Permissible operating speed (rpm)
- f_{ncr} = Coefficient determined by bearing
- d_2 = Root diameter of screw (see dimension tables) (mm)
- l_{cr} = Critical length for preloaded nut systems (mm)
- l_s = Bearing - bearing distance (mm)

For non-preloaded nut systems $l_{cr} = l_s$
For screw ends Form 31, the end fixity can be assumed to be "fixed".

Attention: End fixity IV (fixed-floating) – only recommended for short overall lengths if installed horizontally. For longer overall lengths, the floating end must be supported. Please contact our specialist department if you have any questions.

Permissible axial load on screw F_c (buckling load)

The permissible axial load on the screw F_c depends on the diameter of the screw, the

type of end fixity, and the effective unsupported length l_c .

A safety factor of $s \geq 2$ should be taken into account for axial loading.

Example

- Screw diameter = 63 mm,
- Lead = 10 mm,
- Length l_c = 2.4 m
- End fixity IV (fixed bearing - floating bearing)

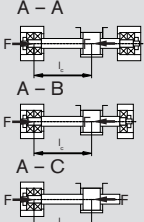
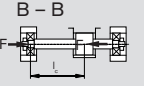
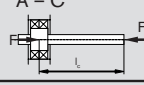
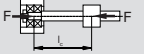
According to the graph, the theoretically permissible axial load is 360 kN. Applying the safety factor 2 yields a permissible axial load on the screw in operation of $360 \text{ kN} : 2 = 180 \text{ kN}$.

This therefore lies above the maximum operating load of $F_1 = 50 \text{ kN}$ used in our calculation example.

15 $F_c = f_{F_c} \cdot \frac{d_2^4}{l_c^2} \cdot 10^4 \text{ (N)}$

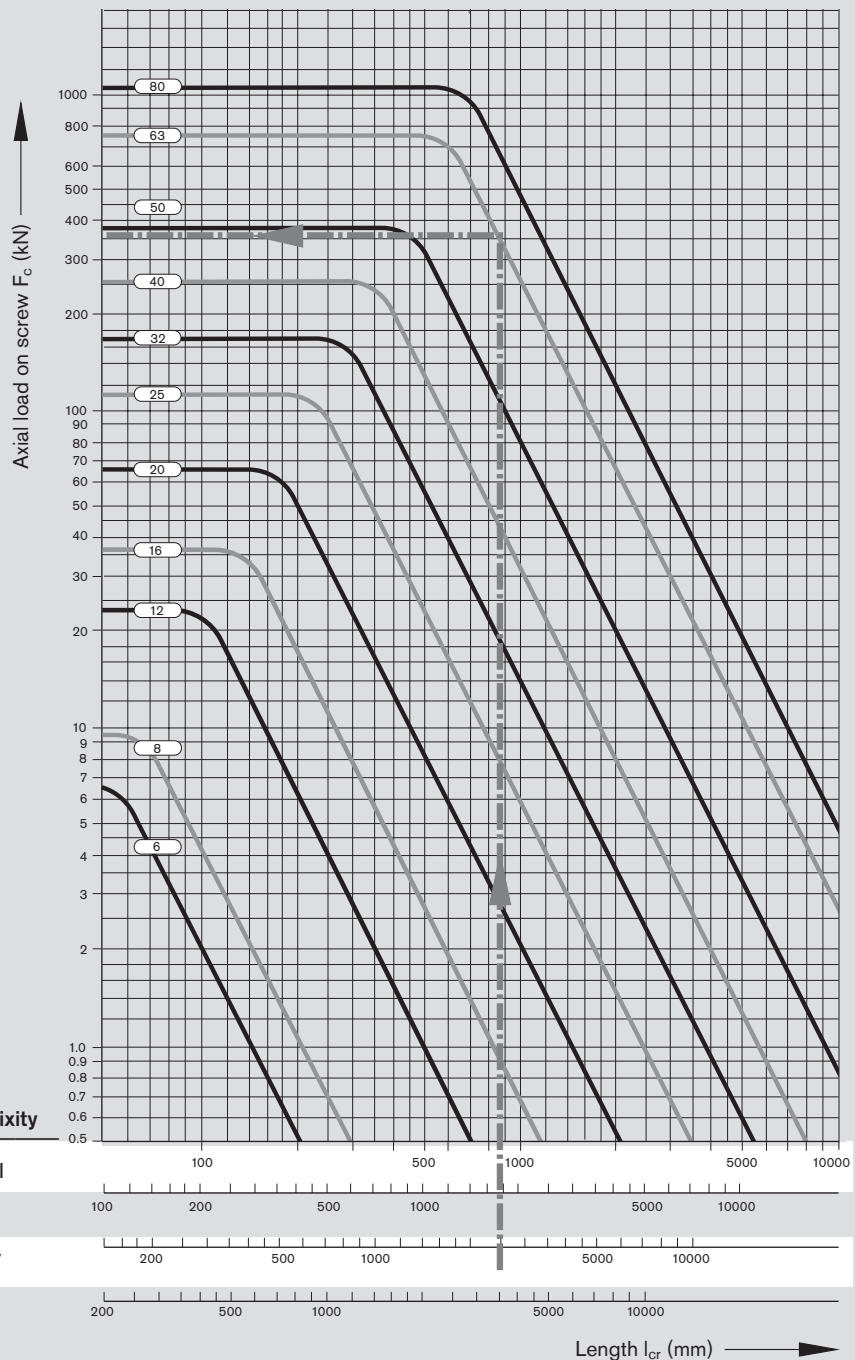
16 $F_{cp} = \frac{F_c}{2} \text{ (N)}$

- F_c = Theoretically permissible axial load on screw (N)
- F_{cp} = Permissible axial load on screw during operation (N)
- f_{F_c} = Corrector value determined by bearing
- d_2 = Root diameter of screw, see dimension tables (mm)
- l_c = unsupported thread length (mm)

| End fixity: | coefficient f_{F_c} | |
|---|-----------------------|-----------------------|
| | nut fixed | nut floating |
|  End fixity I | 39.7 | End fixity IV 20.3 |
|  End fixity II | 20.3 | End fixity V 9.9 |
|  End fixity III | 2.5 | |
|  End fixity VI | | 2.5 |

- End fixity:**
- A = fixed bearing
 - B = floating bearing
 - C = without bearing

| f_{F_c} value | End fixity |
|-----------------|------------|
| 2.5 | III / VI |
| 9.9 | V |
| 20.3 | II / IV |
| 39.7 | I |



Notes on buckling

The effective buckling length l_c of the screw is the maximum unsupported screw length in the direction of the force's flow between the nut unit and the fixed bearing (center-to-center distance) or between the nut unit and the screw end.

For buckling load calculations, the nut is taken into consideration as a bearing.

For "nut fixed," the following conditions must be met:

- zero-backlash nut,
- rigid attachment of the nut to the linear guide,
- the nut unit is not subjected to moment loads, i.e. a linear guide absorbs any arising moments,
- no distortive stresses due to external factors (for example, temperature).

In linear motion systems from Bosch Rexroth, the nut can be considered to be a fixed bearing.

If one or more of the conditions for "nut fixed" are not met, the appropriate coefficients for "nut floating" must be used instead.

Case III occurs in applications with driven nuts, for example, when the nut is stationary and the screw rotates. The nut can then be regarded as a fixed bearing.

Case VI arises only when the nut unit is not supported by any linear guide.

Design of drive unit FAR-B-S

Fundamental advantages of systems with driven nuts

Moment of inertia

In the case of long screws, the screw does not have to be rotated in the acceleration phase, only the nut. The mass moment of inertia of the screw is not therefore critical. The moment of inertia of the nut is comparatively low and it is no longer dependent on the required stroke.

Dynamics

The intricate end bearing designs required for high dynamics, for example, fixed bearing on both ends with angular-contact ball bearings, are no longer necessary.

Screw extenders

Since the screw is stationary, relatively little effort is needed to stretch the screw:

- Increase in permissible axial loading (buckling load); not limited by end bearings
- Compensation of responses to temperature changes
- Increase in overall rigidity

Liquid cooling

- Improved cooling can easily be provided using a hollow-bored screw:
- the stationary screw can be cooled with comparatively little effort.
- Controlled cooling virtually eliminates changes in length due to temperature fluctuations.

Design and manufacturing tolerances

The use of nuts with a high level of axial and radial runout precision minimizes the induced screw vibration.

All functional components are supplied from a single source. In-house designs are no longer needed.

Critical speed

$$n_{cr} = f_{ncr} \cdot \frac{d_2}{l_{cr}} \cdot 10^7 \text{ (min}^{-1}\text{)}$$

$$n_{crp} = 0.8 \cdot n_{cr} \text{ (rpm)}$$

n_{cr} = Critical speed (rpm)

n_{crp} = Perm. operating speed (rpm)

f_{ncr} = Coefficient determined by the bearing

d_2 = For root diameter of screw, see dimension tables (mm)

l_{cr} = Critical length for preloaded nut systems (mm)

Critical speed with driven screw:

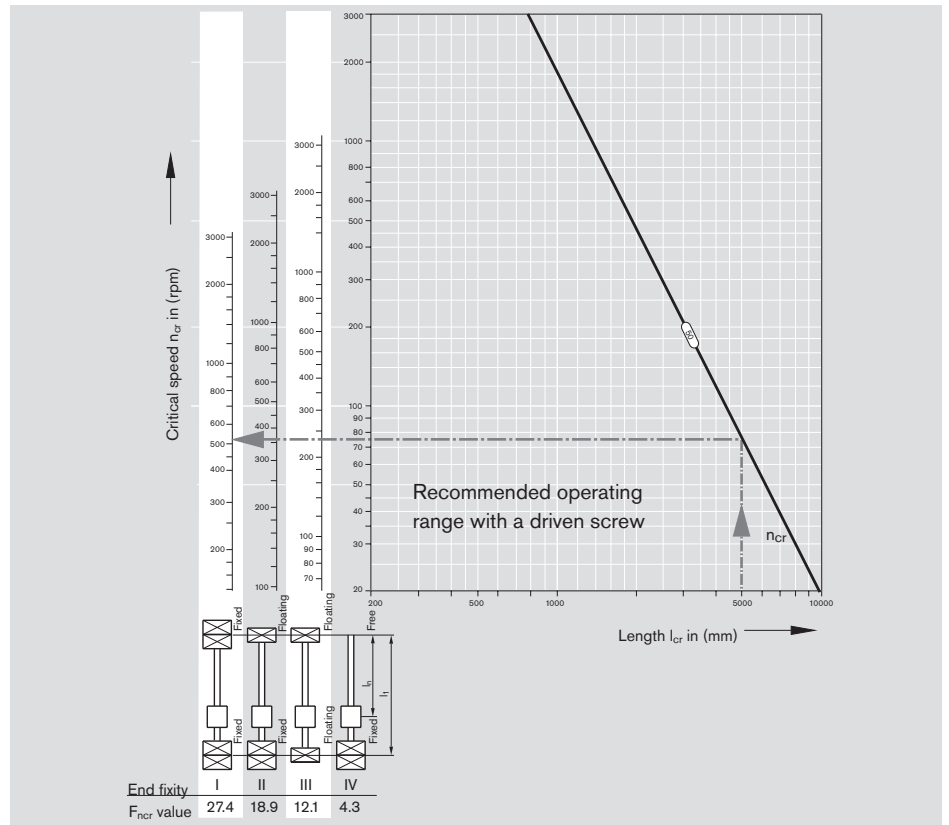
In the case of driven, rotating screws, there is a critical speed that is dependent on the different end fixities:

- I Fixed-fixed,
- II Fixed-floating,
- III Floating-floating,
- IV Fixed-free.

In the case of systems with a driven screw, the bending-critical speed frequently represents a limitation on speed that can be reached.

The rotating screw itself generates vibrations in the system due to the deflection in the horizontal fixity or even due to screw imbalance. Depending on the free screw length and the speed, resonance and very high amplitudes can result that may destroy the system.

At the design stage, a safety distance of 20% to the critical speed is generally maintained.



Critical speed with driven nut:

In the case of systems with a driven nut and a stationary screw, self-excitation of the screw is omitted completely with a suitable design.

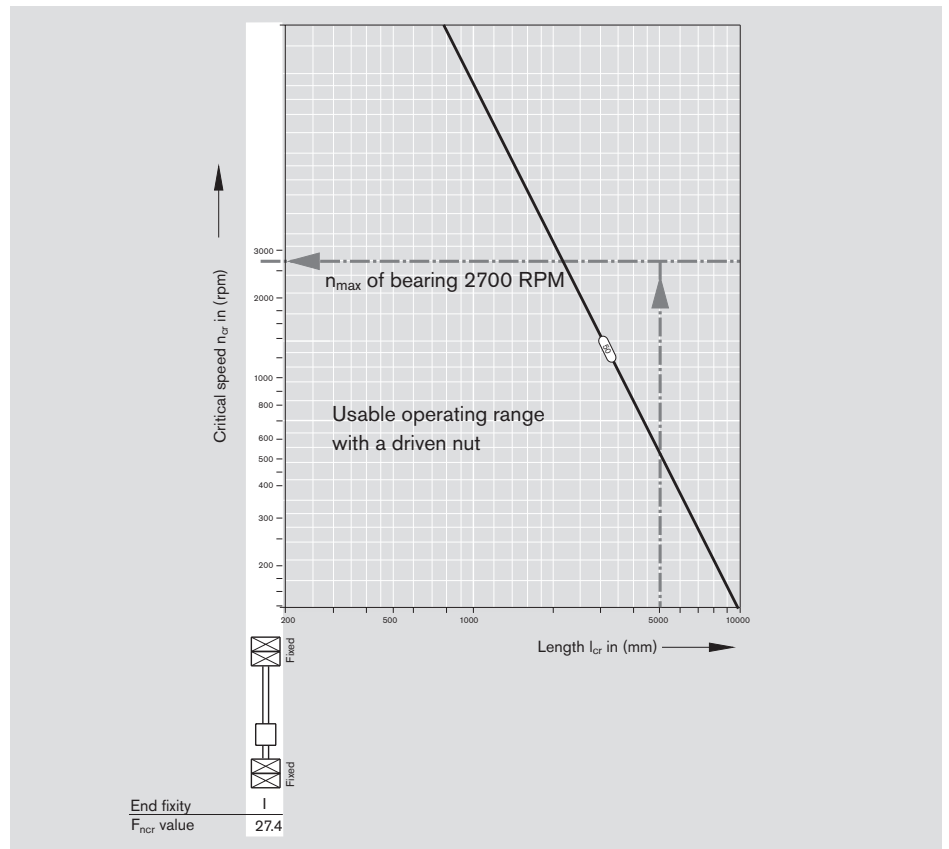
The only other things that excite vibrations are the manufacturing precision of the rotating nut or of the machine's construction. Since FAR-B-S drive units only use nuts that have been manufactured with a high degree of axial and radial run-out accuracy, this means that it is possible to rule out any negative effect on the overall system.

This means that the bending-critical speed no longer represents a limitation.

The maximum speed of the bearings that are used and, to a lesser extent, the high maximum permissible rotary speed ($d_0 \times n$ Wert) of the nut that is used, are still a limitation.

Note:

Applies to fixed-fixed bearing only



Design of drive unit FAR-B-S

Permissible travel speed in dependence on the nut position

Permissible travel speed with a driven nut
End fixity I fixed-fixed bearing
End fixity II fixed-floating bearing

Parameters:

- Screw length
- Screw diameter
- Lead
- End fixity
- Stretching force, negligible
- Max. speed of bearing
- $D \times n$ value of nut

The adjacent diagrams make clear the benefits of a driven nut compared to a "classical ball screw assembly" with a driven screw using size 50 x 40R x 6.5 as an example.

In the case of the driven screw (diagram at the top), the maximum speed with a favorable nut position in the center of the screw is about 60 m/min. However, this speed is only achieved in one position of the stroke. In the case of a non-central nut position, however, it is only possible to achieve about 20 m/min, since the necessary support for the screw is missing. This means that the potential for a high characteristic speed of the nut ($d \times n$ value) cannot be achieved in practice.

Driven nut

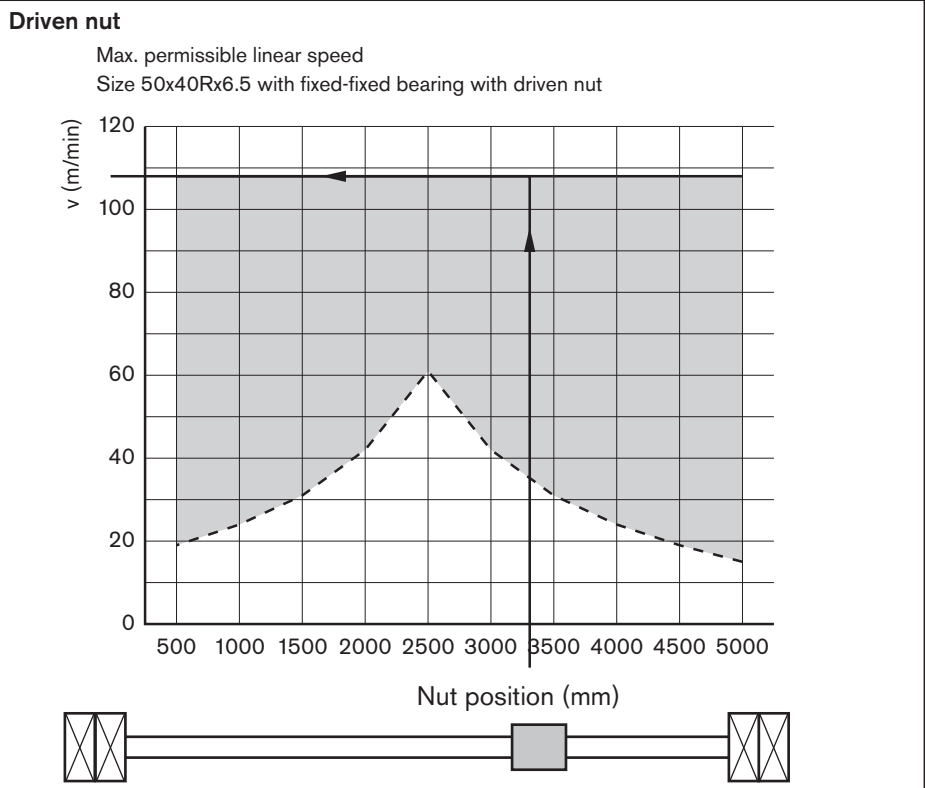
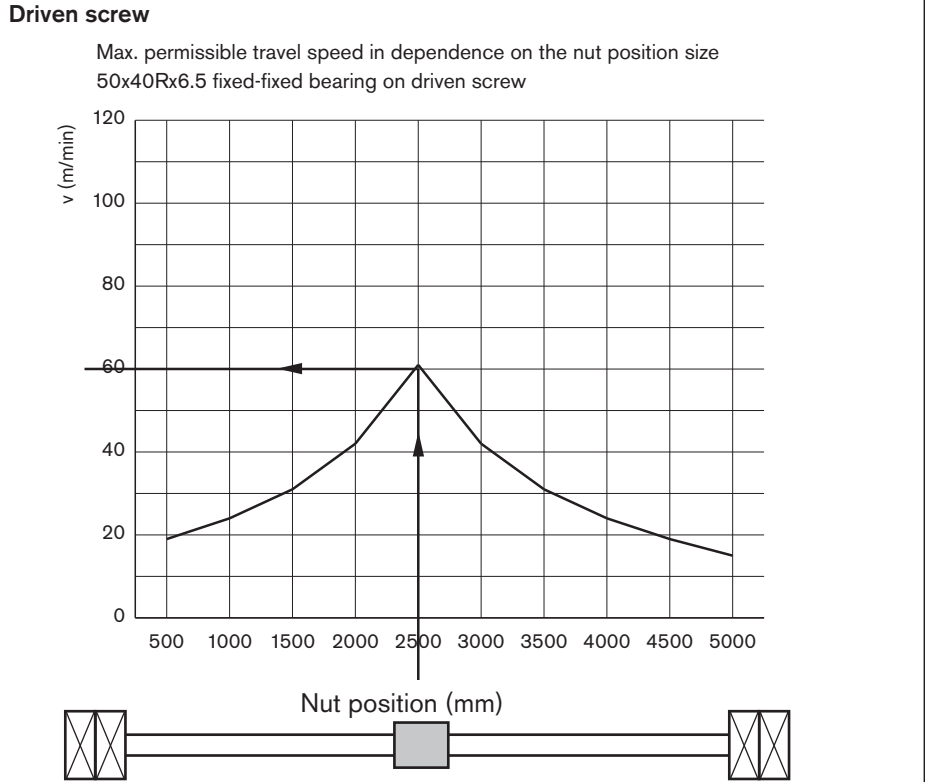
With the driven nut (diagram at the bottom for end fixity I "fixed-fixed"), however, the permissible travel speed of the driven nut is 108 m/min regardless of the nut position across the entire stroke.

In the case of end fixity II "fixed-floating", the floating bearing (axial displacement possible) can be designed such that it is possible to achieve a tangential gradient of the bending line (bending angle at journal area = 0).

In this case, you can also consider a floating bearing end like this as being a fixed bearing for the calculation.

■ Improved performance with driven nut

- - - Driven screw



For the permissible RPM and travel speeds of FAR-B-S drive units, refer to the table below:

End fixity I fixed-fixed bearing and end fixity II fixed-floating bearing

| FAR-B-S size d ₀ x P x D _w - i | Speed n _{max} (rpm) | Speed v _{max} FAR (m/min) |
|---|---------------------------------|---------------------------------------|
| 32 x 10R x 3.969 - 5 | 3,000 | 30 |
| 32 x 20R x 3.969 - 3 | 3,000 | 60 |
| 32 x 32R x 3.969 - 3 | 3,000 | 96 |
| 40 x 10R x 6 - 5 | 2,800 | 28 |
| 40 x 20R x 6 - 3 | 2,800 | 56 |
| 40 x 40R x 6 - 3 | 2,800 | 112 |
| 50 x 10R x 6 - 6 | 2,700 | 27 |
| 50 x 20R x 6.5 - 5 | 2,700 | 54 |
| 50 x 40R x 6.5 - 3 | 2,700 | 108 |
| 63 x 10R x 6 - 6 | 2,300 | 23 |
| 63 x 20R x 6.5 - 5 | 2,300 | 46 |
| 63 x 40R x 6.5 - 3 | 2,300 | 92 |

Conversion of rotational speed to velocity

$$v_{\max} = \frac{n_{\max} \cdot P}{1000}$$

v_{max} = velocity (m/min)
P = lead (mm)
n_{max} = rotational speed (RPM)

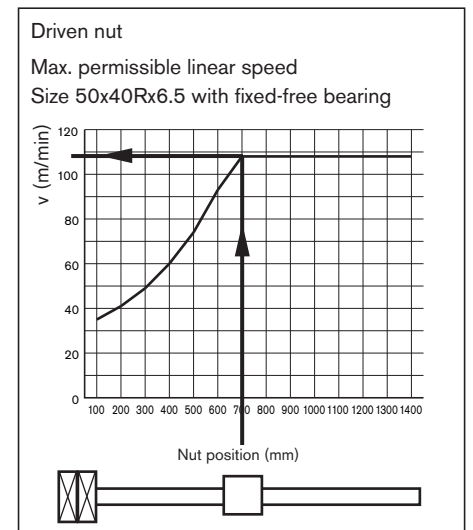
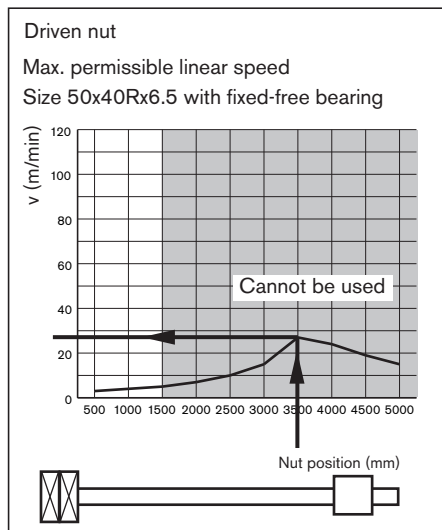
End fixity III floating-floating bearing

This type of end fixity is virtually never used.

Critical speed with rotating nut and screw clamping end fixity IV fixed-free bearing

In the case of “fixed-free” systems with a driven nut, it is only possible to design the screw for short strokes. To quote an extreme case as an example, the system mass of the 50 x 40 screw with a length of 5,000 mm and horizontal mounting would lead to extreme static sagging of about 180 mm. You must take appropriate design measures to ensure that considerably lower sagging and the forces on the nut resulting from this can be avoided,

In this case, it is also possible with FAR-B-S to consider as a limitation the critical speed at an unfavorable nut position on the tensile restraint (see the diagram on the right in the middle). The maximum theoretical value that can be read-off is 28 m/min and it cannot be used due to the deflection. This means that for practical applications, you must introduce a screw length limitation.



In the example diagram on the right, with the recommended maximum length of screw L_{thread max}, a speed of 108 m/min is achieved at a nut position of 700 mm.

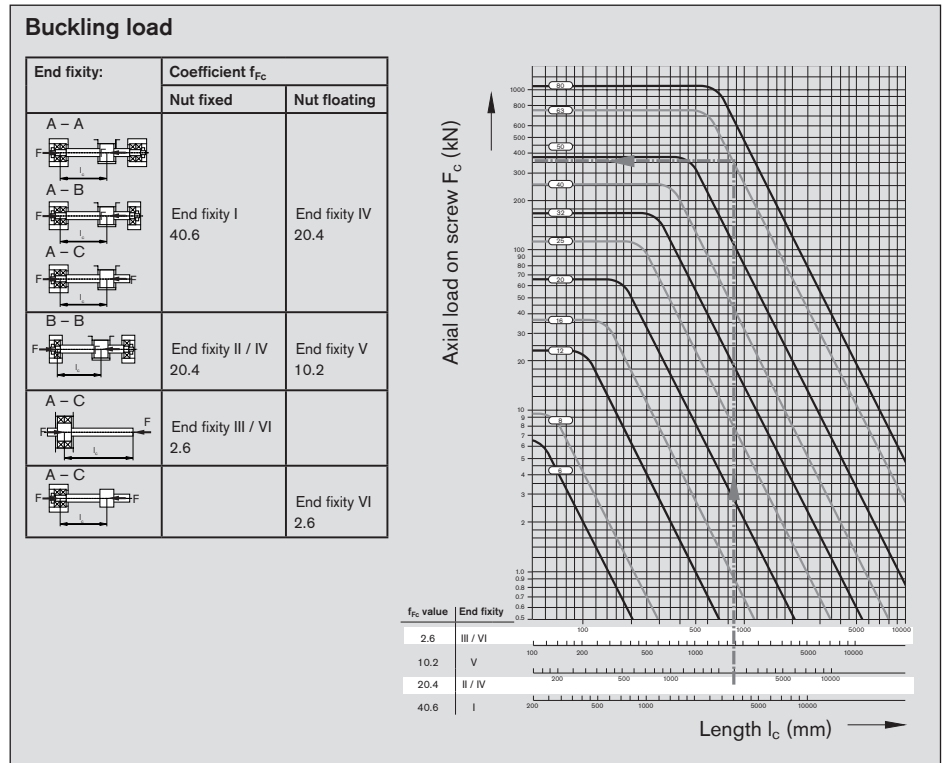
| BASA size | Recommended maximum length (mm) L _{thread max} |
|-----------|--|
| 32 | 1,000 |
| 40 | 1,200 |
| 50 | 1,400 |
| 63 | 1,600 |

Design of drive unit FAR-B-S

Permissible torques in dependence on the nut position

The influencing variables below limit the permissible drive torque with the driven nut

- Screw length
- Screw diameter
- End fixity
- Stretching force
- Geometry of the screw end
- Load direction; in an unfavorable case, a compressive force on the longer screw section (buckling load)



The length and diameter of the screw and its end fixity are taken into account by the Euler buckling case.

This yields the permissible axial load on the screw (see the diagram above). In practice, the adjacent formulas are used for calculation.

$$F_c = f_{Fc} \frac{d_2^4}{l_k^2} \cdot 10^4 \text{ (N)}$$

$$F_{cp} = \frac{F_k}{2} \text{ (N)}$$

$$F_L \leq F_{cp}$$

F_c = Theoretically permissible axial load on screw (N)

F_{cp} = Permissible axial load on screw during operation (N)

f_{Fc} = Corrector value determined by bearing

d_2 = For root diameter of screw, see dimension tables (mm)

l_c = unsupported thread length (mm)

F_L = operating load of the customer (N)

F_{st} = stretching force of the screw (N)

With a stretched screw, the following applies:

$$F_{cp} = \frac{F_c}{2} + F_{st}$$

Due to an increase in temperature, the stretching force may be reduced. You must take this effect into account when calculating F_{kperm} .

The drive torque that is necessary for the operating load results from the following formula:

$$M_{ta} = \frac{F_L \cdot P}{2000 \cdot \pi \cdot \eta}$$

The dynamic drag torque must be taken into account for preloaded nut units.

M_{ta} = drive torque on the nut (Nm)

F = operating load (N)

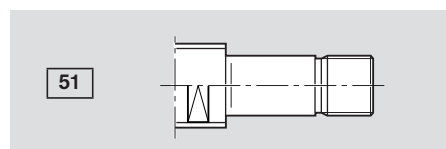
P = lead (mm)

η = mechanical efficiency (approx. 0.9)

$$M_{ta} \leq M_p$$

M_p = permissible torque at the screw journal (Nm)

Recommended maximum torque with the geometry of screw end 51



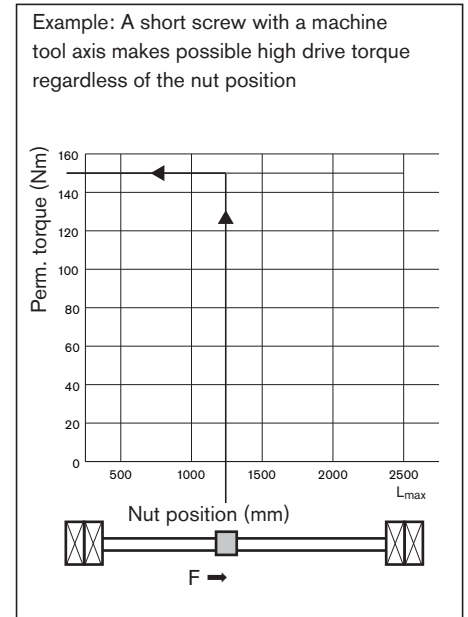
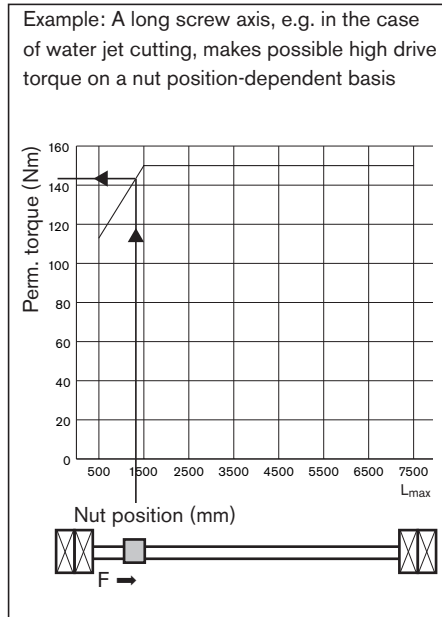
| BASA size | M_{Sperm} (Nm) |
|-----------|------------------|
| 32 | < 40 |
| 40 | < 150 |
| 50 | < 180 |
| 63 | < 190 |

Typical applications

End fixity I fixed-fixed:

Parameters:

- Screw length; two cases
- Screw diameter
- End fixity in this case, fixed-fixed:
- Stretching force ignored (see the next page)
- Geometry of screw end Form 51 on two sides
- Load direction in an unfavorable case, a compressive force on the longer screw section



End fixity II fixed-floating:

Stretching is not possible.

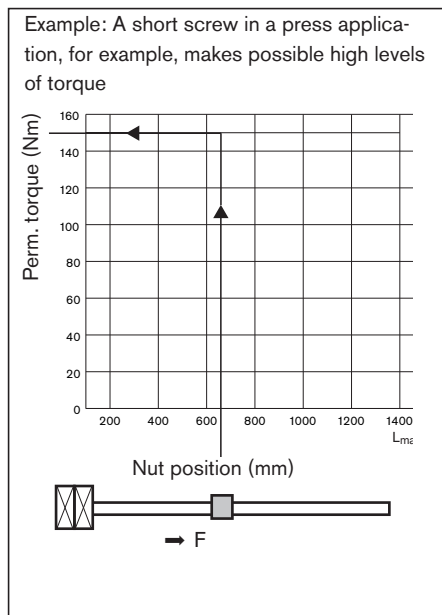
End fixity III floating-floating

This type of end fixity is virtually never used.

End fixity IV fixed-free

Parameters:

- Screw length
- Screw diameter
- End fixity, here fixed-free
- Stretching force, none
- Geometry of screw end Form 51 on one side
- Compressive load toward fixed bearing



Design of drive unit FAR-B-S

Stretching screws

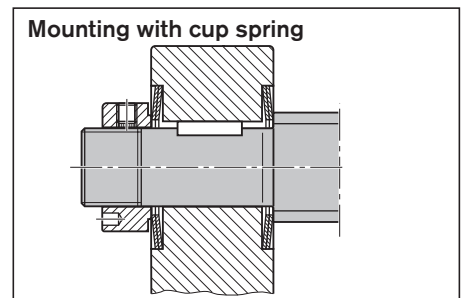
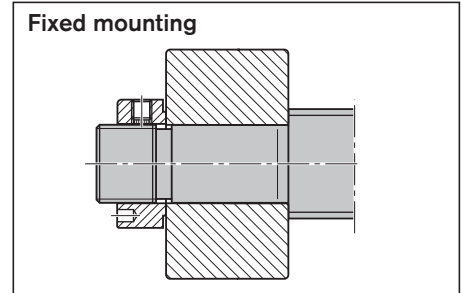
Basic principles

To be able to exploit the efficiency of a system with a driven nut to the full, it is advisable to use the type of end fixity with fixing of the screw on two sides (fixed-fixed). Stretching of the screw has the following positive effect on the overall system:

- Compensation of temperature effects to avoid compressive loads in the screw, which reduces the risk of buckling

The change in length and the tensile stress that results due to stretching must be kept to a range that is acceptable for the overall system. Otherwise, elastic deformation can lead to impermissible lead deviations between the nut and the screw, which can negatively impact the service life.

In the case of convection cooling of the screw, stretching can maintain a maximum temperature difference of about 10 °C. With long, composite screws, temperature compensation of 5 °C is sensible. Water cooling of the screw is necessary at higher temperature differences.



Linear expansion

Calculation of the linear expansion of a screw in operation with a temperature increase.

$$\Delta L = L_{\text{thr}} \cdot \alpha_L \cdot (\vartheta_s - \vartheta_r)$$

Where $\alpha_L = 0.0000115$

ΔL = linear expansion (mm)
 L_{thr} = thread length (mm)
 α_L = linear expansion coefficient (1/K)
 ϑ_s = Screw temperature in operation (K)
 ϑ_r = room temperature (K)

Stretching force

Calculation of the stretching force that is needed for compensating the linear expansion.

$$F_{\text{st}} = \frac{\Delta L \cdot E \cdot \frac{\pi}{4} \cdot d_{\text{ap}}^2}{L_{\text{thr}}}$$

F_{st} = stretching force (N)
 d_{ap} = approximation diameter (mm)
 E = Young's modulus (N/mm²)

$$d_{\text{ap}} = \frac{d_0 + d_2}{2}$$

d_0 = nominal diameter (mm)
 d_2 = screw core diameter (mm)

Compressive stress

The compressive stress in the screw that occurs in the case of fixed mounting on two sides is calculated as shown.

$$\sigma_c = E \cdot (\vartheta_s - \vartheta_r) \cdot \alpha_L$$

σ_c = compressive stress due to increased temperature (N/mm²)

Where $E = 210,000 \text{ N/mm}^2$

Tensile stress

For operation, the tensile stress in the screw due to stretching must be greater than the compressive force due to temperature. At the same time, the permissible tensile stress must not be exceeded.

Tensile stress due to stretching that is generated in the screw

$$\sigma_t = \frac{F_{st}}{\frac{\pi}{4} \cdot d_{ap}^2}$$

σ_t = tensile stress (N/mm²)

$$\sigma_t < \sigma_p$$

The maximum permissible tension
 $\sigma_p = 70 \text{ N/mm}^2$

Permissible change in length

Stretching results in a change of length of the screw, which causes a change in the geometry of the screw and the raceway geometry. To avoid negative effects on the service life of the ball screw assembly, you must check it.

$$\Delta L_{perm} = L_{thr} \cdot 0.0001$$

ΔL_{perm} = perm. linear expansion (mm)
 L_{thr} = thread length (mm)

$$\Delta L \leq \Delta L_{perm}$$

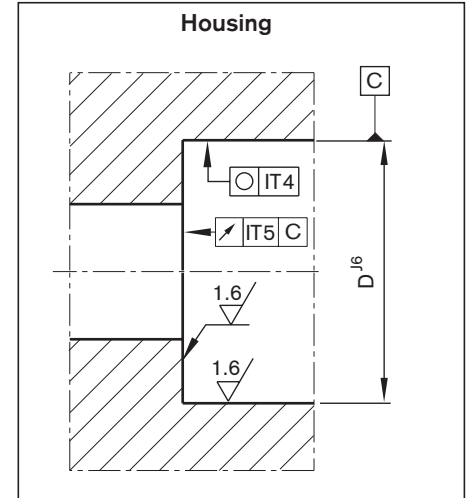
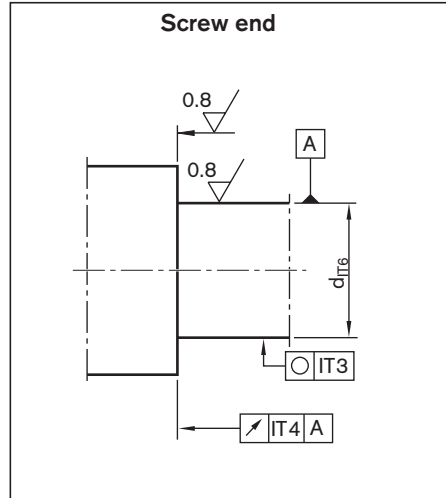
Design notes, installation

Bearing design

For customer machining, please consider the design notes for screw ends and housings.

For Rexroth screw end designs, see "End Machining Details."

Rexroth delivers complete drive systems including bearing units without housing. Calculations are performed with the formulas used in the antifriction bearing industry.



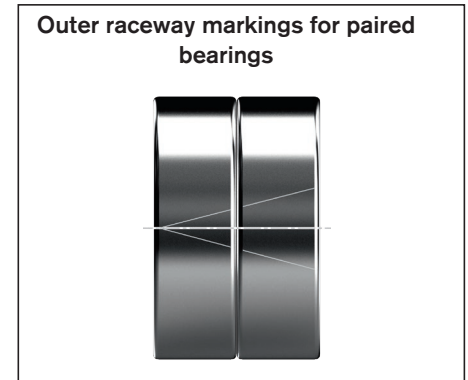
Mounting

Angular-contact thrust ball bearings LGF and LGN

When mounting the angular-contact thrust ball bearings LGF and LGN, ensure that the mounting forces are exerted only on the bearing rings. Never apply mounting forces via the anti-friction bearing elements or the seal rings! The two sections of the inner raceway may not be separated during assembly or disassembly for any reason!

Tighten the mounting screws for screw-down or flange-mounted bearings in crosswise sequence. The mounting screws may be subjected only to tension amounting to a maximum of 70% of their yielding point.

The screw-down (LGF) bearings have a groove on the cylindrical surface of the outer raceway for disassembly. The individual bearings of the bearing pair series LGF-C... and LGN-C... are marked on the cylindrical surfaces of the outer raceways (see figure). The markings reveal the bearing sequence. The sealing rings should face outwards after proper mounting.



Slotted nut NMA, NMZ

The bearings are preloaded by tightening the nuts.

In order to prevent settling phenomena, we recommend first tightening the slotted nut by twice the value of the tightening torque M_A and then easing the load. Only then should the slotted nut be retightened to the specified tightening torque M_A .

The two set screws are then alternately tightened using a hexagon socket wrench.

The components are disassembled in the reverse order, i.e. the set screws have to be removed before the slotted nut.

The slotted nuts can be used several times when properly assembled and disassembled by competent personnel. The inner raceways of the bearings are dimensioned in such a way as to achieve a defined bearing preload sufficient for most applications when the slotted nut is tightened (M_A in accordance with dimension table).

Design Note

For counter holding the tightening torque M_A of the slotted nut we recommend a wrench flat on the spindle or a hexagon socket on the end face of the spindle.

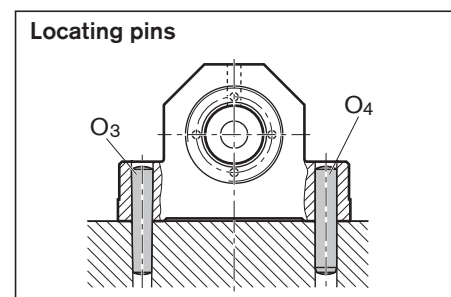
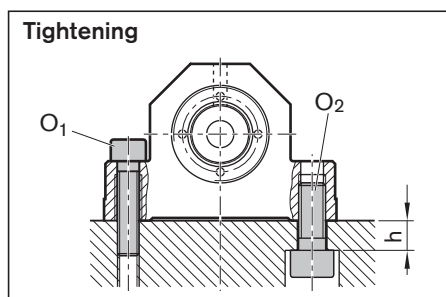
Mounting the housing

Housing mounting SEB

Tighten the fastening screws of the pillow-block bearings in a crosswise sequence. Refer to the table for the maximum tightening torque. The threaded ring fixes the complete bearing in the housing. Use threadlocking adhesive when assembling the threaded ring.



⚠ Align the screw with nut, the bearings and the guide such that they are completely flush with one another. The Rexroth gauge is suitable as an aid.

| Size d ₀ xP | h (mm) | O ₁ DIN 912 | O ₂ DIN 912 | O ₃ , tapered pin (hardened) O ₄ , straight pin (DIN 6325) |
|---------------------------|-----------|---------------------------|---------------------------|---|
| 6x1/2 | 8 | M5x20 | M6x16 | 4x20 |
| 8x1/2/2,5/5 | 8 | M5x20 | M6x16 | 4x20 |
| 12x2/5/10 | 8 | M5x20 | M6x16 | 4x20 |
| 16x5/10/16 | 11 | M8x35 | M10x25 | 8x40 |
| 20x5/10/20/40 | 11 | M8x35 | M10x25 | 8x40 |
| 25x5/10/25 | 14 | M10x40 | M12x30 | 10x50 |
| 32x5/10/20/32/64 | 14 | M10x40 | M12x30 | 10x50 |
| 40x5/10/12/16/20/25/30/40 | 16 | M12x50 | M14x35 | 10x50 |
| 50x5/10/12/16/20/25/30/40 | 16 | M12x55 | M14x35 | 10x60 |
| 63x10/20/40 | 16 | M12x65 | M14x35 | 10x70 |
| 80x10/20 | 22 | M16x70 | M20x50 | 12x80 |





Tightening torques for fastening screws according to VDI 2230 where $\mu_G = \mu_K = 0.125$ (friction coefficient)

Steel/steel material pairing

|  | Strength class for O ₁ ; O ₂ | M5 | M6 | M8 | M10 | M12 | M14 | M20 |
|--|--|-----|------|----|-----|-----|-----|-----|
|  (Nm) | 8.8 | 5.5 | 9.5 | 23 | 46 | 80 | 125 | 390 |
| | 12.9 | 9.5 | 16.0 | 39 | 77 | 135 | 215 | 650 |

Steel/aluminum and aluminum/ aluminum material pairings

|  | Strength class for O ₁ ; O ₂ | M5 | M6 | M8 | M10 | M12 | M14 | M20 |
|--|--|-----|-----|----|-----|-----|-----|-----|
|  (Nm) | 8.8 | 4.8 | 8.5 | 20 | 41 | 70 | 110 | 345 |
| | 12.9 | 4.8 | 8.5 | 20 | 41 | 70 | 110 | 345 |

Mounting screws

⚠ Always make sure the screws are secure where there are high screw loads!

Lubrication of the end bearings

Bearings for ball screw assemblies are lubricated with grease for a lifetime of reliable service. It should be noted, however, that grease lubrication does not facilitate the dissipation of heat in the bearings. The bearing temperature should therefore not exceed 50 °C, particularly in machine tool applications. At higher temperatures circulating oil lubrication must be set up. Angular-contact thrust ball bearings of series LGF, LGN are lifetime-lubricated with KE2P-35 grease as per DIN 51825. For regreasing, the quantities stated in the table below can be applied via the lube ports provided on the bearings. Where there are pairs of bearings, please note that each bearing must be individually lubricated via the lube port. Each bearing must be lubricated with half the value shown in the table. The maximum interval can be assumed to be 350 million revolutions, in which case the larger of the two quantities should be used. As a rule, the initial grease quantity will therefore last for the entire service life of a ball screw assembly.

| Relubrication quantities for angular-contact thrust ball bearings | | | | | | | | | | | |
|---|------------|-----------------------------------|------|--------------|------------|-----------------------------------|-----|--------------|-------------|-----------------------------------|------|
| Abbreviation | | Quantity (cm ³) 1) | | Abbreviation | | Quantity (cm ³) 1) | | Abbreviation | | Quantity (cm ³) 1) | |
| LGN-B-0624 | | 0.33 | 0.22 | | | | | | | | |
| LGN-B-1034 | | 0.33 | 0.22 | | | | | | | | |
| LGN-B-1242 | LGF-B-1255 | 0.43 | 0.33 | | | | | | | | |
| LGN-B-1747 | LGF-B-1762 | 0.54 | 0.43 | | | | | | | | |
| LGN-B-2052 | LGF-B-2068 | 0.87 | 0.54 | | | | | | | | |
| LGN-B-2557 | LGF-B-2575 | 1.09 | 0.65 | LGN-C-2557 | LGF-C-2575 | 2.17 | 1.3 | | | | |
| LGN-B-3062 | LGF-B-3080 | 1.09 | 0.65 | LGN-C-3062 | LGF-C-3080 | 2.17 | 1.3 | | | | |
| LGN-B-3572 | LGF-B-3590 | 1.74 | 0.98 | | | | | | | | |
| LGN-A-4075 | | 2.17 | 1.30 | | | | | LGN-A-4090 | LGF-B-40115 | 6.52 | 3.80 |
| LGN-A-5090 | | 2.72 | 1.63 | | | | | LGN-A-50110 | LGF-A-50140 | 9.78 | 5.98 |

1) Shortened lubricating interval max. 10 M revolutions

2) Where there are pairs of bearings, lubricate each bearing via the lube port.
Lubricate each bearing with half the value shown in the table.

Calculation

Resulting and equivalent bearing loads

For angular-contact thrust ball bearings LGN and LGF

Angular-contact thrust ball bearings are preloaded. The chart shows the resulting axial bearing load F_{ax} as a function of preload and axial operating load F_{Lax} . For a purely axial load $F_{comb} = F_{ax}$.

