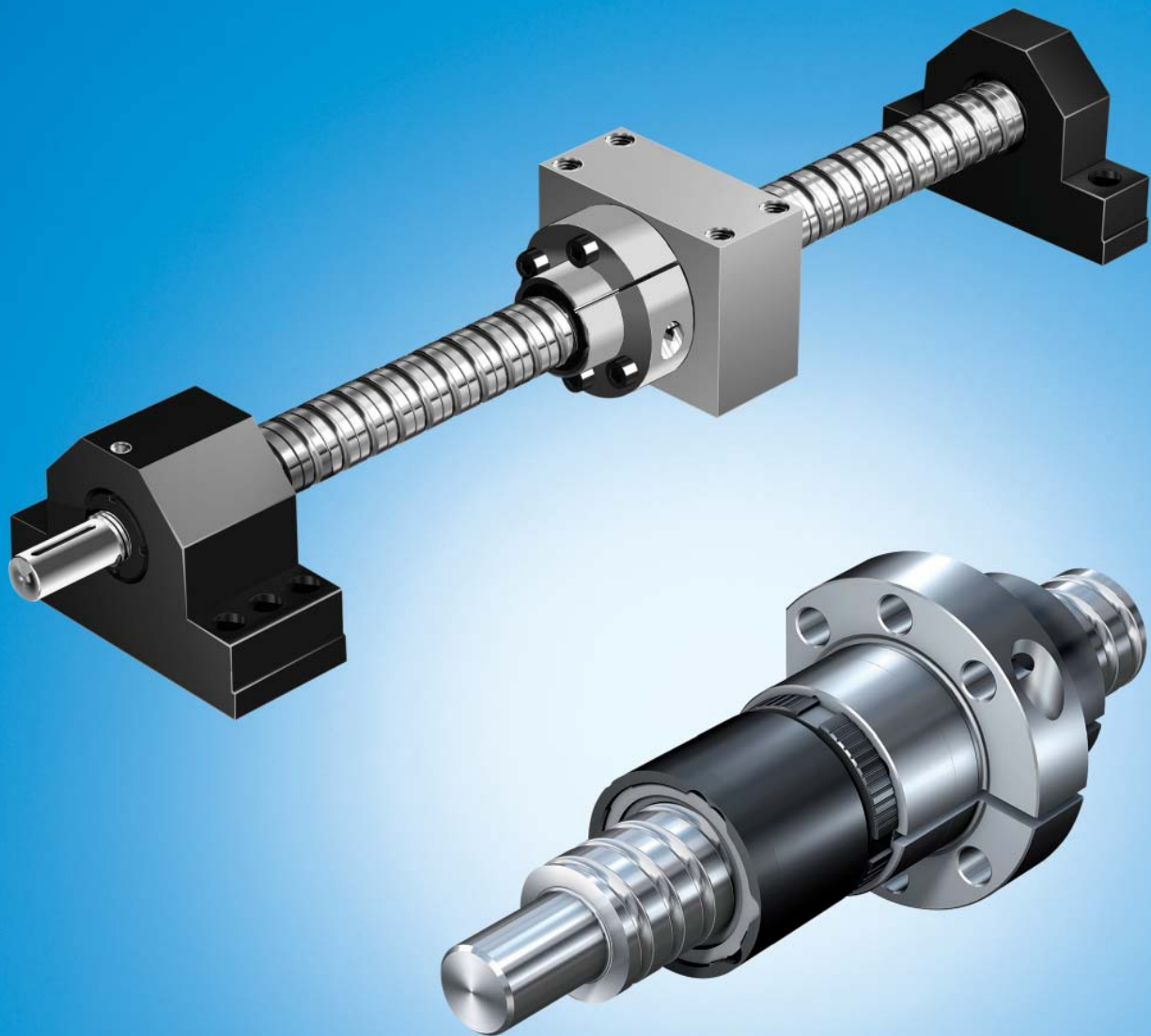


Precision Ball Screw Assemblies

R310EN 3301 (2009.08)