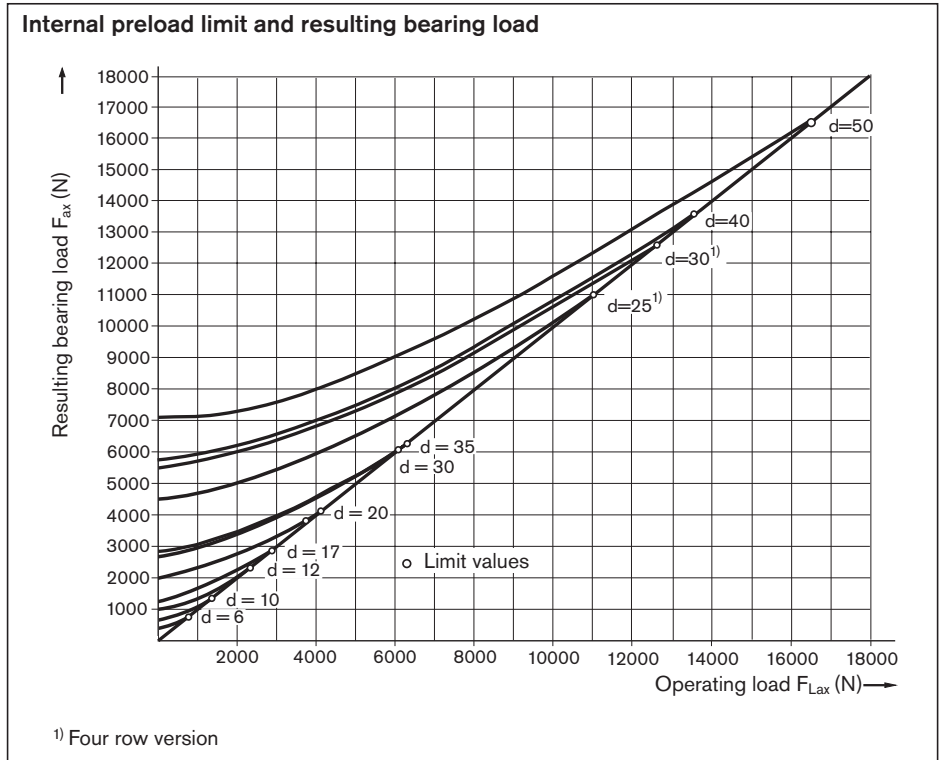
| $\alpha = 60^\circ$ | X | Y |
|------------------------------------|------|------|
| $\frac{F_{ax}}{F_{rad}} \leq 2.17$ | 1.90 | 0.55 |
| $\frac{F_{ax}}{F_{rad}} > 2.17$ | 0.92 | 1.00 |

α = pressure angle
 F_{ax} = resulting bearing load
 F_{Lax} = operating load
 X, Y = dimensionless factor

If the radial operating forces are not insignificant, the equivalent bearing loads are calculated according to formula 20. Bearings for ball screw assemblies are also suitable to accommodate tipping forces. The moments that usually occur due to the mass and drive motion of the screw do not generally need to be included in the calculation of the equivalent bearing load.

$$F_{comb} = X \cdot F_{rad} + Y \cdot F_{ax} \quad 20$$

F_{ax} = resulting axial bearing load (N)
 F_{comb} = combined equivalent bearing load (N)
 F_{rad} = radial bearing load (N)



Permissible static axial load for bearing series LGF

The permissible static axial load of LGF series bearings in screw-down direction is:

$$F_{0ax p} \leq \frac{C_0}{2}$$

$F_{0ax p}$ = permissible static axial bearing load (N)

The static axial load rating C_0 is stated in the Dimension Tables.

⚠ Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)

Calculation

Resulting and equivalent bearing loads

For angular-contact thrust ball bearings LGL

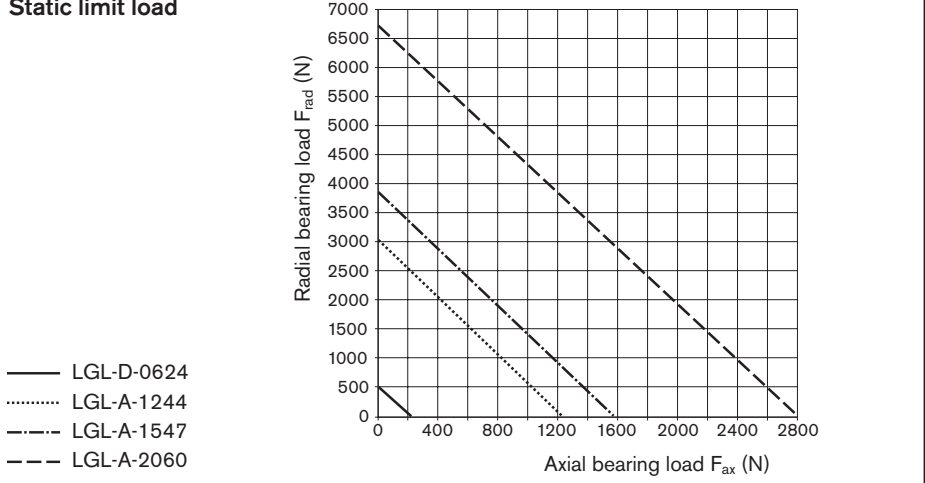
Before determining the combined equivalent load, F_{comb} , you must check the bearing size for the static limit load using the diagram. In this connection, the intersection point of the axial and radial bearing load must be below the muss boundary for a bearing to be suitable for the application.

$$F_{comb} = X \cdot F_{rad}^A + Y \cdot F_{ax}^B + Z \quad 21$$

| Bearing size | X | Y | Z | A | B |
|--------------|-------|--------|-----|------|------|
| LGL-D-0624 | 0.003 | 0.1300 | 140 | 1.90 | 1.40 |
| LGL-A-1244 | 0.076 | 0.0460 | 580 | 1.28 | 1.30 |
| LGL-A-1547 | 0.022 | 0.0110 | 540 | 1.45 | 1.50 |
| LGL-A-2060 | 0.017 | 0.0082 | 960 | 1.45 | 1.50 |

- F_{ax} = axial bearing load (N)
- F_{comb} = combined equivalent bearing load (N)
- F_{rad} = radial bearing load (N)
- X, Y, Z = calculation factors (-)
- A, B = exponents (-)

Static limit load



Average speed and average bearing load

When the bearing load varies in steps over a specific period of time **22**, calculate the dynamic equivalent bearing.

When the speed varies, use formula **23**. In these formulas q_t denotes the discrete time steps for the individual phases in %.

$$F_m = \sqrt[3]{F_{comb1}^3 \cdot \frac{|n_1|}{n_m} \cdot \frac{q_{t1}}{100} + F_{comb2}^3 \cdot \frac{|n_2|}{n_m} \cdot \frac{q_{t2}}{100} + \dots + F_{combn}^3 \cdot \frac{|n_n|}{n_m} \cdot \frac{q_{tn}}{100}} \quad 22$$

$$n_m = \frac{q_1}{100} \cdot n_1 + \frac{q_2}{100} \cdot n_2 + \dots + \frac{q_n}{100} \cdot n_n \quad 23$$

- $F_{comb1} \dots F_{combn}$ = combined equivalent axial load in phases 1 ... n (N)
- F_m = equivalent dynamic axial bearing load (N)
- $n_1 \dots n_n$ = speeds in phases 1 ... n (rpm)
- n_m = average speed (rpm)
- $q_{t1} \dots q_{tn}$ = discrete time steps in phases 1 ... n (%)

Service life and load safety factor

Nominal service life

The nominal service life is calculated as follows:

Attention:

Pay attention to the dynamic load rating of the nut!

$$L = \left(\frac{C}{F_m} \right)^3 \cdot 10^6 \quad 24$$

- C = dynamic bearing load rating (N)
- F_m = equivalent dynamic axial bearing load (N)
- L = nominal service life in revolutions (-)
- L_h = nominal service life in operating hours (h)
- n_m = average speed (rpm)

$$L_h = \frac{16\,666}{n_m} \cdot \left(\frac{C}{F_m} \right)^3 \quad 25$$

Static load safety factor

The static load safety factor for machine tools should not be lower than 4.

$$S_0 = \frac{C_0}{F_{0max}} \quad 26$$

- F_{0max} = maximum static load (N)
- C_0 = static load capacity (N)
- S_0 = static load safety factor (-)

Bosch Rexroth
 Linear Motion Technology

97419 Schweinfurt / Germany

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Company: _____
 Contact: _____
 E-mail: _____
 Telephone: _____

Application

New design

Revised design

Operating conditions

| Discrete time step parameters | | | or | Dynamic cycle parameters | | | | | | | | | | | |
|-------------------------------|------------------|-------------------|-----------------------|--------------------------|----|----|----|----|----|----|----|----|-----|-----|-----|
| Discrete time steps (%) | Speed (1/min) | Action of force x | Section | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 | T12 |
| T ₁ = | n ₁ = | | Path (mm) | | | | | | | | | | | | |
| T ₂ = | n ₂ = | | V (m/s) | | | | | | | | | | | | |
| T ₃ = | n ₃ = | | a (m/s ²) | | | | | | | | | | | | |
| T ₄ = | n ₄ = | | Time (s) | | | | | | | | | | | | |
| T ₅ = | n ₅ = | | Action of force x | | | | | | | | | | | | |
| T ₆ = | n ₆ = | | | | | | | | | | | | | | |

| Forces (N) = | F1 | F2 | F3 | F4 | F5 | F6 |
|--|----|----|----|--------------------|----|----|
| | | | | | | |
| Mass (kg) = | m1 | m2 | m3 | m4 | m5 | m6 |
| | | | | | | |
| Bearing center-to-center distance (mm) = | or | | | Max. stroke (mm) = | | |

Bearing type

| | | | |
|-----------------------------------|--|-------|---|
| 1. <input type="checkbox"/> Tight | | Tight | Installation Position Horizontal <input type="checkbox"/> Vertical <input type="checkbox"/> |
| 2. <input type="checkbox"/> Tight | | Loose | Drawing enclosed (recommended) <input type="checkbox"/> |
| 3. <input type="checkbox"/> Tight | | Free | Delivery with bearing <input type="checkbox"/> |

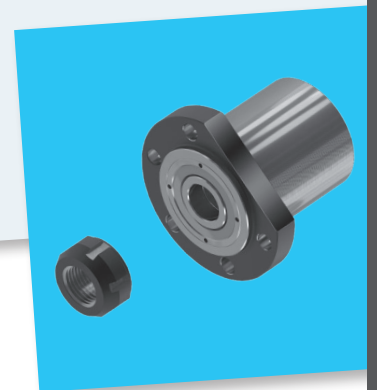
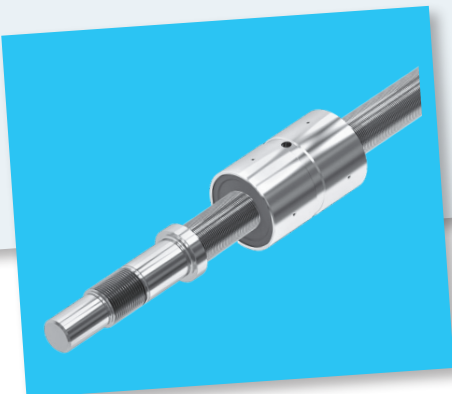
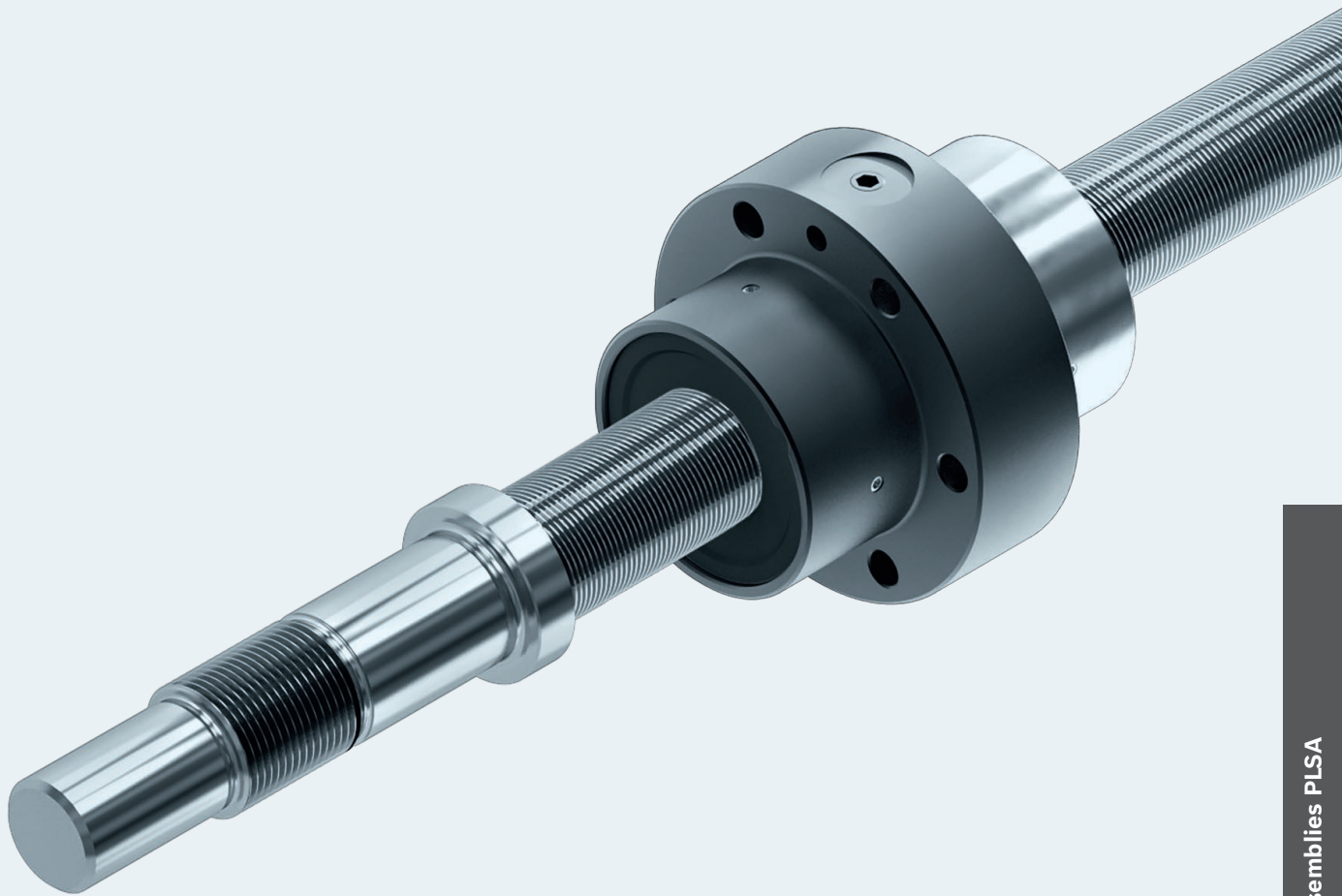
Required life: _____ Operating temperature: _____ °C Up to _____ °C

Type of lubrication: _____

Short description of the application / unusual operating conditions: _____

Visit our official homepage and use the provided configurators and our dimensioning program Linear Motion Designer free of charge.

Planetary screw assemblies PLSA



New features at a glance

The divided FDM-E-S of the single nut with flange nut type has been discontinued.



▲ FDM-E-S

New screw sizes 25x5 and 25x10

To add to our product portfolio, the intermediate sizes 25 with leads 5 and 10 have been issued.

This size is available for the nut types cylindrical single nut ZEM-E-S and single nut with flange FEM-E-S.

Cover plate wiper

To expand on our seal system, the cover plate wiper has been issued.

This is suitable especially for applications in the temperature range of 60° and higher.



▲ Cover plate wiper
without friction torque,
TRD = 0 Nm

Expansion of the documentation



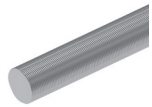
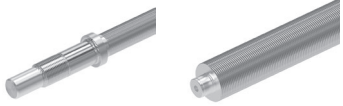







Option 5 = Two-point compensation

This kind of documentation is intended to compensate for the lead error of a screw.

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Nuts, screws, screw ends, bearings

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| Diameter d ₀ (mm) | Lead P (mm) | | |
|---------------------------------|----------------|----|----|
| | 5 | 10 | 20 |
| 20 | X | – | – |
| 25 | X | X | – |
| 30 | X | X | – |
| 39 | X | X | – |
| 48 | X | X | – |
| 60 | – | X | X |
| 75 | – | X | X |

Planetary screw assembly – definition

The planetary screw assembly PLSA is a complete cylindrical screw assembly with planets as the rolling elements. It serves to convert rotary motion into linear motion and vice versa.

The basic functioning of a planetary screw assembly is easy to describe, but the range of designs and the requirements for practical applications are many and varied.

Planetary screw assemblies are designed to transmit high forces and thus round off the upper end of the screw assembly product portfolio.

Planetary screw assemblies are drive technology screw assemblies in which threaded rollers

(the planets) are housed in a threaded nut, their ends being lodged in discs with holes arranged around a pitch circle so that they rotate axially parallel to the special threaded screw, causing the nut to move linearly along the screw.

Rexroth planetary screw assemblies offer design engineers many opportunities to solve transport and positioning tasks with a driven screw. At Rexroth you will be sure to find exactly the kind of tailor-made products you need for special applications.

Structural design:

Both the screw and the nut have an identical multi-start profile with a flank angle of 90°.

The planets have journals at both ends, which are lodged in holes bored in the guide discs. The toothed ends of the planets engage with the internal gear rims of the nut. The planets have single-start threads and crowned flanks that roll without slipping along the nut threads.

At each end of the nut there are internally geared rims which engage with the external gearing on the planets. Guide discs inside the gear rims support the planets' journals and ensure that they are correctly spaced. The discs also prevent coarse dirt from working its way into the nut.

Versions:

- Cylindrical single nut with backlash or preload (ZEM-E-S)
- Single nut with flange with backlash or preload (FEM-E-S)

Precision screws PSR

Bosch Rexroth has a long tradition of manufacturing precision screws. Offered in many sizes and in unmatched quality, these have been an integral part of our ball screw assembly product range for years.

We have now transferred this tried and trusted manufacturing technology to the screws of our planetary screw assemblies.

For users, this results in many advantages, including the following:

- Identical quality to Rexroth ball screw assemblies
- Fast delivery
- Attractive prices thanks to cost-effective manufacturing

Benefits

- Smooth functioning due to the principle of synchronized planets
- Very low noise
- High linear travel speeds
- Large number of contact points
- High load ratings
- High mechanical efficiency
- Long service life
- Compact design
- High power density
- Effective, wiping sealing
- Low lubricant consumption
- Pre-tensioned units available
- High positioning accuracy and repeatability

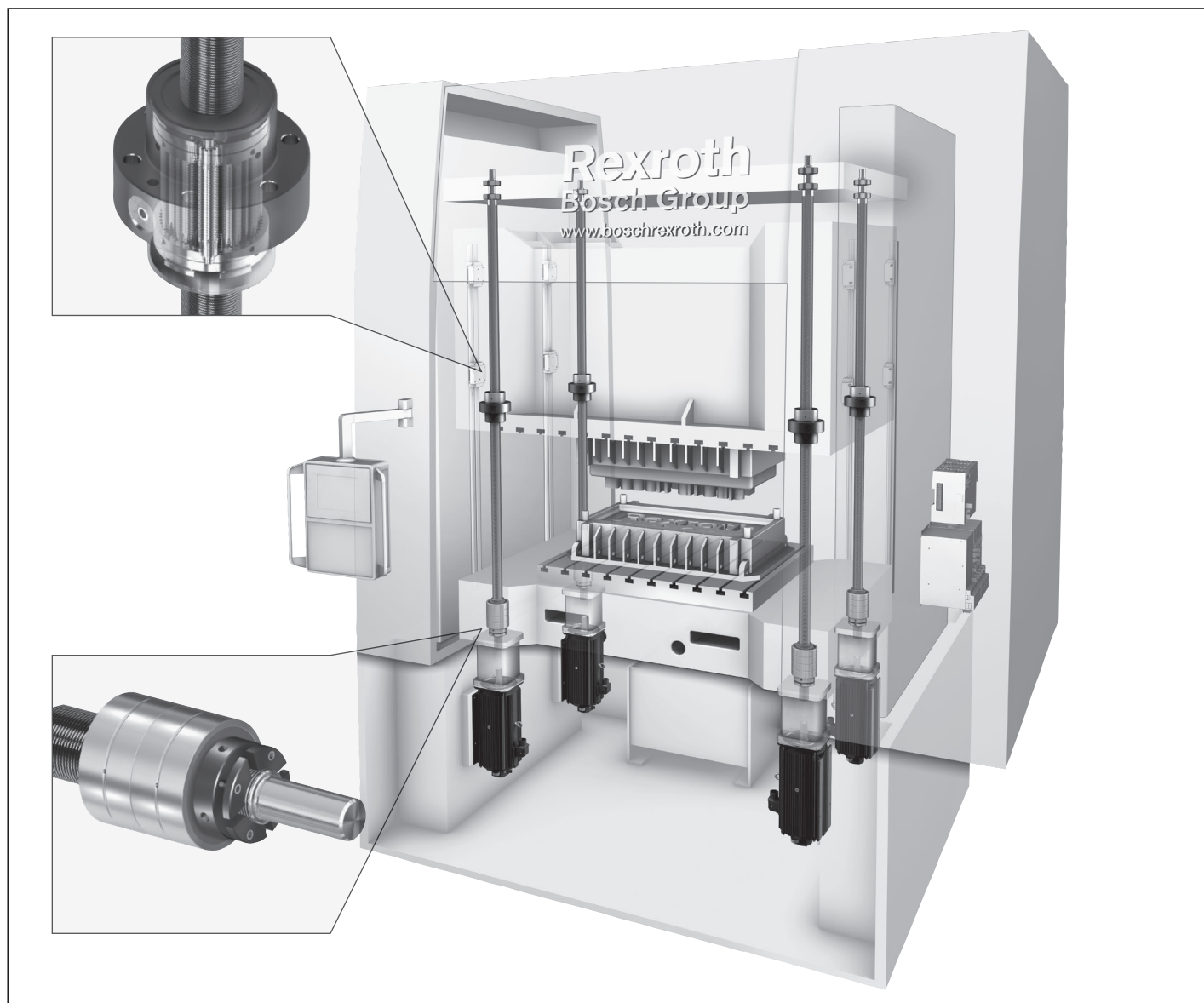


Sample applications

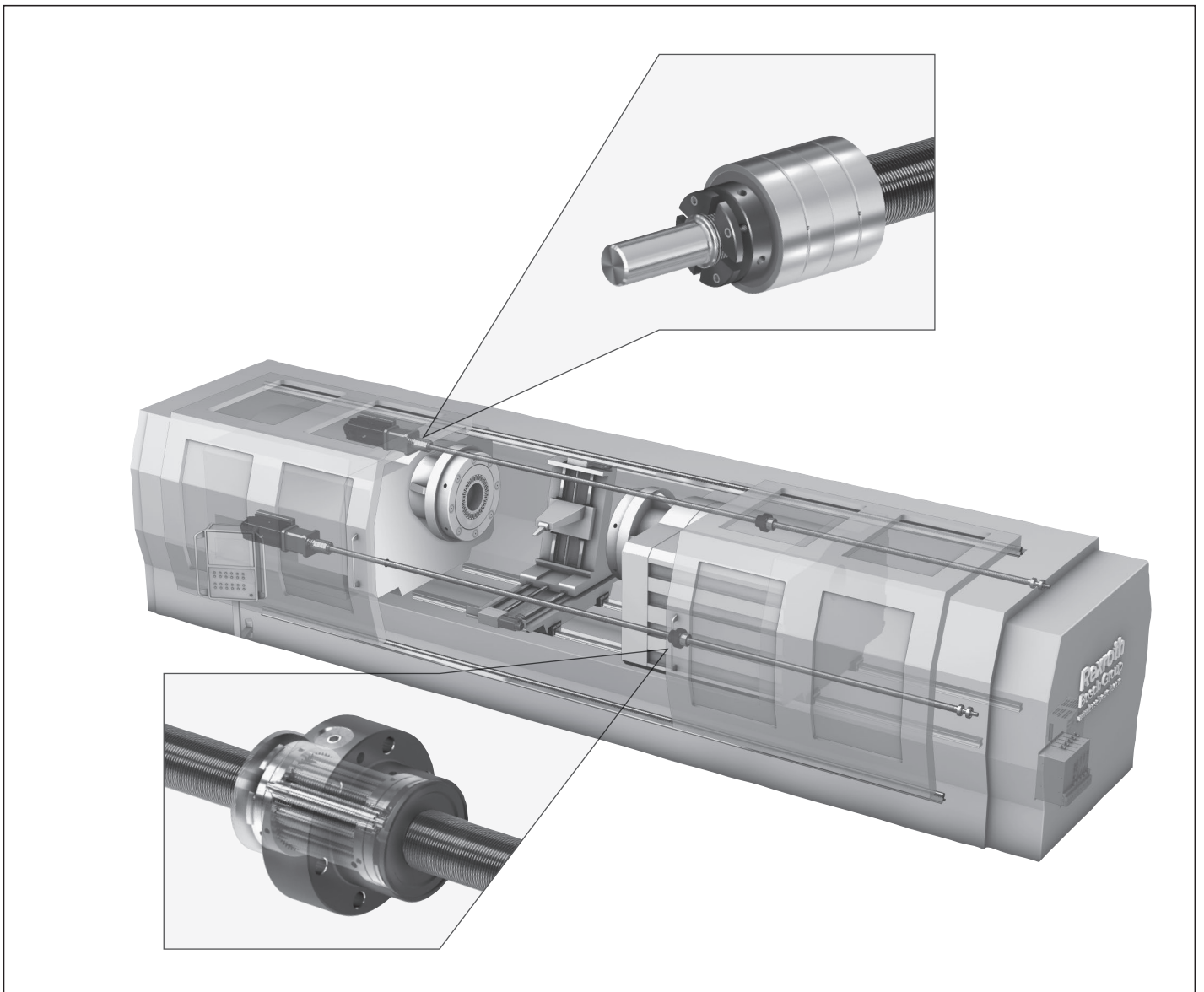
Rexroth planetary screw assemblies are used with great success in many different application areas:

- Plastic injection molding machines
- Machine tools
- Measuring and material testing machines
- Robots
- Automotive industry
- Aerospace industry
- Automation and handling
- Food and packaging industries
- Printing and paper industry
- Medical technology
- Cutting operations
- Forming operations
- Metals industry

Electric press



Friction welding machine

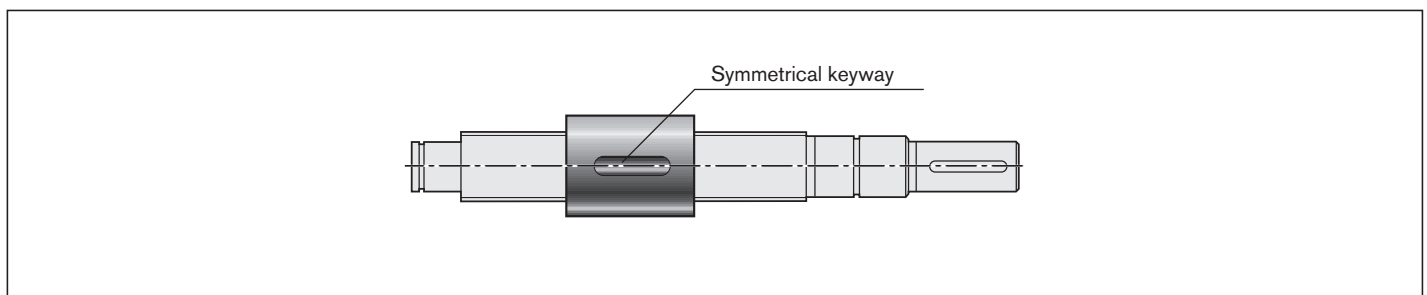
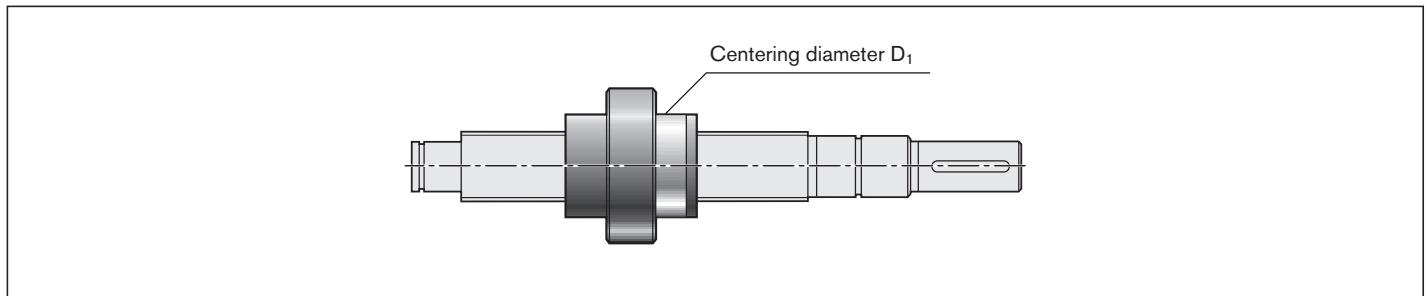


Identification system for short product names PLSA / ordering data

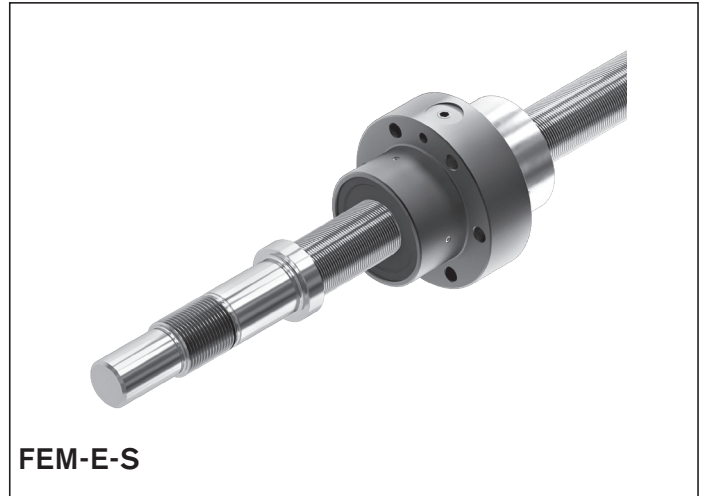
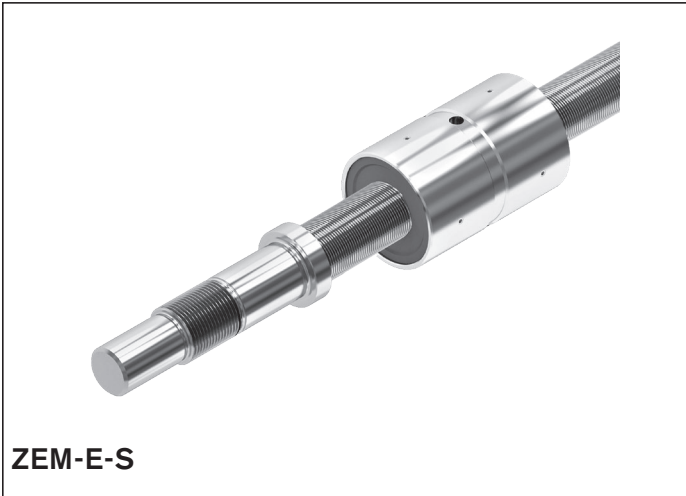
| | | | | | | | | | | | | | | | | |
|---------------------------------|--|--------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|-----------------------------------|
| Planetary screw assembly | PLSA 20 x 5 R FEM-E-S 00 1 0 T7 R 812 Z 120 412 Z 120 1250 1 1 | | | | | | | | | | | | | | | |
| Size | Nominal diameter (mm) | | | | | | | | | | | | | | | |
| | Lead (mm) | | | | | | | | | | | | | | | |
| | Direction of lead, R ... right | | | | | | | | | | | | | | | |
| Nut type | ZEM-E-S Cylindrical Single Nut | | | | | | | | | | | | | | | |
| | FEM-E-S Single nut with flange | | | | | | | | | | | | | | | |
| Nut rework | 00 ... no rework | | | | | | | | | | | | | | | |
| Sealing system | 0 ... without | 4 ... gap-type seal (standard) | | | | | | | | | | | | | | |
| | 1 ... lip-type seal | 5 ... Wiper | | | | | | | | | | | | | | |
| Preload classes | 0 ... C0 (standard backlash) | | | | | | | | | | | | | | | |
| | 1 ... C2 (average preload) | | | | | | | | | | | | | | | |
| Accuracy | T5, T7 , T9 | | | | | | | | | | | | | | | |
| Screw | R ... Precision screw | | | | | | | | | | | | | | | |
| Left screw end | Form: ... standard form | | | | | | | | | | | | | | | |
| | Option: Z ... centering as per DIN 332-D | | | | | | | | | | | | | | | |
| | S... hex socket | | | | | | | | | | | | | | | |
| | G... female thread | | | | | | | | | | | | | | | |
| | K ... none | | | | | | | | | | | | | | | |
| Versions: | | | | | | | | | | | | | | | | |
| Right screw end | ... see left screw end | | | | | | | | | | | | | | | |
| Overall length [mm] | | | | | | | | | | | | | | | | |
| Documentation | 1 ... standard (acceptance test report) | | | | | | | | | | | | | | | 5 ... Two-point compensation |
| | 2 ... torque test report | | | | | | | | | | | | | | | 6 ... lead and torque test report |
| | 3 ... lead test report | | | | | | | | | | | | | | | |
| Lubrication | 1 ... preserved and nut with basic greasing | | | | | | | | | | | | | | | |
| | 2 ... preserved | | | | | | | | | | | | | | | |

Mounting direction of nut types

Definition: The centering diameter on nuts with a flange points to the right end of the screw. The mounting direction for cylindrical nuts is freely selectable (symmetrical).



Overview of formats



Abbreviations

C = dynamic load rating
C₀ = static load rating
d₀ x P = size
d₀ = nominal diameter
F_{aB} = axial breaking load of slotted nut
G = female thread
J_s = moment of inertia
n_G = limit speed (grease)
No. = part number
M_A = tightening torque of slotted nut

M_{AG} = tightening torque of set screw
M_{RL} = bearing friction torque with seal
M_p = Maximum permissible drive torque
 (condition: no radial load at drive journal)
R_{fb} = rigidity (axial)
R_{kl} = rigidity against tilting
P = lead (R = right-hand)
v_{max} = maximum speed
S = hex socket
Z = centering hole

Cylindrical single nut ZEM-E-S

- With standard seals
- Preload class: C0, C2
- For precision screws PSR in tolerance grade T5, T7, T9 (with backlash only)

Note: Delivered only as a complete unit



Ordering code PLSA:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | ZEM-E-S | 00 | 4 | 0 | T7 | R | 822Z150 | 412Z120 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

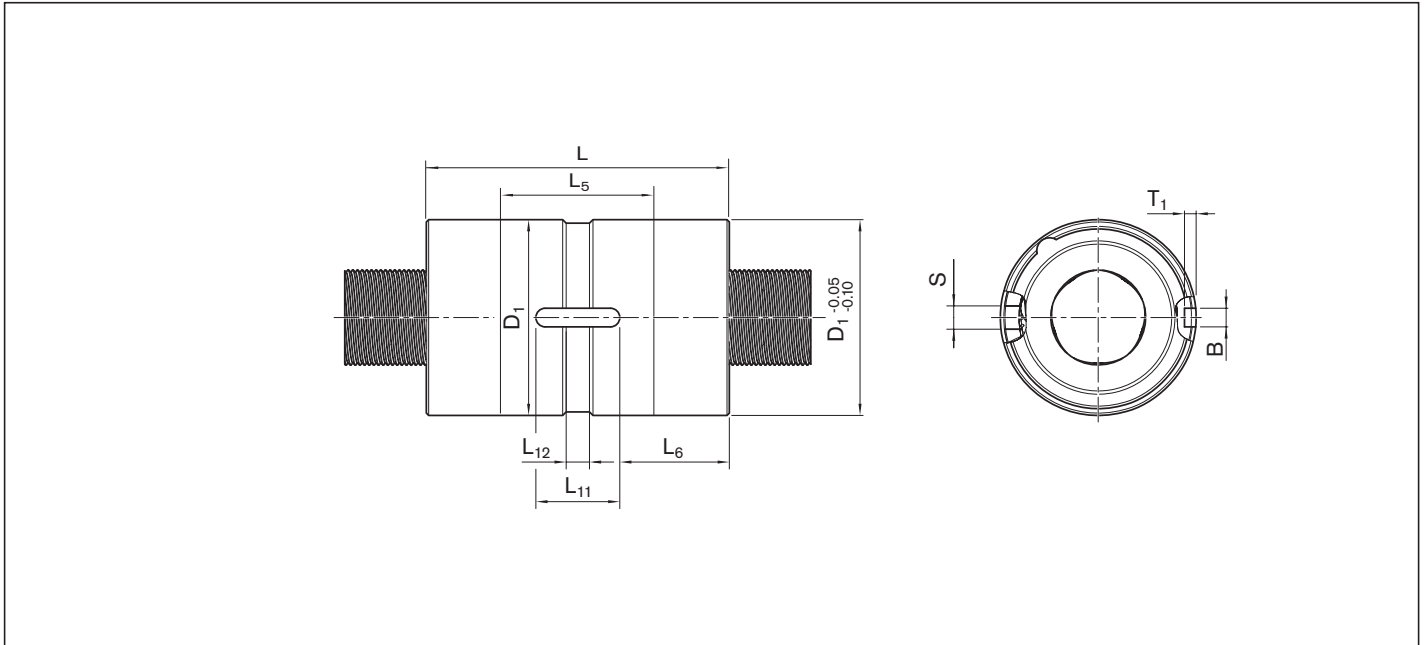
| $d_0 \times P$ | no. | $C^1)$ (kN) | $C_0^1)$ (kN) | $v_{max}^2)$ (m/min) |
|----------------|--------------|----------------|------------------|-------------------------|
| 20 x 5R | R157C A10 03 | 55 | 80 | 37.5 |
| 20 x 5R | R157C A10 13 | 55 | 80 | 37.5 |
| 25 x 5R | R157C 210 03 | 65 | 122 | 30.0 |
| 25 x 10R | R157C 230 03 | 74 | 118 | 60.0 |
| 30 x 5R | R157C 310 13 | 87 | 178 | 25.0 |
| 30 x 10R | R157C 330 03 | 101 | 174 | 50.0 |
| 39 x 5R | R157C 410 03 | 123 | 269 | 19.2 |
| 39 x 10R | R157C 430 03 | 145 | 271 | 38.4 |
| 48 x 5R | R157C 610 03 | 188 | 481 | 15.6 |
| 48 x 10R | R157C 630 03 | 220 | 475 | 31.2 |
| 60 x 10R | R157C 730 03 | 322 | 780 | 25.0 |
| 60 x 20R | R157C 770 03 | 375 | 786 | 50.0 |
| 75 x 10R | R157C 830 03 | 480 | 1,487 | 20.0 |
| 75 x 20R | R157C 870 03 | 544 | 1,496 | 40.0 |

1) The load ratings are valid for tolerance grade T5 only.

For other tolerance grades, please consider the correction factor f_{ac} on page 251.

2) See "Characteristic speed" on page 251 and "Critical speed n_{cr} " on page 270

For the codes, see the chapter entitled "Abbreviations"



| $d_0 \times P$ | (mm) | | | | | | | | | | Mass m (kg) |
|----------------|----------|------------|-----|-------|-------|-----------------|----------|--------------|-----|-------|----------------|
| | B^{P9} | D_1^{g6} | L | L_5 | L_6 | $L_{11}^{+0.2}$ | L_{12} | $T_1^{+0.1}$ | S | | |
| 20 x 5R | 4 | 42 | 65 | 34 | 23.5 | 18 | 5.0 | 2.5 | 2 | 0.62 | |
| 20 x 5R | 5 | 45 | 64 | 34 | 22.0 | 20 | 5.0 | 3.0 | 2 | 0.72 | |
| 25 x 5R | 6 | 53 | 78 | 50 | 26.5 | 25 | 5 | 3.5 | 5 | 0.72 | |
| 25 x 10R | 6 | 53 | 78 | 50 | 26.5 | 25 | 5 | 3.5 | 5 | 0.72 | |
| 30 x 5R | 6 | 64 | 85 | 53 | 26.5 | 32 | 5.0 | 3.5 | 5 | 1.25 | |
| 30 x 10R | 6 | 64 | 85 | 53 | 26.5 | 32 | 5.0 | 3.5 | 5 | 1.25 | |
| 39 x 5R | 8 | 80 | 100 | 64 | 30.0 | 40 | 7.0 | 4.0 | 5 | 2.00 | |
| 39 x 10R | 8 | 80 | 100 | 64 | 30.0 | 40 | 7.0 | 4.0 | 5 | 2.00 | |
| 48 x 5R | 8 | 100 | 127 | 87 | 41.0 | 45 | 7.0 | 4.0 | 5 | 4.20 | |
| 48 x 10R | 8 | 100 | 127 | 87 | 41.0 | 45 | 7.0 | 4.0 | 5 | 4.20 | |
| 60 x 10R | 10 | 122 | 152 | 99 | 53.5 | 45 | 10.5 | 5.0 | 5 | 6.82 | |
| 60 x 20R | 10 | 122 | 152 | 99 | 53.5 | 45 | 10.5 | 5.0 | 5 | 6.80 | |
| 75 x 10R | 10 | 150 | 191 | 129 | 64.0 | 63 | 10.5 | 5.0 | 5 | 14.00 | |
| 75 x 20R | 10 | 150 | 191 | 129 | 64.0 | 63 | 10.5 | 5.0 | 5 | 13.70 | |

Single nut with flange FEM-E-S

- With standard seals
- Preload class: C0, C2
- For precision screws PSR in tolerance grade T5, T7, T9 (with backlash only)

Note: Delivered only as a complete unit



Ordering code PLSA:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 4 | 0 | T5 | R | 812Z150 | 412Z120 | 1100 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

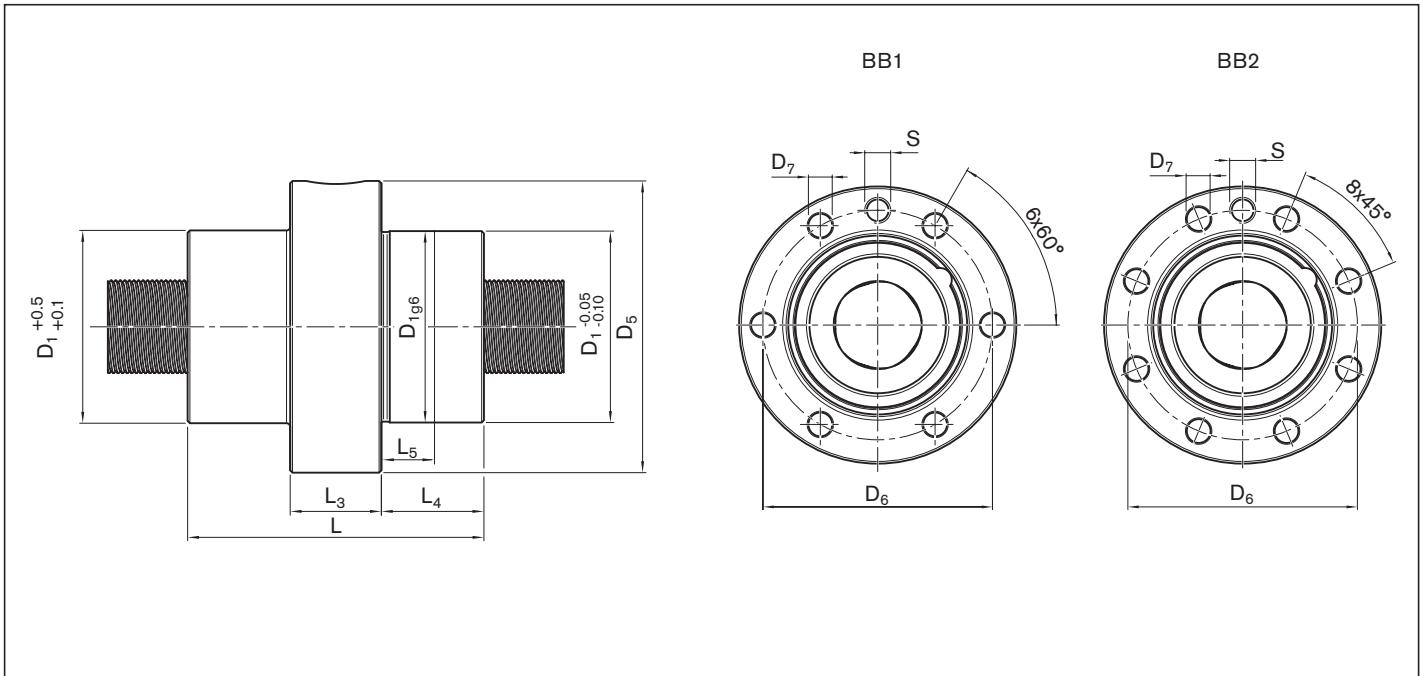
| d ₀ x P | no. | C ¹⁾ (kN) | C ₀ ¹⁾ (kN) | v _{max} ²⁾ (m/min) |
|--------------------|--------------|-------------------------|--------------------------------------|---|
| 20 x 5R | R157C A10 01 | 55 | 80 | 37.5 |
| 20 x 5R | R157C A10 11 | 55 | 80 | 37.5 |
| 25 x 5R | R157C 210 01 | 65 | 122 | 30.0 |
| 25 x 10R | R157C 230 01 | 74 | 118 | 60.0 |
| 30 x 5R | R157C 310 11 | 87 | 178 | 25.0 |
| 30 x 10R | R157C 330 01 | 101 | 174 | 50.0 |
| 39 x 5R | R157C 410 01 | 123 | 269 | 19.2 |
| 39 x 10R | R157C 430 01 | 145 | 271 | 38.4 |
| 48 x 5R | R157C 610 01 | 188 | 481 | 15.6 |
| 48 x 10R | R157C 630 01 | 220 | 475 | 31.2 |
| 60 x 10R | R157C 730 01 | 322 | 780 | 25.0 |
| 60 x 20R | R157C 770 01 | 375 | 786 | 50.0 |
| 75 x 10R | R157C 830 01 | 480 | 1,487 | 20.0 |
| 75 x 20R | R157C 870 01 | 544 | 1,496 | 40.0 |

1) The load ratings are valid for tolerance grade T5 only.

For other tolerance grades, please consider the correction factor f_{ac} on Page 251.

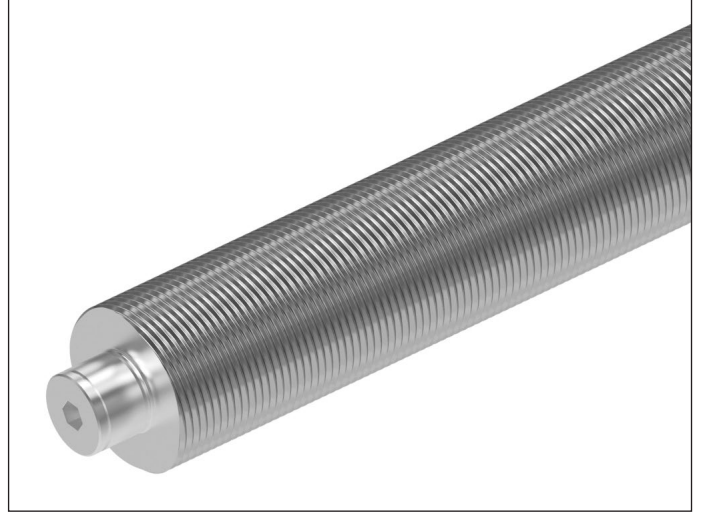
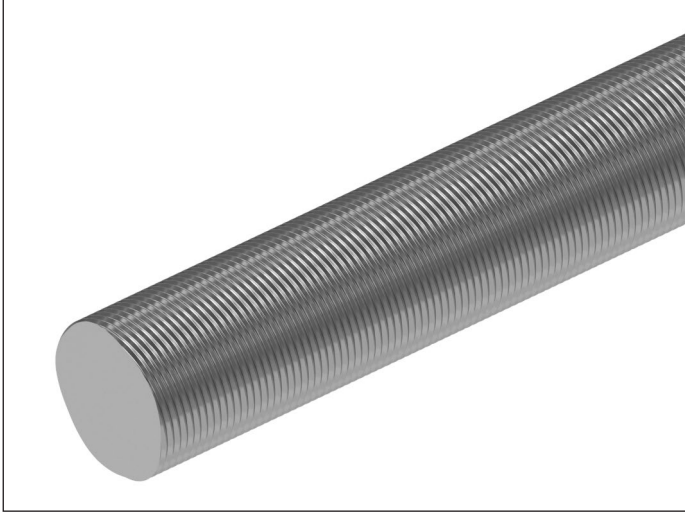
2) See "Characteristic speed" on page 251 and "Critical speed n_{cr} " on page 270

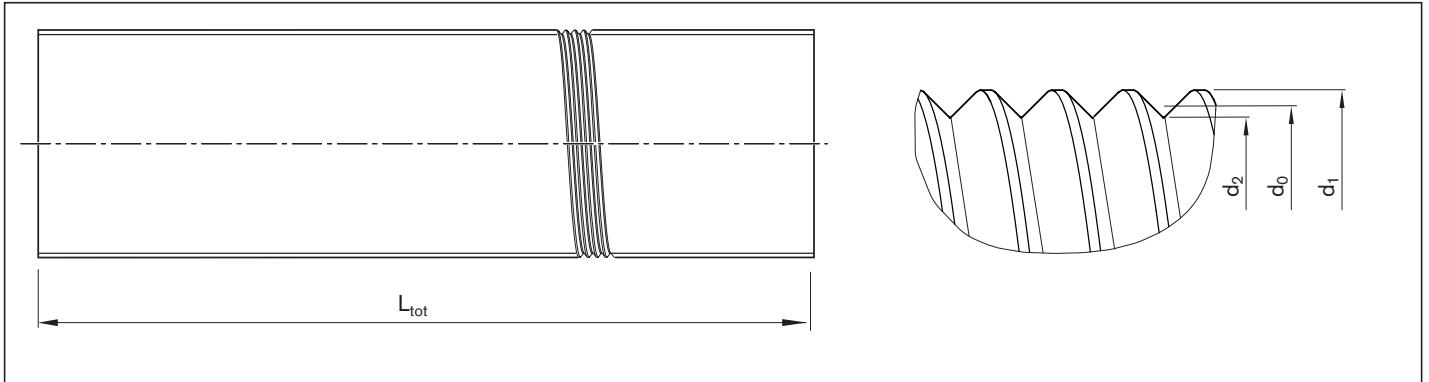
For the codes, see the chapter entitled "Abbreviations"



| d ₀ x P | (mm) | | | | | | | | | | | m (kg) |
|--------------------|----------------|----------------|--------------|-----|----------------|----------------|----------------|----------------|----------------|--------|-------|--------|
| | D ₁ | D ₅ | Hole pattern | L | D ₆ | D ₇ | L ₃ | L ₄ | L ₅ | S | | |
| 20 x 5R | 42 | 64 | BB1 | 65 | 53 | 5.5 | 20.0 | 22.5 | 11.0 | M6 | 0.65 | |
| 20 x 5R | 45 | 68 | BB1 | 64 | 56 | 5.5 | 18.0 | 23.0 | 11.0 | M6 | 0.75 | |
| 25 x 5R | 56 | 84 | BB1 | 78 | 70 | 6.6 | 20.0 | 29.0 | 15.0 | M6 | 1.34 | |
| 25 x 10R | 56 | 84 | BB1 | 78 | 70 | 6.6 | 20.0 | 29.0 | 15.0 | M6 | 1.34 | |
| 30 x 5R | 64 | 98 | BB1 | 85 | 81 | 9.0 | 27.0 | 29.0 | 13.0 | M6 | 2.10 | |
| 30 x 10R | 64 | 98 | BB1 | 85 | 81 | 9.0 | 27.0 | 29.0 | 13.0 | M6 | 2.10 | |
| 39 x 5R | 80 | 124 | BB1 | 100 | 102 | 11.0 | 33.0 | 33.5 | 15.5 | M6 | 3.70 | |
| 39 x 10R | 80 | 124 | BB1 | 100 | 102 | 11.0 | 33.0 | 33.5 | 15.5 | M6 | 3.70 | |
| 48 x 5R | 105 | 150 | BB1 | 127 | 127 | 13.5 | 37.0 | 45.0 | 25.0 | M8 x 1 | 7.60 | |
| 48 x 10R | 105 | 150 | BB1 | 127 | 127 | 13.5 | 37.0 | 45.0 | 25.0 | M8 x 1 | 7.60 | |
| 60 x 10R | 122 | 180 | BB1 | 152 | 150 | 17.5 | 45.0 | 53.5 | 27.0 | M8 x 1 | 11.30 | |
| 60 x 20R | 122 | 180 | BB1 | 152 | 150 | 17.5 | 45.0 | 53.5 | 27.0 | M8 x 1 | 11.30 | |
| 75 x 10R | 150 | 210 | BB2 | 191 | 180 | 17.5 | 45.0 | 73.0 | 42.0 | M8 x 1 | 19.40 | |
| 75 x 20R | 150 | 210 | BB2 | 191 | 180 | 17.5 | 45.0 | 73.0 | 42.0 | M8 x 1 | 20.20 | |

Precision screw PSR





| d ₀ x P | (mm) | | Length | | J _s (kgcm ² /m) | Mass m (kg/m) |
|--------------------|----------------|----------------|----------|------------|--|---------------------|
| | d ₁ | d ₂ | Standard | on request | | |
| 20 x 5R | 20.3 | 19.5 | 1,500 | 2,500 | 1.22 | 2.45 |
| 25 x 5R | 25.3 | 24.1 | 3,000 | 5,000 | 2.99 | 3.85 |
| 25 x 10R | 25.6 | 24.0 | | | 2.96 | 3.82 |
| 30 x 5R | 30.3 | 29.5 | | | 6.21 | 5.54 |
| 30 x 10R | 30.5 | 29.1 | | | 6.15 | 5.51 |
| 39 x 5R | 39.3 | 38.5 | | | 17.64 | 9.36 |
| 39 x 10R | 39.5 | 38.1 | | | 17.64 | 9.33 |
| 48 x 5R | 48.3 | 47.5 | | | 40.88 | 14.21 |
| 48 x 10R | 48.5 | 47.1 | | | 40.62 | 14.16 |
| 60 x 10R | 60.5 | 59.1 | | | 99.38 | 22.15 |
| 60 x 20R | 61.1 | 58.1 | | | 98.38 | 22.03 |
| 75 x 10R | 75.5 | 74.1 | | | 243.37 | 34.67 |
| 75 x 20R | 76.1 | 73.1 | | | 241.32 | 34.51 |

Precision screws PSR, with mechanically connected screw ends

These screws consist of

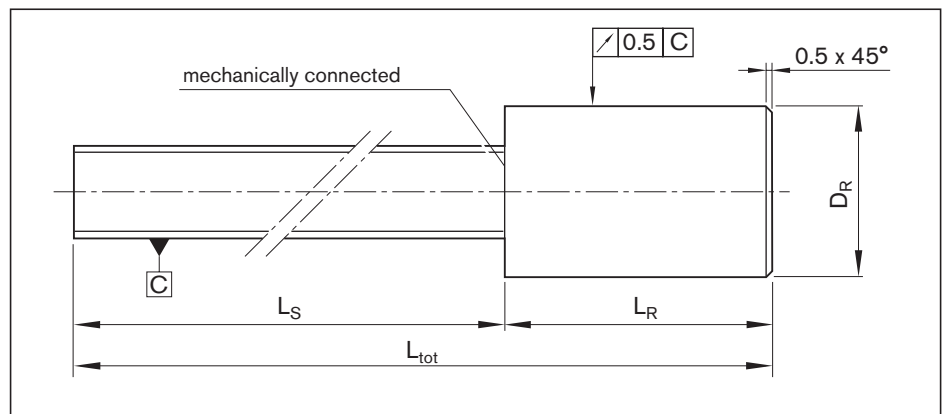
- a precision screw part and
- an unmachined spigot (as the screw journal).

The spigot is mechanically connected on one side and is available in different sizes.

To prevent problems arising when using big end bearing journals (for example, visible thread grooves or axial contact faces that are too small for the fixed bearing), we offer appropriate solutions.

Please consult us.

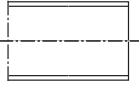
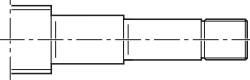
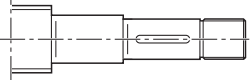
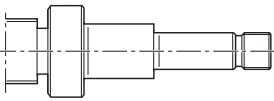
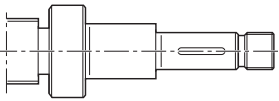
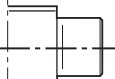
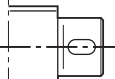
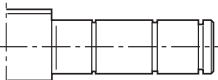
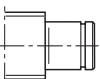
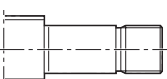
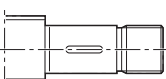
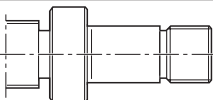
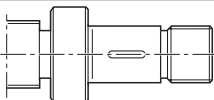
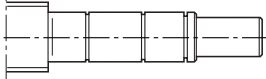
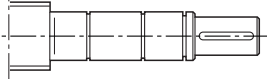
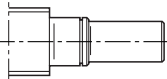
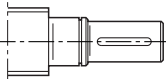
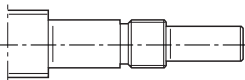
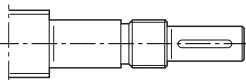
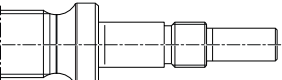
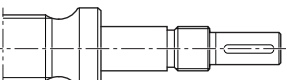
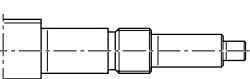
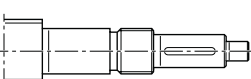
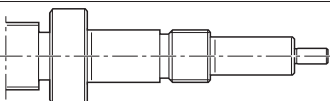
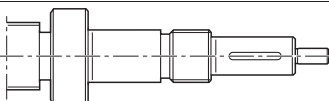
Separate delivery of a screw without end machining and without nut is not planned.



| d ₀ x P (mm) | Tolerance grade | (mm) | | | |
|----------------------------|-----------------|----------------------|----------------------|------------------|----------------|
| | | D _R -1 | L _R +2 | L _{tot} | L _S |
| 20 x 5R | T5 | 36.40 | 200 | 1,700 | 1,500 |
| 25 x 5R/10R | | 36.40 | 200 | 1,700 | 1,500 |
| 30 x 5R/10R | | 46.10 | 250 | 2,050 | 1,800 |
| 39 x 5R/10R | | 76.25 | 400 | 2,300 | 1,900 |
| 48 x 5R/10R | | 80.40 | 400 | 2,300 | 1,900 |
| 60 x 10R/20R | | 98.30 | 600 | 3,500 | 2,900 |
| 75 x 10R/20R | | 110.40 | 600 | 3,500 | 2,900 |

Overview of screw ends:

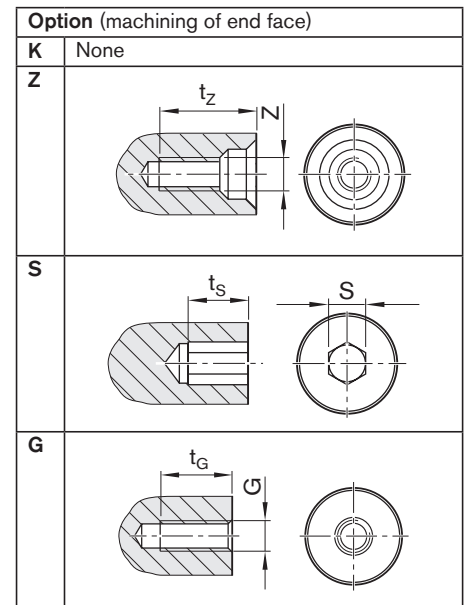
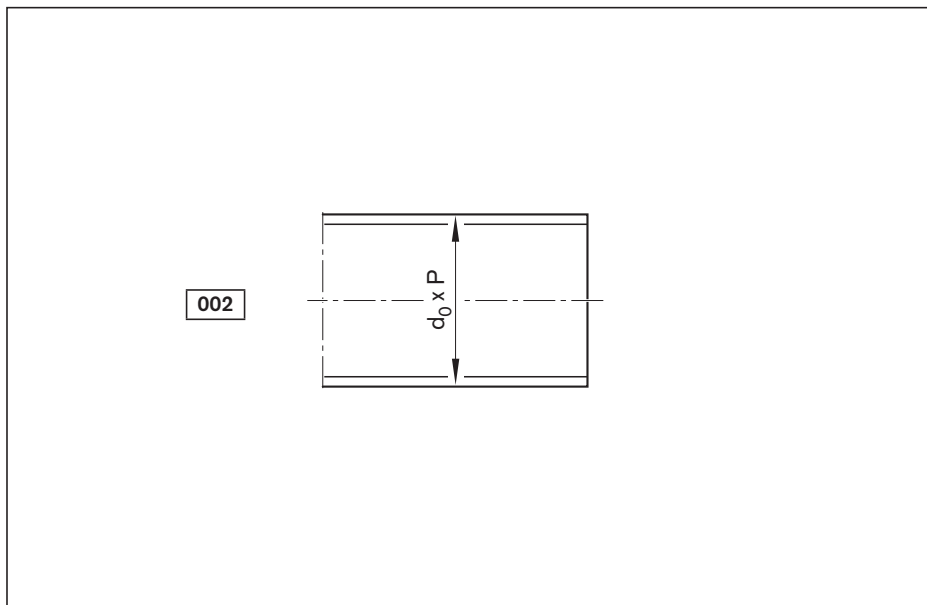
Screw ends, forms for a left or right screw end

| Basic version | | with keyway | |
|---------------|---|-------------|---|
| 002 |  | Page 207 | |
| 112 |  | Page 208 | 122  Page 208 |
| 132 |  | Page 210 | 142  Page 210 |
| 212 |  | Page 212 | 222  Page 212 |
| 312 |  | Page 214 | |
| 412 |  | Page 216 | |
| 512 |  | page 218 | 522  page 218 |
| 532 |  | page 220 | 542  page 220 |
| 612 |  | page 222 | 622  page 222 |
| 712 |  | page 224 | 722  page 224 |
| 812 |  | Page 226 | 822  Page 226 |
| 832 |  | Page 228 | 842  Page 228 |
| 912 |  | page 230 | 922  page 230 |
| 932 |  | page 232 | 942  page 232 |

Abbreviations

| | | | | | |
|----------------|---|------------------------------------|----------|---|--|
| C | = | dynamic load rating | M_{AG} | = | tightening torque of set screw |
| C_0 | = | static load rating | M_{RL} | = | bearing friction torque with seal |
| $d_0 \times P$ | = | size | M_p | = | maximum permissible drive torque (condition: no radial load at drive journal) |
| d_0 | = | nominal diameter | R_{fb} | = | rigidity (axial) |
| F_{aB} | = | axial breaking load of slotted nut | R_{ki} | = | rigidity against tilting |
| G | = | female thread | P | = | lead (R = right-hand) |
| n_G | = | limit speed (grease) | S | = | hex socket |
| No. | = | part number | Z | = | centering hole |
| M_A | = | tightening torque of slotted nut | | | |

Form 002

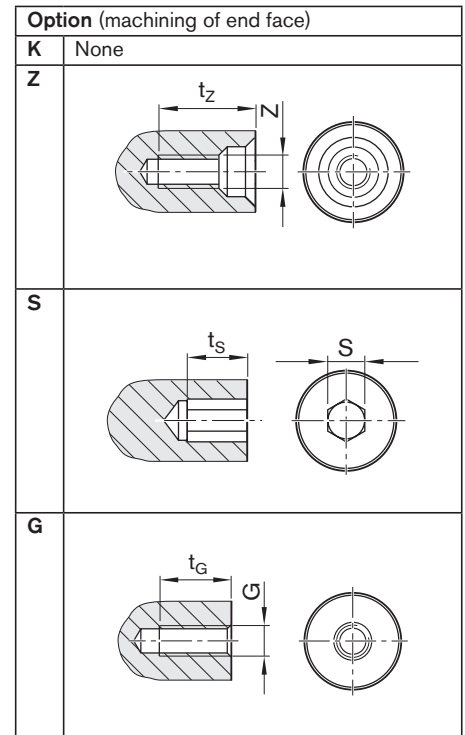
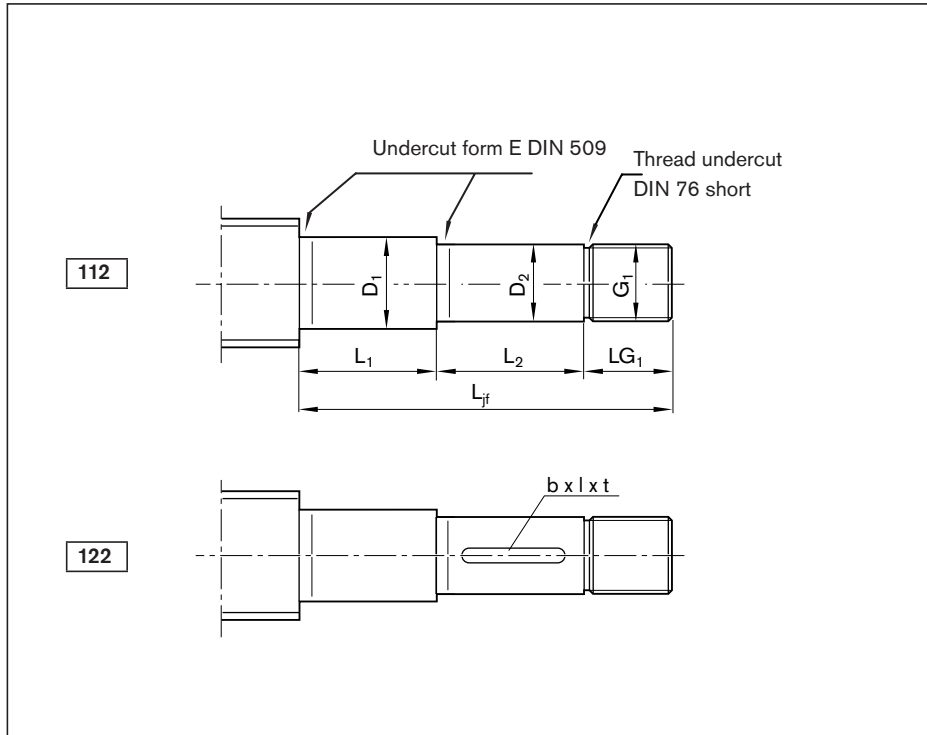


Ordering data:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 002K200 | 822K150 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version | Size $d_0 \times P$ | (mm) | | | | | |
|------|---------|------------------------|------|-------|----|-------|-----|-------|
| | | | Z | t_z | S | t_s | G | t_G |
| 002 | 200 | 20 x 5 | M6 | 16.0 | 8 | 8 | M6 | 9 |
| | 250 | 25 x 5/10 | M8 | 19.0 | 10 | 10 | M8 | 12 |
| | 300 | 30 x 5/10 | M10 | 22.0 | 12 | 12 | M10 | 15 |
| | 390 | 39 x 5/10 | M12 | 28.0 | 14 | 14 | M12 | 18 |
| | 480 | 48 x 5/10 | M16 | 36.0 | 17 | 17 | M16 | 24 |
| | 600 | 60 x 10/20 | M20 | 42.0 | 17 | 17 | M20 | 30 |
| | 750 | 75 x 10/20 | M20 | 42.0 | 19 | 19 | M24 | 36 |

Form 112, 122



Ordering data:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 122Z151 | 412K120 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version ¹⁾ | Size | (mm) | | | | | | | DIN 6885 ²⁾ keyway | | | | | | | | | |
|-------------------|-----------------------|----------|--------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------|-------------------------------|---------|-----|-----|------|----------------|----|----------------|----|----------------|
| | | | d ₀ x P | L _{jf} | D ₁ h6 | L ₁ | D ₂ h7 | L ₂ | G ₁ | LG ₁ | b P9 | l | t | Z | t _z | S | t _s | G | t _G |
| 112 | 150 | 20x5 | 60 | 15 | 23 | 12 | 25 | M12x1 | 12 | 4 | 20 | 2.5 | M4 | 10.0 | 4 | 4 | M5 | 8 | |
| 122 ²⁾ | 151 | 20x5 | 87 | 15 | 50 | 12 | 25 | M12x1 | 12 | 4 | 20 | 2.5 | M4 | 10.0 | 4 | 4 | M5 | 8 | |
| | 170 | 25x5/10 | 100 | 17 | 48 | 15 | 30 | M15x1 | 22 | 5 | 25 | 3.0 | M5 | 12,5 | 4 | 4 | M6 | 9 | |
| | 171 | 25x5/10 | 106 | 17 | 54 | 15 | 30 | M15x1 | 22 | 5 | 25 | 3.0 | M5 | 12,5 | 4 | 4 | M6 | 9 | |
| | 200 | 30x5/10 | 116 | 20 | 54 | 18 | 40 | M17x1 | 22 | 6 | 28 | 3.5 | M6 | 16.0 | 5 | 5 | M6 | 9 | |
| | 201 | 30x5/10 | 120 | 20 | 58 | 18 | 40 | M17x1 | 22 | 6 | 28 | 3.5 | M6 | 16.0 | 5 | 5 | M6 | 9 | |
| | 300 | 39x5/10 | 130 | 30 | 54 | 28 | 50 | M25x1.5 | 26 | 8 | 36 | 4.0 | M10 | 22.0 | 8 | 8 | M10 | 15 | |
| | 301 | 39x5/10 | 150 | 30 | 74 | 28 | 50 | M25x1.5 | 26 | 8 | 36 | 4.0 | M10 | 22.0 | 8 | 8 | M10 | 15 | |
| | 350 | 48x5/10 | 152 | 35 | 66 | 32 | 60 | M30x1.5 | 26 | 10 | 40 | 5.0 | M10 | 22.0 | 10 | 10 | M12 | 18 | |
| | 351 | 48x5/10 | 168 | 35 | 82 | 32 | 60 | M30x1.5 | 26 | 10 | 40 | 5.0 | M10 | 22.0 | 10 | 10 | M12 | 18 | |
| | 450 | 60x10/20 | 186 | 45 | 98 | 42 | 60 | M40x1.5 | 28 | 12 | 50 | 5.0 | M16 | 36.0 | 12 | 12 | M16 | 24 | |
| | 600 | 75x10/20 | 234 | 60 | 122 | 58 | 80 | M50x1.5 | 32 | 16 | 63 | 6.0 | M16 | 36.0 | 17 | 17 | M20 | 30 | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

2) Keyway with form 122 only

3) Under preparation

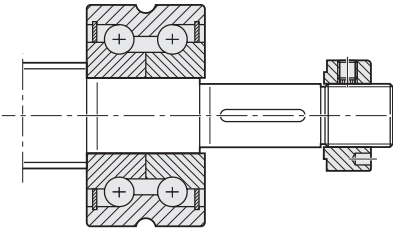
For the codes, see the chapter entitled "Abbreviations"

End bearings for screw ends form 112, 122

The bearing assemblies LAF, LAN, LAS consist of:

- 1 bearing
- 1 slotted nut

Application

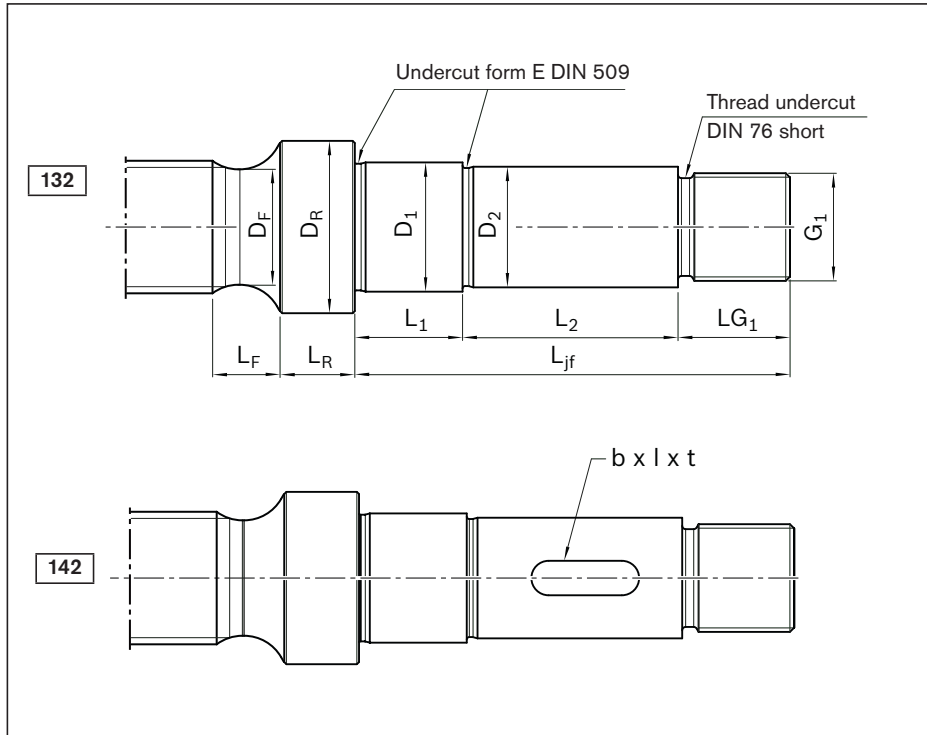


Separate technical dimensioning of the permissible drive torque is absolutely necessary.



| Version ¹⁾ | Bearing assembly | | |
|-----------------------|--------------------|--------------------|--------------------|
| | LAF Part number | LAN Part number | LAS Part number |
| 150 | R159A 015 01 | R159A 115 01 | - |
| 151 | - | - | R159A 415 01 |
| 170 | ³⁾ | ³⁾ | - |
| 171 | - | - | R159A 417 02 |
| 200 | R159A 320 01 | R159A 220 01 | - |
| 201 | - | - | R159A 420 02 |
| 300 | R1590 330 30 | R1590 230 30 | - |
| 301 | - | - | R159A 430 01 |
| 350 | R159A 335 01 | R159A 235 01 | - |
| 351 | - | - | R159A 435 01 |
| 450 | - | - | R159A 445 01 |
| 600 | - | - | R159A 460 01 |

Form 132, 142



| Option (machining of end face) | |
|--------------------------------|------|
| K | None |
| Z | |
| S | |
| G | |

Ordering data:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 142Z250 | 312Z120 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version ¹⁾ | Size | (mm) | | | | | | | | | | |
|-------------------|-----------------------|-------|--------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------|-----------------|----------------|----------------|----------------|
| | | | d ₀ x P | L _{jf} | D ₁ h6 | L ₁ | D ₂ h7 | L ₂ | G ₁ | L _{G1} | D _R | L _R | D _F |
| 132 | 200 | 20x5 | 116 | 20 | 54 | 18 | 40 | M17x1 | 22 | 27 | 7 | 19.2 | 14.0 |
| | 250 | 20x5 | 159 | 25 | 87 | 22 | 50 | M20x1 | 22 | 34 | 7 | 19.2 | 26.0 |
| 142 ²⁾ | 251 | 25x5 | 138 | 25 | 66 | 22 | 50 | M20x1 | 22 | 34 | 7 | 24.2 | 14.0 |
| | 252 | 25x10 | 138 | 25 | 66 | 22 | 50 | M20x1 | 22 | 34 | 7 | 23.7 | 14.0 |
| | 253 | 25x5 | 159 | 25 | 87 | 22 | 50 | M20x1 | 22 | 34 | 7 | 24.2 | 14.0 |
| | 254 | 25x10 | 159 | 25 | 87 | 22 | 50 | M20x1 | 22 | 34 | 7 | 23.7 | 14.0 |
| | 300 | 30x5 | 150 | 30 | 74 | 28 | 50 | M25x1.5 | 26 | 40 | 10 | 29.2 | 17.0 |
| | 301 | 30x10 | 150 | 30 | 74 | 28 | 50 | M25x1.5 | 26 | 40 | 10 | 28.7 | 17.0 |
| | 350 | 30x5 | 194 | 35 | 108 | 32 | 60 | M30x1.5 | 26 | 45 | 10 | 29.2 | 28.0 |
| | 351 | 30x10 | 194 | 35 | 108 | 32 | 60 | M30x1.5 | 26 | 45 | 10 | 28.7 | 28.0 |
| | 400 | 39x5 | 178 | 40 | 90 | 38 | 60 | M35x1.5 | 28 | 54 | 12 | 38.1 | 24.5 |
| | 401 | 39x10 | 178 | 40 | 90 | 38 | 60 | M35x1.5 | 28 | 54 | 12 | 37.7 | 24.5 |
| | 500 | 39x5 | 245 | 50 | 137 | 48 | 80 | M40x1.5 | 28 | 62 | 12 | 38.1 | 32.0 |
| | 501 | 39x10 | 245 | 50 | 137 | 48 | 80 | M40x1.5 | 28 | 62 | 12 | 37.7 | 32.0 |
| | 502 | 48x5 | 214 | 50 | 106 | 48 | 80 | M40x1.5 | 28 | 62 | 12 | 47.2 | 22.0 |
| | 503 | 48x10 | 214 | 50 | 106 | 48 | 80 | M40x1.5 | 28 | 62 | 12 | 46.7 | 22.0 |
| | 650 | 48x5 | 312 | 65 | 178 | 62 | 100 | M60x2 | 34 | 78 | 18 | 47.2 | 46.0 |
| | 651 | 48x10 | 312 | 65 | 178 | 62 | 100 | M60x2 | 34 | 78 | 18 | 46.7 | 46.0 |
| | 700 | 60x10 | 272 | 70 | 138 | 68 | 100 | M65x2 | 34 | 90 | 20 | 58.7 | 50.0 |
| | 701 | 60x20 | 272 | 70 | 138 | 68 | 100 | M65x2 | 34 | 90 | 20 | 57.7 | 50.0 |
| | 652 | 60x10 | 312 | 65 | 178 | 62 | 100 | M60x2 | 34 | 78 | 18 | 58.7 | 39.0 |
| | 653 | 60x20 | 312 | 65 | 178 | 62 | 100 | M60x2 | 34 | 78 | 18 | 57.7 | 39.0 |
| | 900 | 75x10 | 327 | 90 | 169 | 88 | 120 | M85x2 | 38 | 108 | 25 | 73.7 | 59.0 |
| | 901 | 75x20 | 327 | 90 | 169 | 88 | 120 | M85x2 | 38 | 108 | 25 | 72.7 | 59.0 |
| | 902 | 75x10 | 391 | 90 | 233 | 88 | 120 | M85x2 | 38 | 108 | 25 | 73.7 | 59.0 |
| 903 | 75x20 | 391 | 90 | 233 | 88 | 120 | M85x2 | 38 | 108 | 25 | 72.7 | 59.0 | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

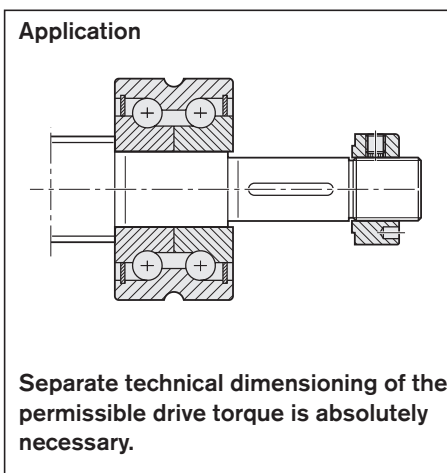
2) Keyway with form 142 only

For the codes, see the chapter entitled "Abbreviations"

End bearings for screw ends form 132, 142

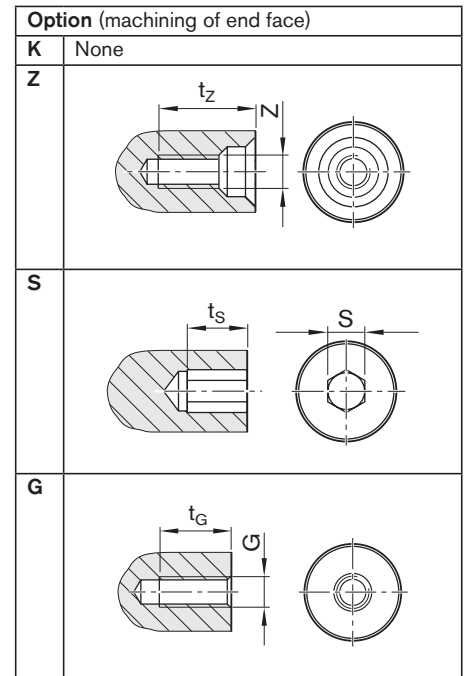
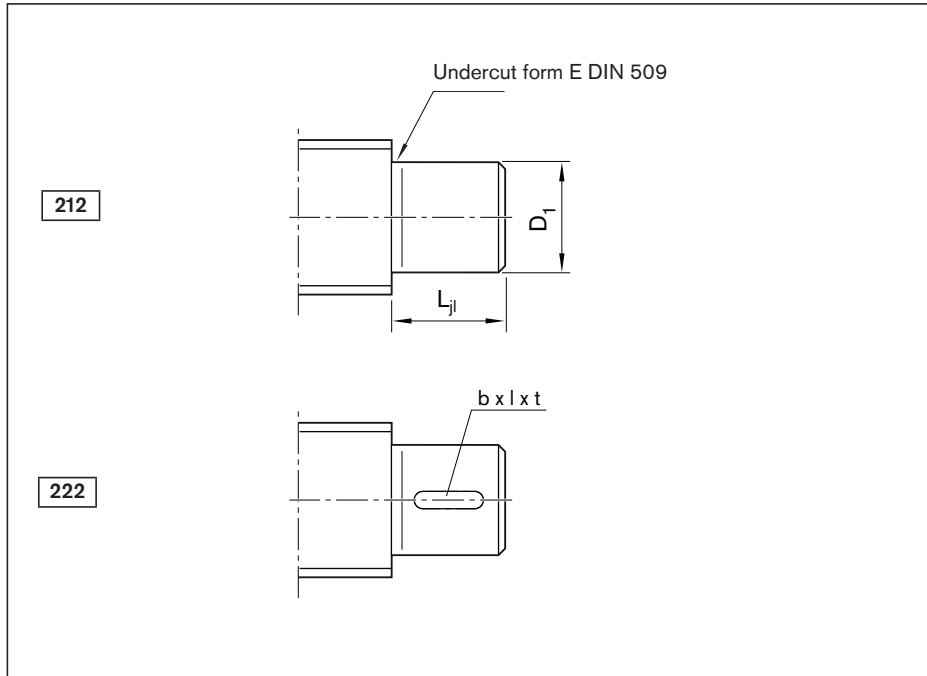
The bearing assemblies LAS, FEC-F consist of:

- 1 bearing
- 1 slotted nut



| Version ¹⁾ | DIN 6885 ²⁾ keyway | | | Centering hole | | Hex socket | | Thread | | | Bearing assembly | |
|-----------------------|-------------------------------|-----|-----|----------------|----------------|------------|----------------|--------|----------------|--------------------|----------------------|--|
| | b P9 | l | t | Z | t _Z | S | t _S | G | t _G | LAS Part number | FEC-F Part number | |
| 200 | 6 | 36 | 3.5 | M6 | 16 | 5 | 5 | M6 | 9 | R159A 420 01 | - | |
| 250 | 6 | 40 | 3.5 | M6 | 16 | 5 | 5 | M8 | 12 | - | R159B 425 01 | |
| 251 | 6 | 40 | 3.5 | M6 | 16 | 5 | 5 | M8 | 12 | R159A 425 01 | - | |
| 252 | 6 | 40 | 3.5 | M6 | 16 | 5 | 5 | M8 | 12 | R159A 425 01 | - | |
| 253 | 6 | 40 | 3.5 | M6 | 16 | 5 | 5 | M8 | 12 | - | R159B 425 01 | |
| 254 | 6 | 40 | 3.5 | M6 | 16 | 5 | 5 | M8 | 12 | - | R159B 425 01 | |
| 300 | 8 | 40 | 4.0 | M10 | 22 | 8 | 8 | M10 | 15 | R159A 430 01 | - | |
| 301 | 8 | 40 | 4.0 | M10 | 22 | 8 | 8 | M10 | 15 | R159A 430 01 | - | |
| 350 | 10 | 45 | 5.0 | M10 | 22 | 10 | 10 | M12 | 18 | - | R159B 435 01 | |
| 351 | 10 | 45 | 5.0 | M10 | 22 | 10 | 10 | M12 | 18 | - | R159B 435 01 | |
| 400 | 10 | 50 | 5.0 | M12 | 28 | 12 | 12 | M12 | 18 | R159A 440 01 | - | |
| 401 | 10 | 50 | 5.0 | M12 | 28 | 12 | 12 | M12 | 18 | R159A 440 01 | - | |
| 500 | 14 | 50 | 5.5 | M16 | 36 | 12 | 12 | M16 | 24 | - | R159B 450 01 | |
| 501 | 14 | 50 | 5.5 | M16 | 36 | 12 | 12 | M16 | 24 | - | R159B 450 01 | |
| 502 | 14 | 50 | 5.5 | M16 | 36 | 12 | 12 | M16 | 24 | R159A 450 01 | - | |
| 503 | 14 | 50 | 5.5 | M16 | 36 | 12 | 12 | M16 | 24 | R159A 450 01 | - | |
| 650 | 18 | 90 | 7.0 | M20 | 42 | 19 | 19 | M24 | 36 | - | R159B 465 01 | |
| 651 | 18 | 90 | 7.0 | M20 | 42 | 19 | 19 | M24 | 36 | - | R159B 465 01 | |
| 700 | 20 | 90 | 7.5 | M20 | 42 | 19 | 19 | M24 | 36 | R159A 470 01 | - | |
| 701 | 20 | 90 | 7.5 | M20 | 42 | 19 | 19 | M24 | 36 | R159A 470 01 | - | |
| 652 | 18 | 90 | 7.0 | M20 | 42 | 19 | 19 | M24 | 36 | - | R159B 465 01 | |
| 653 | 18 | 90 | 7.0 | M20 | 42 | 19 | 19 | M24 | 36 | - | R159B 465 01 | |
| 900 | 25 | 100 | 9.0 | M20 | 42 | 19 | 19 | M30 | 45 | R159A 490 01 | - | |
| 901 | 25 | 100 | 9.0 | M20 | 42 | 19 | 19 | M30 | 45 | R159A 490 01 | - | |
| 902 | 25 | 100 | 9.0 | M20 | 42 | 19 | 19 | M30 | 45 | - | R159B 490 01 | |
| 903 | 25 | 100 | 9.0 | M20 | 42 | 19 | 19 | M30 | 45 | - | R159B 490 01 | |

Form 212, 222



Ordering data:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 222Z150 | 412Z120 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version ¹⁾ | Size d ₀ x P | (mm) | | | | | | | Deep-groove ball bearing as per DIN 625 ³⁾ | | | | | |
|-------------------|-----------------------|----------------------------|-----------------|----------------------|--|----|-----|---------------------|------|---|----|-------------|----|-------------|-------------------------------------|
| | | | L _{jl} | D ₁ j6 | DIN 6885 ²⁾ keyway b P9 | | | Centering hole Z | | Hex socket S | | Thread G | | Designation | Bearing assembly LAD Part number |
| 212 | 120 | 20 x 5 | 13 | 12 | 4 | 8 | 2.5 | M4 | 10.0 | 4 | 4 | M5 | 8 | 6201.2RS | R3414 042 00 |
| 222 ²⁾ | 150 | 20 x 5 | 15 | 15 | 5 | 10 | 3.0 | M5 | 12.5 | 4 | 4 | M6 | 9 | 6202.2RS | R3414 074 00 |
| | 170 | 25 x 5/10 | 15 | 17 | 5 | 10 | 3.0 | M6 | 16.0 | 5 | 5 | M6 | 9 | 6203.2RS | R3414 050 00 |
| | 200 | 30 x 5/10 | 24 | 20 | 6 | 14 | 3.5 | M6 | 16.0 | 5 | 5 | M8 | 12 | 6204.2RS | R3414 038 00 |
| | 250 | 30 x 5/10 | 28 | 25 | 8 | 18 | 4.0 | M10 | 22.0 | 8 | 8 | M10 | 15 | 6205.2RS | R3414 063 00 |
| | 300 | 39 x 5/10 | 28 | 30 | 8 | 18 | 4.0 | M10 | 22.0 | 10 | 10 | M12 | 18 | 6206.2RS | R3414 051 00 |
| | 350 | 48 x 5/10 | 32 | 35 | 10 | 22 | 5.0 | M12 | 28.0 | 12 | 12 | M12 | 18 | 6207.2RS | R3414 075 00 |
| | 500 | 60 x 10/20 | 46 | 50 | 14 | 36 | 5.5 | M16 | 36.0 | 19 | 19 | M20 | 30 | 6210.2RS | R3414 077 00 |
| | 600 | 75 x 10/20 | 60 | 60 | 18 | 50 | 7.0 | M20 | 42.0 | 19 | 19 | M24 | 36 | 6212.2RS | R3414 078 00 |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

2) Keyway with form 222 only

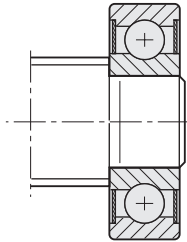
3) Deep groove ball bearing with form 212 only

4) Scope of delivery: 1 bearing, 2 retaining rings.

For the codes, see the chapter entitled "Abbreviations"

End bearings for screw ends in form 212

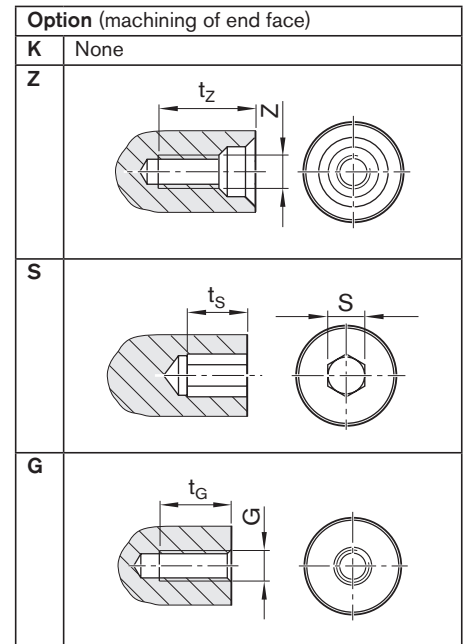
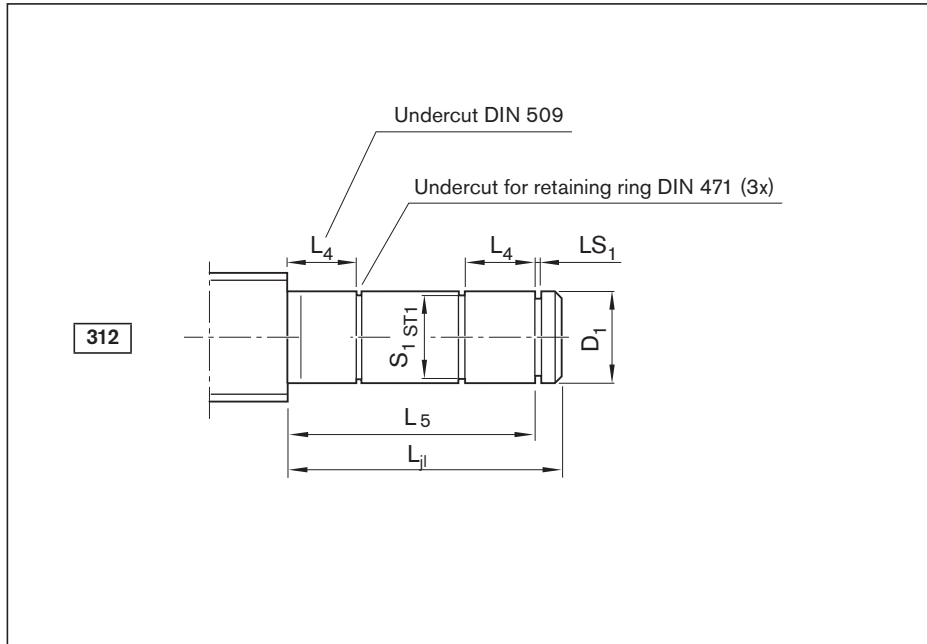
Application



Bearing assembly LAD²⁾



Form 312



Ordering data:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 312Z120 | 822K150 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version ¹⁾ | Size | (mm) | | | | | | | Centering hole | | Hex socket | | Thread | | Bearing assembly LAD | Part number |
|------|-----------------------|------------|----------------|-------------|----------|-------|-------|-------|--------|----------------|------|------------|-----|--------|--------------|----------------------|-------------|
| | | | $d_0 \times P$ | D_1 j6 | L_{II} | L_4 | L_5 | S_1 | ST_1 | LS_1 H13 | Z | t_z | S | t_s | G | | |
| 312 | 120 | 20 x 5 | 12 | 43 | 10 | 40 | 11.5 | h11 | 1.10 | M4 | 10.0 | 4 | 4 | M5 | 8 | R1590 612 00 | |
| | 150 | 20 x 5 | 15 | 47 | 11 | 44 | 14.3 | h11 | 1.10 | M5 | 12.5 | 4 | 4 | M6 | 9 | R1590 615 00 | |
| | 170 | 25 x 5/10 | 17 | 51 | 12 | 48 | 16.2 | h11 | 1.10 | M6 | 16.0 | 5 | 5 | M6 | 9 | R1590 617 00 | |
| | 200 | 30 x 5/10 | 20 | 60 | 14 | 56 | 19.0 | h11 | 1.30 | M6 | 16.0 | 5 | 5 | M8 | 12 | R1590 620 00 | |
| | 250 | 30 x 5/10 | 25 | 64 | 15 | 60 | 23.9 | h12 | 1.30 | M10 | 22.0 | 8 | 8 | M10 | 15 | R1590 625 00 | |
| | 300 | 39 x 5/10 | 30 | 68 | 16 | 64 | 28.6 | h12 | 1.60 | M10 | 22.0 | 10 | 10 | M12 | 18 | R1590 630 00 | |
| | 350 | 48 x 5/10 | 35 | 73 | 17 | 68 | 33.0 | h12 | 1.60 | M12 | 28.0 | 12 | 12 | M12 | 18 | R1590 635 00 | |
| | 500 | 60 x 10/20 | 50 | 87 | 20 | 80 | 47.0 | h12 | 2.15 | M16 | 36.0 | 19 | 19 | M20 | 30 | R1590 650 00 | |
| 600 | 75 x 10/20 | 60 | 95 | 22 | 88 | 57.0 | h12 | 2.15 | M20 | 42.0 | 19 | 19 | M24 | 36 | R1590 660 00 | | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

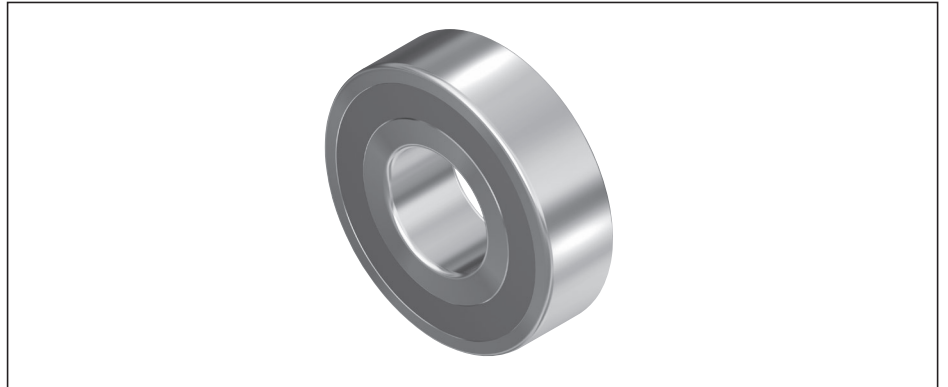
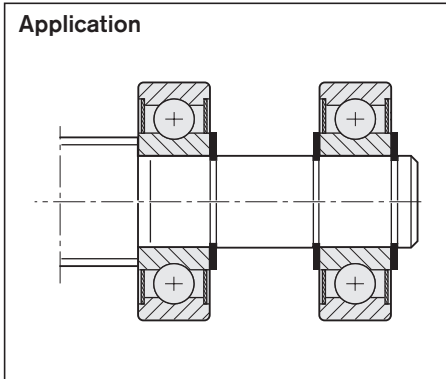
Note: Form 312 with two floating bearings increases the critical speed, see "Critical speed n_c " on page 270.

For the codes, see the chapter entitled "Abbreviations"

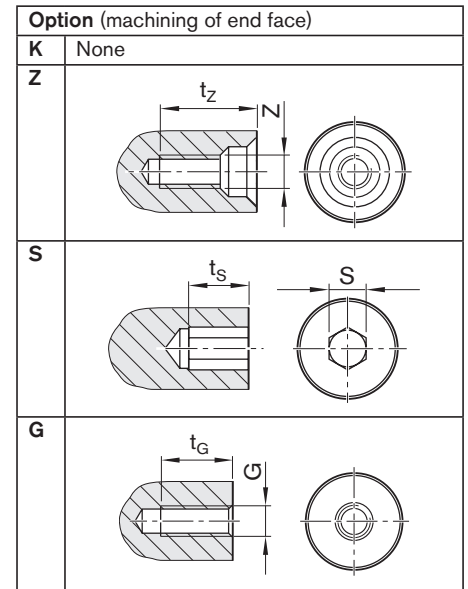
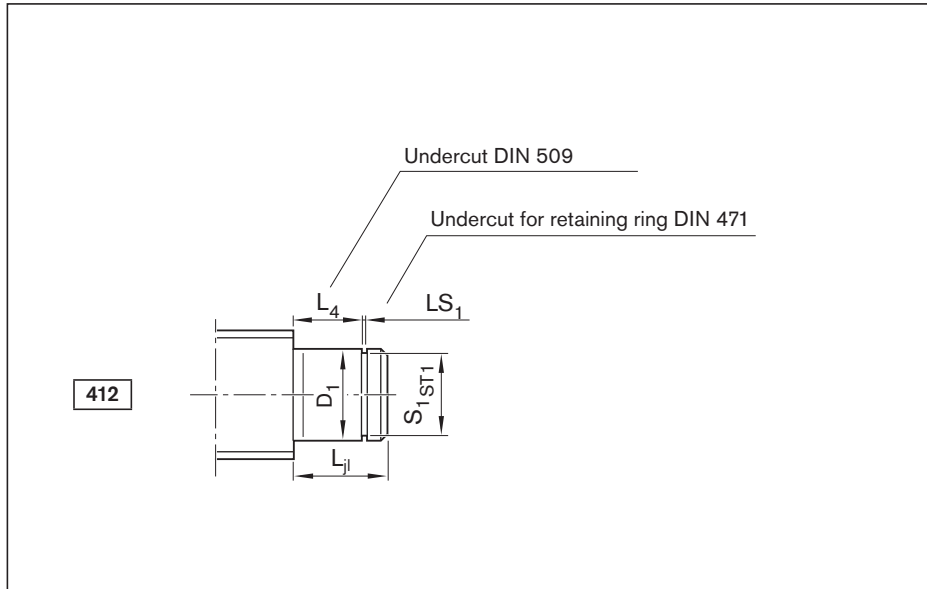
End bearings for screw ends in form 312

The bearing assembly LAD consists of:

- 1 bearing (2x required)
- 2 retaining rings



Form 412



Ordering data:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 412Z120 | 822K150 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version ¹⁾ | Size | (mm) | | | | | | | Centering hole | | Hex socket | | Thread | | Bearing assembly LAD | Part number |
|------|-----------------------|------------|----------------|-------------|----------|-------|-------|--------|---------------|----------------|-------|------------|-------|--------|--------------|----------------------|-------------|
| | | | $d_0 \times P$ | D_1 j6 | L_{j1} | L_4 | S_1 | ST_1 | LS_1 H13 | Z | t_z | S | t_s | G | t_G | | |
| 412 | 120 | 20 x 5 | 12 | 13 | 10 | 11.5 | h11 | 1.10 | M4 | 10.0 | 4 | 4 | M5 | 8 | R1590 612 00 | | |
| | 150 | 20 x 5 | 15 | 14 | 11 | 14.3 | h11 | 1.10 | M5 | 12.5 | 4 | 4 | M6 | 9 | R1590 615 00 | | |
| | 170 | 25 x 5/10 | 17 | 15 | 12 | 16,2 | h11 | 1,10 | M6 | 16,0 | 5 | 5 | M6 | 9 | R1590 617 00 | | |
| | 200 | 30 x 5/10 | 20 | 18 | 14 | 19.0 | h11 | 1.30 | M6 | 16.0 | 5 | 5 | M8 | 12 | R1590 620 00 | | |
| | 250 | 30 x 5/10 | 25 | 19 | 15 | 23.9 | h12 | 1.30 | M10 | 22.0 | 8 | 8 | M10 | 15 | R1590 625 00 | | |
| | 300 | 39 x 5/10 | 30 | 20 | 16 | 28.6 | h12 | 1.60 | M10 | 22.0 | 10 | 10 | M12 | 18 | R1590 630 00 | | |
| | 350 | 48 x 5/10 | 35 | 22 | 17 | 33.0 | h12 | 1.60 | M12 | 28.0 | 12 | 12 | M12 | 18 | R1590 635 00 | | |
| | 500 | 60 x 10/20 | 50 | 27 | 20 | 47.0 | h12 | 2.15 | M16 | 36.0 | 19 | 19 | M20 | 30 | R1590 650 00 | | |
| | 600 | 75 x 10/20 | 60 | 29 | 22 | 57.0 | h12 | 2.15 | M20 | 42.0 | 19 | 19 | M24 | 36 | R1590 660 00 | | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

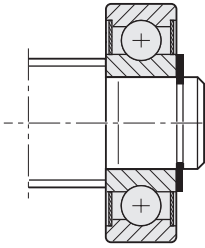
For the codes, see the chapter entitled "Abbreviations"

End bearings for screw ends in form 412

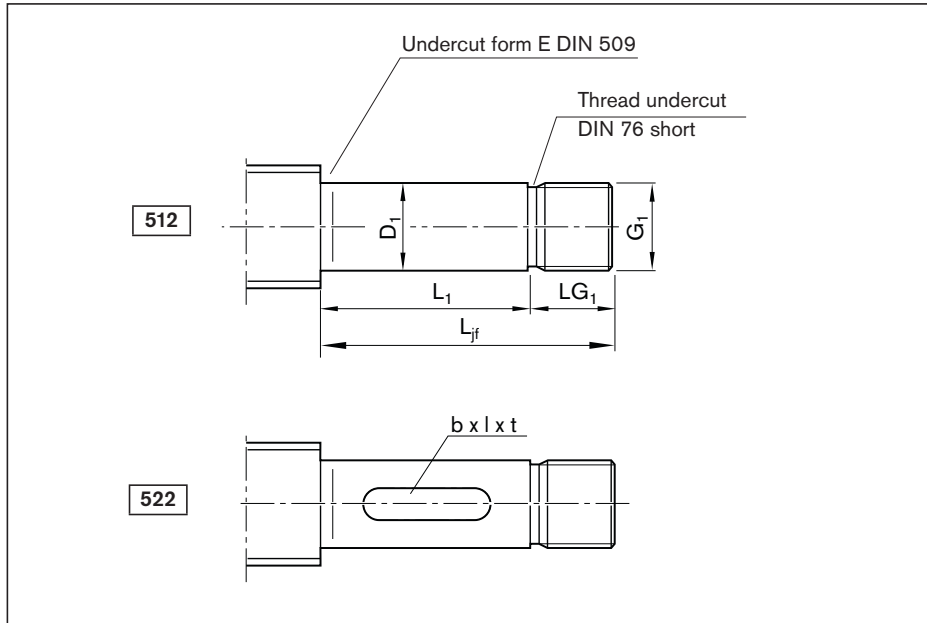
The bearing assembly LAD consists of:

- 1 bearing
- 2 retaining rings

Application



Form 512, 522



| Option (machining of end face) | |
|--------------------------------|------|
| K | None |
| Z | |
| S | |
| G | |

Ordering data:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 512Z150 | 312Z120 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version ¹⁾ | Size (mm) | DIN 6885 ²⁾ keyway | | | | | Centering hole | | Hex socket | | Thread | | | | |
|---------------------------|-----------------------|--------------|-------------------------------|-----------------------|----------------|----------------|----------------|-----------------|---------|------------|-----|--------|----------------|----|----------------|----|
| | | | d ₀ x P | L _{jf} h6 | D ₁ | L ₁ | G ₁ | LG ₁ | b P9 | l | t | Z | t _z | S | t _s | G |
| 512/ 522 ²⁾ | 150 | 20 x 5 | 45 | 15 | 23 | M15X1 | 22 | 5 | 14 | 3.0 | M5 | 12.5 | 4 | 4 | M6 | 9 |
| | 151 | 20 x 5 | 72 | 15 | 50 | M15x1 | 22 | 5 | 25 | 3.0 | M5 | 12.5 | 4 | 4 | M6 | 9 |
| | 170 | 25 x 5 | 70 | 17 | 48 | M17x1 | 22 | 5 | 25 | 3.0 | M6 | 16.0 | 5 | 5 | M6 | 9 |
| | | 25 x 10 | 70 | 17 | 48 | M17x1 | 22 | 5 | 25 | 3.0 | M6 | 16.0 | 5 | 5 | M6 | 9 |
| | 171 | 25 x 5 | 76 | 17 | 54 | M17x1 | 22 | 5 | 25 | 3.0 | M6 | 16.0 | 5 | 5 | M6 | 9 |
| | | 25 x 10 | 76 | 17 | 54 | M17x1 | 22 | 5 | 25 | 3.0 | M6 | 16.0 | 5 | 5 | M6 | 9 |
| | 200 | 30 x 5 | 76 | 20 | 54 | M20x1 | 22 | 6 | 28 | 3.5 | M6 | 16.0 | 5 | 5 | M8 | 12 |
| | | 30 x 10 | 76 | 20 | 54 | M20x1 | 22 | 6 | 28 | 3.5 | M6 | 16.0 | 5 | 5 | M8 | 12 |
| | 201 | 30 x 5 | 80 | 20 | 58 | M20x1 | 22 | 6 | 28 | 3.5 | M6 | 16.0 | 5 | 5 | M8 | 12 |
| | | 30 x 10 | 80 | 20 | 58 | M20x1 | 22 | 6 | 28 | 3.5 | M6 | 16.0 | 5 | 5 | M8 | 12 |
| | 300 | 39 x 5 | 80 | 30 | 54 | M30x1.5 | 26 | 8 | 36 | 4.0 | M10 | 22.0 | 10 | 10 | M12 | 18 |
| | | 39 x 10 | 80 | 30 | 54 | M30x1.5 | 26 | 8 | 36 | 4.0 | M10 | 22.0 | 10 | 10 | M12 | 18 |
| | 301 | 39 x 5 | 100 | 30 | 74 | M30x1.5 | 26 | 8 | 36 | 4.0 | M10 | 22.0 | 10 | 10 | M12 | 18 |
| | | 39 x 10 | 100 | 30 | 74 | M30x1.5 | 26 | 8 | 36 | 4.0 | M10 | 22.0 | 10 | 10 | M12 | 18 |
| | 350 | 48 x 5 | 94 | 35 | 66 | M35x1.5 | 28 | 10 | 40 | 5.0 | M12 | 28.0 | 12 | 12 | M12 | 18 |
| | | 48 x 10 | 94 | 35 | 66 | M35x1.5 | 28 | 10 | 40 | 5.0 | M12 | 28.0 | 12 | 12 | M12 | 18 |
| | 351 | 48 x 5 | 110 | 35 | 82 | M35x1.5 | 28 | 10 | 40 | 5.0 | M12 | 28.0 | 12 | 12 | M12 | 18 |
| | | 48 x 10 | 110 | 35 | 82 | M35x1.5 | 28 | 10 | 40 | 5.0 | M12 | 28.0 | 12 | 12 | M12 | 18 |
| | 450 | 60 x 10 | 126 | 45 | 98 | M45x1.5 | 28 | 14 | 63 | 5.5 | M16 | 36.0 | 14 | 14 | M16 | 24 |
| | | 60 x 20 | 126 | 45 | 98 | M45x1.5 | 28 | 14 | 63 | 5.5 | M16 | 36.0 | 14 | 14 | M16 | 24 |
| | 600 | 75 x 10 | 156 | 60 | 122 | M60x2 | 34 | 18 | 80 | 7.0 | M20 | 42.0 | 19 | 19 | M24 | 36 |
| | | 75 x 20 | 156 | 60 | 122 | M60x2 | 34 | 18 | 80 | 7.0 | M20 | 42.0 | 19 | 19 | M24 | 36 |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

2) Keyway with form 522 only

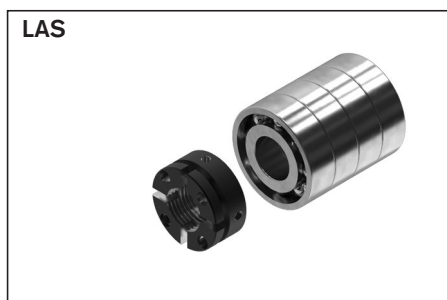
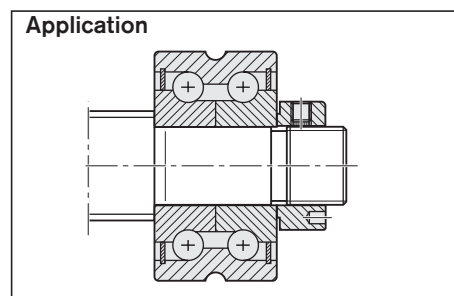
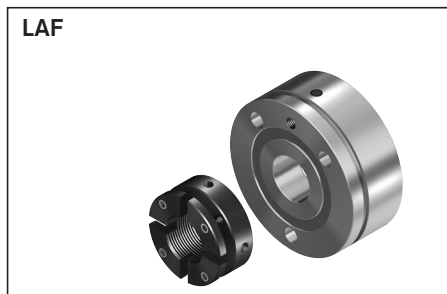
3) Under preparation

For the codes, see the chapter entitled "Abbreviations"

End bearings for screw ends in form 512

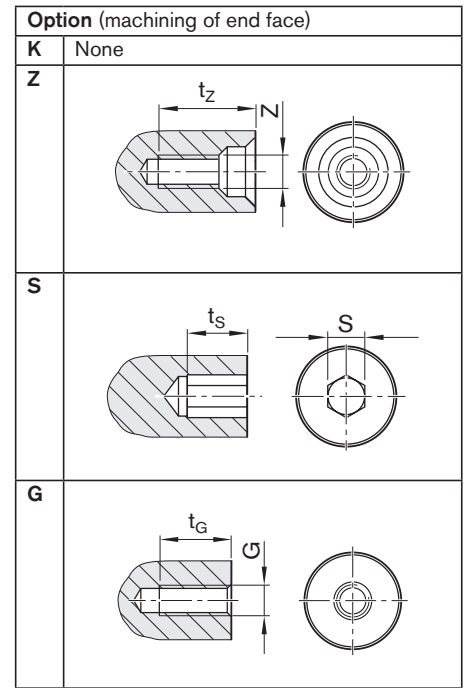
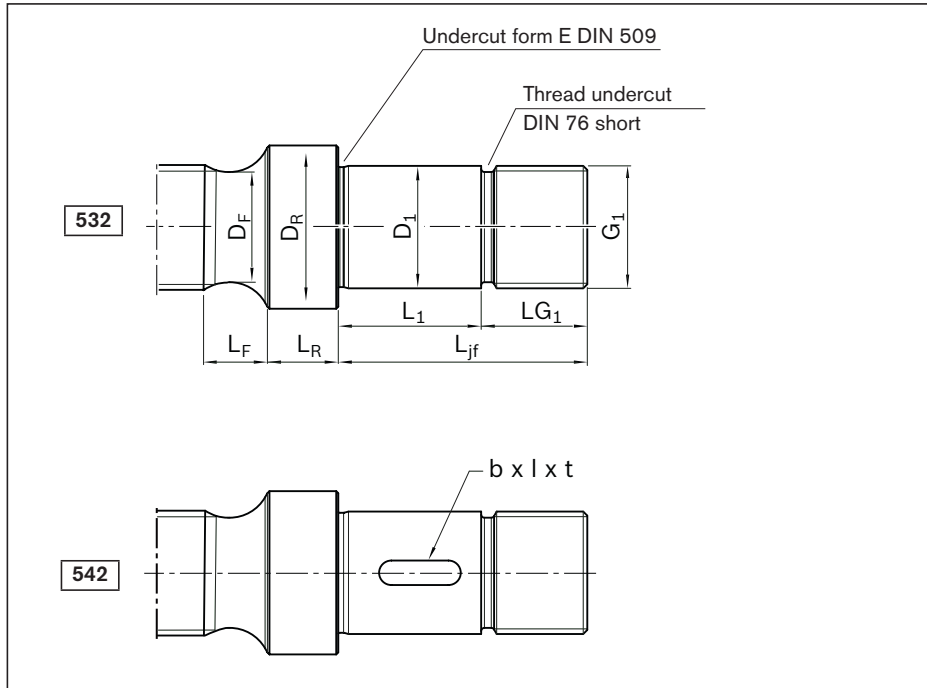
The bearing assemblies LAF, LAN, LAS consist of:

- 1 bearing
- 1 slotted nut



| Version ¹⁾ | Size d ₀ x P | M _p (Nm) (For form 512 only) | Bearing assembly | | |
|-----------------------|----------------------------|--|--------------------|--------------------|--------------------|
| | | | LAF Part number | LAN Part number | LAS Part number |
| 150 | 20 x 5 | 12.1 | R159A 015 01 | R159A 115 01 | - |
| 151 | 20 x 5 | 12.1 | - | - | R159A 415 01 |
| 170 | 25 x 5 | 16.0 ³⁾ | - | ³⁾ | - |
| | 25 x 10 | 28.8 ³⁾ | - | ³⁾ | - |
| 171 | 25 x 5 | 16.0 | - | - | R159A 417 02 |
| | 25 x 10 | 25.8 | - | - | R159A 417 02 |
| 200 | 30 x 5 | 22.6 | R159A 320 01 | R159A 220 01 | - |
| | 30 x 10 | 38.8 | R159A 320 01 | R159A 220 01 | - |
| 201 | 30 x 5 | 22.6 | - | - | R159A 420 02 |
| | 30 x 10 | 38.8 | - | - | R159A 420 02 |
| 300 | 39 x 5 | 46.1 | R1590 330 30 | R1590 230 30 | - |
| | 39 x 10 | 86.4 | R1590 330 30 | R1590 230 30 | - |
| 301 | 39 x 5 | 46.1 | - | - | R159A 430 01 |
| | 39 x 10 | 86.4 | - | - | R159A 430 01 |
| 350 | 48 x 5 | 62.7 | R159A 335 01 | R159A 235 01 | - |
| | 48 x 10 | 120.4 | R159A 335 01 | R159A 235 01 | - |
| 351 | 48 x 5 | 62.7 | - | - | R159A 435 01 |
| | 48 x 10 | 120.4 | - | - | R159A 435 01 |
| 450 | 60 x 10 | 194.3 | - | - | R159A 445 01 |
| | 60 x 20 | 359.7 | - | - | R159A 445 01 |
| 600 | 75 x 10 | 324.8 | - | - | R159A 460 01 |
| | 75 x 20 | 624.2 | - | - | R159A 460 01 |

Form 532, 542



Ordering data:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 532Z200 | 412Z120 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version ¹⁾ | Size | (mm) | | | | | | | | | | DIN 6885 ²⁾ keyway | | |
|-------------------|-----------------------|---------|--------------------|-----------------|----------------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|-------------------------------|-----|---|
| | | | d ₀ x P | L _{jf} | D ₁ h6 | L ₁ | G ₁ | L _{G1} | D _R | L _R | D _F | L _F | b P9 | l | t |
| 532 | 200 | 20 x 5 | 76 | 20 | 54 | M20x1 | 22 | 27 | 7 | 19.2 | 14.0 | 6 | 36 | 3.5 | |
| 542 ²⁾ | 250 | 20 x 5 | 113 | 25 | 87 | M25x1.5 | 26 | 34 | 7 | 19.2 | 26.0 | 8 | 40 | 4.0 | |
| | 252 | 25 x 5 | 92 | 25 | 66 | M25x1.5 | 26 | 34 | 7 | 24.2 | 14.0 | 8 | 40 | 4.0 | |
| | 253 | 25 x 10 | 92 | 25 | 66 | M25x1.5 | 26 | 34 | 7 | 23.7 | 14.0 | 8 | 40 | 4.0 | |
| | 254 | 25 x 5 | 113 | 25 | 87 | M25x1.5 | 26 | 34 | 7 | 24.2 | 14.0 | 8 | 40 | 4.0 | |
| | 255 | 25 x 10 | 113 | 25 | 87 | M25x1.5 | 26 | 34 | 7 | 23.7 | 14.0 | 8 | 40 | 4.0 | |
| | 300 | 30 x 5 | 100 | 30 | 74 | M30x1.5 | 26 | 40 | 10 | 29.2 | 17.0 | 8 | 40 | 4.0 | |
| | 301 | 30 x 10 | 100 | 30 | 74 | M30x1.5 | 26 | 40 | 10 | 28.7 | 17.0 | 8 | 40 | 4.0 | |
| | 350 | 30 x 5 | 136 | 35 | 108 | M35x1.5 | 28 | 45 | 10 | 29.2 | 28.0 | 10 | 45 | 5.0 | |
| | 351 | 30 x 10 | 136 | 35 | 108 | M35x1.5 | 28 | 45 | 10 | 28.7 | 28.0 | 10 | 45 | 5.0 | |
| | 400 | 39 x 5 | 118 | 40 | 90 | M40x1.5 | 28 | 54 | 12 | 38.1 | 24.5 | 12 | 50 | 5.0 | |
| | 401 | 39 x 10 | 118 | 40 | 90 | M40x1.5 | 28 | 54 | 12 | 37.7 | 24.5 | 12 | 50 | 5.0 | |
| | 500 | 39 x 5 | 169 | 50 | 137 | M50x1.5 | 32 | 62 | 12 | 38.1 | 32.0 | 14 | 50 | 5.5 | |
| | 501 | 39 x 10 | 169 | 50 | 137 | M50x1.5 | 32 | 62 | 12 | 37.7 | 32.0 | 14 | 50 | 5.5 | |
| | 502 | 48 x 5 | 138 | 50 | 106 | M50x1.5 | 32 | 62 | 12 | 47.2 | 22.0 | 14 | 50 | 5.5 | |
| | 503 | 48 x 10 | 138 | 50 | 106 | M50x1.5 | 32 | 62 | 12 | 46.7 | 22.0 | 14 | 50 | 5.5 | |
| | 650 | 48 x 5 | 212 | 65 | 178 | M65x2 | 34 | 78 | 18 | 47.2 | 46.0 | 18 | 90 | 7.0 | |
| | 651 | 48 x 10 | 212 | 65 | 178 | M65x2 | 34 | 78 | 18 | 46.7 | 46.0 | 18 | 90 | 7.0 | |
| | 700 | 60 x 10 | 174 | 70 | 138 | M70x2 | 36 | 90 | 20 | 58.7 | 50.0 | 20 | 90 | 7.5 | |
| | 701 | 60 x 20 | 174 | 70 | 138 | M70x2 | 36 | 90 | 20 | 57.7 | 50.0 | 20 | 90 | 7.5 | |
| | 652 | 60 x 10 | 212 | 65 | 178 | M65x2 | 34 | 78 | 18 | 58.7 | 39.0 | 18 | 90 | 7.0 | |
| 653 | 60 x 20 | 212 | 65 | 178 | M65x2 | 34 | 78 | 18 | 57.7 | 39.0 | 18 | 90 | 7.0 | | |
| 900 | 75 x 10 | 209 | 90 | 169 | M90x2 | 40 | 108 | 25 | 73.7 | 59.0 | 25 | 100 | 9.0 | | |
| 901 | 75 x 20 | 209 | 90 | 169 | M90x2 | 40 | 108 | 25 | 72.7 | 59.0 | 25 | 100 | 9.0 | | |
| 902 | 75 x 10 | 273 | 90 | 233 | M90x2 | 40 | 108 | 25 | 73.7 | 59.0 | 25 | 100 | 9.0 | | |
| 903 | 75 x 20 | 273 | 90 | 233 | M90x2 | 40 | 108 | 25 | 72.7 | 59.0 | 25 | 100 | 9.0 | | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

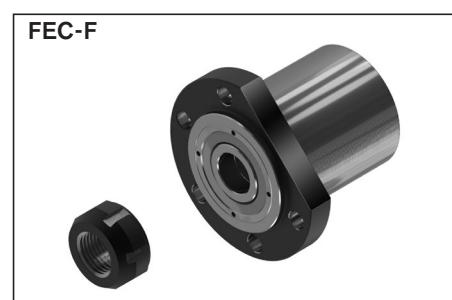
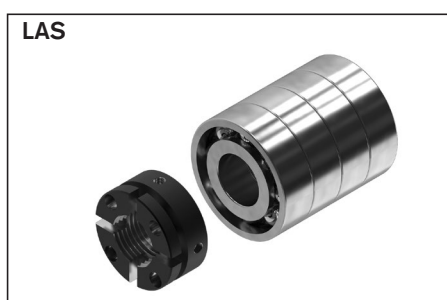
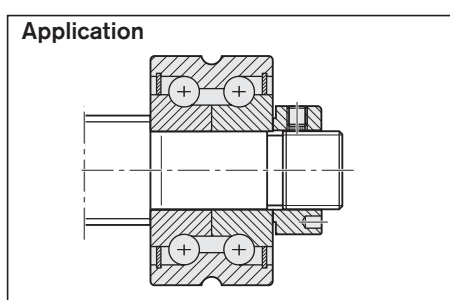
2) Keyway with form 542 only

For the codes, see the chapter entitled "Abbreviations"

End bearings for screw ends in form 532

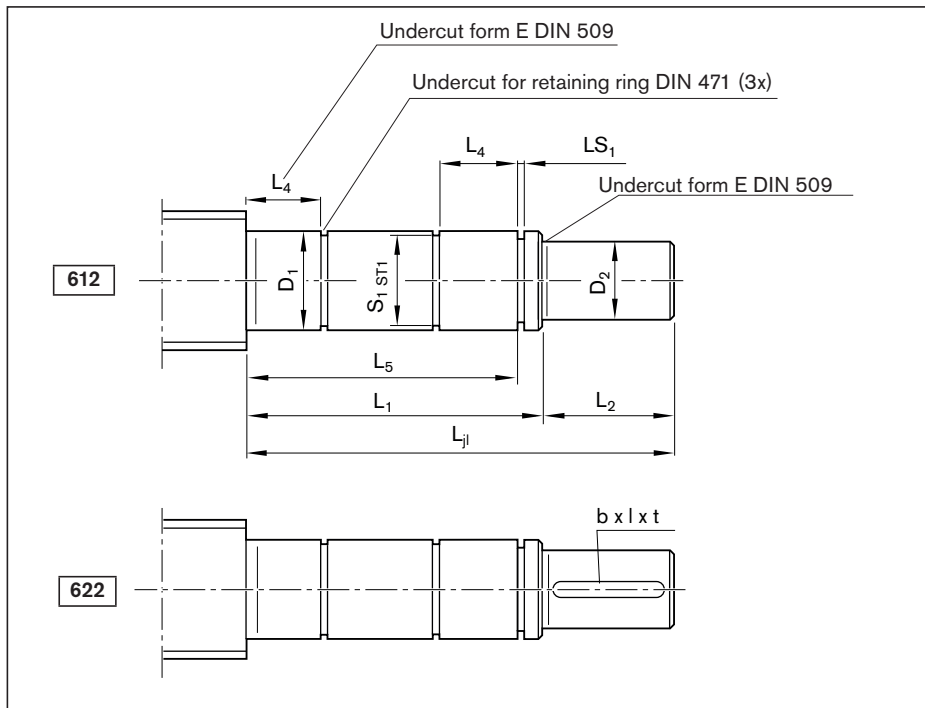
The bearing assemblies FEC-F, LAS consist of:

- 1 bearing
- 1 slotted nut



| Version ¹⁾ | Centering hole | | Hex socket | | Thread | | Mp (Nm) For form 532 only | Bearing assembly | |
|-----------------------|----------------|----------------|------------|----------------|--------|----------------|------------------------------|--------------------|----------------------|
| | Z | t _z | S | t _s | G | t _G | | LAS Part number | FEC-F Part number |
| 200 | M6 | 16 | 5 | 5 | M6 | 9 | 22.9 | R159A 420 01 | - |
| 250 | M6 | 16 | 5 | 5 | M8 | 12 | 28.6 | - | R159B 425 01 |
| 252 | M10 | 22 | 8 | 8 | M10 | 15 | 33.3 | R159A 425 01 | - |
| 253 | M10 | 22 | 8 | 8 | M10 | 15 | 60.5 | R159A 425 01 | - |
| 254 | M10 | 22 | 8 | 8 | M10 | 15 | 33.3 | - | R159B 425 01 |
| 255 | M10 | 22 | 8 | 8 | M10 | 15 | 60.5 | - | R159B 425 01 |
| 300 | M10 | 22 | 8 | 8 | M10 | 15 | 45.8 | R159A 430 01 | - |
| 301 | M10 | 22 | 8 | 8 | M10 | 15 | 85.9 | R159A 430 01 | - |
| 350 | M10 | 22 | 10 | 10 | M12 | 18 | 54.3 | - | R159B 435 01 |
| 351 | M10 | 22 | 10 | 10 | M12 | 18 | 108.6 | - | R159B 435 01 |
| 400 | M12 | 28 | 12 | 12 | M12 | 18 | 80.2 | R159A 440 01 | - |
| 401 | M12 | 28 | 12 | 12 | M12 | 18 | 156.0 | R159A 440 01 | - |
| 500 | M16 | 36 | 12 | 12 | M16 | 24 | 91.1 | - | R159B 450 01 |
| 501 | M16 | 36 | 12 | 12 | M16 | 24 | 175.4 | - | R159B 450 01 |
| 502 | M16 | 36 | 12 | 12 | M16 | 24 | 121.3 | R159A 450 01 | - |
| 503 | M16 | 36 | 12 | 12 | M16 | 24 | 237.3 | R159A 450 01 | - |
| 650 | M20 | 42 | 19 | 19 | M24 | 36 | 137.4 | - | R159B 465 01 |
| 651 | M20 | 42 | 19 | 19 | M24 | 36 | 279.9 | - | R159B 465 01 |
| 700 | M20 | 42 | 19 | 19 | M24 | 36 | 423.8 | R159A 470 01 | - |
| 701 | M20 | 42 | 19 | 19 | M24 | 36 | 793.8 | R159A 470 01 | - |
| 652 | M20 | 42 | 19 | 19 | M24 | 36 | 408.1 | - | R159B 465 01 |
| 653 | M20 | 42 | 19 | 19 | M24 | 36 | 771.4 | - | R159B 465 01 |
| 900 | M20 | 42 | 19 | 19 | M30 | 45 | 656.2 | R159A 490 01 | - |
| 901 | M20 | 42 | 19 | 19 | M30 | 45 | 1,250.0 | R159A 490 01 | - |
| 902 | M20 | 42 | 19 | 19 | M30 | 45 | 656.2 | - | R159B 490 01 |
| 903 | M20 | 42 | 19 | 19 | M30 | 45 | 1,250.0 | - | R159B 490 01 |

Form 612, 622



| Option (machining of end face) | |
|--------------------------------|------|
| K | None |
| Z | |
| S | |
| G | |

Ordering data:

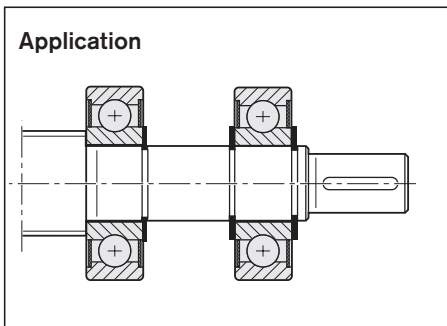
| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 622Z150 | 822K150 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version ¹⁾ | Size (mm) | | | | | | | | | | |
|------|-----------------------|-----------|--------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------|----------------|--------------------|------------------------|
| | | | d ₀ x P | L _{ji} | D ₁ j6 | L ₁ | D ₂ h7 | L ₂ | L ₄ | L ₅ | S ₁ ST1 | LS ₁ H13 |
| 612 | 120 | 20 x 5 | 68 | 12 | 43 | 10 | 25 | 10 | 40 | 11.5 | h11 | 1.10 |
| | 622 ²⁾ | 150 | 20 x 5 | 72 | 15 | 47 | 12 | 25 | 11 | 44 | 14.3 | h11 |
| | 170 | 25 x 5 | 81 | 17 | 51 | 15 | 30 | 12 | 48 | 16.2 | h11 | 1.10 |
| | | 25 x 10 | 81 | 17 | 51 | 15 | 30 | 12 | 48 | 16.2 | h11 | 1.10 |
| | 200 | 30 x 5 | 100 | 20 | 60 | 18 | 40 | 14 | 56 | 19.0 | h11 | 1.30 |
| | | 30 x 10 | 100 | 20 | 60 | 18 | 40 | 14 | 56 | 19.0 | h11 | 1.30 |
| | 250 | 30 x 5 | 114 | 25 | 64 | 22 | 50 | 15 | 60 | 23.9 | h12 | 1.30 |
| | | 30 x 10 | 114 | 25 | 64 | 22 | 50 | 15 | 60 | 23.9 | h12 | 1.30 |
| | 300 | 39 x 5 | 118 | 30 | 68 | 28 | 50 | 16 | 64 | 28.6 | h12 | 1.60 |
| | | 39 x 10 | 118 | 30 | 68 | 28 | 50 | 16 | 64 | 28.6 | h12 | 1.60 |
| | 350 | 48 x 5 | 133 | 35 | 73 | 32 | 60 | 17 | 68 | 33.0 | h12 | 1.60 |
| | | 48 x 10 | 133 | 35 | 73 | 32 | 60 | 17 | 68 | 33.0 | h12 | 1.60 |
| | 500 | 60 x 10 | 167 | 50 | 87 | 48 | 80 | 20 | 80 | 47.0 | h12 | 2.15 |
| | | 60 x 20 | 167 | 50 | 87 | 48 | 80 | 20 | 80 | 47.0 | h12 | 2.15 |
| | 600 | 75 x 10 | 175 | 60 | 95 | 58 | 80 | 22 | 88 | 57.0 | h12 | 2.15 |
| | | 75 x 20 | 175 | 60 | 95 | 58 | 80 | 22 | 88 | 57.0 | h12 | 2.15 |

- The allocation of screw ends to the bearing assemblies is clearly defined by the version.
Note: Form 312 with two floating bearings increases the critical speed, see "Critical speed n_c " on page 270.
- Keyway with form 622 only
- Scope of delivery per assembly: 1 bearing, 2 retaining rings. Two assemblies are required for form 612-622.

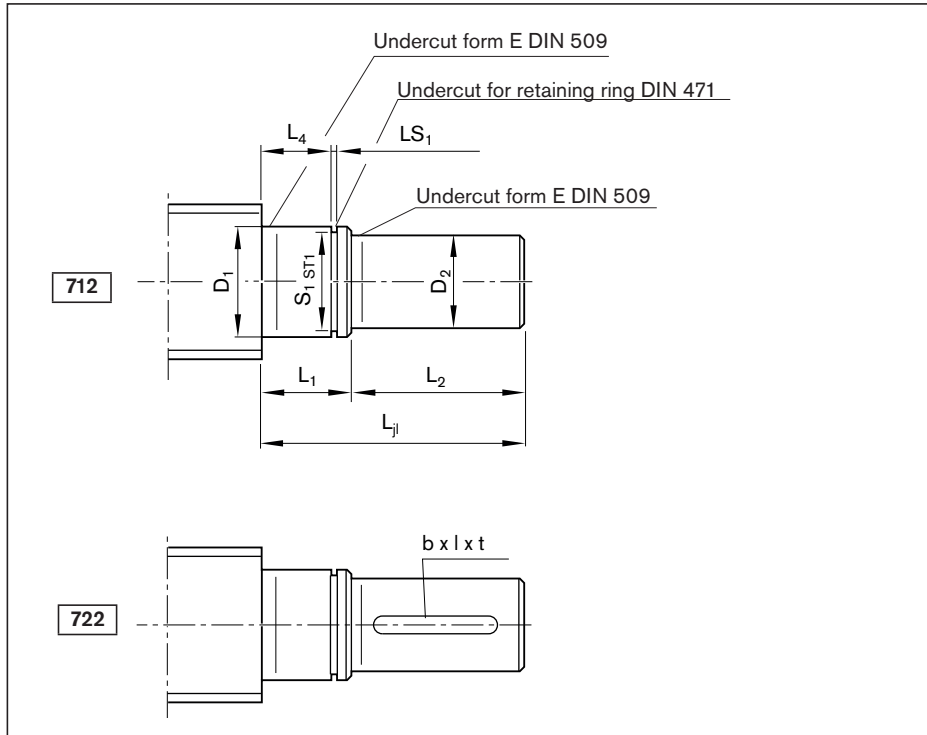
For the codes, see the chapter entitled "Abbreviations"

End bearings for screw ends form 612, 622



| Version ¹⁾ | Size d ₀ x P | DIN 6885 ²⁾ keyway | | Centering hole | | Hex socket | | Thread | | M _p (Nm) | | Bearing assembly | |
|-----------------------|----------------------------|-------------------------------|----|----------------|-----|----------------|----|----------------|-----|---------------------|---------|------------------|----------------------------------|
| | | b P9 | l | t | Z | t _z | S | t _s | G | t _g | 612 | 622 | LAD ³⁾ Part number |
| 120 | 20 x 5 | 3 | 20 | 1.8 | M3 | 9.0 | 4 | 4 | M4 | 6.0 | 16.2 | 12.8 | R1590 612 00 |
| 150 | 20 x 5 | 4 | 20 | 2.5 | M4 | 10.0 | 4 | 4 | M5 | 8.0 | 29.1 | 21.9 | R1590 615 00 |
| 170 | 25 x 5 | 5 | 25 | 3.0 | M5 | 12.5 | 4 | 4 | M6 | 9.0 | 40.2 | 40.2 | R1590 617 00 |
| | 25 x 10 | 5 | 25 | 3.0 | M5 | 12.5 | 4 | 4 | M6 | 9.0 | 40.2 | 40.2 | R1590 617 00 |
| 200 | 30 x 5 | 6 | 28 | 3.5 | M6 | 16.0 | 5 | 5 | M6 | 9.0 | 61.4 | 61.4 | R1590 620 00 |
| | 30 x 10 | 6 | 28 | 3.5 | M6 | 16.0 | 5 | 5 | M6 | 9.0 | 61.4 | 61.4 | R1590 620 00 |
| 250 | 30 x 5 | 6 | 36 | 3.5 | M8 | 19.0 | 6 | 6 | M8 | 12.0 | 118.2 | 118.2 | R1590 625 00 |
| | 30 x 10 | 6 | 36 | 3.5 | M8 | 19.0 | 6 | 6 | M8 | 12.0 | 118.3 | 118.3 | R1590 625 00 |
| 300 | 39 x 5 | 8 | 36 | 4.0 | M10 | 22.0 | 10 | 10 | M10 | 15.0 | 173.6 | 173.6 | R1590 630 00 |
| | 39 x 10 | 8 | 36 | 4.0 | M10 | 22.0 | 10 | 10 | M10 | 15.0 | 173.8 | 173.8 | R1590 630 00 |
| 350 | 48 x 5 | 10 | 40 | 5.0 | M12 | 28.0 | 10 | 10 | M12 | 18.0 | 244.6 | 244.6 | R1590 635 00 |
| | 48 x 10 | 10 | 40 | 5.0 | M12 | 28.0 | 10 | 10 | M12 | 18.0 | 244.9 | 244.9 | R1590 635 00 |
| 500 | 60 x 10 | 14 | 63 | 5.5 | M16 | 36.0 | 17 | 17 | M16 | 24.0 | 669.6 | 669.6 | R1590 650 00 |
| | 60 x 20 | 14 | 63 | 5.5 | M16 | 36.0 | 17 | 17 | M16 | 24.0 | 671.1 | 671.1 | R1590 650 00 |
| 600 | 75 x 10 | 16 | 63 | 6.0 | M20 | 42.0 | 19 | 19 | M20 | 30.0 | 1,142.4 | 1,142.4 | R1590 660 00 |
| | 75 x 20 | 16 | 63 | 6.0 | M20 | 42.0 | 19 | 19 | M20 | 30.0 | 1,144.5 | 1,144.5 | R1590 660 00 |

Form 712, 722



| Option (machining of end face) | |
|--------------------------------|------|
| K | None |
| Z | |
| S | |
| G | |

Ordering data:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 712Z120 | 822K150 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version ¹⁾ | Size d ₀ x P | (mm) | | | | | | | | |
|------|-----------------------|----------------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------|----------------|------|------------------------|
| | | | L _{ji} | D ₁ j6 | L ₁ | D ₂ h7 | L ₂ | L ₄ | S ₁ | ST1 | LS ₁ H13 |
| 712 | 120 | 20 x 5 | 38 | 12 | 13 | 10 | 25 | 10 | 11.5 | h11 | 1.10 |
| | 722 ²⁾ | 150 | 20 x 5 | 39 | 15 | 14 | 12 | 25 | 11 | 14.3 | h11 |
| | 170 | 25 x 5 | 45 | 17 | 15 | 15 | 30 | 12 | 16.2 | h11 | 1.10 |
| | | 25 x 10 | 45 | 17 | 15 | 15 | 30 | 12 | 16.2 | h11 | 1.10 |
| | 200 | 30 x 5 | 58 | 20 | 18 | 18 | 40 | 14 | 19.0 | h11 | 1.30 |
| | | 30 x 10 | 58 | 20 | 18 | 18 | 40 | 14 | 19.0 | h11 | 1.30 |
| | 250 | 30 x 5 | 69 | 25 | 19 | 22 | 50 | 15 | 23.9 | h12 | 1.30 |
| | | 30 x 10 | 69 | 25 | 19 | 22 | 50 | 15 | 23.9 | h12 | 1.30 |
| | 300 | 39 x 5 | 70 | 30 | 20 | 28 | 50 | 16 | 28.6 | h12 | 1.60 |
| | | 39 x 10 | 70 | 30 | 20 | 28 | 50 | 16 | 28.6 | h12 | 1.60 |
| | 350 | 48 x 5 | 82 | 35 | 22 | 32 | 60 | 17 | 33.0 | h12 | 1.60 |
| | | 48 x 10 | 82 | 35 | 22 | 32 | 60 | 17 | 33.0 | h12 | 1.60 |
| | 500 | 60 x 10 | 107 | 50 | 27 | 48 | 80 | 20 | 47.0 | h12 | 2.15 |
| | | 60 x 20 | 107 | 50 | 27 | 48 | 80 | 20 | 47.0 | h12 | 2.15 |
| | 600 | 75 x 10 | 109 | 60 | 29 | 58 | 80 | 22 | 57.0 | h12 | 2.15 |
| | | 75 x 20 | 109 | 60 | 29 | 58 | 80 | 22 | 57.0 | h12 | 2.15 |

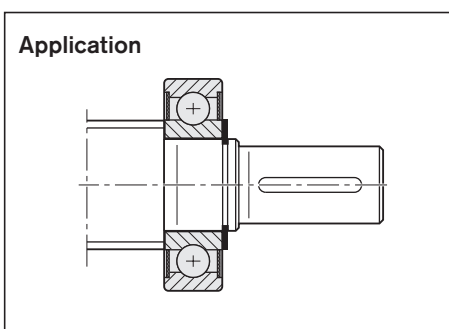
1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

2) Keyway with form 722 only

3) Scope of delivery per assembly: 1 bearing, 2 retaining rings.

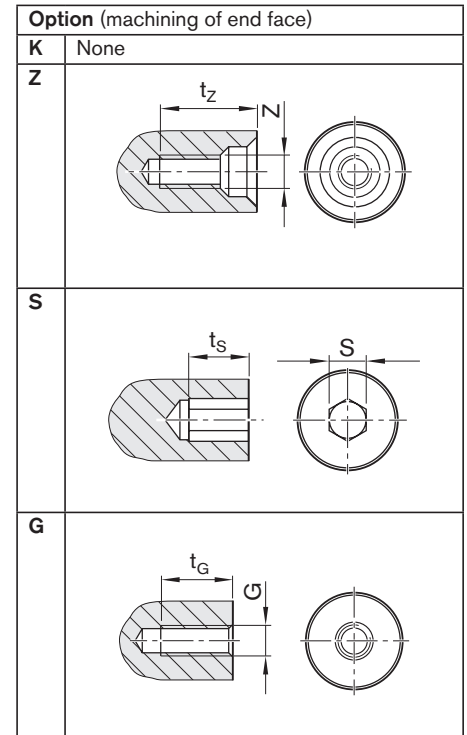
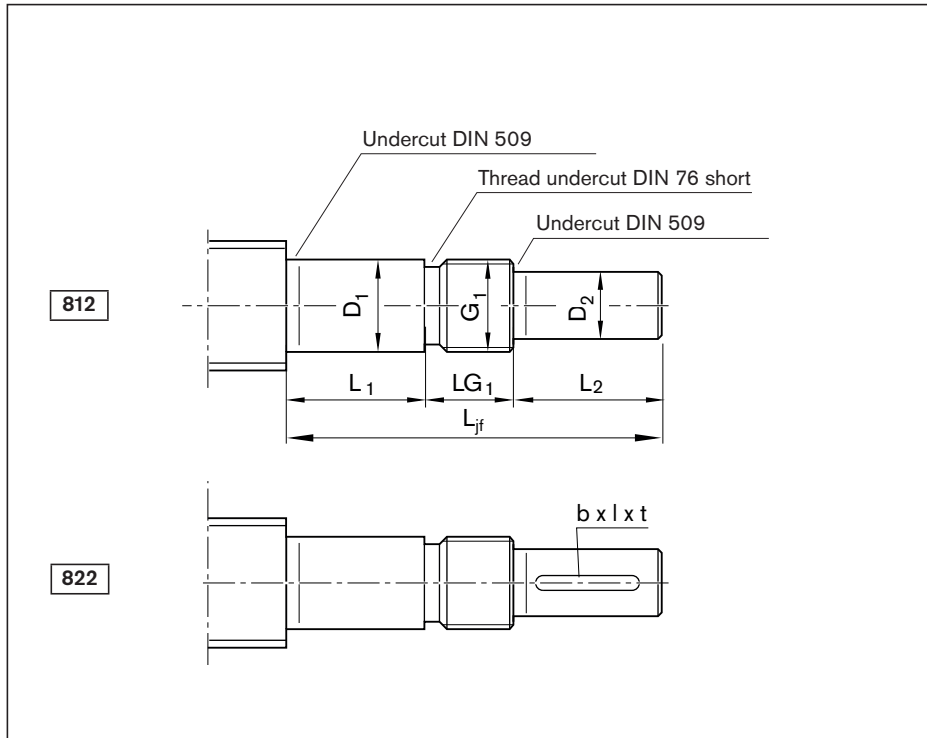
For the codes, see the chapter entitled "Abbreviations"

End bearings for screw ends form 712, 722



| Version ¹⁾ | Size d ₀ x P | DIN 6885 ²⁾ keyway | | t | Centering hole | | Hex socket | | Thread | | M _p (Nm) Form | | Bearing assembly LAD ²⁾ Part number |
|-----------------------|----------------------------|-------------------------------|----|-----|----------------|----------------|------------|----------------|--------|----------------|-----------------------------|---------|--|
| | | b P9 | l | | Z | t _Z | S | t _S | G | t _G | 712 | 722 | |
| 120 | 20 x 5 | 3 | 20 | 1.8 | M3 | 9.0 | 4 | 4 | M4 | 6 | 16.2 | 12.7 | R1590 612 00 |
| 150 | 20 x 5 | 4 | 20 | 2.5 | M4 | 10.0 | 4 | 4 | M5 | 8 | 29.1 | 21.6 | R1590 615 00 |
| 170 | 25 x 5 | 5 | 25 | 3.0 | M5 | 12.5 | 4 | 4 | M6 | 9 | 40.2 | 40.2 | R1590 617 00 |
| | 25 x 10 | 5 | 25 | 3.0 | M5 | 12.5 | 4 | 4 | M6 | 9 | 40.2 | 40.2 | R1590 617 00 |
| 200 | 30 x 5 | 6 | 28 | 3.5 | M6 | 16.0 | 5 | 5 | M6 | 9 | 61.4 | 61.4 | R1590 620 00 |
| | 30 x 10 | 6 | 28 | 3.5 | M6 | 16.0 | 5 | 5 | M6 | 9 | 61.4 | 61.4 | R1590 620 00 |
| 250 | 30 x 5 | 6 | 36 | 3.5 | M8 | 19.0 | 6 | 6 | M8 | 12 | 118.2 | 118.2 | R1590 625 00 |
| | 30 x 10 | 6 | 36 | 3.5 | M8 | 19.0 | 6 | 6 | M8 | 12 | 118.3 | 118.3 | R1590 625 00 |
| 300 | 39 x 5 | 8 | 36 | 4.0 | M10 | 22.0 | 10 | 10 | M10 | 15 | 173.6 | 173.6 | R1590 630 00 |
| | 39 x 10 | 8 | 36 | 4.0 | M10 | 22.0 | 10 | 10 | M10 | 15 | 173.8 | 173.8 | R1590 630 00 |
| 350 | 48 x 5 | 10 | 40 | 5.0 | M12 | 28.0 | 10 | 10 | M12 | 18 | 244.6 | 244.6 | R1590 635 00 |
| | 48 x 10 | 10 | 40 | 5.0 | M12 | 28.0 | 10 | 10 | M12 | 18 | 244.9 | 244.9 | R1590 635 00 |
| 500 | 60 x 10 | 14 | 63 | 5.5 | M16 | 36.0 | 17 | 17 | M16 | 24 | 669.6 | 669.6 | R1590 650 00 |
| | 60 x 20 | 14 | 63 | 5.5 | M16 | 36.0 | 17 | 17 | M16 | 24 | 671.1 | 671.1 | R1590 650 00 |
| 600 | 75 x 10 | 16 | 63 | 6.0 | M20 | 42.0 | 19 | 19 | M20 | 30 | 1,142.4 | 1,142.4 | R1590 660 00 |
| | 75 x 20 | 16 | 63 | 6.0 | M20 | 42.0 | 19 | 19 | M20 | 30 | 1,144.5 | 1,144.5 | R1590 660 00 |

Form 812, 822



Ordering data:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 822Z150 | 412Z120 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version ¹⁾ | Size | (mm) | | | | | | | DIN 6885 ²⁾ keyway | | | |
|------|-----------------------|---------|--------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------|-------------------------------|---------|-----|-----|
| | | | d ₀ x P | L _{jf} | D ₁ h6 | L ₁ | D ₂ h7 | L ₂ | G ₁ | LG ₁ | b P9 | l | t |
| 812 | 150 | 20 x 5 | | 70 | 15 | 23 | 12 | 25 | M15x1 | 22 | 4 | 20 | 2.5 |
| | 822 ²⁾ | 153 | 20 x 5 | 97 | 15 | 50 | 12 | 25 | M15x1 | 22 | 4 | 20 | 2.5 |
| | 170 | 25 x 5 | 100 | 17 | 48 | 15 | 30 | M17x1 | 22 | 5 | 25 | 3.0 | |
| | | 25 x 10 | 100 | 17 | 48 | 15 | 30 | M17x1 | 22 | 5 | 25 | 3.0 | |
| | 171 | 25 x 5 | 106 | 17 | 54 | 15 | 30 | M17x1 | 22 | 5 | 25 | 3.0 | |
| | | 25 x 10 | 106 | 17 | 54 | 15 | 30 | M17x1 | 22 | 5 | 25 | 3.0 | |
| | 205 | 30 x 5 | 116 | 20 | 54 | 18 | 40 | M20x1 | 22 | 6 | 28 | 3.5 | |
| | | 30 x 10 | 116 | 20 | 54 | 18 | 40 | M20x1 | 22 | 6 | 28 | 3.5 | |
| | 206 | 30 x 5 | 120 | 20 | 58 | 18 | 40 | M20x1 | 22 | 6 | 28 | 3.5 | |
| | | 30 x 10 | 120 | 20 | 58 | 18 | 40 | M20x1 | 22 | 6 | 28 | 3.5 | |
| | 305 | 39 x 5 | 128 | 30 | 54 | 25 | 50 | M30x1.5 | 24 | 8 | 36 | 4.0 | |
| | | 39 x 10 | 128 | 30 | 54 | 25 | 50 | M30x1.5 | 24 | 8 | 36 | 4.0 | |
| | 306 | 39 x 5 | 148 | 30 | 74 | 25 | 50 | M30x1.5 | 24 | 8 | 36 | 4.0 | |
| | | 39 x 10 | 148 | 30 | 74 | 25 | 50 | M30x1.5 | 24 | 8 | 36 | 4.0 | |
| | 351 | 48 x 5 | 140 | 35 | 66 | 30 | 50 | M35x1.5 | 24 | 8 | 36 | 4.0 | |
| | | 48 x 10 | 140 | 35 | 66 | 30 | 50 | M35x1.5 | 24 | 8 | 36 | 4.0 | |
| | 352 | 48 x 5 | 156 | 35 | 82 | 30 | 50 | M35x1.5 | 24 | 8 | 36 | 4.0 | |
| | | 48 x 10 | 156 | 35 | 82 | 30 | 50 | M35x1.5 | 24 | 8 | 36 | 4.0 | |
| | 450 | 60 x 10 | 184 | 45 | 98 | 40 | 60 | M45x1.5 | 26 | 12 | 50 | 5.0 | |
| | | 60 x 20 | 184 | 45 | 98 | 40 | 60 | M45x1.5 | 26 | 12 | 50 | 5.0 | |
| | 603 | 75 x 10 | 233 | 60 | 122 | 55 | 80 | M60x2 | 31 | 16 | 63 | 6.0 | |
| | | 75 x 20 | 233 | 60 | 122 | 55 | 80 | M60x2 | 31 | 16 | 63 | 6.0 | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

2) Keyway with form 822 only

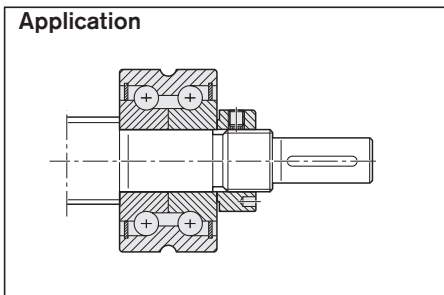
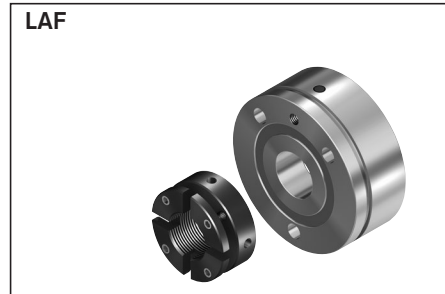
3) Under preparation

For the codes, see the chapter entitled "Abbreviations"

End bearings for screw ends form 812, 822

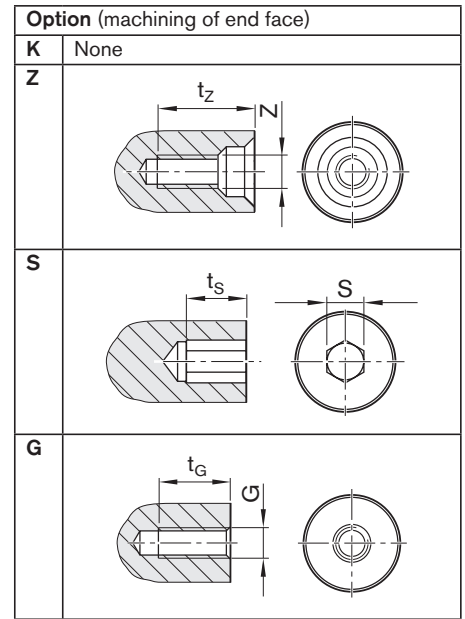
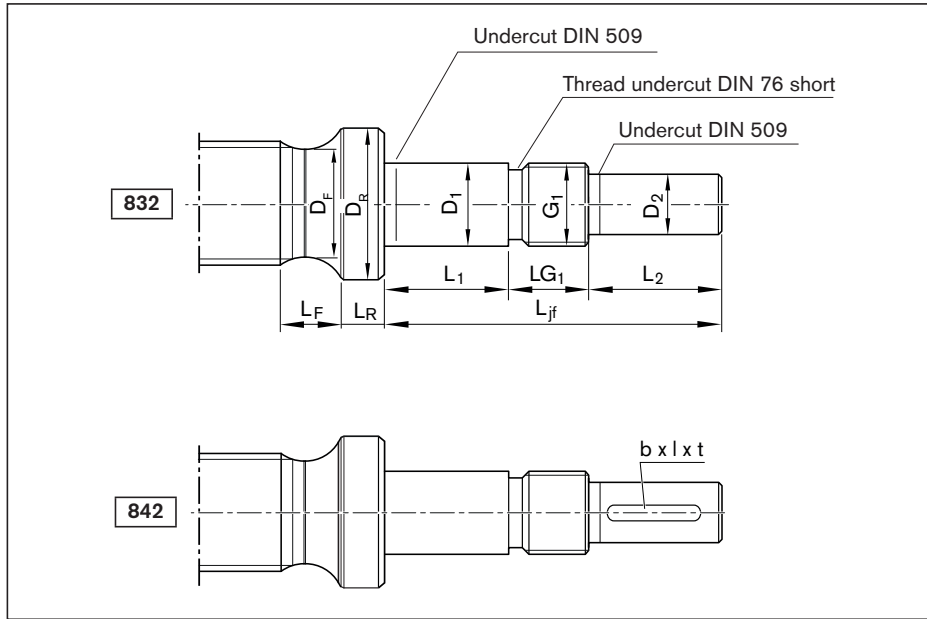
The bearing assemblies LAF, LAN, LAS consist of:

- 1 bearing
- 1 slotted nut



| Version ¹⁾ | Size d ₀ x P | Centering hole | | Hex socket | | Thread | | M _p (Nm) | Bearing assembly | | |
|-----------------------|----------------------------|----------------|----------------|------------|----------------|--------|----------------|---------------------|--------------------|--------------------|--------------------|
| | | Z | t _Z | S | t _S | G | t _G | | LAF Part number | LAN Part number | LAS Part number |
| 150 | 20 x 5R | M4 | 10.0 | 4 | 4 | M5 | 8 | 12.1 | R159A 015 01 | R159A 115 01 | - |
| 153 | 20 x 5R | M4 | 10.0 | 4 | 4 | M5 | 8 | 12.1 | - | - | R159A 415 01 |
| 170 | 25 x 5 | M5 | 12.5 | 4 | 4 | M6 | 9 | 16.0 ³⁾ | - | - | - |
| | 25 x 10 | M5 | 12.5 | 4 | 4 | M6 | 9 | 25.8 ³⁾ | - | - | - |
| 171 | 25 x 5R | M5 | 12.5 | 4 | 4 | M6 | 9 | 16.0 | - | - | R159A 417 02 |
| | 25 x 10R | M5 | 12.5 | 4 | 4 | M6 | 9 | 25.8 | - | - | R159A 417 02 |
| 205 | 30 x 5R | M6 | 16.0 | 5 | 5 | M6 | 9 | 22.6 | R159A 320 01 | R159A 220 01 | - |
| | 30 x 10R | M6 | 16.0 | 5 | 5 | M6 | 9 | 38.8 | R159A 320 01 | R159A 220 01 | - |
| 206 | 30 x 5R | M6 | 16.0 | 5 | 5 | M6 | 9 | 22.6 | - | - | R159A 420 02 |
| | 30 x 10R | M6 | 16.0 | 5 | 5 | M6 | 9 | 38.8 | - | - | R159A 420 02 |
| 305 | 39 x 5R | M10 | 22.0 | 8 | 8 | M10 | 15 | 46.1 | R1590 330 30 | R1590 230 30 | - |
| | 39 x 10R | M10 | 22.0 | 8 | 8 | M10 | 15 | 86.4 | R1590 330 30 | R1590 230 30 | - |
| 306 | 39 x 5R | M10 | 22.0 | 8 | 8 | M10 | 15 | 46.1 | - | - | R159A 430 01 |
| | 39 x 10R | M10 | 22.0 | 8 | 8 | M10 | 15 | 86.4 | - | - | R159A 430 01 |
| 351 | 48 x 5R | M10 | 22.0 | 10 | 10 | M12 | 18 | 62.7 | R159A 335 01 | R159A 235 01 | - |
| | 48 x 10R | M10 | 22.0 | 10 | 10 | M12 | 18 | 120.4 | R159A 335 01 | R159A 235 01 | - |
| 352 | 48 x 5R | M10 | 22.0 | 10 | 10 | M12 | 18 | 62.7 | - | - | R159A 435 01 |
| | 48 x 10R | M10 | 22.0 | 10 | 10 | M12 | 18 | 120.4 | - | - | R159A 435 01 |
| 450 | 60 x 10R | M16 | 36.0 | 12 | 12 | M16 | 24 | 194.3 | - | - | R159A 445 01 |
| | 60 x 20R | M16 | 36.0 | 12 | 12 | M16 | 24 | 359.7 | - | - | R159A 445 01 |
| 603 | 75 x 10R | M20 | 42.0 | 19 | 19 | M20 | 30 | 324.8 | - | - | R159A 460 01 |
| | 75 x 20R | M20 | 42.0 | 19 | 19 | M20 | 30 | 624.2 | - | - | R159A 460 01 |

Form 832, 842



Ordering data:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 842Z201 | 312Z120 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version ¹⁾ | Size | (mm) | | | | | | | | | | | DIN 6885 ²⁾ keyway | | |
|-------------------|-----------------------|---------|--------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------|-----------------|----------------|----------------|----------------|-------------------------------|---------|-----|
| | | | d ₀ x P | L _{jf} | D ₁ h6 | L ₁ | D ₂ h7 | L ₂ | G ₁ | L _{G1} | D _R | L _R | D _F | L _F | b P9 | l |
| 832 | 201 | 20 x 5 | 116 | 20 | 54 | 18 | 40 | M20x1 | 22 | 27 | 7 | 19.2 | 14.0 | 6 | 36 | 3.5 |
| 842 ²⁾ | 251 | 20 x 5 | 157 | 25 | 87 | 20 | 45 | M25x1.5 | 25 | 34 | 7 | 19.2 | 26.0 | 6 | 40 | 3.5 |
| | 252 | 25 x 5 | 136 | 25 | 66 | 20 | 45 | M25x1.5 | 25 | 34 | 7 | 24.2 | 14.0 | 6 | 40 | 3.5 |
| | 253 | 25 x 10 | 136 | 25 | 66 | 20 | 45 | M25x1.5 | 25 | 34 | 7 | 24.2 | 14.0 | 6 | 40 | 3.5 |
| | 254 | 25 x 5 | 157 | 25 | 87 | 20 | 45 | M25x1.5 | 25 | 34 | 7 | 23.7 | 14.0 | 6 | 40 | 3.5 |
| | 255 | 25 x 10 | 157 | 25 | 87 | 20 | 45 | M25x1.5 | 25 | 34 | 7 | 23.7 | 14.0 | 6 | 40 | 3.5 |
| | 301 | 30 x 5 | 148 | 30 | 74 | 25 | 50 | M30x1.5 | 24 | 40 | 10 | 29.2 | 17.0 | 8 | 40 | 4.0 |
| | 302 | 30 x 10 | 148 | 30 | 74 | 25 | 50 | M30x1.5 | 24 | 40 | 10 | 28.7 | 17.0 | 8 | 40 | 4.0 |
| | 350 | 30 x 5 | 189 | 35 | 108 | 30 | 55 | M35x1.5 | 26 | 45 | 10 | 29.2 | 28.0 | 8 | 45 | 4.0 |
| | 351 | 30 x 10 | 189 | 35 | 108 | 30 | 55 | M35x1.5 | 26 | 45 | 10 | 28.7 | 28.0 | 8 | 45 | 4.0 |
| | 401 | 39 x 5 | 176 | 40 | 90 | 36 | 60 | M40x1.5 | 26 | 54 | 12 | 38.1 | 24.5 | 10 | 50 | 5.0 |
| | 402 | 39 x 10 | 176 | 40 | 90 | 36 | 60 | M40x1.5 | 26 | 54 | 12 | 37.7 | 24.5 | 10 | 50 | 5.0 |
| | 505 | 39 x 5 | 233 | 50 | 137 | 40 | 65 | M50x1.5 | 31 | 62 | 12 | 38.1 | 32.0 | 12 | 50 | 5.0 |
| | 506 | 39 x 10 | 233 | 50 | 137 | 40 | 65 | M50x1.5 | 31 | 62 | 12 | 37.7 | 32.0 | 12 | 50 | 5.0 |
| | 503 | 48 x 5 | 205 | 50 | 106 | 40 | 70 | M50x1.5 | 29 | 62 | 12 | 47.2 | 22.0 | 12 | 50 | 5.0 |
| | 504 | 48 x 10 | 205 | 50 | 106 | 40 | 70 | M50x1.5 | 29 | 62 | 12 | 46.7 | 22.0 | 12 | 50 | 5.0 |
| | 650 | 48 x 5 | 310 | 65 | 178 | 60 | 100 | M65x2 | 32 | 78 | 18 | 47.2 | 46.0 | 18 | 90 | 7.0 |
| | 651 | 48 x 10 | 310 | 65 | 178 | 60 | 100 | M65x2 | 32 | 78 | 18 | 46.7 | 46.0 | 18 | 90 | 7.0 |
| | 652 | 60 x 10 | 310 | 65 | 178 | 60 | 100 | M65x2 | 32 | 78 | 18 | 58.7 | 39.0 | 18 | 90 | 7.0 |
| | 653 | 60 x 20 | 310 | 65 | 178 | 60 | 100 | M65x2 | 32 | 78 | 18 | 57.7 | 39.0 | 18 | 90 | 7.0 |
| | 700 | 60 x 10 | 271 | 70 | 138 | 65 | 100 | M70x2 | 33 | 90 | 20 | 58.7 | 50.0 | 18 | 90 | 7.0 |
| | 701 | 60 x 20 | 271 | 70 | 138 | 65 | 100 | M70x2 | 33 | 90 | 20 | 57.7 | 50.0 | 18 | 90 | 7.0 |
| | 900 | 75 x 10 | 327 | 90 | 169 | 85 | 120 | M90x2 | 38 | 108 | 25 | 73.7 | 59.0 | 22 | 100 | 9.0 |
| | 901 | 75 x 20 | 327 | 90 | 169 | 85 | 120 | M90x2 | 38 | 108 | 25 | 72.7 | 59.0 | 22 | 100 | 9.0 |
| | 902 | 75 x 10 | 389 | 90 | 233 | 85 | 120 | M90x2 | 36 | 108 | 25 | 73.7 | 59.0 | 22 | 100 | 9.0 |
| | 903 | 75 x 20 | 389 | 90 | 233 | 85 | 120 | M90x2 | 36 | 108 | 25 | 72.7 | 59.0 | 22 | 100 | 9.0 |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

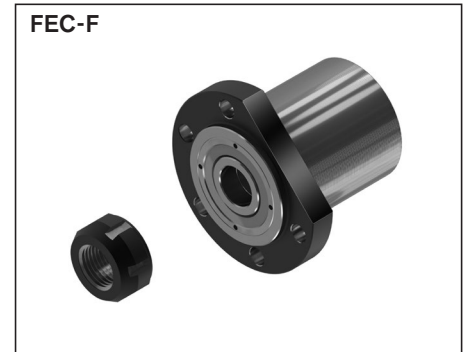
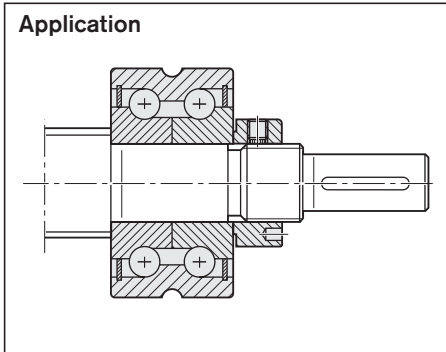
2) Keyway with form 842 only

For the codes, see the chapter entitled "Abbreviations"

End bearings for screw ends form 832, 842

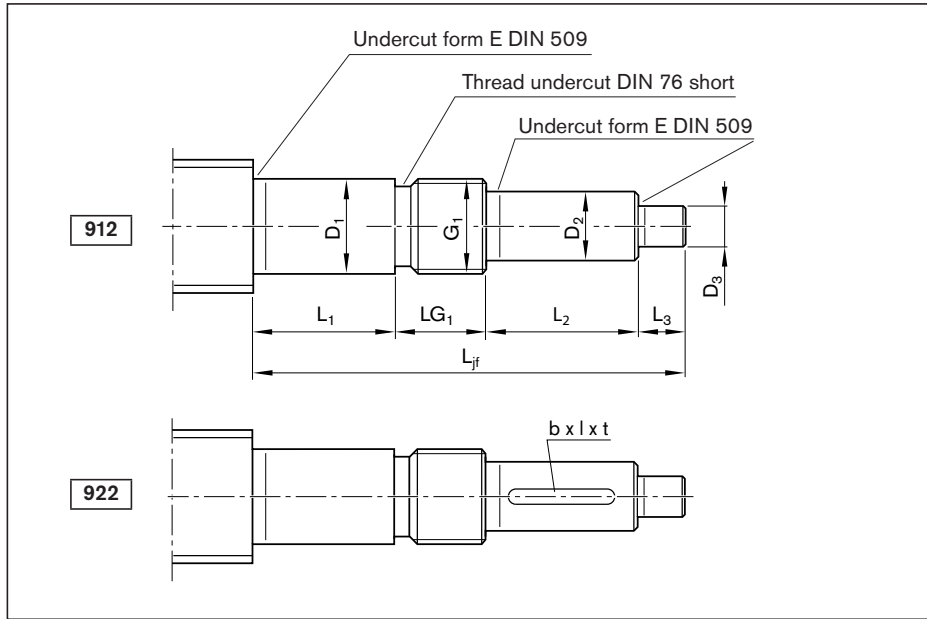
The bearing assemblies LAS, FEC-F consist of:

- 1 bearing
- 1 slotted nut



| Version ¹⁾ | Centering hole | | Hex socket | | Thread | | M_p (Nm) | Bearing assembly | |
|-----------------------|----------------|-------|------------|-------|--------|-------|------------|------------------|-------------------|
| | Z | t_z | S | t_s | G | t_G | | LAS Part number | FEC-F Part number |
| 201 | M6 | 16 | 5 | 5 | M6 | 9 | 22.9 | R159A 420 01 | - |
| 251 | M6 | 16 | 5 | 5 | M8 | 12 | 28.6 | - | R159B 425 01 |
| 252 | M6 | 16 | 5 | 5 | M8 | 12 | 33.3 | R159A 425 01 | - |
| 253 | M6 | 16 | 5 | 5 | M8 | 12 | 60.5 | R159A 425 01 | - |
| 254 | M6 | 16 | 5 | 5 | M8 | 12 | 33.3 | - | R159B 425 01 |
| 255 | M6 | 16 | 5 | 5 | M8 | 12 | 60.5 | - | R159B 425 01 |
| 301 | M10 | 22 | 8 | 8 | M10 | 15 | 45.8 | R159A 430 01 | - |
| 302 | M10 | 22 | 8 | 8 | M10 | 15 | 85.9 | R159A 430 01 | - |
| 350 | M10 | 22 | 10 | 10 | M12 | 18 | 54.3 | - | R159B 435 01 |
| 351 | M10 | 22 | 10 | 10 | M12 | 18 | 108.6 | - | R159B 435 01 |
| 401 | M12 | 28 | 12 | 12 | M12 | 18 | 80.2 | R159A 440 01 | - |
| 402 | M12 | 28 | 12 | 12 | M12 | 18 | 156.0 | R159A 440 01 | - |
| 505 | M16 | 36 | 12 | 12 | M16 | 24 | 91.1 | - | R159B 450 01 |
| 506 | M16 | 36 | 12 | 12 | M16 | 24 | 175.4 | - | R159B 450 01 |
| 503 | M16 | 36 | 12 | 12 | M16 | 24 | 121.3 | R159A 450 01 | - |
| 504 | M16 | 36 | 12 | 12 | M16 | 24 | 237.3 | R159A 450 01 | - |
| 650 | M20 | 42 | 19 | 19 | M24 | 36 | 137.4 | - | R159B 465 01 |
| 651 | M20 | 42 | 19 | 19 | M24 | 36 | 279.9 | - | R159B 465 01 |
| 652 | M20 | 42 | 19 | 19 | M24 | 36 | 408.1 | - | R159B 465 01 |
| 653 | M20 | 42 | 19 | 19 | M24 | 36 | 771.4 | - | R159B 465 01 |
| 700 | M20 | 42 | 19 | 19 | M24 | 36 | 423.8 | R159A 470 01 | - |
| 701 | M20 | 42 | 19 | 19 | M24 | 36 | 793.8 | R159A 470 01 | - |
| 900 | M20 | 42 | 19 | 19 | M30 | 45 | 656.2 | R159A 490 01 | - |
| 901 | M20 | 42 | 19 | 19 | M30 | 45 | 1,250.0 | R159A 490 01 | - |
| 902 | M20 | 42 | 19 | 19 | M30 | 45 | 656.2 | - | R159B 490 01 |
| 903 | M20 | 42 | 19 | 19 | M30 | 45 | 1,250.0 | - | R159B 490 01 |

Form 912, 922



| Option (machining of end face) | |
|--------------------------------|------|
| K | None |

Ordering data:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 922Z151 | 312Z120 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version ¹⁾ | Size | (mm) | | | | | | | | |
|------|-----------------------|---------|--------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------------|----------------|----------------|
| | | | d ₀ x P | L _{jf} | D ₁ h6 | L ₁ | D ₂ h7 | L ₂ | D ₃ h7 | L ₃ | G ₁ |
| 912 | 150 | 20 x 5 | 85 | 15 | 23 | 12 | 25 | 6 | 15 | M15X1 | 22 |
| | 922 ²⁾ | 151 | 20 x 5 | 112 | 15 | 50 | 12 | 25 | 6 | 15 | M15x1 |
| | 170 | 25 x 5 | 115 | 17 | 48 | 15 | 30 | 6 | 15 | M17x1 | 22 |
| | | 25 x 10 | 115 | 17 | 48 | 15 | 30 | 6 | 15 | M17x1 | 22 |
| | 171 | 25 x 5 | 121 | 17 | 54 | 15 | 30 | 6 | 15 | M17x1 | 22 |
| | | 25 x 10 | 121 | 17 | 54 | 15 | 30 | 6 | 15 | M17x1 | 22 |
| | 200 | 30 x 5 | 131 | 20 | 54 | 18 | 40 | 6 | 15 | M20x1 | 22 |
| | | 30 x 10 | 131 | 20 | 54 | 18 | 40 | 6 | 15 | M20x1 | 22 |
| | 201 | 30 x 5 | 135 | 20 | 58 | 18 | 40 | 6 | 15 | M20x1 | 22 |
| | | 30 x 10 | 135 | 20 | 58 | 18 | 40 | 6 | 15 | M20x1 | 22 |
| | 300 | 39 x 5 | 143 | 30 | 54 | 25 | 50 | 6 | 15 | M30x1.5 | 24 |
| | | 39 x 10 | 143 | 30 | 54 | 25 | 50 | 6 | 15 | M30x1.5 | 24 |
| | 301 | 39 x 5 | 163 | 30 | 74 | 25 | 50 | 6 | 15 | M30x1.5 | 24 |
| | | 39 x 10 | 163 | 30 | 74 | 25 | 50 | 6 | 15 | M30x1.5 | 24 |
| | 350 | 48 x 5 | 155 | 35 | 66 | 30 | 50 | 6 | 15 | M35x1.5 | 24 |
| | | 48 x 10 | 155 | 35 | 66 | 30 | 50 | 6 | 15 | M35x1.5 | 24 |
| | 351 | 48 x 5 | 171 | 35 | 82 | 30 | 50 | 6 | 15 | M35x1.5 | 24 |
| | | 48 x 10 | 171 | 35 | 82 | 30 | 50 | 6 | 15 | M35x1.5 | 24 |
| | 450 | 60 x 10 | 199 | 45 | 98 | 40 | 60 | 6 | 15 | M45x1.5 | 26 |
| | | 60 x 20 | 199 | 45 | 98 | 40 | 60 | 6 | 15 | M45x1.5 | 26 |
| | 600 | 75 x 10 | 248 | 60 | 122 | 55 | 80 | 6 | 15 | M60x2 | 31 |
| | | 75 x 20 | 248 | 60 | 122 | 55 | 80 | 6 | 15 | M60x2 | 31 |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

2) Keyway with form 922 only

3) Under preparation

For the codes, see the chapter entitled "Abbreviations"

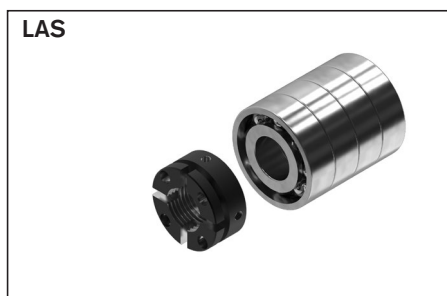
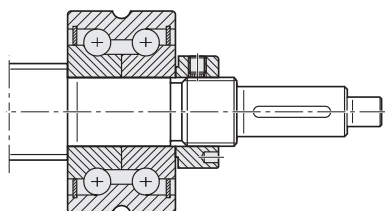
End bearings for screw ends form 912, 922

The bearing assemblies LAF, LAN, LAS consist of:

- 1 bearing
- 1 slotted nut

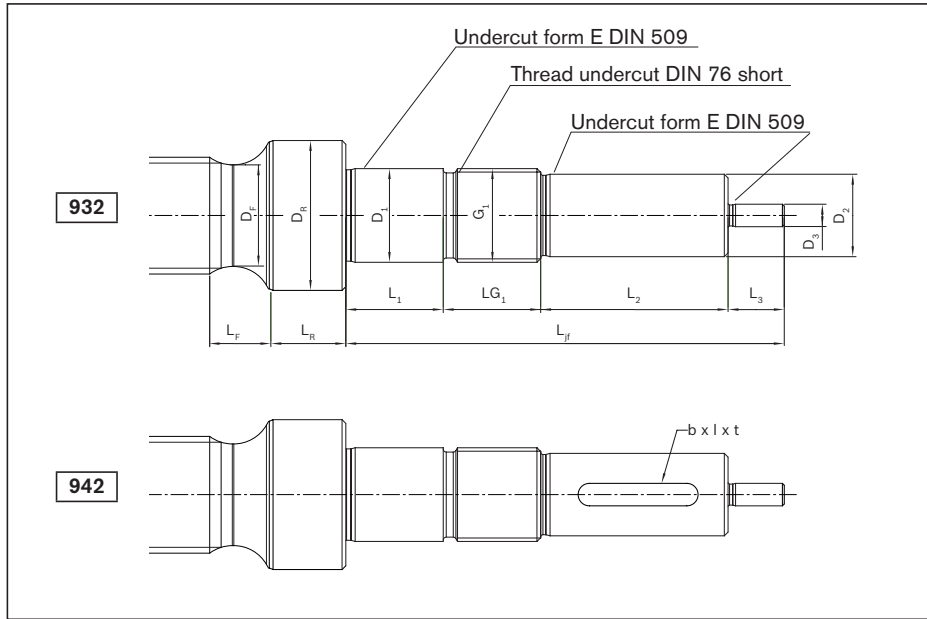


Application



| Version ¹⁾ | Size d ₀ x P | DIN 6885 ²⁾ keyway | | | t | M _p (Nm) | Bearing assembly Pillow block unit | | |
|-----------------------|----------------------------|-------------------------------|----|-----|--------------------|---------------------|---------------------------------------|-------------------------------|--------------------|
| | | b P9 | l | | | | LAF Part number | Bearing LAN Part number | LAS Part number |
| 150 | 20 x 5 | 4 | 20 | 2.5 | 12.1 | R159A 015 01 | R159A 115 01 | - | |
| 151 | 20 x 5 | 4 | 20 | 2.5 | 12.1 | - | - | R159A 415 01 | |
| 170 | 25 x 5 | 5 | 25 | 3.0 | 16.0 ³⁾ | - | ³⁾ | - | |
| | 25 x 10 | 5 | 25 | 3.0 | 25.8 ³⁾ | - | ³⁾ | - | |
| 171 | 25 x 5 | 5 | 25 | 3.0 | 16.0 | - | - | R159A417 02 | |
| | 25 x 10 | 5 | 25 | 3.0 | 25.8 | - | - | R159A417 02 | |
| 200 | 30 x 5 | 6 | 28 | 3.5 | 22.6 | R159A 320 01 | R159A 220 01 | - | |
| | 30 x 10 | 6 | 28 | 3.5 | 38.8 | R159A 320 01 | R159A 220 01 | - | |
| 201 | 30 x 5 | 6 | 28 | 3.5 | 22.6 | - | - | R159A 420 02 | |
| | 30 x 10 | 6 | 28 | 3.5 | 38.8 | - | - | R159A 420 02 | |
| 300 | 39 x 5 | 8 | 36 | 4.0 | 46.1 | R1590 330 30 | R1590 230 30 | - | |
| | 39 x 10 | 8 | 36 | 4.0 | 86.4 | R1590 330 30 | R1590 230 30 | - | |
| 301 | 39 x 5 | 8 | 36 | 4.0 | 46.1 | - | - | R159A 430 01 | |
| | 39 x 10 | 8 | 36 | 4.0 | 86.4 | - | - | R159A 430 01 | |
| 350 | 48 x 5 | 8 | 36 | 4.0 | 62.7 | R159A 335 01 | R159A 235 01 | - | |
| | 48 x 10 | 8 | 36 | 4.0 | 120.4 | R159A 335 01 | R159A 235 01 | - | |
| 351 | 48 x 5 | 8 | 36 | 4.0 | 62.7 | - | - | R159A 435 01 | |
| | 48 x 10 | 8 | 36 | 4.0 | 120.4 | - | - | R159A 435 01 | |
| 450 | 60 x 10 | 12 | 50 | 5.0 | 194.3 | - | - | R159A 445 01 | |
| | 60 x 20 | 12 | 50 | 5.0 | 359.7 | - | - | R159A 445 01 | |
| 600 | 75 x 10 | 16 | 63 | 6.0 | 324.8 | - | - | R159A 460 01 | |
| | 75 x 20 | 16 | 63 | 6.0 | 624.2 | - | - | R159A 460 01 | |

Form 932, 942



| Option (machining of end face) | |
|--------------------------------|------|
| K | None |

Ordering data:

| | | | | | | | | | | | | |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|
| PLSA | 20 x 5R | FEM-E-S | 00 | 1 | 0 | T7 | R | 942Z251 | 412Z120 | 1250 | 1 | 1 |
|------|---------|---------|----|---|---|----|---|---------|---------|------|---|---|

| Form | Version ¹⁾ | Size | (mm) | | | | | | | | | | | | |
|------|-----------------------|---------|--------------------|-----------------|----------------------|----------------|----------------------|----------------|----------------------|----------------|----------------|-----------------|----------------|----------------|----------------|
| | | | d ₀ x P | L _{rf} | D ₁ h6 | L ₁ | D ₂ h7 | L ₂ | D ₃ h7 | L ₃ | G ₁ | LG ₁ | D _R | L _R | D _F |
| 932 | 201 | 20 x 5 | 131 | 20 | 54 | 18 | 40 | 6 | 15 | M20x1 | 22 | 27 | 7 | 19.2 | 14.0 |
| | 251 | 20 x 5 | 172 | 25 | 87 | 20 | 45 | 6 | 15 | M25x1.5 | 25 | 34 | 7 | 19.2 | 26.0 |
| | 252 | 25 x 5 | 151 | 25 | 66 | 20 | 45 | 6 | 15 | M25x1.5 | 25 | 34 | 7 | 24.2 | 14.0 |
| | 253 | 25 x 10 | 151 | 25 | 66 | 20 | 45 | 6 | 15 | M25x1.5 | 25 | 34 | 7 | 23.7 | 14.0 |
| | 254 | 25 x 5 | 172 | 25 | 87 | 20 | 45 | 6 | 15 | M25x1.5 | 25 | 34 | 7 | 24.2 | 14.0 |
| | 255 | 25 x 10 | 172 | 25 | 87 | 20 | 45 | 6 | 15 | M25x1.5 | 25 | 34 | 7 | 23.7 | 14.0 |
| | 301 | 30 x 5 | 163 | 30 | 74 | 25 | 50 | 6 | 15 | M30x1.5 | 24 | 40 | 10 | 29.2 | 17.0 |
| | 302 | 30 x 10 | 163 | 30 | 74 | 25 | 50 | 6 | 15 | M30x1.5 | 24 | 40 | 10 | 28.7 | 17.0 |
| | 350 | 30 x 5 | 204 | 35 | 108 | 30 | 55 | 6 | 15 | M35x1.5 | 26 | 45 | 10 | 29.2 | 28.0 |
| | 351 | 30 x 10 | 204 | 35 | 108 | 30 | 55 | 6 | 15 | M35x1.5 | 26 | 45 | 10 | 28.7 | 28.0 |
| | 401 | 39 x 5 | 191 | 40 | 90 | 36 | 60 | 6 | 15 | M40x1.5 | 26 | 54 | 12 | 38.1 | 24.5 |
| | 402 | 39 x 10 | 191 | 40 | 90 | 36 | 60 | 6 | 15 | M40x1.5 | 26 | 54 | 12 | 37.7 | 24.5 |
| | 505 | 39 x 5 | 248 | 50 | 137 | 40 | 65 | 6 | 15 | M50x1.5 | 31 | 62 | 12 | 38.1 | 32.0 |
| | 506 | 39 x 10 | 248 | 50 | 137 | 40 | 65 | 6 | 15 | M50x1.5 | 31 | 62 | 12 | 37.7 | 32.0 |
| | 503 | 48 x 5 | 220 | 50 | 106 | 40 | 70 | 6 | 15 | M50x1.5 | 29 | 62 | 12 | 47.2 | 22.0 |
| | 504 | 48 x 10 | 220 | 50 | 106 | 40 | 70 | 6 | 15 | M50x1.5 | 29 | 62 | 12 | 46.7 | 22.0 |
| | 650 | 48 x 5 | 325 | 65 | 178 | 60 | 100 | 6 | 15 | M65x2 | 32 | 78 | 18 | 47.2 | 46.0 |
| | 651 | 48 x 10 | 325 | 65 | 178 | 60 | 100 | 6 | 15 | M65x2 | 32 | 78 | 18 | 46.7 | 46.0 |
| | 700 | 60 x 10 | 286 | 70 | 138 | 65 | 100 | 6 | 15 | M70x2 | 33 | 90 | 20 | 58.7 | 50.0 |
| | 701 | 60 x 20 | 286 | 70 | 138 | 65 | 100 | 6 | 15 | M70x2 | 33 | 90 | 20 | 57.7 | 50.0 |
| 652 | 60 x 10 | 325 | 65 | 178 | 60 | 100 | 6 | 15 | M65x2 | 32 | 78 | 18 | 58.7 | 39.0 | |
| 653 | 60 x 20 | 325 | 65 | 178 | 60 | 100 | 6 | 15 | M65x2 | 32 | 78 | 18 | 57.7 | 39.0 | |
| 900 | 75 x 10 | 342 | 90 | 169 | 85 | 120 | 6 | 15 | M90x2 | 38 | 108 | 25 | 73.7 | 59.0 | |
| 901 | 75 x 20 | 342 | 90 | 169 | 85 | 120 | 6 | 15 | M90x2 | 38 | 108 | 25 | 72.7 | 59.0 | |
| 902 | 75 x 10 | 404 | 90 | 233 | 85 | 120 | 6 | 15 | M90x2 | 36 | 108 | 25 | 73.7 | 59.0 | |
| 903 | 75 x 20 | 404 | 90 | 233 | 85 | 120 | 6 | 15 | M90x2 | 36 | 108 | 25 | 72.7 | 59.0 | |

1) The allocation of screw ends to the bearing assemblies is clearly defined by the version.

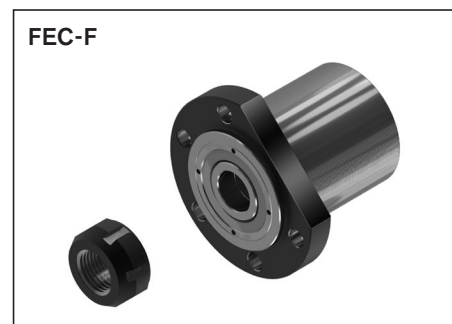
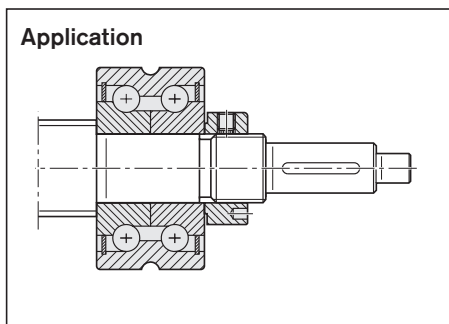
2) Keyway with form 942 only

For the codes, see the chapter entitled "Abbreviations"

End bearings for screw ends form 932, 942

The bearing assemblies FEC-F, LAS consist of:

- 1 bearing
- 1 slotted nut



| Version ¹⁾ | Keyway as per DIN ²⁾ 6885 ²⁾ | | | M _p (Nm) | Bearing assembly | |
|-----------------------|--|-----|-----|---------------------|--------------------|----------------------|
| | b P9 | l | t | | LAS Part number | FEC-F Part number |
| 201 | 6 | 36 | 3.5 | 22.9 | R159A 420 01 | - |
| 251 | 6 | 40 | 3.5 | 28.6 | - | R159B 425 01 |
| 252 | 6 | 40 | 3.5 | 33.3 | R159A 425 01 | - |
| 253 | 6 | 40 | 3.5 | 60.5 | R159A 425 01 | - |
| 254 | 6 | 40 | 3.5 | 33.3 | - | R159B 425 01 |
| 255 | 6 | 40 | 3.5 | 60.5 | - | R159B 425 01 |
| 301 | 8 | 40 | 4.0 | 45.8 | R159A 430 01 | - |
| 302 | 8 | 40 | 4.0 | 85.9 | R159A 430 01 | - |
| 350 | 8 | 45 | 4.0 | 54.3 | - | R159B 435 01 |
| 351 | 8 | 45 | 4.0 | 108.6 | - | R159B 435 01 |
| 401 | 10 | 50 | 5.0 | 80.2 | R159A 440 01 | - |
| 402 | 10 | 50 | 5.0 | 156.0 | R159A 440 01 | - |
| 505 | 12 | 50 | 5.0 | 91.1 | - | R159B 450 01 |
| 506 | 12 | 50 | 5.0 | 175.4 | - | R159B 450 01 |
| 503 | 12 | 50 | 5.0 | 121.3 | R159A 450 01 | - |
| 504 | 12 | 50 | 5.0 | 237.3 | R159A 450 01 | - |
| 650 | 18 | 90 | 7.0 | 137.4 | - | R159B 465 01 |
| 651 | 18 | 90 | 7.0 | 279.9 | - | R159B 465 01 |
| 700 | 18 | 90 | 7.0 | 423.8 | R159A 470 01 | - |
| 701 | 18 | 90 | 7.0 | 793.8 | R159A 470 01 | - |
| 652 | 18 | 90 | 7.0 | 408.1 | - | R159B 465 01 |
| 653 | 18 | 90 | 7.0 | 771.4 | - | R159B 465 01 |
| 900 | 22 | 100 | 9.0 | 656.2 | R159A 49001 | - |
| 901 | 22 | 100 | 9.0 | 1,250.0 | R159A 49001 | - |
| 902 | 22 | 100 | 9.0 | 656.2 | - | R159B 490 01 |
| 903 | 22 | 100 | 9.0 | 1,250.0 | - | R159B 490 01 |

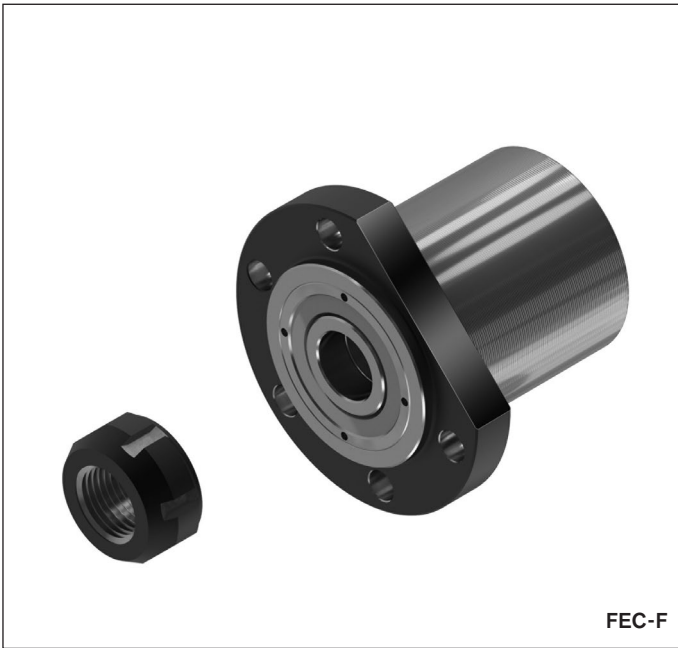
Overview

Rexroth offers an extensive range of accessories for planetary screw assemblies.

These include bearings and slotted nuts.

A reasonable ratio of the load capacities of the bearing and the planetary screw assembly should be taken into account when dimensioning. Further information is provided in this section.





Bearing assembly LAF

Fixed bearing with angular-contact thrust ball bearing LGF

Double-thrust, screw-on,

Series LGF-B...

Double-thrust, screw-on,

Series LGF-C...

The bearing assembly consists of:

- angular-contact thrust ball bearing LGF (not available as a separate part)
- slotted nut NMA...

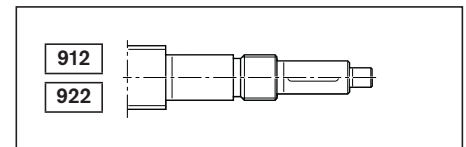
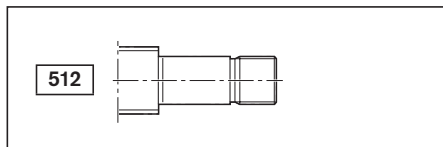
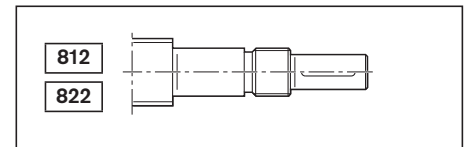
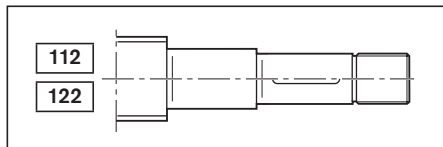
Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)

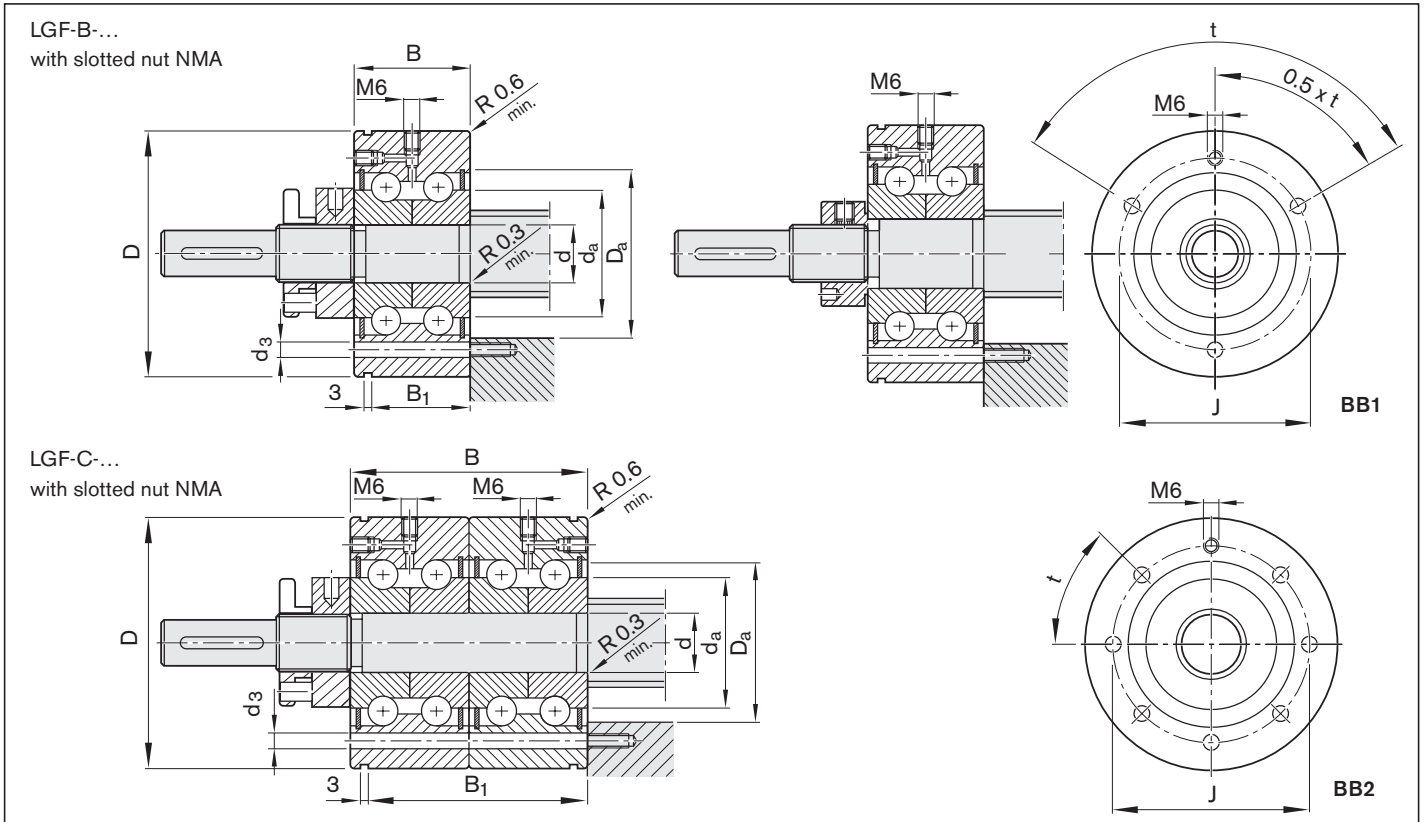


| $d_0 \times P$ | LAF Part number | LGF Abbreviation | NMA Abbreviation | Part number | Weight complete m (kg) | C (N) | C_0 (N) | M_{RL} (Nm) | R_{fb} (N/ μ m) | R_{kl} (Nm/mrad) | n_G (min^{-1}) |
|----------------|--------------------|---------------------|---------------------|--------------|------------------------------|----------|--------------|------------------|--------------------------|-----------------------|--------------------------------|
| 20 x 5 | R159A 015 01 | LGF-B-1560 | NMA 15x1 | R3446 020 04 | 0.49 | 17,900 | 28,000 | 0.20 | 400 | 65 | 3,500 |
| 30 x 5/10 | R159A 320 01 | LGF-C-2068 | NMA 20x1 | R3446 015 04 | 1.35 | 42,000 | 94,000 | 0.45 | 1,150 | 320 | 3,000 |
| 39 x 5/10 | R1590 330 30 | LGF-C-3080 | NMA 30x1.5 | R3446 016 04 | 1.76 | 47,500 | 127,000 | 0.75 | 1,500 | 620 | 2,200 |
| 48 x 5/10 | R159A 335 01 | LGF-C-3590 | NMA 35x1.5 | R3446 012 04 | 2.49 | 66,000 | 177,000 | 0.90 | 1,600 | 900 | 2,000 |

For the codes, see the chapter entitled "Abbreviations"

Suitable for screw ends: Form





| $d_0 \times P$ | (mm) | | | | | | | | | | Mounting holes | | |
|----------------|----------------------|----------------------|---------------------|----------------|----|-----|-----------------------|-----|-----------------------|--------|------------------------|----------|-----------------|
| | d | D | B | B ₁ | J | min | D _a max | min | d _a max | Number | d ₃ (mm) | t (°) | Hole pattern |
| 20 x 5 | 15 _{-0.010} | 60 _{-0.013} | 25 _{-0.25} | 17 | 46 | 32 | 35 | 20 | 31 | 3 | 6.8 | 120 | BB1 |
| 30 x 5/10 | 20 _{-0.005} | 68 _{-0.010} | 56 _{-0.50} | 47 | 53 | 40 | 43 | 25 | 39 | 7 | 6.8 | 45 | BB2 |
| 39 x 5/10 | 30 _{-0.005} | 80 _{-0.010} | 56 _{-0.50} | 47 | 63 | 50 | 53 | 40 | 49 | 11 | 6.8 | 30 | BB2 |
| 48 x 5/10 | 35 _{-0.005} | 90 _{-0.010} | 68 _{-0.50} | 59 | 75 | 59 | 62 | 45 | 58 | 7 | 8.8 | 45 | BB2 |

Bearing assembly LAN

Fixed bearing with angular-contact thrust ball bearing LGN

Double-thrust,
series LGN-B-...

Double-thrust, in pairs,
series LGN-C-...

The bearing assembly consists of:

- angular-contact thrust ball bearing LGN
(not available as a separate part)
- slotted nut NMA...

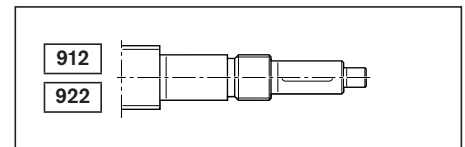
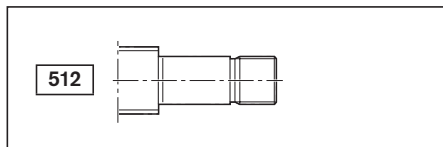
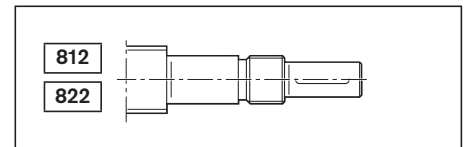
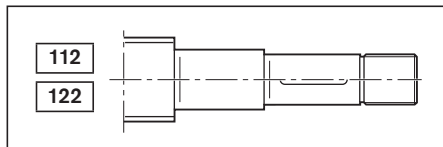
Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)

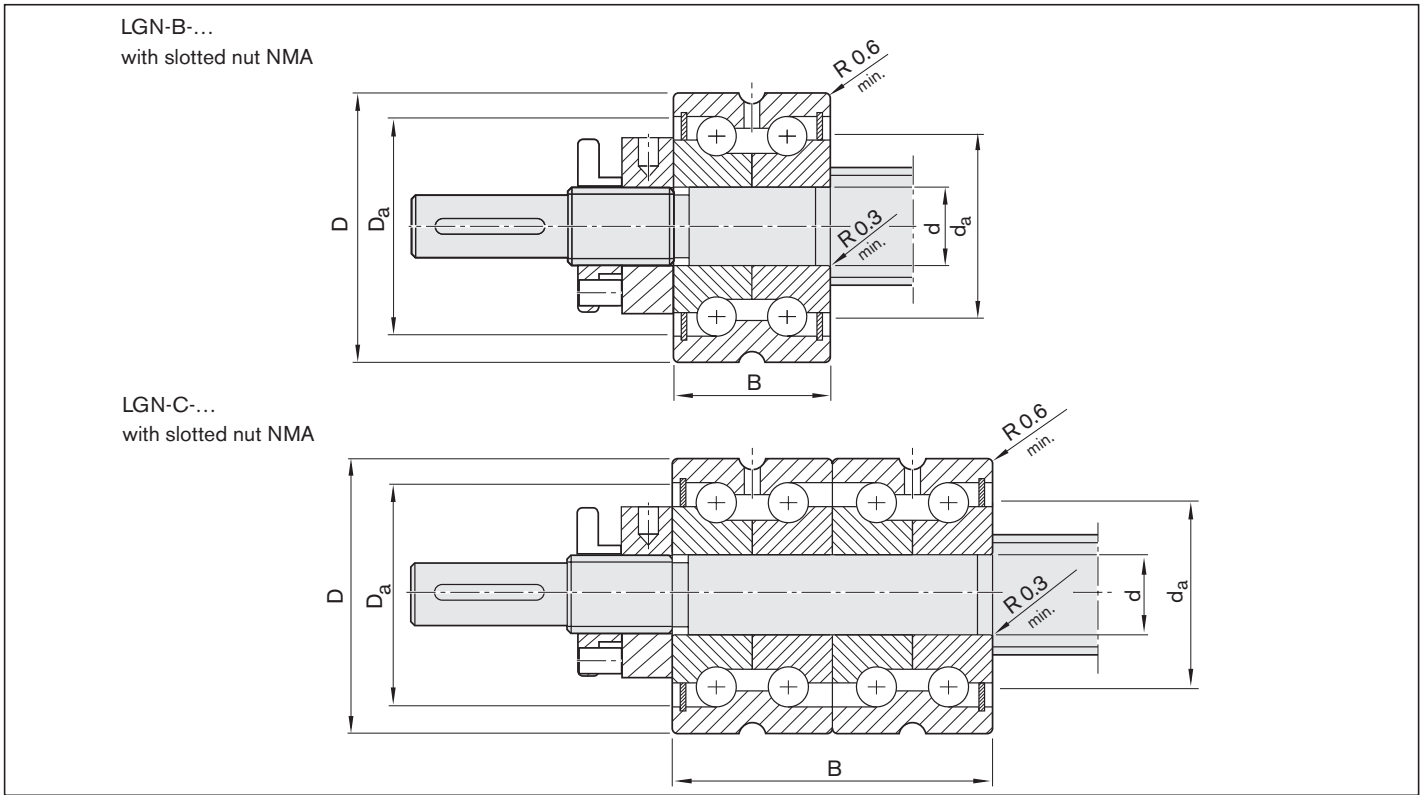


| $d_0 \times P$ | LAN Part number | LGN Abbreviation | NMA Abbreviation | Part number | Weight complete m (kg) | C (N) | C_0 (N) | M_{RL} (Nm) | R_{fb} (N/ μ m) | R_{kl} (Nm/mrad) | n_G (min^{-1}) |
|----------------|--------------------|---------------------|---------------------|--------------|------------------------------|----------|--------------|------------------|--------------------------|-----------------------|--------------------------------|
| 20 x 5 | R159A 115 01 | LGN-B-1545 | NMA 15x1 | R3446 020 04 | 0.27 | 17,900 | 28,000 | 0.20 | 400 | 65 | 3,500 |
| 30 x 5/10 | R159A 220 01 | LGN-C-2052 | NMA 20x1 | R3446 015 04 | 0.75 | 42,000 | 94,000 | 0.45 | 1,150 | 320 | 3,000 |
| 39 x 5/10 | R1590 230 30 | LGN-C-3062 | NMA 30x1.5 | R3446 016 04 | 0.98 | 47,500 | 127,000 | 0.75 | 1,500 | 620 | 2,200 |
| 48 x 5/10 | R159A 235 01 | LGN-C-3572 | NMA 35x1.5 | R3446 012 04 | 1.25 | 66,000 | 177,000 | 0.90 | 1,600 | 900 | 2,000 |

For the codes, see the chapter entitled "Abbreviations"

Suitable for screw ends: Form





| $d_0 \times P$ | (mm) | | | | | | |
|----------------|----------------------|---------------------|---------------------|-----|-------|-------|-------|
| | d | D | B | d | D_a | d_a | d_a |
| | | | | min | max | min | max |
| 20 x 5 | 15 _{-0.010} | 45 _{-0.01} | 25 _{-0.25} | 32 | 35 | 20 | 31 |
| 30 x 5/10 | 20 _{-0.005} | 52 _{-0.01} | 56 _{-0.50} | 40 | 43 | 25 | 39 |
| 39 x 5/10 | 30 _{-0.005} | 62 _{-0.01} | 56 _{-0.50} | 50 | 53 | 40 | 49 |
| 48 x 5/10 | 35 _{-0.005} | 72 _{-0.01} | 68 _{-0.50} | 59 | 62 | 45 | 58 |

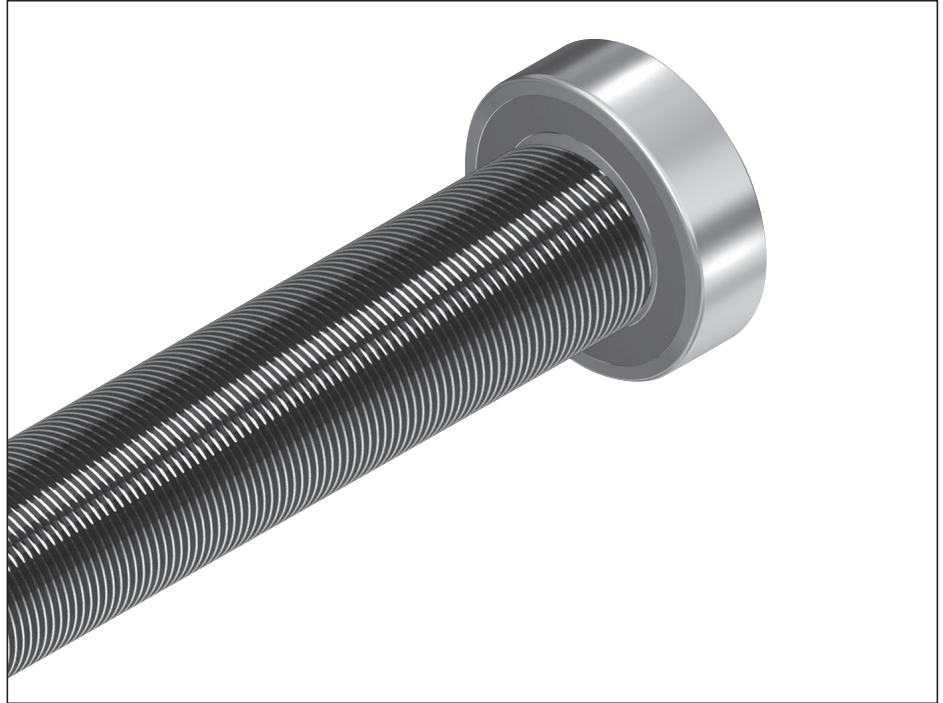
Bearing assembly LAD

Floating bearing with deep-groove ball bearing

The bearing assembly consists of:

- deep-groove ball bearing as per DIN 625... .2RS
- retaining ring DIN 471 (2 pcs)

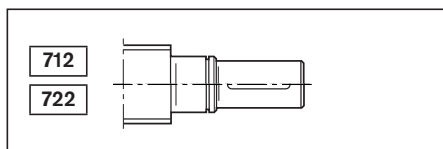
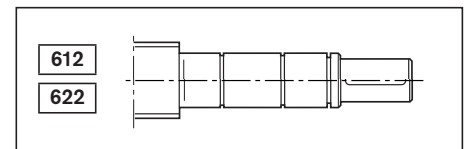
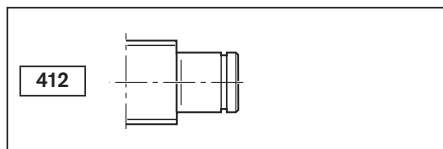
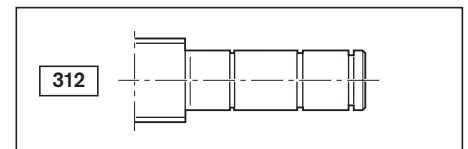
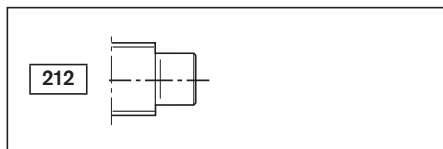
Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)

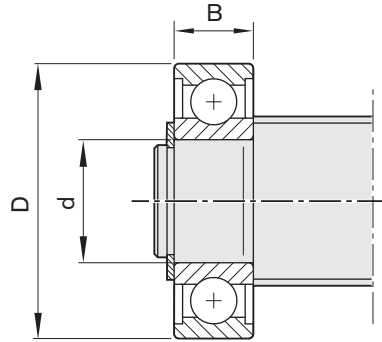


| $d_0 \times P$ | LAD | Single parts | | | | Weight complete m (kg) | C (N) | C ₀ (N) |
|----------------|--------------|---|--------------|--|--------------|---------------------------|----------|-----------------------|
| | | Deep-groove ball bearing DIN 625 Part number | Abbreviation | Retaining ring DIN 471 Abbreviation | Part number | | | |
| 20 x 5 | R1590 612 00 | 6201.2RS | R3414 042 00 | 12x1 | R3410 712 00 | 0.035 | 6,950 | 2,650 |
| | R1590 615 00 | 6202.2RS | R3414 074 00 | 15x1 | R3410 748 00 | 0.043 | 7,800 | 3,250 |
| 25 x 5/10 | R1590 617 00 | 6203.2RS | R3414 050 00 | 17x1 | R3410 749 00 | 0.064 | 9,500 | 4,150 |
| 30 x 5/10 | R1590 620 00 | 6204.2RS | R3414 038 00 | 20x1.2 | R3410 735 00 | 0.106 | 12,700 | 5,700 |
| | R1590 625 00 | 6205.2RS | R3414 063 00 | 25x1.2 | R3410 750 00 | 0.125 | 14,300 | 6,950 |
| 39 x 5/10 | R1590 630 00 | 6206.2RS | R3414 051 00 | 30x1.5 | R3410 724 00 | 0.195 | 19,300 | 9,800 |
| 48 x 5/10 | R1590 635 00 | 6207.2RS | R3414 075 00 | 35x1.5 | R3410 725 00 | 0.288 | 25,500 | 13,200 |
| 60 x 10/20 | R1590 650 00 | 6210.2RS | R3414 077 00 | 50x2 | R3410 727 00 | 0.453 | 36,500 | 20,800 |
| 75 x 10/20 | R1590 660 00 | 6212.2RS | R3414 078 00 | 60x2 | R3410 764 00 | 0.783 | 52,000 | 31,000 |

For the codes, see the chapter entitled "Abbreviations"

Suitable for screw ends: Form





| d ₀ x P | (mm) | | |
|--------------------|------|-----|----|
| | d | D | B |
| 20 x 5 | 12 | 32 | 10 |
| | 15 | 35 | 11 |
| 25 x 5/10 | 17 | 40 | 12 |
| 30 x 5/10 | 20 | 47 | 14 |
| | 25 | 52 | 15 |
| 39 x 5/10 | 30 | 62 | 16 |
| 48 x 5/10 | 35 | 72 | 17 |
| 60 x 10/20 | 50 | 90 | 20 |
| 75 x 10/20 | 60 | 110 | 22 |

Bearing assembly LAS

Fixed bearing with angular-contact thrust ball bearing LGS

Double-thrust,
series LAS-E

The bearing assembly consists of:

- angular-contact thrust ball bearing LGS as per DIN 628 (not available as a separate part)
- slotted nut NMA...

Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)

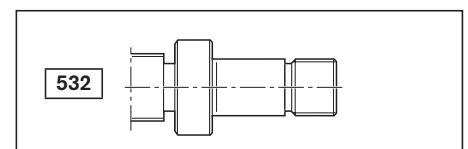
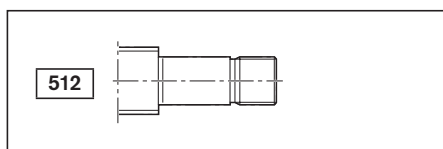
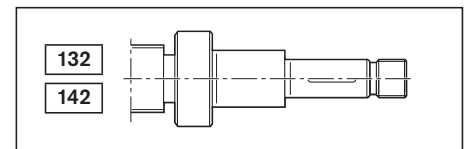
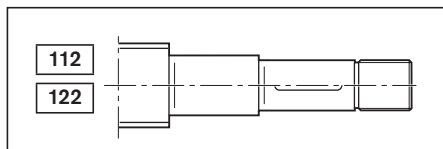


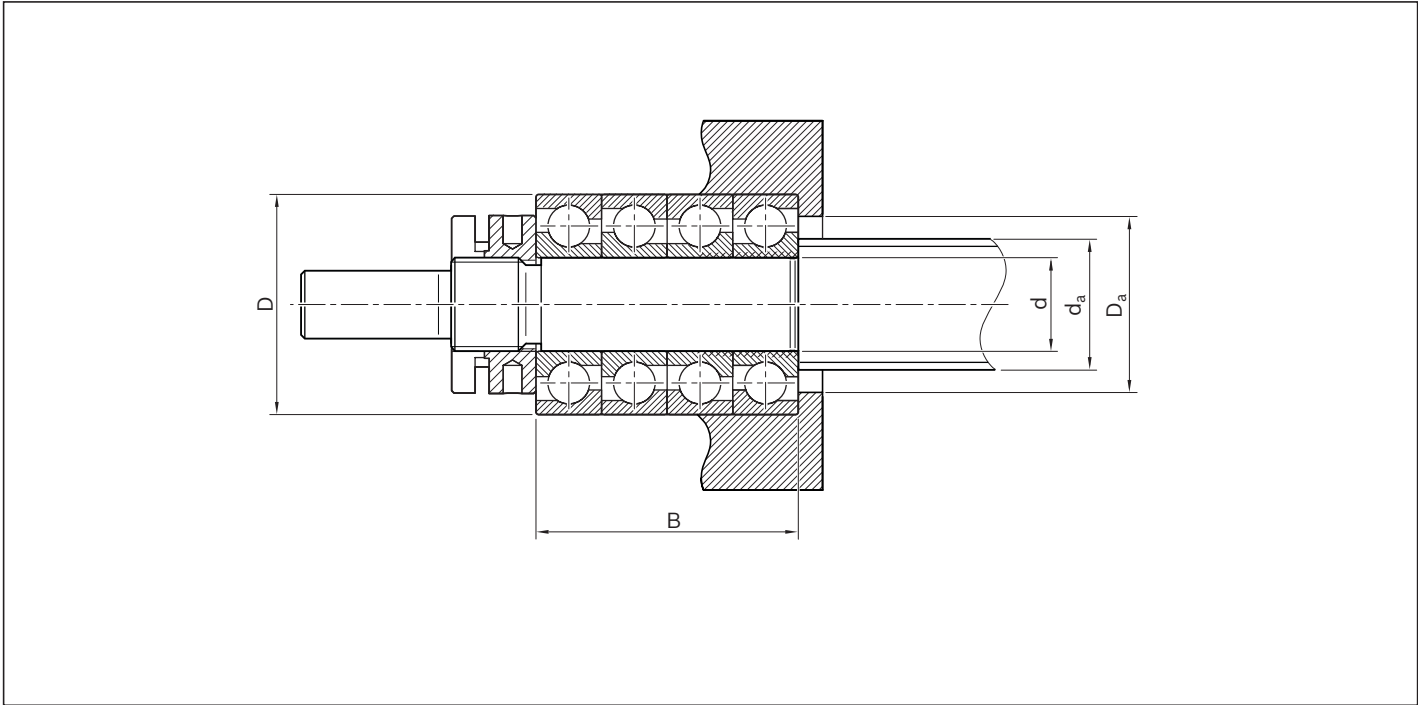
| $d_0 \times P$ | LAS Part number | LGS Abbreviation | NMA Abbreviation | Part number | Weight complete m (kg) | C (kN) | C ₀ (kN) | $n_G^{1)}$ (min ⁻¹) |
|----------------|--------------------|---------------------|---------------------|--------------|------------------------------|-----------|------------------------|------------------------------------|
| 20 x 5 | R159A 415 01 | LGS-E-1542 | NMA 15x1 | R3446 020 04 | 0.39 | 37.1 | 51.5 | 9,000 |
| | R159A 420 01 | LGS-E-2047 | NMA 20x1 | R3446 015 04 | 0.57 | 39.9 | 63.8 | 8,550 |
| 35 x 5/10 | R159A 417 02 | LGS-E-1747 | NMA 17x1 | R3446 014 04 | 0.50 | 45.3 | 63.8 | 9,500 |
| | R159A 425 01 | LGS-E-2562 | NMA 25x1.5 | R3446 011 04 | 1.10 | 74.1 | 120.0 | 7,500 |
| 30 x 5/10 | R159A 420 02 | LGS-E-2052 | NMA 20x1 | R3446 015 04 | 0.73 | 54.2 | 80.0 | 8,100 |
| | R159A 430 01 | LGS-E-3072 | NMA 30x1.5 | R3446 016 04 | 1.68 | 98.3 | 163.1 | 5,850 |
| 39 x 5/10 | R159A 430 01 | LGS-E-3072 | NMA 30x1.5 | R3446 016 04 | 1.68 | 98.3 | 163.1 | 5,850 |
| | R159A 440 01 | LGS-E-4090 | NMA 40x1.5 | R3446 016 08 | 2.74 | 140.8 | 257.7 | 4,500 |
| 48 x 5/10 | R159A 435 01 | LGS-E-3580 | NMA 35x1.5 | R3446 012 04 | 2.19 | 111.2 | 188.5 | 4,950 |
| | R159A 450 01 | LGS-E-50110 | NMA 50x1.5 | R3446 019 04 | 4.95 | 211.2 | 392.3 | 3,600 |
| 60 x 10/20 | R159A 445 01 | LGS-E-45100 | NMA 45x1.5 | R9130 342 15 | 1.70 | 172.4 | 319.2 | 4,050 |
| | R159A 470 01 | LGS-E-70150 | NMA 70x2 | R9130 342 17 | 10.99 | 339.2 | 692.3 | 2,520 |
| 75 x 10/20 | R159A 460 01 | LGS-E-60130 | NMA 60x2 | R9130 342 16 | 7.49 | 272.5 | 534.6 | 3,015 |
| | R159A 490 01 | LGS-E-90190 | NMA 90x2 | R9163 113 51 | 21.45 | 470.3 | 1,123.1 | 2,025 |

1) Values as a guide for low bearing load, good heat dissipation and suitable lubricating greases with low consistency

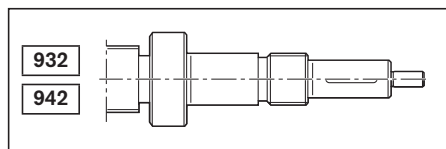
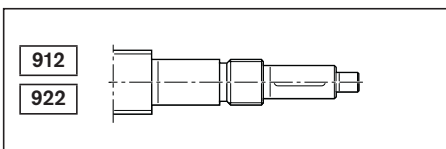
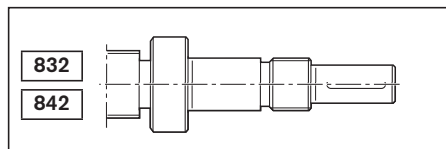
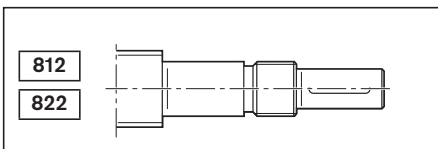
For the codes, see the chapter entitled "Abbreviations"

Suitable for screw ends: Form





| d ₀ x P | (mm) | | | | | | | |
|--------------------|----------------------|-----------------------|-----|-------|-----------------------|-------|-----------------------|--|
| | d | D | B | min | D _a max | min | d _a max | |
| 20 x 5 | 15 ^{-0.008} | 42 ^{-0.011} | 52 | 33.0 | 36.0 | - | - | |
| | 20 ^{-0.010} | 47 ^{-0.011} | 56 | 36.0 | 41.0 | 25.6 | 35.0 | |
| 25 x 5/10 | 17 ^{-0.008} | 47 ^{-0.008} | 56 | 36.2 | 41.1 | 22.6 | 35.2 | |
| | 25 ^{-0.010} | 62 ^{-0.013} | 68 | 48.1 | 55.0 | 32.0 | 47.1 | |
| 30 x 5/10 | 20 ^{-0.010} | 52 ^{-0.013} | 60 | 40.0 | 45.0 | - | - | |
| | 30 ^{-0.010} | 72 ^{-0.013} | 76 | 56.5 | 65.0 | 37.0 | 55.5 | |
| 39 x 5/10 | 30 ^{-0.010} | 72 ^{-0.013} | 76 | 56.5 | 65.0 | - | - | |
| | 40 ^{-0.012} | 90 ^{-0.015} | 92 | 72.0 | 81.0 | 49.0 | 71.0 | |
| 48 x 5/10 | 35 ^{-0.012} | 80 ^{-0.013} | 84 | 63.0 | 71.0 | - | - | |
| | 50 ^{-0.012} | 110 ^{-0.015} | 108 | 89.0 | 100.0 | 61.0 | 88.0 | |
| 60 x 10/20 | 45 ^{-0.012} | 100 ^{-0.015} | 100 | 81.0 | 91.0 | - | - | |
| | 70 ^{-0.015} | 150 ^{-0.018} | 140 | 121.0 | 138.0 | 82.0 | 119.0 | |
| 75 x 10/20 | 60 ^{-0.015} | 130 ^{-0.018} | 124 | 106.0 | 118.0 | - | - | |
| | 90 ^{-0.020} | 190 ^{-0.030} | 172 | 153.0 | 176.0 | 104.0 | 150.0 | |



Bearing assembly FEC-F

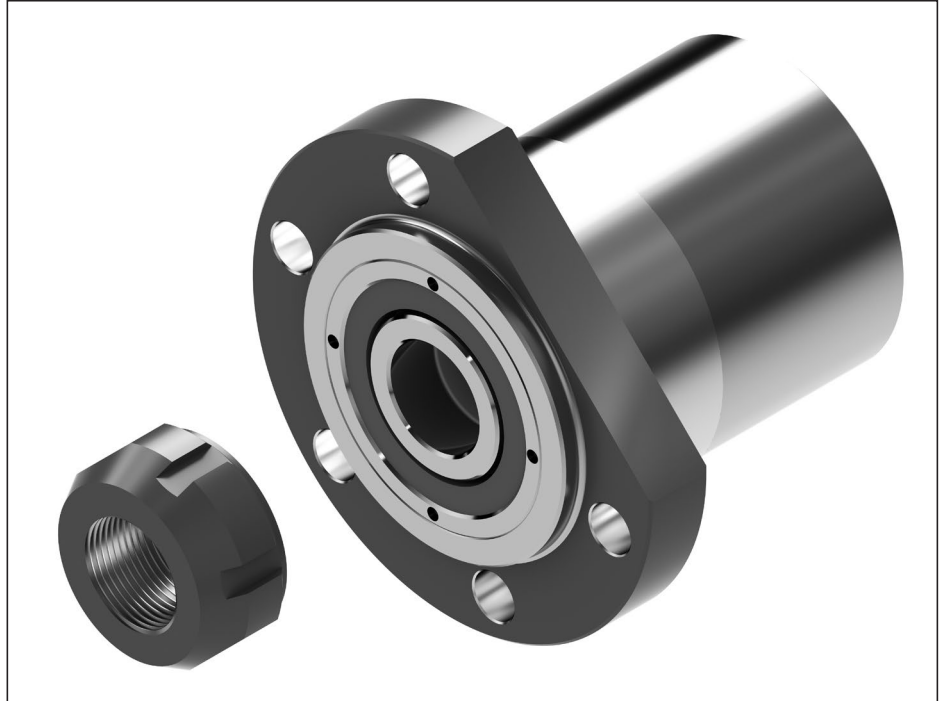
Fixed bearing with angular-contact thrust ball bearing LGS

The bearing assembly consists of:

- precision flanged housing made of steel
- Angular-contact ball bearing LGS
- Slotted nut NMB

The slotted nut is delivered unmounted

Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)



| $d_0 \times P$ | FEC-F Part number | LGS Part number | NMB Part number | $M_A^{1)}$ (Nm) | M_{AG} (Nm) | Weight complete m (kg) | C (kN) | C_0 (kN) | $M_{RL}^{2)}$ (Nm) | R_{fb} (N/ μ m) | R_{kL} (Nm/mrad) | $n_G^{3)}$ (min^{-1}) |
|----------------|----------------------|--------------------|--------------------|--------------------|------------------|------------------------------|-----------|---------------|-----------------------|--------------------------|-----------------------|-------------------------------------|
| 20 x 5 | R159B 425 01 | LGS-E-2562 | NMB 25x1.5 | 38 | 8 | 3.5 | 74.2 | 119.2 | 1.10 | 450 | 160 | 6,900 |
| 25 x 5/10 | R159B 425 01 | LGS-E-2562 | NMB 25x1.5 | 38 | 8 | 3.5 | 74.2 | 119.2 | 1.10 | 450 | 160 | 6,900 |
| 30 x 5/10 | R159B 435 01 | LGS-E-3580 | NMB 35x1.5 | 65 | 8 | 6.0 | 109.4 | 188.4 | 1.10 | 600 | 715 | 4,950 |
| 39 x 5/10 | R159B 450 01 | LGS-E-50110 | NMB 50x1.5 | 110 | 18 | 11.8 | 208.8 | 392.3 | 1.50 | 750 | 1,000 | 3,600 |
| 48 x 5/10 | R159B 465 01 | LGS-E-65140 | NMB 65x2 | 200 | 18 | 27.0 | 305.3 | 615.4 | 2.00 | 1 250 | 3,200 | 2,835 |
| 60 x 10/20 | R159B 465 01 | LGS-E-65140 | NMB 65x2 | 200 | 18 | 27.0 | 305.3 | 615.4 | 2.00 | 1 250 | 3,200 | 2,835 |
| 75 x 10/20 | R159B 490 01 | LGS-E-90190 | NMB 90x2 | 300 | 35 | 53.4 | 473.1 | 1,123.0 | 2.30 | 1 500 | 7,500 | 2,025 |

1) Assembly with hook wrench (DIN 1810)

2) Measured at 50 rpm

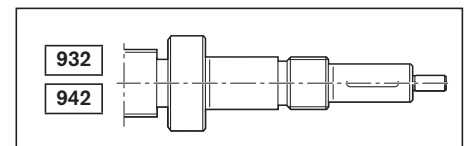
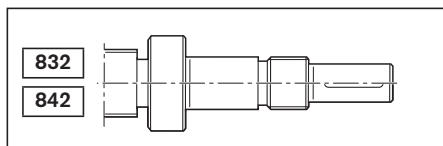
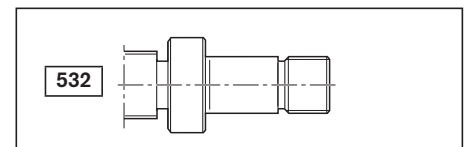
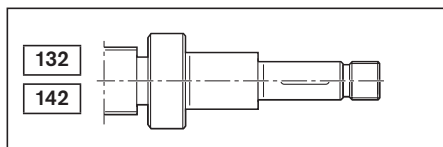
3) Values as a guide for low bearing load, good heat dissipation and suitable lubricating greases with low consistency

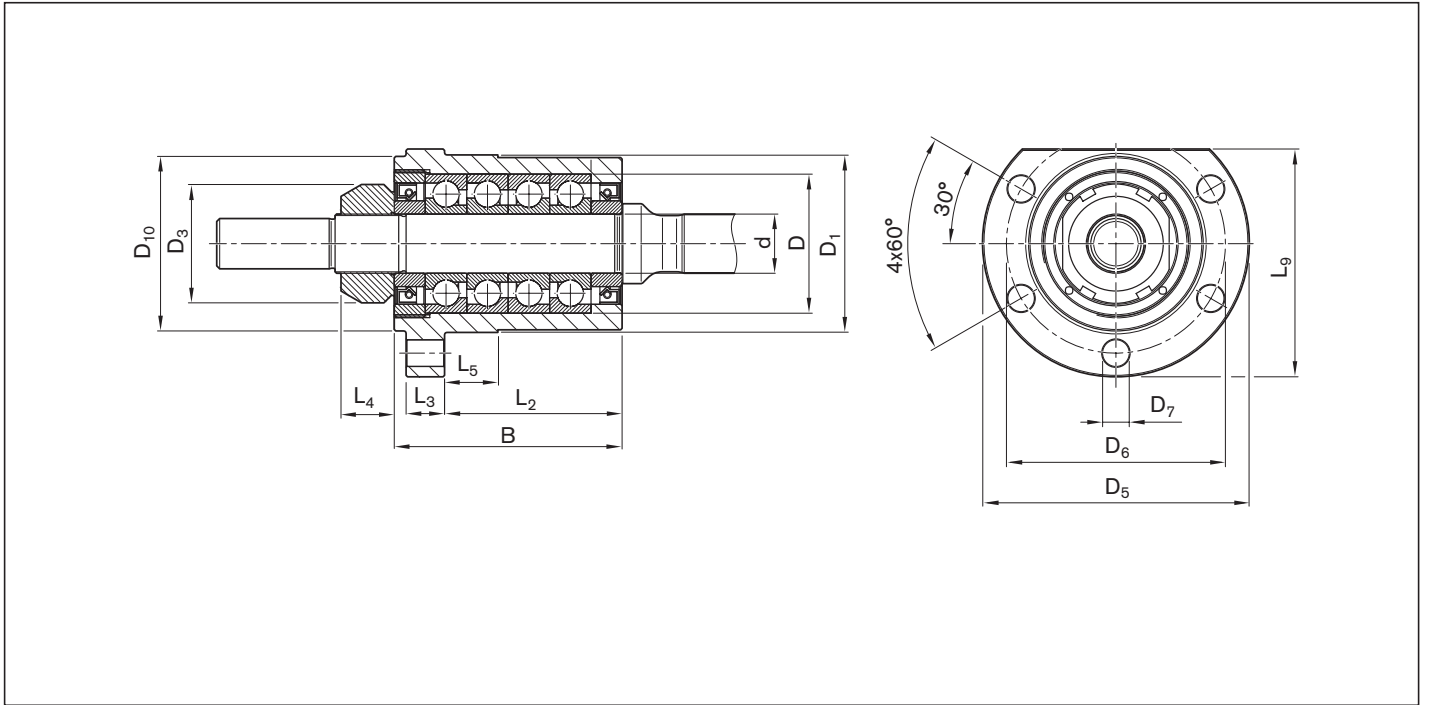
For the codes, see the "Abbreviations" on page 207.

Values apply to bearing configuration 2 + 2.

Bearing configurations 3 + 1 or 1 + 3 are possible. Please consult us.

Suitable for screw ends: Form



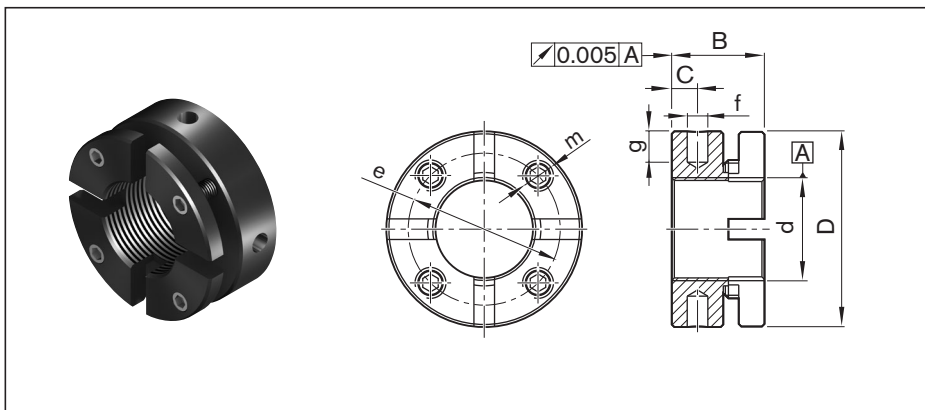


| $d_0 \times P$ | (mm) | | | | | | | | | | | | | |
|----------------|----------------------|-----------------------|-----|-------|-------|-------|-------|-------|-------------|-------|-------|-------|-------|----------|
| | d | D | B | L_2 | L_3 | L_4 | L_5 | L_9 | D_1 h7 | D_3 | D_5 | D_6 | D_7 | D_{10} |
| 20 x 5 | 25 _{-0.010} | 62 _{-0.013} | 89 | 68.0 | 16 | 20 | 36.0 | 104.0 | 80 | 44 | 120 | 100 | 11.0 | 80 |
| 25 x 5/10 | 25 _{-0.010} | 62 _{-0.013} | 89 | 68.0 | 16 | 20 | 36.0 | 104.0 | 80 | 44 | 120 | 100 | 11.0 | 80 |
| 30 x 5/10 | 35 _{-0.012} | 80 _{-0.013} | 110 | 82.0 | 20 | 22 | 47.0 | 124.0 | 100 | 54 | 140 | 120 | 13.0 | 99 |
| 39 x 5/10 | 50 _{-0.012} | 110 _{-0.015} | 140 | 98.5 | 25 | 25 | 58.5 | 152.5 | 130 | 75 | 171 | 152 | 13.0 | 130 |
| 48 x 5/10 | 65 _{-0.015} | 140 _{-0.018} | 180 | 133.5 | 30 | 28 | 53.5 | 199.5 | 170 | 95 | 225 | 198 | 17.5 | 170 |
| 60 x 10/20 | 65 _{-0.015} | 140 _{-0.018} | 180 | 133.5 | 30 | 28 | 53.5 | 199.5 | 170 | 95 | 225 | 198 | 17.5 | 170 |
| 75 x 10/20 | 90 _{-0.020} | 190 _{-0.018} | 235 | 179.0 | 35 | 32 | 99.0 | 257.5 | 220 | 125 | 285 | 252 | 22.0 | 219 |

Slotted nuts NMA for fixed bearings

Slotted nut NMA

- For maximum vibratory loads
- NMA 15 to 40 with 4 segments
- NMA 45 to 90 with 6 segments



| Abbreviation | Part number | (mm) | | | | | | | | M_A (Nm) | F_{AB} (kN) | M_{AG} (Nm) | Mass m (g) |
|--------------|--------------|---------|-----|----|----|-----|-----|---|----|---------------|------------------|------------------|---------------|
| | | d | D | B | c | m | e | f | g | | | | |
| NMA 15x1 | R3446 020 04 | M15x1 | 30 | 18 | 5 | M5 | 24 | 4 | 5 | 10 | 100 | 3 | 60 |
| NMA 17x1 | R3446 014 04 | M17x1 | 32 | 18 | 5 | M5 | 26 | 4 | 5 | 15 | 120 | 3 | 70 |
| NMA 20x1 | R3446 015 04 | M20x1 | 38 | 18 | 5 | M6 | 31 | 4 | 6 | 18 | 145 | 5 | 130 |
| NMA 25x1.5 | R3446 011 04 | M25x1.5 | 45 | 20 | 6 | M6 | 38 | 5 | 6 | 25 | 205 | 5 | 160 |
| NMA 30x1.5 | R3446 016 04 | M30x1.5 | 52 | 20 | 6 | M6 | 45 | 5 | 7 | 32 | 250 | 5 | 200 |
| NMA 35x1.5 | R3446 012 04 | M35x1.5 | 58 | 20 | 6 | M6 | 51 | 5 | 7 | 40 | 280 | 5 | 230 |
| NMA 40x1.5 | R3446 018 04 | M40x1.5 | 65 | 22 | 6 | M6 | 58 | 6 | 8 | 55 | 350 | 5 | 300 |
| NMA 45x1.5 | R9130 342 15 | M45x1.5 | 70 | 22 | 6 | M6 | 63 | 6 | 8 | 65 | 360 | 5 | 340 |
| NMA 50x1.5 | R3446 019 04 | M50x1.5 | 75 | 25 | 8 | M6 | 68 | 6 | 8 | 85 | 450 | 5 | 430 |
| NMA 60x2 | R9130 342 16 | M60x2.0 | 90 | 26 | 8 | M8 | 80 | 6 | 8 | 100 | 550 | 15 | 650 |
| NMA 70x2 | R9130 342 17 | M70x2.0 | 100 | 28 | 9 | M8 | 90 | 8 | 10 | 130 | 650 | 15 | 790 |
| NMA 90x2 | R9163 113 51 | M90x2.0 | 130 | 32 | 13 | M10 | 118 | 8 | 10 | 200 | 900 | 20 | 1.530 |

For the codes, see the chapter entitled "Abbreviations"

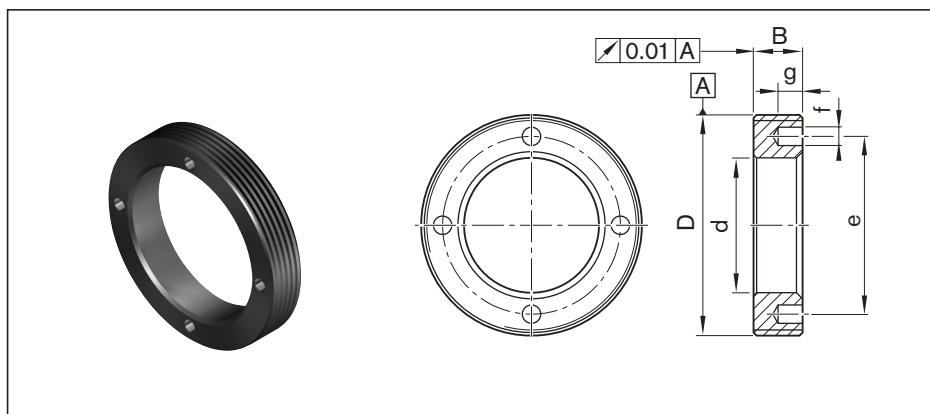
Ring nut GWR

– For angular-contact thrust ball bearing LGN

Attention:

Use a threadlocker (for example, Loctite 638) to secure against loosening

MA = Tightening torque for threaded ring



| Abbreviation | Part number | (mm) | | | | | | M _A (Nm) | Mass | |
|--------------|--------------|---------|------|----|-------|-----|---|------------------------|-------|--|
| | | D | d | B | e | f | g | | m (g) | |
| GWR 18x1 | R1507 040 33 | M18x1 | 8.5 | 8 | 12.5 | 2.5 | 3 | 6 | 10.0 | |
| GWR 23x1 | R1507 240 35 | M23x1 | 13.0 | 8 | 18.0 | 2.5 | 3 | 8 | 15.0 | |
| GWR 26x1,5 | R1507 240 22 | M26x1.5 | 16.5 | 8 | 20.5 | 2.5 | 3 | 10 | 16.5 | |
| GWR 30x1,5 | R1507 340 34 | M30x1.5 | 17.0 | 8 | 23.0 | 3.0 | 4 | 20 | 29.0 | |
| GWR 36x1,5 | R1507 040 23 | M36x1.5 | 22.0 | 8 | 29.0 | 3.0 | 4 | 25 | 35.0 | |
| GWR 40x1,5 | R1507 140 03 | M40x1.5 | 25.0 | 8 | 33.0 | 3.0 | 4 | 28 | 39.5 | |
| GWR 45x1,5 | R1507 240 04 | M45x1.5 | 28.0 | 8 | 38.0 | 3.0 | 4 | 30 | 55.0 | |
| GWR 50x1,5 | R1507 240 25 | M50x1.5 | 31.0 | 10 | 40.0 | 4.0 | 5 | 45 | 86.0 | |
| GWR 55x1,5 | R1507 340 05 | M55x1.5 | 36.0 | 10 | 46.0 | 4.0 | 5 | 50 | 96.0 | |
| GWR 58x1,5 | R1507 440 32 | M58x1.5 | 43.0 | 10 | 50.0 | 4.0 | 5 | 58 | 84.0 | |
| GWR 60x1 | R1507 440 28 | M60x1 | 43.0 | 10 | 51.0 | 4.0 | 5 | 60 | 97.0 | |
| GWR 62x1,5 | R1507 440 29 | M62x1.5 | 43.0 | 12 | 53.0 | 5.0 | 6 | 60 | 127.0 | |
| GWR 65x1,5 | R1507 440 26 | M65x1.5 | 47.0 | 12 | 55.0 | 4.0 | 5 | 70 | 136.0 | |
| GWR 70x1,5 | R1507 440 06 | M70x1.5 | 42.0 | 12 | 58.0 | 4.0 | 5 | 75 | 216.0 | |
| GWR 78x2 | R1507 567 27 | M78x2 | 54.0 | 15 | 67.0 | 6.0 | 7 | 90 | 286.0 | |
| GWR 92x2 | R1507 640 09 | M92x2 | 65.0 | 16 | 82.0 | 6.0 | 7 | 125 | 385.0 | |
| GWR 95x2 | R1507 667 28 | M95x2 | 68.0 | 16 | 82.0 | 6.0 | 7 | 130 | 425.0 | |
| GWR 112x2 | R1507 740 11 | M112x2 | 82.0 | 18 | 100.0 | 8.0 | 8 | 175 | 596.0 | |
| GWR 115x2 | R1507 767 29 | M115x2 | 85.0 | 18 | 100.0 | 8.0 | 8 | 200 | 664.0 | |

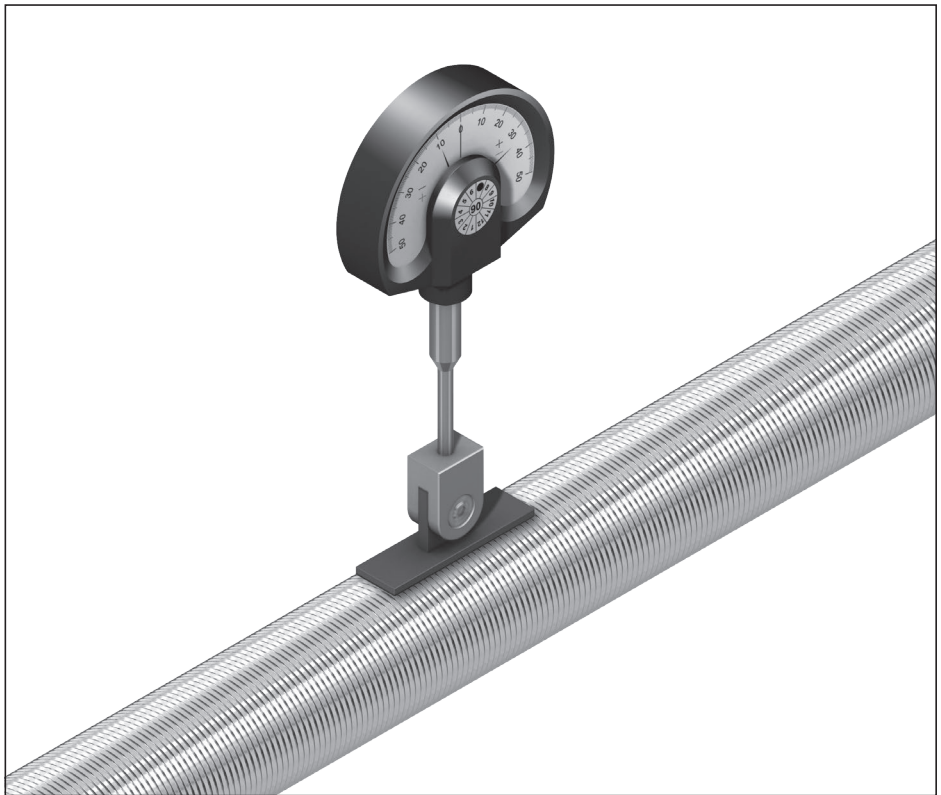
Measuring pads

Alignment of the planetary screw assembly in the machine

Rexroth can provide a gauge with a self-aligning contact pad for easy alignment of the planetary screw assembly.

Two pads of different lengths are available which can be used depending on the screw lead:

- material no. R3305 131 19:
length 33 mm
- material no. R3305 131 21:
length 50 mm



Dial gauge not supplied as standard with the planetary screw assembly

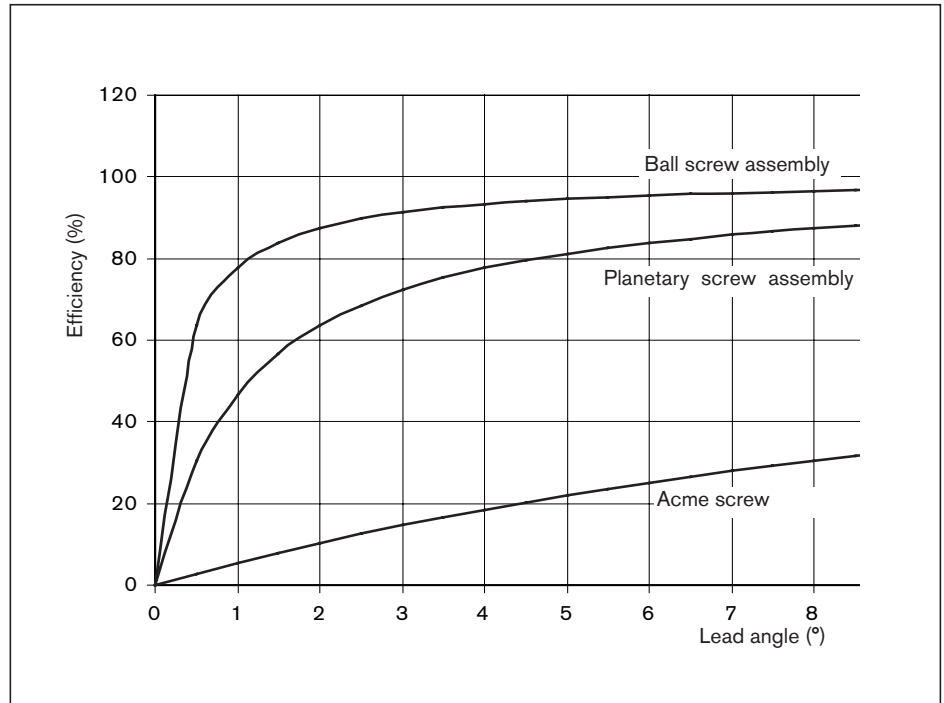
Technical notes

The degree of efficiency determines the torque required to convert the rotary motion into linear motion.

Due to their high mechanical efficiency, PLSAs are in principle not self-locking.

▲ Safety information

For installation, customers should check whether separate protection against falling loads is required. Please consult us.



Advantages over the acme screw drive

- The maximum mechanical efficiency of an Acme screw drive is 50%, whereas a planetary screw assembly can achieve 90%, and a ball screw assembly 98%.
- Higher life expectancy due to negligible wear during operation
- Less drive power required
- No stick-slip effect
- More precise positioning
- Higher travel speed
- Less heat-up

Selection criteria for planetary screw assemblies (extract)

The factors below should be considered when selecting the PLSA for a given application:

- degree of accuracy required (lead deviation)
- Load
- Service life
- critical speed
- buckling load
- rigidity/permissible clearance or desired preload
- characteristic speed (max. permissible linear speed)

▲ Note

Radial and eccentric forces relative to the screw must be avoided, as they can affect the PLSA's performance and shorten its life. Where special conditions of use are involved, please consult us.

The following points should be taken into consideration when selecting a PLSA that is to be both cost-efficient and optimally designed:

- The calculation of the service life should be based on average loads and average speeds, not on maximum values.
- In order for us to provide you with a customized solution, installation drawings or sketches of the nut environment should be enclosed.

Static load rating C_0

The static load rating is an axial, concentrically acting force that induces a permanent deformation of 0.0001 x the rolling element diameter.

Dynamic load rating C

The dynamic load rating is an axial, concentrically acting force of constant magnitude and direction under which 90% of a sufficiently large number of identical PLSAs can achieve a nominal service life of one million revolutions.

Correction factor for tolerance grades

The static load rating C_0 and the dynamic load rating C must be multiplied by the correction factor f_{ac} as appropriate for the specific tolerance grade of the screw.

| Tolerance grade T | 5 | 7 | 9 |
|-------------------|---|-----|-----|
| f_{ac} | 1 | 0.9 | 0.8 |

Service life

The nominal service life is expressed by the number of revolutions (or number of operating hours at constant speed) that will be attained or exceeded by 90% of a representative sample of identical planetary screw assemblies before the first signs of material fatigue become evident. The nominal life is designated as L or L_h h, depending on whether it is specified in revolutions or hours.

The nominal life calculation is based on optimal installation and environmental conditions. The service life may be shortened, for example, if the lubrication is affected by exposure to process media.

Critical speed and buckling load

The critical speed and buckling load can be checked using the corresponding charts. For precise calculations see formula 12 15 , in the section "Design Calculations"

Characteristic speed $d_0 \cdot n$

Rexroth PLSAs can be operated at very high speeds due to their structural design. Characteristic speeds of up to 150,000 are possible depending on the nut type. The characteristic speeds can be exceeded for short periods, please consult us.

$$d_0 \cdot n \leq 150,000$$

d_0 = nominal diameter (mm)
 n = speed (rpm)

The theoretically possible maximum linear speed v_{max} (m/min) is specified on the page featuring the relevant nut. Actually attainable speeds are heavily dependent among other factors on preload and duty cycle. They are generally restricted by the critical speed. (See "Design Calculations").

Material, hardness

PLSA's are made of high-quality, heat-treatable steel, carbon chrome alloy steels or case-hardened steels. The screw and nut raceways have a minimum Rockwell hardness of HRC 58. The screw ends are not hardened.

Technical notes

Sealing

PLSAs are precision assemblies that require protection against contamination. Flat protective covers, bellows-type dust boots or other enclosures are particularly suitable for this purpose. As there are some applications in which these methods do not provide sufficient protection, we have developed an additional gapless lip-type seal which ensures an optimal sealing effect and maintains high efficiency due to the low friction level. Our PLSAs can therefore be supplied with lip-type seals as an option.

At the customer's request, the seals can be omitted entirely.

To ensure that seals retain their functionality, dirt must be removed at regular intervals.

Short stroke

Short stroke applications = stroke \leq nut length

Lubrication:

During a short stroke, the planets do not make a real turn. It is therefore impossible for an adequate lubricating film to form. This may result in premature wear.

To avoid this, it is sufficient to perform longer strokes at regular intervals with simultaneous relubrication as "lubricating strokes".

Load rating:

Short stroke applications will increase the number of times a rolling load passes over each point within the load zone.

This reduces the load rating.

Please consult us.

Permissible operating temperatures

Standard design PLSAs allow a continuous temperature of 60 °C (measured on the outer shell of the nut).

Permissible operating temperatures:

$$-10\text{ °C} \leq T_{\text{operation}} \leq 60\text{ °C}$$

Permissible bearing temperatures:

$$-15\text{ °C} \leq T_{\text{bearing}} \leq 80\text{ °C}$$

Applications with high-loading and/or rapid cycles can generate excessive heat. To prevent excessive heating, Bosch Rexroth recommends cooling the screw and/or the nut. Apart from this, we can offer solutions for uses at higher temperatures.

Bearing

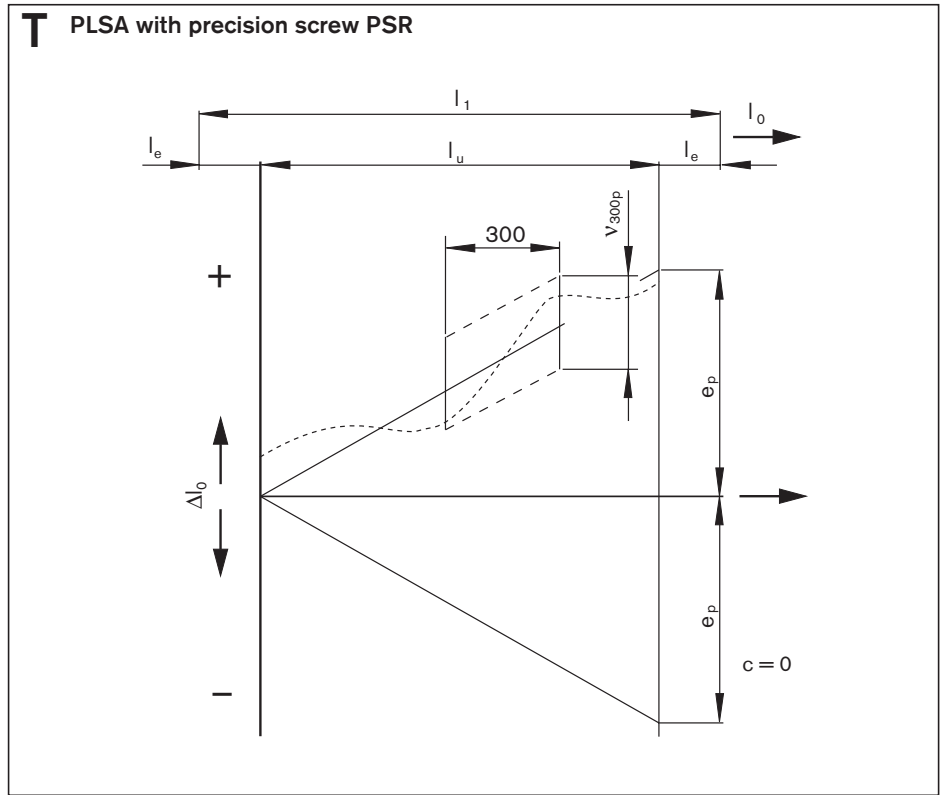
When calculating the life expectancy of the overall system, the end bearings must be considered separately.

Acceptance conditions and tolerance grades

Permissible travel deviation based on DIN ISO 3408-3

Symbol definitions: (excerpt)

- l_0 = nominal travel
- l_1 = thread length
- Δl_0 = travel deviation
- l_u = useful travel
- l_e = excess travel (the closer tolerances for travel and hardness do not apply here)
- c = travel compensation (target travel deviation) (standard: $c = 0$)
- e_p = tolerance mean target travel deviation
- v_{300p} = permissible travel deviation within 300 mm travel
- $v_{2\pi p}$ = permissible travel deviation within one revolution



| Useful travel l_u | | Tolerance mean actual travel deviation e_p (μm) | | |
|---------------------|--------|--|----------|----------|
| $>$ | \leq | Tolerance grade | | |
| | | 5 | 7 | 9 |
| 0 | 100 | 18 | 44 | 110 |
| 100 | 200 | 20 | 48 | 120 |
| 200 | 315 | 23 | 52 | 130 |
| 315 | | | | |

$$e_p = \frac{l_u}{300} \cdot v_{300p}$$

For precision screws PSR the following values apply in all cases:

| v_{300p} (μm) | Tolerance grade | | |
|------------------------------|-----------------|----------|----------|
| | 5 | 7 | 9 |
| | 23 | 52 | 130 |

Non-usable length l_e
 (Excess travel)

| d_0 (mm) | l_e (mm) |
|----------------|---------------|
| 20, 25, 30, 39 | 40 |
| 48, 60, 75 | 50 |

Minimum number of measurements within 300 mm (measuring interval) and excess travel to be taken into consideration.

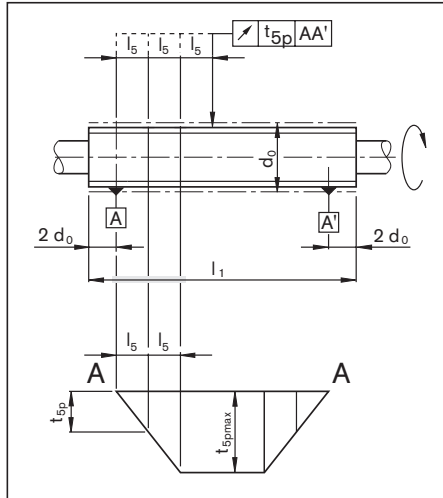
| Lead P (mm) | Minimum number of measurements for tolerance grade | | |
|----------------|--|----------|----------|
| | 5 | 7 | 9 |
| 5 | 6 | 3 | 3 |
| 10 | 3 | 1 | 1 |
| 20 | 3 | 1 | 1 |

Acceptance conditions and tolerance grades

Run-outs and location deviations

based on DIN ISO 3408-3

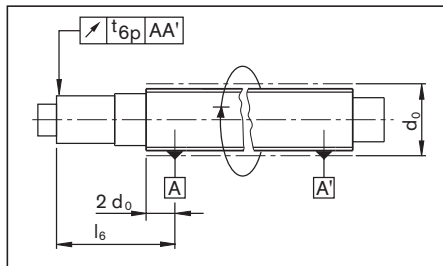
Radial run-out t_5 of the outer diameter of the screw over the length l_5 used to determine the straightness in relation to AA'.



| d_0 | | l_5 | t_{5pmax} in μm for l_5 | | |
|-------|--------|-------|----------------------------------|----|----|
| > | \leq | | Tolerance grade | | |
| 6 | 12 | 80 | 5 | 7 | 9 |
| | | | 32 | 40 | 60 |
| 12 | 25 | 160 | | | |
| 25 | 50 | 315 | | | |
| 50 | 100 | 630 | | | |

| l_1/d_0 | | t_{5pmax} in μm for $l_1 \geq 4l_5$ | | |
|-----------|--------|--|-----|-----|
| > | \leq | Tolerance grade | | |
| | 40 | 64 | 80 | 120 |
| 40 | 60 | 96 | 120 | 180 |
| 60 | 80 | 160 | 200 | 300 |
| 80 | 100 | 256 | 320 | 480 |

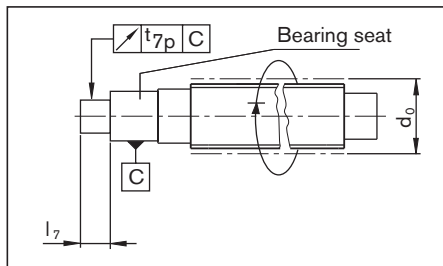
Coaxial deviation t_6 of the bearing journal in relation to AA' where $l_6 \leq l$.
 Tabular value t_{6p} applies if $l_6 \leq$ reference length l .



| d_0 | | Reference length l | t_{6p} in μm for $l_6 \leq l$ | | |
|-------|--------|----------------------|--------------------------------------|----|----|
| > | \leq | | Tolerance grade | | |
| 6 | 20 | 80 | 5 | 7 | 9 |
| | | | 20 | 40 | 50 |
| 20 | 50 | 125 | 25 | 50 | 63 |
| 50 | 125 | 200 | 32 | 63 | 80 |

Where $l_6 > l$, then $t_{6a} \leq t_{6p} \cdot \frac{l_6}{l}$

Coaxial deviation t_7 of the journal diameter of the screw in relation to the bearing diameter for $l_7 > l$.
 Tabular value t_{7p} applies if $l_7 \leq$ reference length l .

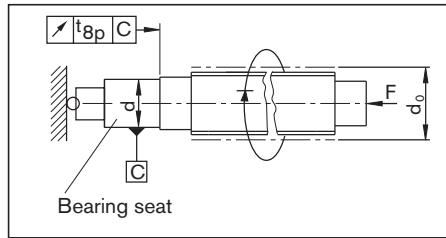


| d_0 | | Reference length l | t_{7p} in μm for $l_7 \leq l$ | | |
|-------|--------|----------------------|--------------------------------------|----|----|
| > | \leq | | Tolerance grade | | |
| 6 | 20 | 80 | 5 | 7 | 9 |
| | | | 8 | 12 | 14 |
| 20 | 50 | 125 | 10 | 16 | 18 |
| 50 | 125 | 200 | 12 | 20 | 23 |

Where $l_7 > l$, then $t_{7a} \leq t_{7p} \cdot \frac{l_7}{l}$

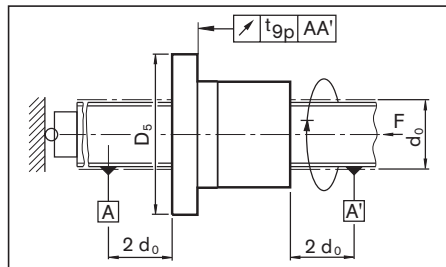
d_0 = nominal diameter

Axial run-out t_8 of the shaft (bearing) face of the screw in relation to the bearing diameter.



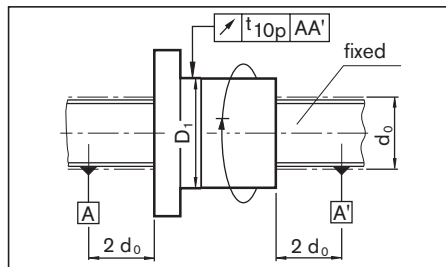
| d_0 | | t_{8p} in μm for tolerance grade | | |
|-------|--------|--|---|----|
| > | \leq | 5 | 7 | 9 |
| 6 | 63 | 5 | 6 | 8 |
| 63 | 125 | 6 | 8 | 10 |

Axial run-out t_9 of the nut location face in relation to **A** and **A'** (for preloaded ball nuts only).



| Flange diameter D_5 | | t_{9p} in μm for tolerance grade | | |
|--------------------------|--------|--|----|--|
| > | \leq | 5 | 7 | |
| 16 | 32 | 16 | 20 | |
| 32 | 63 | 20 | 25 | |
| 63 | 125 | 25 | 32 | |
| 125 | 250 | 32 | 40 | |

Radial run-out t_{10} of the outer diameter D_1 of the nut unit in relation to **A** and **A'** (for preloaded and rotating nuts only). Fix screw to prevent rotation before carrying out the measurement.

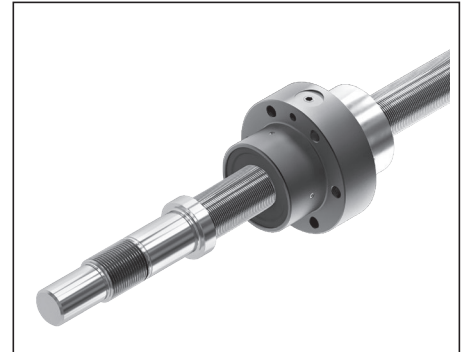
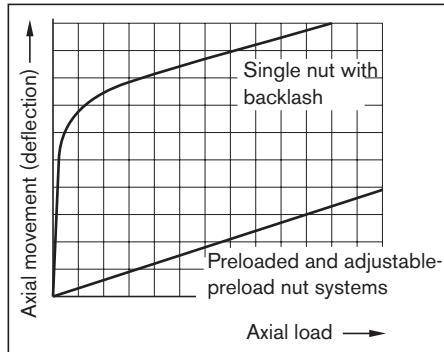


| Outer diameter D_1 | | t_{10p} in μm for tolerance grade | | |
|-------------------------|--------|---|----|--|
| > | \leq | 5 | 7 | |
| 16 | 32 | 16 | 20 | |
| 32 | 63 | 20 | 25 | |
| 63 | 125 | 25 | 32 | |
| 125 | 250 | 32 | 40 | |

Preload, rigidity, friction torques

Nut system preload

In addition to single nuts with reduced backlash, Rexroth supplies preloaded nut systems.



With preloaded nut systems, the deformation due to load cycling is significantly less than that of systems without preload. Preloaded nut systems should therefore be used in applications requiring a high degree of rigidity. The preload of the planetary screw assembly will decrease over time as a function of the load and the operating hours. The screw is typically far less rigid than the nut unit (for details see "Overall axial rigidity...").

Rigidity

The rigidity of a planetary screw assembly is also influenced by all adjoining parts such as bearings, housing bores, nut housings etc.

Overall axial rigidity R_{bs} of the planetary screw assembly

The overall axial rigidity R_{bs} is made up of the component rigidity of the bearing R_{fb} , the screw R_S and the nut unit R_{nu} .

$$\frac{1}{R_{bs}} = \frac{1}{R_{fb}} + \frac{1}{R_S} + \frac{1}{R_{nu}} \quad 16$$

Rigidity of the bearing R_{fb}

The rigidity of the bearings corresponds to the values found in the bearing manufacturer's catalog. See the dimension tables in this catalog for the rigidity values of the bearings that Rexroth can provide.

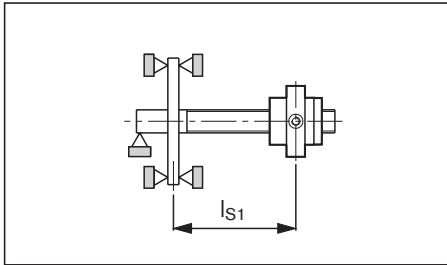
Rigidity of the screw R_S

The rigidity of the screw R_S depends on the type of bearing used. See the corresponding tables for rigidity values.

Note:

Please note that in most cases the rigidity R_S of the screw will be significantly lower than the rigidity R_{nu} of the nut unit.

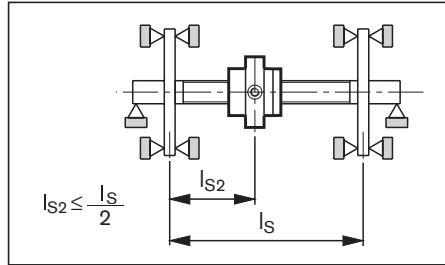
1 PLSA shaft is fixed at one end



$$R_{S2} = 165 \cdot \frac{(d_0)^2}{l_{S2}} \cdot \frac{l_S}{l_S - l_{S2}} \text{ (N/}\mu\text{m)} \quad 18$$

$$R_{S1} = 165 \cdot \frac{(d_0)^2}{l_{S1}} \text{ (N/}\mu\text{m)} \quad 17$$

2 PLSA shaft is fixed at both ends



The lowest screw rigidity occurs at the center of the screw R_{S2min} ($l_{S2} = l_S/2$) and thus equals:

$$R_{S2min} = 660 \cdot \frac{(d_0)^2}{l_S} \text{ (N/}\mu\text{m)} \quad 19$$

$R_S/R_{S1}/R_{S2}$ = rigidity of the screw (N/ μ m)
 d_0 = nominal diameter (mm)
 l_S = distance between bearing and bearing (mm)
 l_{S2} = distance between bearing and nut (mm)

Rigidity in the area of the nut unit R_{nu}

See the corresponding tables for rigidity values.

Preload and rigidity

| $d_0 \times P$ | Single nut FEM / ZEM backlash standard (mm) | (preload class C2) | | | $R_s \left(\frac{N \cdot m}{\mu m} \right)$ |
|----------------|---|----------------------------|--------------------|--------------------|--|
| | | R_{nu} (N/ μ m) max. | T_{p0} (Nm) min. | T_{p0} (Nm) max. | |
| 20 x 5 | 0,03 | 400 | 0.29 | 0.66 | 66 |
| 25 x 5 | | 460 | 0.42 | 0.92 | 103 |
| 25 x 10 | | 290 | 0.42 | 0.92 | 103 |
| 30 x 5 | | 620 | 0.57 | 1.24 | 149 |
| 30 x 10 | | 420 | 0.57 | 1.24 | 149 |
| 39 x 5 | | 750 | 0.88 | 1.92 | 251 |
| 39 x 10 | | 500 | 0.88 | 1.92 | 251 |
| 48 x 5 | | 1,080 | 1.24 | 2.72 | 380 |
| 48 x 10 | | 760 | 1.24 | 2.72 | 380 |
| 60 x 10 | | 1,030 | 1.79 | 3.94 | 594 |
| 60 x 20 | | 700 | 1.79 | 3.94 | 594 |
| 75 x 10 | | 1,400 | 2.61 | 5.17 | 928 |
| 75 x 20 | | 1,000 | 2.61 | 5.17 | 928 |

Frictional torque of the seals

Seal torque of the nuts

$d_0 \times P$ = size

R_S = rigidity of the screw

R_{nu} = rigidity of the nut

T_{RD} = dynamic drag torque of the 2 seals

T_{p0} = dynamic drag torque without seals

T_0 = overall dynamic drag torque

$T_0 = T_{p0} + T_{RD}$

| $d_0 \times P$ | Dynamic drag torque T_{RD} approx. (Nm) | |
|----------------|---|---------------------------------|
| | Lip seal | Gap-type seal/cover plate wiper |
| 20 x 5 | 0.10 | 0 |
| 25 x 5/10 | 0.10 | 0 |
| 30 x 5/10 | 0.15 | 0 |
| 39 x 5/10 | 0.25 | 0 |
| 48 x 5/10 | 0.35 | 0 |
| 60 x 10/20 | 0.50 | 0 |
| 75 x 10/20 | 0.70 | 0 |

The values given for dynamic drag torque are proven practical indicators for the nut preloading.

Installation

Delivery condition

Rexroth PLSAs are normally delivered prelubricated with an initial supply of grease. Relubrication is possible, and cartridges and cans of this grease are available. If another lubricant is used, you will need to check that it is compatible with the initial lubrication grease.

In special cases, a ball screw assembly with only a preservative coating can be ordered and supplied via the appropriate ordering code.

⚠ Note

The selected lubricant must be in the nut before the machine is started.

⚠ Note

In systems with a gap-type seal (Option 4), the user must additionally apply the stroke-dependent amount of grease. (See section on Lubrication).

Cleaning

Various cleaning agents can be used to degrease and wash the assembly:

- aqueous cleaning agents
- organic cleaning agents

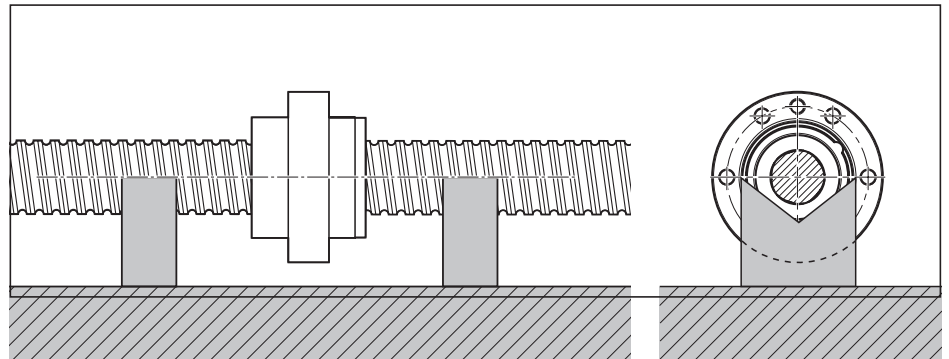
⚠ Note

Immediately after cleaning, thoroughly dry all parts and apply a preservative coating or anti-corrosion oil.

In all cases, take care to observe the appropriate legal regulations (environmental protection, health and safety at work, etc.) as well as the specifications for the cleaning agent (e.g. handling).

Storage

Planetary screw assemblies are high-quality systems that must be treated with due care. In order to prevent damage and contamination, the elements should not be removed from the protective wrapping until immediately before installation. Once they have been removed from the packaging, they must be set down on V-shaped cradles.



Installation in the machine

It is not normally necessary to remove the preservative coating before installation.

- If the planetary screw assembly is contaminated, it must first be cleaned (see “Cleaning”) and re-oiled
- Push the nut unit into the mounting bore, taking care to avoid any impact force or misalignment.
- Tighten the mounting screws using a torque wrench if necessary. Maximum tightening torque for the steel/steel material pairing ($R_m \geq 370 \text{ N/mm}^2$), see table.
- For the steel/aluminum and aluminum/aluminum material pairings ($R_m \geq 280 \text{ N/mm}^2$), the maximum tightening torques specified in the follow table apply.

When driving screws into aluminum, the length of thread engagement should be at least 1.5 times the screw diameter.

Tightening torques for fastening screws according to VDI 2230 where $\mu_G = \mu_K = 0.125$

Mounting screws

⚠ Always make sure the screws are secure where there are high screw loads!

| Steel/aluminum and aluminum/aluminum material pairings | | | |
|--|---|-------|-------|
| Screw diameter (mm) | Tightening torque (Nm) Strength classes as per DIN ISO 898: | | |
| | 8.8 | 10.9 | 12.9 |
| M3 | 1.2 | 1.2 | 1.2 |
| M4 | 2.4 | 2.4 | 2.4 |
| M5 | 4.8 | 4.8 | 4.8 |
| M6 | 8.5 | 8.5 | 8.5 |
| M8 | 20.0 | 20.0 | 20.0 |
| M10 | 41.0 | 41.0 | 41.0 |
| M12 | 70.0 | 70.0 | 70.0 |
| M14 | 110.0 | 110.0 | 110.0 |
| M16 | 175.0 | 175.0 | 175.0 |
| M18 | 250.0 | 250.0 | 250.0 |
| M20 | 345.0 | 345.0 | 345.0 |

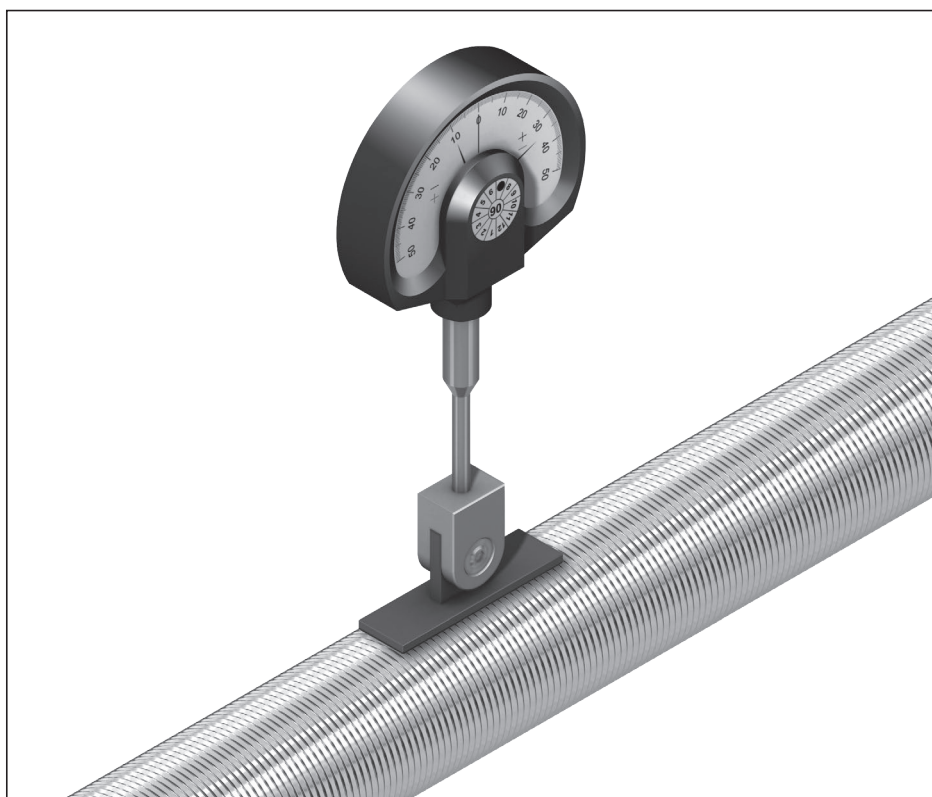
| Steel/steel material pairing | | | |
|------------------------------|---|-------|-------|
| Screw diameter (mm) | Tightening torque (Nm) Strength classes as per DIN ISO 898: | | |
| | 8.8 | 10.9 | 12.9 |
| M3 | 1.3 | 1.8 | 2.1 |
| M4 | 2.7 | 3.8 | 4.6 |
| M5 | 5.5 | 8.0 | 9.5 |
| M6 | 9.5 | 13.0 | 16.0 |
| M8 | 23.0 | 32.0 | 39.0 |
| M10 | 46.0 | 64.0 | 77.0 |
| M12 | 80.0 | 110.0 | 135.0 |
| M14 | 125.0 | 180.0 | 215.0 |
| M16 | 195.0 | 275.0 | 330.0 |
| M18 | 280.0 | 400.0 | 470.0 |
| M20 | 390.0 | 560.0 | 650.0 |

Alignment of the planetary screw assembly in the machine

Rexroth can provide a gauge with a self-aligning contact pad for easy alignment of the planetary screw assembly.

Two pads of different lengths are available which can be used depending on the screw lead:

- material no. R3305 131 19: length 33 mm
- material no. R3305 131 21: length 50 mm

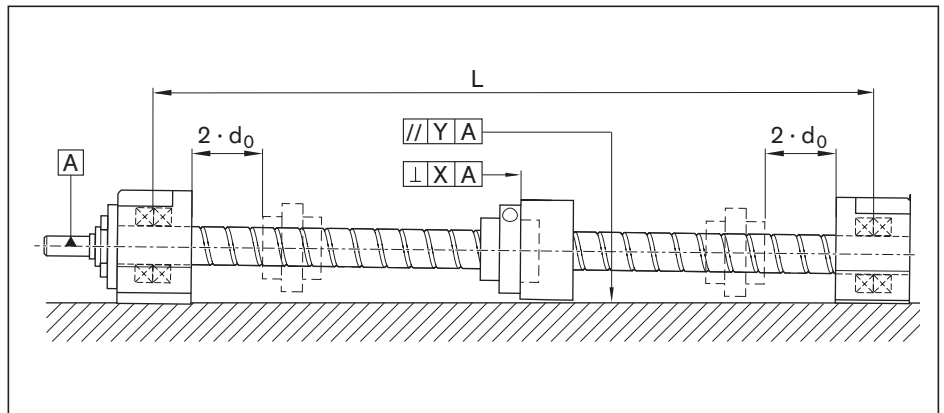


Dial gauge not supplied as standard with the planetary screw assembly

Installation tolerances

To ensure that a PLSA can actually achieve the calculated service life and performance, its system-related requirements and limitations must be taken into account at the design stage. Screw assemblies are not suitable for transferring radial forces and torques, such as may be caused by misalignments during installation. The following sections illustrate the most important principles for achieving designs that will be compatible with the screw drive system and its requirements.

When using PLSAs, the specified installation tolerances must be observed when designing and building the adjoining structures. The first basic principle is: The higher the PLSA's precision and preload, the more accurate the adjoining structures must be. This applies in particular to applications in which the nut travels close up to the end bearings since, in this area, the risk of distortive stresses and therefore of additional loads is very high.



Parallelism offset and details of the rectangularity between the screw shaft axis and the location face of the nut housing.

L = distance between end bearings (mm)

d_0 = nominal diameter of screw (mm)

X = permissible deviation from rectangularity (mm)

The tolerance applies to a surface that must lie between two planes spaced at a distance X from each other which are perpendicular to the reference axis A.

Y = Permissible parallelism offset between the guide and the screw axis (mm)

The table shows the most important recommended tolerances for planetary screw assemblies as a function of the preload. These tolerances include the rectangularity of the nut housing (or adjoining structure) relative to the screw axis. The tolerances for parallelism between the guide and the screw axis must also be complied with.

Any alignment errors can lead to premature breakdown of the planetary screw assembly!

| Option | X | Y |
|----------|------|------|
| Preload | (mm) | (mm) |
| Backlash | 0.02 | 0.02 |
| Preload | 0.01 | 0.01 |

Lubrication

► All information on lubrication is based on test values and field experience and are recommendations from Bosch Rexroth..

⚠ Do not use greases containing solid particles (e.g. graphite or MoS₂)!

⚠ If other lubricants are used, this may lead to a reduction in the relubrication intervals, the achievable travel in short-stroke applications, and the load capacities. Possible chemical interactions between the plastic materials, lubricants and preservative oils must also be taken into account.

⚠ If your application makes greater environmental demands (i.e. cleanroom, vacuum, foodstuff application, strong or aggressive metalworking fluids, or extreme temperatures) please contact us, since a special test, and possibly a special lubricant, will be required. Please have all information about your application to hand.

⚠ When using in other sectors, e.g.: food industry, clean room, vacuum etc. or at extreme temperatures, or if the lubrication is exposed to process media, the standard initial lubrication and anti-corrosion agents used prior to shipment may not be suitable, or they may be incompatible with the relubrication lubricant. In this case, please consult us in advance!

⚠ Even under normal operating conditions, the system must be relubricated at the latest after 2 years due to aging of the grease. Please note the reduced load ratings according to the technical notes.

► In general, you should not apply the grease all in one go; rather, apply several smaller amounts.

Grease lubrication

Planetary screw assemblies are designed to be lubricated with NLGI Class 2 grease. The advantage of grease lubrication is that the planetary screw assembly can run long distances on one supply of grease.

Lubricating grease

We recommend using Dynalub 510 with the following properties:

- NLGI grade 2 lithium-based high-performance grease as per DIN 51818 (KP2K-20 according to DIN 51825)
- Good water resistance
- Corrosion protection

Under conventional environmental conditions, this ground-fiber, homogeneous grease is ideally suited for the lubrication of linear elements:

- For loads of up to 50% C
- For short-stroke applications ≥ 1 mm
- For the permissible speed range for planetary screw assemblies

The product and material safety data sheets are available on our website at www.boschrexroth.de/brl

Material numbers for Dynalub 510:

- R3416 037 00 (cartridge 400 g)
- R3416 035 00 (hobbock 25 kg)

For more information on Dynalub 510, see Page 168.

Initial lubrication of the PLSA

(Basic lubrication)

Fully assembled PLSAs are prelubricated with Dynalub 510 before shipment. In versions without prelubrication, the initial lubrication quantities according to table 1 must be applied to the nut unit via the lube hole prior to commissioning. Please follow the described procedure.

In versions with a gap-type seal, the stroke-dependent lubrication quantity according to table 1 must additionally be applied when commissioning is carried out.

Relubrication of the planetary screw assemblies

Stroke > nut length L:

If the relubrication interval according to diagram 1 or diagram 2 has been reached, relubricate the amount stated in table 1.

Stroke < nut length L:

Carry out a lubricating stroke on a regular basis (if possible)! Reducing the relubrication interval according to table 1 by a factor of at least 3 means that the relubrication quantity can be reduced by the same factor. Please follow the described procedure.

| d ₀ x P | Lubricant quantity (cm ³) | | | |
|--------------------|---------------------------------------|----------------------------|---------------------|---------------|
| | Gap-type seal/cover plate wiper | | Lip seal | |
| | Initial lubrication | Relubrication | Initial lubrication | Relubrication |
| 20 x 5 | 10 + L _s / 115 | 5 + L _s / 115 | 10 | 5.0 |
| 25 x 5/10 | 10 + L _s / 90 | 5 + L _s / 90 | 10 | 5.0 |
| 30 x 5/10 | 20 + L _s / 75 | 10 + L _s / 75 | 20 | 10.0 |
| 39 x 5/10 | 35 + L _s / 60 | 17,5 + L _s / 60 | 35 | 17.5 |
| 48 x 5/10 | 50 + L _s / 50 | 25 + L _s / 50 | 50 | 25.0 |
| 60 x 10/20 | 150 + L _s / 40 | 75 + L _s / 40 | 150 | 75.0 |
| 75 x 10/20 | 250 + L _s / 30 | 125 + L _s / 30 | 250 | 125.0 |

table 1

L_s = stroke length (mm)

The nut is prelubricated; the stroke-dependent quantity of grease must be applied before the assembly is commissioned.

Apply the stated quantity of grease through the nut unit in several partial amounts. The nut unit must be moved through the full stroke during this process.

Conditions:

- Temperature ≤ 60 °C
- Relubrication interval applies as long as the lubricant is not spun off by the screw or removed.

**Load-dependent
relubrication intervals**

s = relubrication interval (10⁶ revs.)
 F_m = equivalent dynamic axial load (N)
 C = dynamic load capacity (N)
 d₀ = nominal diameter (mm)

Relubrication interval for gap-type seal/wiper

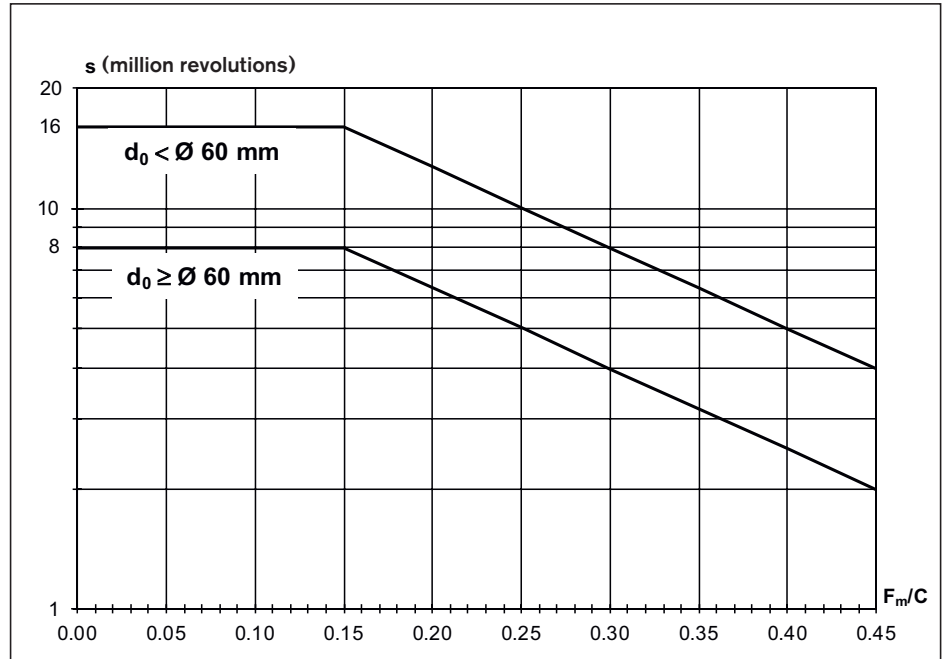


diagramm 1

Relubrication interval for lip-type seal

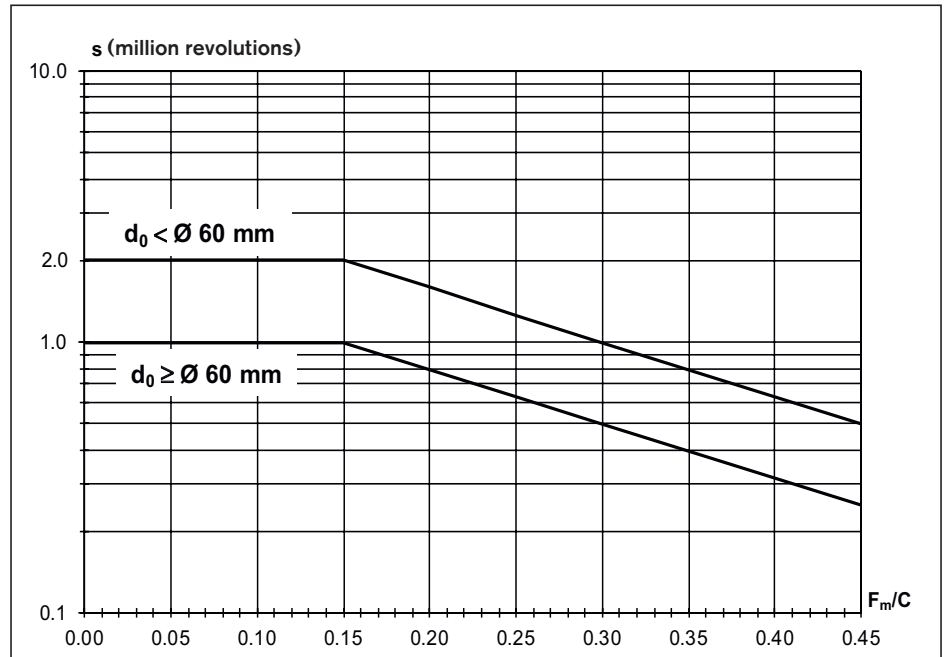


diagramm 2

Oil lubrication

Oil lubricant

We recommend using Shell Tonna S 220, which has the following properties:

- Special demulsifying oil CLP or CGLP as per DIN 51517-3 for machine bed tracks and tool guides
- A blend of highly refined mineral oils and additives
- Can be used even when mixed with significant quantities of metalworking fluids

We recommend using piston distributors from SKF. These should be installed as close as possible to the lube ports of the nut units. Long lines and small line diameters should be avoided, and the lines should be laid on an upward slant.

Initial lubrication of the PLSA

(Basic lubrication)

Fully assembled PLSAs are prelubricated with Dynalub 510 before shipment. In versions without prelubrication, the initial lubrication quantities according to table 3 must be applied to the nut unit via the lube hole.

Please follow the described procedure. When using single-line distributor systems, care should be taken that all lines and the piston distributors (including the connection to the nut unit) are filled before performing basic lubrication or relubrication.

Position specification

Lube hole: The connection should be at the top wherever possible (horizontal mounting orientation).

Relubrication of the planetary screw assemblies

Apply the relubrication quantity according to table 2 to the lube port when the specified relubrication interval has been reached.

The pulse count can be calculated as the quotient (rounded to the next whole figure) of the relubrication quantity and the piston distributor size.

The lubricant cycle time can then be obtained by dividing the relubrication interval by the calculated pulse count.

| d ₀ x P | Lubricant quantity (cm ³) | |
|--------------------|---|---------------|
| | Gap-type seal/cover plate wiper/ lip seal | |
| | Initial lubrication | Relubrication |
| 20 x 5 | 2.7 | 1.4 |
| 25 x 5/10 | 3.0 | 1.5 |
| 30 x 5/10 | 3.5 | 1.8 |
| 39 x 5/10 | 12.0 | 6.0 |
| 48 x 5/10 | 20.0 | 10.0 |
| 60 x 10/20 | 50.0 | 25.0 |
| 75 x 10/20 | 80.0 | 40.0 |

table 2

**Load-dependent
 relubrication intervals**

Apply the oil quantity via the nut unit. The nut unit must be traversed during this process.
 Conditions:

- Temperature $\leq 60\text{ }^{\circ}\text{C}$
- Relubrication interval applies as long as the lubricant is not spun off by the screw or removed.
- For gap-type seals / Wiper, horizontal mounting only.

Oil relubrication interval

s = relubrication interval (10⁶ revs.)
 F_m = equivalent dynamic axial load (N)
 C = dynamic load capacity (N)
 d_0 = nominal diameter (mm)

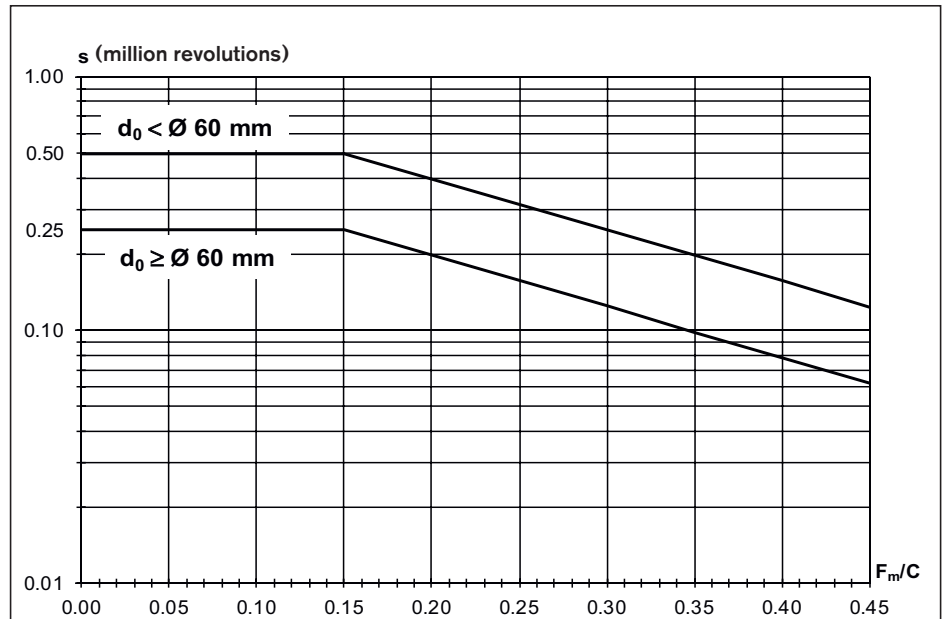


diagramm 3

Calculation

On request, we can perform all calculations to your specifications.

Average speed and average load

- Where the speed fluctuates, the average speed n_m is calculated as follows:

See section "Design Calculation Service Form" on page 276

Where the operating conditions vary (fluctuating speed and load), the service life must be calculated using the average values F_m and n_m .

$$n_m = \frac{|n_1| \cdot q_{t1} + |n_2| \cdot q_{t2} + \dots + |n_n| \cdot q_{tn}}{100\%} \quad 1$$

The following applies to the effective equivalent bearing load:

| $d_o \times P$ | F_{pr} (N) |
|----------------|--------------|
| 20 x 5 | 1,180 |
| 25 x 5 | 1,580 |
| 25 x 10 | 1,010 |
| 30 x 5 | 1,840 |
| 30 x 10 | 1,470 |
| 39 x 5 | 2,290 |
| 39 x 10 | 1,960 |
| 48 x 5 | 2,700 |
| 48 x 10 | 2,410 |
| 60 x 10 | 2,910 |
| 60 x 20 | 2,320 |
| 75 x 10 | 3,800 |
| 75 x 20 | 3,000 |

$$\begin{aligned} |F_n| > 2.8 \cdot F_{pr} & \quad F_{eff\ n} = |F_n| \\ |F_n| \leq 2.8 \cdot F_{pr} & \quad F_{eff\ n} = \left[\frac{|F_n|}{2.8 \cdot F_{pr}} + 1 \right]^{\frac{3}{2}} \cdot F_{pr} \end{aligned}$$

- where the load fluctuates and the speed is constant, the equivalent dynamic axial load F_m is calculated as follows:

$$F_m = \sqrt[3]{|F_{eff\ 1}|^3 \cdot \frac{q_{t1}}{100\%} + |F_{eff\ 2}|^3 \cdot \frac{q_{t2}}{100\%} + \dots + |F_{eff\ n}|^3 \cdot \frac{q_{tn}}{100\%}} \quad 2$$

- Where both the load and the speed fluctuate, the equivalent dynamic axial load F_m is calculated as follows:

$$F_m = \sqrt[3]{|F_{eff\ 1}|^3 \cdot \frac{|n_1|}{n_m} \cdot \frac{q_{t1}}{100\%} + |F_{eff\ 2}|^3 \cdot \frac{|n_2|}{n_m} \cdot \frac{q_{t2}}{100\%} + \dots + |F_{eff\ n}|^3 \cdot \frac{|n_n|}{n_m} \cdot \frac{q_{tn}}{100\%}} \quad 3$$

| | | |
|---|--|-------|
| $F_{eff\ 1}, F_{eff\ 2}, \dots, F_{eff\ n}$ | = effective equivalent axial load during phases 1 ... n | (N) |
| $F_{eff\ n}$ | = effective equivalent axial load during phase n | (N) |
| F_m | = equivalent dynamic axial load | (N) |
| F_n | = axial load during phase n | (N) |
| F_{pr} | = internal axial load on the nut unit due to the preload | (N) |
| n_1, n_2, \dots, n_n | = speeds in phases 1 ... n | (rpm) |
| n_m | = average speed | (rpm) |
| $q_{t1}, q_{t2}, \dots, q_{tn}$ | = discrete time step in phases 1 ... n | (%) |

Nominal service life

Service life in revolutions L

$$L = \left[\frac{C}{F_m} \right]^3 \cdot 10^6 \quad 4 \rightarrow C = F_m \cdot \sqrt[3]{\frac{L}{10^6}} \quad 5 \rightarrow F_m = \frac{C}{\sqrt[3]{\frac{L}{10^6}}} \quad 6$$

Service life in hours L_h

$$L_h = \frac{L}{n_m \cdot 60} \quad 7$$

$$L_{h \text{ machine}} = L_h \cdot \frac{DC_{\text{machine}}}{DC_{\text{PLSA}}} \quad 8$$

Drive torque and drive power

Drive torque M_{ta}

for conversion of rotary motion into linear motion:

$$M_{ta} = \frac{F_L \cdot P}{2,000 \cdot \pi \cdot \eta} \quad 9$$

$$M_{ta} \leq M_p$$

Transmitted torque M_{te}

for conversion of linear motion into rotary motion:

$$M_{te} = \frac{F_L \cdot P \cdot \eta'}{2,000 \cdot \pi} \quad 10$$

$$M_{te} \leq M_p$$

The dynamic drag torque must be taken into account for preloaded nut units.

Drive power P_a

$$P_a = \frac{M_{ta} \cdot n}{9,550} \quad 11$$

| | | | |
|-------------------------|---|--|-------|
| C | = | dynamic load rating | (N) |
| DC_{machine} | = | duty cycle of the machine | (%) |
| DC_{PLSA} | = | duty cycle of the PLSA | (%) |
| F_L | = | thrust force | (N) |
| F_m | = | equivalent dynamic axial load | (N) |
| L | = | nominal service life in revolutions | (-) |
| L_h | = | nominal service life of the PLSA | (h) |
| $L_{h \text{ machine}}$ | = | nominal service life of the machine | (h) |
| M_p | = | maximum permissible drive torque | (Nm) |
| M_{te} | = | transmitted torque | (Nm) |
| M_{ta} | = | drive torque | (Nm) |
| n | = | speed | (rpm) |
| n_m | = | average speed | (rpm) |
| P | = | lead | (mm) |
| P_a | = | drive power | (kW) |
| η | = | mech. efficiency ($\eta \approx 0.8$) | (-) |
| η' | = | mech. efficiency ($\eta' \approx 0.7$) | (-) |

▲ With critical applications, you must pay attention to the information below.

Static load safety factor S_0

You must verify mathematically any structural design involving rolling contact with regard to the static load safety factor.

In this connection, $F_{0 \max}$ represents the maximum load amplitude that can occur, which can affect the screw drive.

It does not matter whether this load is exerted only for a short period.

It may represent the peak amplitude of an overall dynamic loading.

For design purposes, the data shown in the table applies.

| | |
|--------------------------------------|--|
| $S_0 = C_0 / (F_{0 \max})$ 12 | C_0 = Static load rating (N) |
| | $F_{0 \max}$ = Maximum static load (N) |
| | S_0 = Static load safety factor (-) |

Design of the static load safety factor in relation to the operating conditions

| Operating conditions | Static load safety factor S_0 |
|---|---------------------------------|
| Overhead arrangements and applications representing a high hazard potential | ≥ 12 |
| High dynamic load when at standstill, contamination. | 8 - 12 |
| Normal design of machinery and plant without full knowledge of the load parameters or connection details. | 5 - 8 |
| Full knowledge of all the load data. Vibration-free operation is ensured. | 3 - 5 |

If there are health and safety hazards, protection against falling loads must be provided.

Calculation example service life

Operating conditions

The service life of the machine should be 40,000 operating hours with the PLSA operating 60% of the time.

Proposed PLSA: 30 x 5, tolerance grade T5

| | | | | | |
|--------------------------|----|---------------------------|-----|----------------------------|-------------------|
| $F_1 = 50,000 \text{ N}$ | at | $n_1 = 10 \text{ rpm}$ | for | $q_1 = 6\%$ | of the duty cycle |
| $F_2 = 25,000 \text{ N}$ | at | $n_2 = 30 \text{ rpm}$ | for | $q_2 = 22\%$ | of the duty cycle |
| $F_3 = 8,000 \text{ N}$ | at | $n_3 = 100 \text{ rpm}$ | for | $q_3 = 47\%$ | of the duty cycle |
| $F_4 = 2,000 \text{ N}$ | at | $n_4 = 1,000 \text{ rpm}$ | for | $q_4 = \frac{25\%}{100\%}$ | of the duty cycle |

Calculation procedure

Average torque n_m

$$n_m = \frac{6}{100} \cdot |10| + \frac{22}{100} \cdot |30| + \frac{47}{100} \cdot |100| + \frac{25}{100} \cdot |1000| \quad \mathbf{1}$$

$$n_m = 304 \text{ rpm}$$

Equivalent dynamic axial load F_m for variable load and variable speed

$$F_m = \sqrt[3]{\left|50000\right|^3 \cdot \frac{|10|}{304} \cdot \frac{6}{100} + \left|25000\right|^3 \cdot \frac{|30|}{304} \cdot \frac{22}{100} + \left|8000\right|^3 \cdot \frac{|100|}{304} \cdot \frac{47}{100} + \left|2000\right|^3 \cdot \frac{|1000|}{304} \cdot \frac{25}{100}} \quad \mathbf{3}$$

$$F_m = 8\,757 \text{ N}$$

Required service life L (revolutions)

The service life L can be calculated by transposing formulas **7** and **8**:

$$L = L_h \cdot n_m \cdot 60$$

$$L_h = L_{h \text{ machine}} \cdot \frac{DC_{PLSA}}{DC_{\text{machine}}}$$

$$L_h = 40,000 \cdot \frac{60}{100} = 24,000 \text{ h}$$

$$L = 24,000 \cdot 304 \cdot 60$$

$$L = 437,760,000 \text{ revolutions}$$

Basic dynamic load rating C

$$C = 8\,757 \cdot \sqrt[3]{\frac{437\,760\,000}{10^6}} \quad \mathbf{5} \quad C \approx 66\,492 \text{ N}$$

Result and selection

Now a selection can be made from the dimension tables:

e.g. PLSA, size 30 x 5 R, with single nut with flange FEM-E-S, and screw in tolerance grade T5.
Dyn. load rating $C = 87 \text{ KN}$.

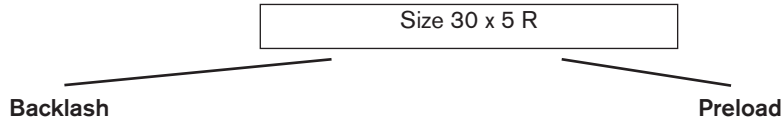
Attention:

Take into account the dynamic load rating of the screw end bearing used!

▲ Take into account correction factor f_{ac} of the tolerance grade! See page 255.

Cross-check

Now the following can be selected from the product tables:



FEM-E-S, with preload class C0
Load capacity $C_{dyn.} = 87,000$ N
Correction factor $f_{ac} = 1.0$
Cross-check
Service life of the selected ball screw drive in revolutions

$$L = \left(\frac{1.0 \cdot 87\,000}{8\,757} \right)^3 \cdot 10^6$$

$L \approx 981 \cdot 10^6$ revolutions

Service life in hours L_h

$$L_h = \frac{981 \cdot 10^6}{304 \cdot 60}$$

$L_h \approx 53,760$ hours

FEM-E-S, with preload class C2
Load capacity $C_{dyn.} = 87,000$ N
Correction factor $f_{ac} = 1.0$
Cross-check
The following applies to the effective equivalent bearing load:

$$|F_n| > 2.8 \cdot F_{pr} \quad F_{eff\ n} = |F_n|$$

$$|F_n| \leq 2.8 \cdot F_{pr} \quad F_{eff\ n} = \left[\frac{|F_n|}{2.8 \cdot F_{pr}} + 1 \right]^{\frac{3}{2}} \cdot F_{pr}$$

$F_{eff\ n}$ = effective equivalent axial load during phase n (N)
 F_n = axial load during phase n (N)
 F_{pr} = internal axial load on the nut unit due to the preload (N)

$2.8 \times F_{pr} = 2.8 \times 1.840$ N = 5152 N

- $F_1 = 50,000$ N > 5,152 N $\Rightarrow F_{eff1} = 50,000$ N
- $F_2 = 25,000$ N > 5,152 N $\Rightarrow F_{eff2} = 25,000$ N
- $F_3 = 8,000$ N > 5,152 N $\Rightarrow F_{eff3} = 8,000$ N
- $F_4 = 2,000$ N < 5,152 N $\Rightarrow F_{eff4} = \left[\frac{2,000}{5,152} + 1 \right]^{1.5} \cdot 1,840$ N = 3,010 N

$$F_m = \sqrt[3]{|50000|^3 \cdot \frac{10}{304} \cdot \frac{6}{100} + |25000|^3 \cdot \frac{30}{304} \cdot \frac{22}{100} + |8000|^3 \cdot \frac{100}{304} \cdot \frac{47}{100} + |3010|^3 \cdot \frac{1000}{304} \cdot \frac{25}{100}}$$

$F_m = 8,826$ N

$$L = \left(\frac{1.0 \cdot 87,000}{8,826} \right)^3 \cdot 10^6 = 957 \cdot 10^6 \text{ revolutions}$$

$$L_h = \frac{957 \cdot 10^6}{304 \cdot 60} = 52,467 \text{ hours}$$

The service life of both PLSAs (with standard backlash/with standard preload) exceeds the required service life of $40,000 \times 60\% = 24,000$ hours. The selection of a smaller PLSA is consequently possible, subject to a review of it being undertaken.

Critical speed n_{cr}

The critical speed n_{cr} depends on the diameter of the screw, the type of end fixity, and the free length l_{cr} . No allowance

must be made for guidance by a nut with backlash. The operating speed should not reach more than 80% of the critical speed.

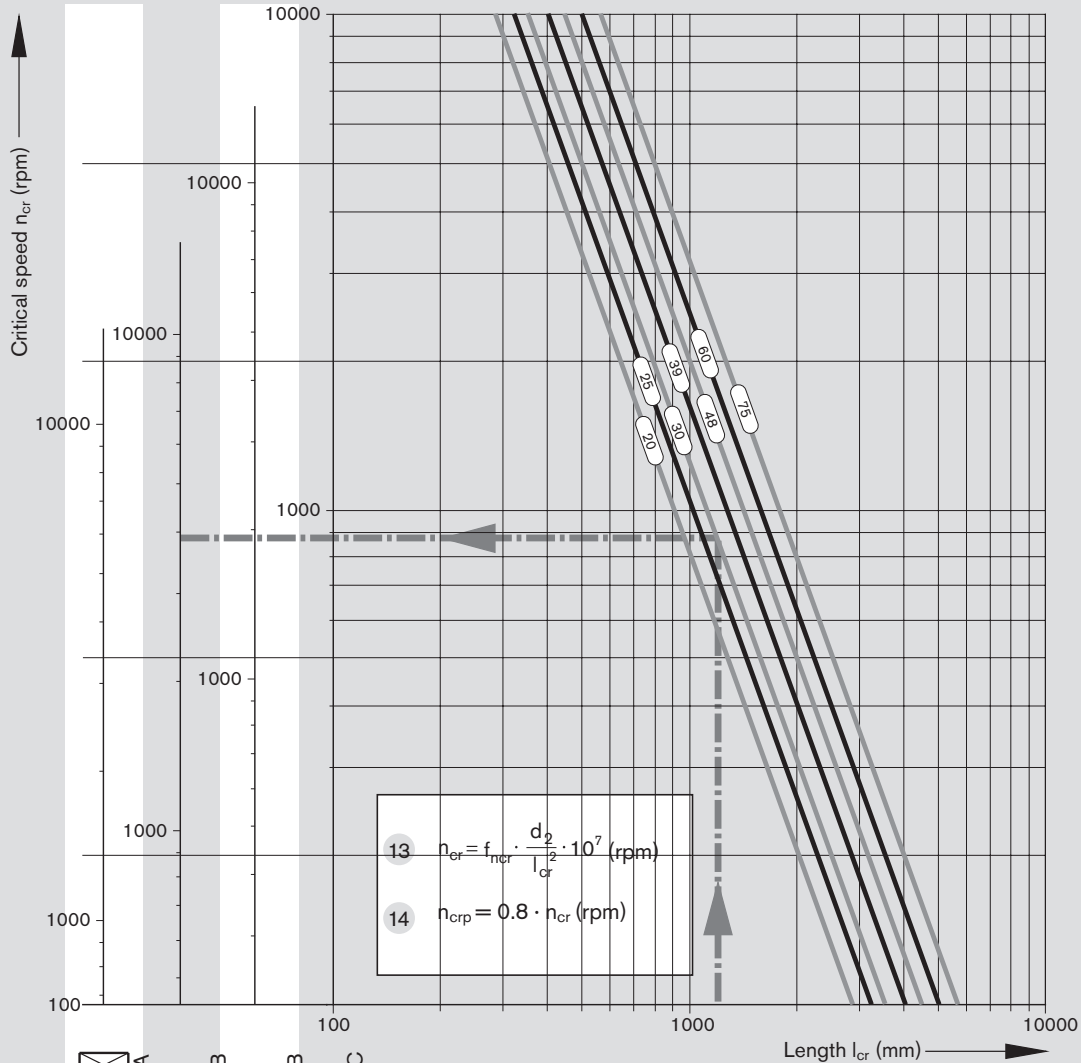
The characteristic speed and the max. permissible linear speed must be taken into account, see "Technical Notes".

Example

Screw diameter = 30 mm
Length l_c = 1,200 mm
End fixity II (fixed bearing - floating bearing)

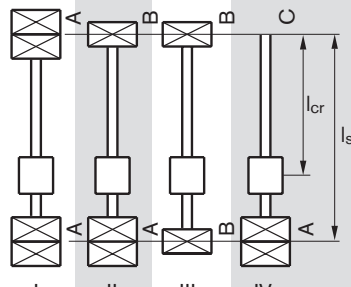
According to the graph, the critical speed is 3,900 rpm.
The permissible operating speed is 3,900 rpm x 0.8 = 3,120 rpm.

The maximum operating speed in our calculation example of $n_4 = 1,000$ rpm is therefore below the permissible operating speed.



End fixity:

- A = fixed bearing
- B = floating bearing
- C = without bearing



| End fixity | I | II | III | IV |
|--------------------|------|------|------|-----|
| f_{nocr} - value | 27.4 | 18.9 | 12.1 | 4.3 |

n_{cr} = Critical speed (rpm)
 n_{crp} = Permissible operating speed (rpm)
 f_{nocr} = Coefficient determined by bearing
 d_2 = Root diameter of screw (see dimension tables) (mm)
 l_{cr} = Critical length for preloaded nut systems (mm)
 l_s = Bearing - bearing distance (mm)
 For non-preloaded nut systems $l_{cr} = l_s$
 For screw ends Form 312, 612, 622, the end fixity can be assumed to be "fixed"

Permissible axial load on screw F_c (buckling load)

The permissible axial load on the screw F_c depends on the diameter of the screw, the type of end fixity, and the effective unsupported length l_c .

A safety factor of $s \geq 2$ must be taken into consideration when determining the permissible axial load.

Example

Screw diameter = 30 mm,
Length l_c = 1,200 mm
End fixity IV (fixed bearing - floating bearing)

According to the graph, the theoretically permissible axial load is 115 kN.

Applying the safety factor 2 yields a permissible axial load on the screw in operation of 115 kN : 2 = 57.5 kN.

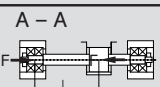
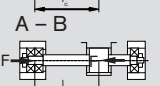
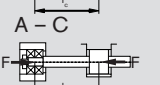
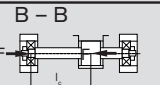
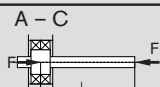
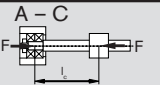
This therefore lies above the maximum operating load of $F_1 = 50$ kN used in our calculation example.

For more information on buckling, see next page.

$$15 \quad F_c = f_{F_c} \cdot \frac{d_2^4}{l_c} \cdot 10^4 \text{ (N)}$$

$$16 \quad F_{cp} = \frac{F_c}{2} \text{ (N)}$$

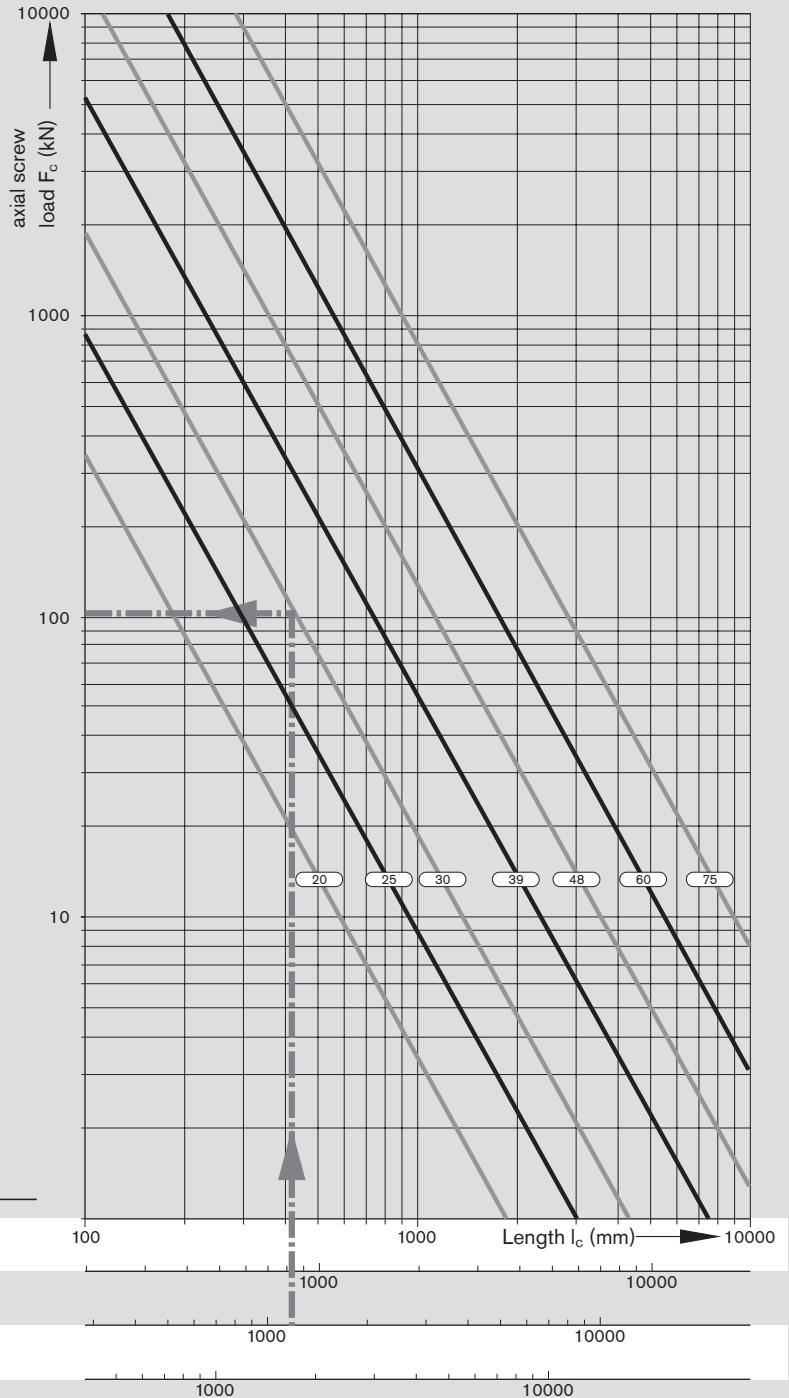
- F_c = Theoretically permissible axial load on screw
- F_{cp} = Permissible axial load on screw during operation (N)
- f_{F_c} = Corrector value determined by bearing
- d_2 = Root diameter of screw, see dimension tables (mm)
- l_c = unsupported thread length

| End fixity: | coefficient f_{F_c} | |
|---|-----------------------|-----------------------|
| | nut fixed | nut floating |
|    | End fixity I 39.7 | End fixity IV 20.3 |
|  | End fixity II 20.3 | End fixity V 9.9 |
|  | End fixity III 2.5 | |
|  | | End fixity VI 2.5 |

End fixity:

- A = fixed bearing
- B = floating bearing
- C = without bearing

| f_{F_c} value | End fixity |
|-----------------|------------|
| 2.5 | III / VI |
| 9.9 | V |
| 20.3 | II / IV |
| 39.7 | I |



Notes on buckling

The effective buckling length l_c of the screw is the maximum unsupported screw length in the direction of the force's flow between the nut unit and the fixed bearing (center-to-center distance) or between the nut unit and the screw end.

For buckling load calculations, the nut is taken into consideration as a bearing.

For "nut fixed," the following conditions must be met:

- zero-backlash nut,
- rigid attachment of the nut to the linear guide,
- the nut unit is not subjected to moment loads, i.e. a linear guide absorbs any arising moments,
- no distortive stresses due to external factors (for example, temperature).

If one or more of the conditions for "nut fixed" are not met, the appropriate coefficients for "nut floating" must be used instead.

Case III occurs in applications with driven nuts, for example, when the nut is stationary and the screw rotates. The nut can then be regarded as a fixed bearing.

Case VI arises only when the nut unit is not supported by any linear guide.

End Bearings

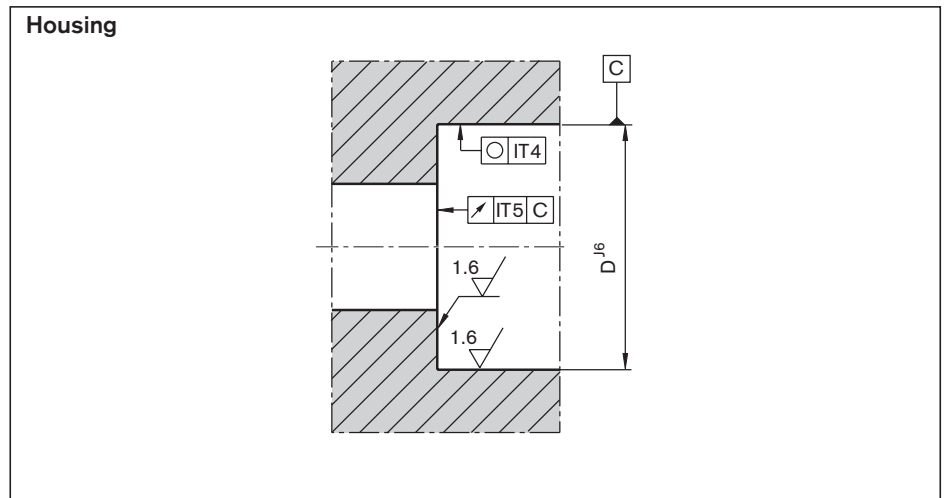
Design notes, installation

Bearing design

For customer-machined screw ends, please consider the design notes given for screw ends and housings.

For Rexroth screw end designs, see "End Machining Details."

Rexroth delivers complete drive systems, including the end bearings. Calculations are performed with the formulas used in the antifriction bearing industry.



Mounting

Angular-contact thrust ball bearings and deep-groove ball bearings

When mounting the angular-contact thrust ball bearings LGF and LGN, ensure that the mounting forces are exerted only on the bearing rings. Never apply mounting forces via the anti-friction bearing elements or the seal rings! The two sections of the inner raceway may not be separated during assembly or disassembly for any reason! Tighten the mounting screws for screw-down or flange-mounted bearings in cross-wise sequence. The mounting screws may

be subjected only to tension amounting to a maximum of 70% of their yielding point. The screw-down (LGF) bearings have a groove on the cylindrical surface of the outer raceway for disassembly. The individual bearings of the bearing pair series LGF-C... and LGN-C... are marked on the cylindrical surfaces of the outer raceways (see Figure). The markings reveal the bearing sequence. The sealing rings should face outwards after proper mounting.

Outer raceway markings for paired bearings



Slotted nut

The bearings are preloaded by tightening the nuts. In order to prevent settling phenomena, we recommend first tightening the slotted nut by twice the value of the tightening torque M_A and then easing the load. Only then should the slotted nut be retightened to the specified tightening torque M_A .

The two set screws are then alternately tightened using a hexagon socket wrench. The components are disassembled in the reverse order, i.e. the set screws have to be removed before the slotted nut. The slotted nuts can be used several times when properly assembled and disassembled by competent personnel. The inner

raceways of the bearings are dimensioned in such a way as to achieve a defined bearing preload sufficient for most applications when the slotted nut is tightened (M_A in accordance with Dimension Table).

Design Note

For counter holding the tightening torque M_A of the slotted nut we recommend a wrench flat on the spindle or a hexagon socket on the end face of the spindle.

Lubrication of the end bearings

Bearings for planetary screw assemblies are lubricated with grease for a lifetime of reliable service. It should be noted, however, that grease lubrication does not facilitate the dissipation of heat in the bearings. The bearing temperature should therefore not exceed 50 °C, particularly in machine tool applications. At higher temperatures circulating oil lubrication must be set up. Angular-contact thrust ball bearings of series LGF, LGN are lifetime-lubricated with KE2P-35 grease as per DIN 51825. For regreasing, the quantities stated in the table below can be applied via the lube ports provided on the bearings. Where there are pairs of bearings, please note that each bearing must be individually lubricated via the lube port. Each bearing must be lubricated with half the value shown in the table. The maximum interval can be assumed to be 350 million revolutions, in which case the larger of the two quantities should be used. As a rule, the initial grease quantity will therefore last for the entire service life of a planetary screw assembly.

| Relubrication quantities for angular-contact thrust ball bearings | | | | | | | |
|---|------------|-----------------------------|---------------|--------------|---------------|-----------------------------|---------------|
| Abbreviation | | Quantity (cm ³) | | Abbreviation | | Quantity (cm ³) | |
| | | | ¹⁾ | | ²⁾ | | ¹⁾ |
| LGN-B-1545 | LGF-B-1560 | 0.49 | 0.38 | LGN-C-2052 | LGF-C-2068 | 1.74 | 1.09 |
| | | | | LGN-C-3062 | LGF-C-3080 | 2.17 | 1.30 |
| | | | | LGN-C-3572 | LGF-C-3590 | 3.48 | 1.96 |

- 1) Shortened lubricating interval max. 10 M revolutions
- 2) Where there are pairs of bearings, lubricate each bearing via the lube port. Lubricate each bearing with half the value shown in the table.

Resulting and equivalent bearing loads

For angular-contact thrust ball bearings LGN and LGF6

Angular-contact thrust ball bearings are preloaded. The chart shows the resulting axial bearing load F_{ax} as a function of preload and axial operating load F_{Lax} . For a purely axial load $F_{comb} = F_{ax}$.

| $\alpha = 60^\circ$ | X | Y |
|------------------------------------|------|------|
| $\frac{F_{ax}}{F_{rad}} \leq 2.17$ | 1.90 | 0.55 |
| $\frac{F_{ax}}{F_{rad}} > 2.17$ | 0.92 | 1.00 |

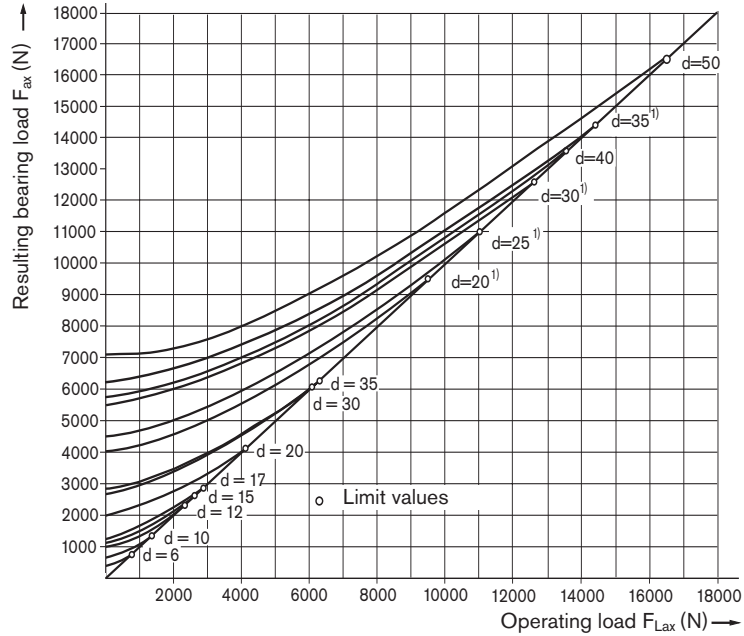
- α = pressure angle
- F_{ax} = resulting bearing load
- F_{Lax} = operating load
- X, Y = dimensionless factor

If the radial operating forces are not insignificant, the equivalent bearing loads are calculated according to formula 20. Bearings for planetary screw assemblies are also able to accommodate tilting moments. The moments that usually occur due to the weight and drive motion of the screw do not generally need to be incorporated into the calculation of the equivalent bearing load.

$$F_{comb} = X \cdot F_{rad} + Y \cdot F_{ax} \quad 20$$

- F_{ax} = resulting axial bearing load (N)
- F_{comb} = combined equivalent bearing load (N)
- F_{rad} = radial bearing load (N)

Internal preload limit and resulting bearing load



1) Four row version

▲ Separate technical dimensioning to determine the limit values is absolutely necessary for all attachments (e.g. pillow block units, bearing assembly, etc.)

Permissible static axial load for bearing series LGF

The permissible static axial load of LGF series bearings in screw-down direction is:

$$F_{0ax p} \leq \frac{C_0}{2}$$

The static axial load rating C_0 is stated in the Dimension Tables.

Average speed and average bearing load

When the bearing load varies in steps over a specific period of time 22, calculate the dynamic equivalent bearing load.

When the speed varies, use formula 23. In these formulas q_t denotes the discrete time steps for the individual phases in %.

$$F_m = \sqrt[3]{F_{comb1}^3 \cdot \frac{|n_1|}{n_m} \cdot \frac{q_{t1}}{100} + F_{comb2}^3 \cdot \frac{|n_2|}{n_m} \cdot \frac{q_{t2}}{100} + \dots + F_{combn}^3 \cdot \frac{|n_n|}{n_m} \cdot \frac{q_{tn}}{100}} \quad 22$$

$$n_m = \frac{q_{t1}}{100} \cdot |n_1| + \frac{q_{t2}}{100} \cdot |n_2| + \dots + \frac{q_{tn}}{100} \cdot |n_n| \quad 23$$

Service life and load safety factor

$$L = \left(\frac{C}{F_{comb}} \right)^3 \cdot 10^6 \quad 24$$

Nominal service life

The nominal service life is calculated as follows:

$$L_h = \frac{16\,666}{n_m} \cdot \left(\frac{C}{F_{comb}} \right)^3 \quad 25$$

Attention:

take the dynamic load rating of the nut into account!

Static load safety factor

The static load safety factor for machine tools should not be lower than 4.

$$S_0 = \frac{C_0}{F_{0max}} \quad 26$$

| | | |
|-----------------------------|--|-------|
| C | = dynamic bearing load rating | (N) |
| $F_{0ax p}$ | = permissible static axial bearing load | (N) |
| F_{comb} | = combined equivalent bearing load | (N) |
| $F_{comb1} \dots F_{combn}$ | = combined equivalent axial load in phases 1 ... n | (N) |
| F_m | = equivalent dynamic axial bearing load | (N) |
| L | = nominal service life in revolutions | (-) |
| L_h | = nominal service life in operating hours | (h) |
| $n_1 \dots n_n$ | = speeds in phases 1 ... n | (rpm) |
| n_m | = average speed | (rpm) |
| $q_{t1} \dots q_{tn}$ | = discrete time steps in phases 1 ... n | (%) |

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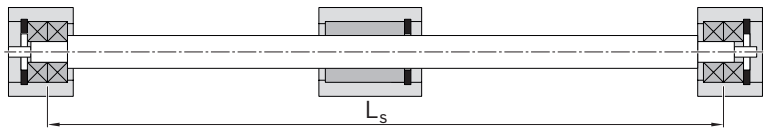
Application _____
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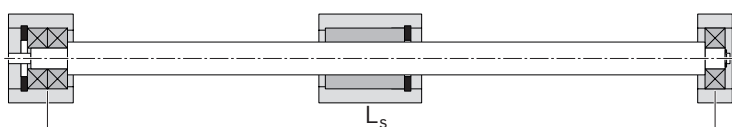
Operating conditions

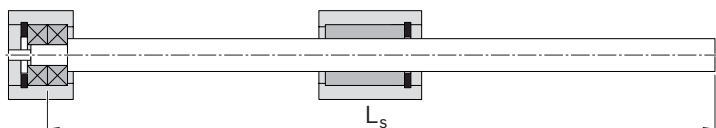
| Discrete time step parameters | | | or | Dynamic cycle parameters | | | | | | | | | | | |
|-------------------------------|------------------|-------------------|-----------------------|--------------------------|----|----|----|----|----|----|----|----|-----|-----|-----|
| Discrete time steps (%) | Speed (1/min) | Action of force x | Section | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 | T12 |
| T ₁ = | n ₁ = | | Path (mm) | | | | | | | | | | | | |
| T ₂ = | n ₂ = | | V (m/s) | | | | | | | | | | | | |
| T ₃ = | n ₃ = | | a (m/s ²) | | | | | | | | | | | | |
| T ₄ = | n ₄ = | | Time (s) | | | | | | | | | | | | |
| T ₅ = | n ₅ = | | Action of force x | | | | | | | | | | | | |
| T ₆ = | n ₆ = | | | | | | | | | | | | | | |

| | F1 | F2 | F3 | F4 | F5 | F6 |
|---------------------------|----|----|----|----|----|----|
| Forces (N) = | | | | | | |
| Mass (kg) = | | | | | | |
| Max. stroke (mm) = | | | | | | |

Bearing type

1. Tight  Tight Installation Position
Horizontal
Vertikal

2. Tight  Loose Drawing enclosed (recommended)

3. Tight  Free Delivery with bearing

Required life: _____ Operating temperature: _____ °C Up to _____ °C

Type of lubrication: _____

Short description of the application / unusual operating conditions: _____

Visit our official homepage and use the provided configurators and our dimensioning program Linear Motion Designer free of charge.

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Bosch Rexroth AG

Ernst-Sachs-Straße 100
97424 Schweinfurt, Germany
Tel. +49 9721 937-0
Fax +49 9721 937-275
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