The Drive & Control Company

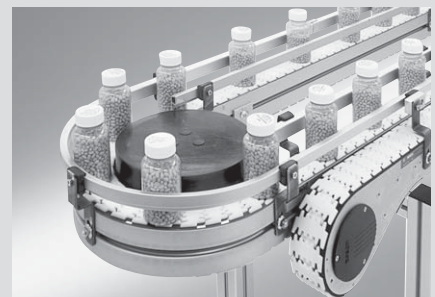
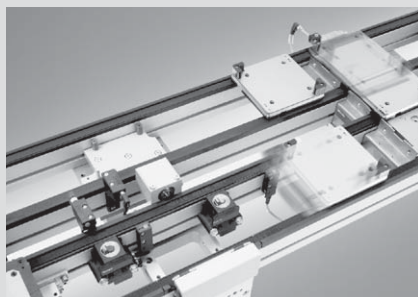
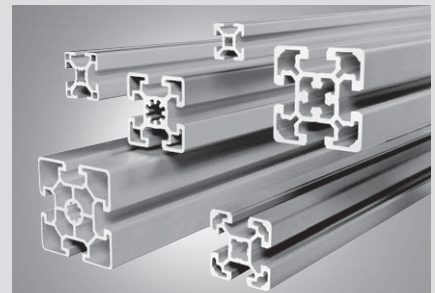
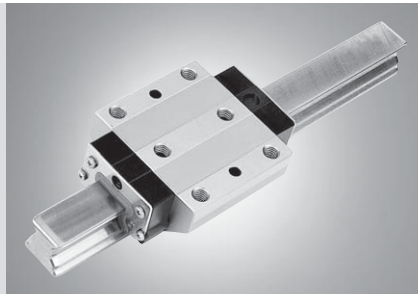
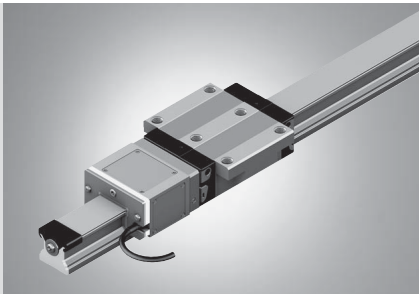


Linear Motion and Assembly Technologies

Ball Rail Systems
Roller Rail Systems
Linear Bushings and Shafts

Ball Screw Drives
Linear Motion Systems

Basic Mechanical Elements
Manual Production Systems
Transfer Systems



Precision Ball Screw Assemblies

Product Overview	4	Nut Housings	58
Nuts and Nut Housings	4	Nut Housing MGS	58
Screws, Bearings and Accessories	6	Nut Housing MGD	60
Definition of Precision Ball Screw Assembly	8	Nut Housing MGA-Z	62
Ball Screw Assembly with Front Lube Unit	10	Screws	64
eLINE Ball Screw Assemblies	14	Screw Ends	66
Ball Screw Assemblies with Flanged Single Nut – Miniature Line	16	Bearings	92
Precision Ball Screw Assemblies with Driven Screws	18	Pillow Block Unit SEC-F, Aluminum	92
Precision Ball Screw Assemblies for All Applications	20	Pillow Block Unit SES-F, Steel	94
Application Examples	22	Pillow Block Unit SEC-L, Aluminium	96
Inquiries and Orders	24	Pillow Block Unit SES-L, Steel	98
Ordering Code	28	Pillow Block Unit SEB-F	100
Nuts	32	Pillow Block Unit SEB-L	102
Miniature Single Nut with Flange FEM-E-B	32	Bearing LAF	104
Screw-in Nut ZEV-E-S	34	Bearing LAN	106
Single Nut with Flange and Recirculation Caps FBZ-E-S	36	Bearing LAD	108
Single Nut with Flange and Recirculation Caps FSZ-E-S	38	Bearing LAL	110
Single Nut with Flange and Recirculation Caps FEP-E-S	40	Slotted Nuts and Housing Nuts	112
Single Nut with Flange FEM-E-C	42	Slotted Nuts NMA, NMZ and NMG for Fixed Bearings	112
Adjustable-Preload Single Nut SEM-E-C	44	Technical Data	114
Single Nut with Flange FEM-E-S	46	Technical Notes	114
Adjustable-Preload Single Nut SEM-E-S	48	Acceptance Conditions and Tolerance Grades	116
Cylindrical Single Nut ZEM-E-S	50	Preload and Rigidity	120
2-start Single Nut with Flange FED-E-B	52	Friction Torques of Seals	126
Double Nut with Flange FDM-E-C	54	eLINE Ball Screw Assemblies	128
Double Nut with Flange FDM-E-S	56	eLINE Ball Screw with Screw-In Nut ZEV-E-S, Fixed Length	128
		eLINE Ball Screw with Flanged Single Nut FBZ-E-S, Fixed Length	130
		eLINE Ball Screw with Screw-In Nut ZEV-E-S, Custom Length	132
		eLINE Ball Screw with Flanged Single Nut FBZ-E-S, Custom Length	134
		Technical Data	136
		Mounting	140
		Lubrication	142
		Design Calculations	146
		End Bearings	152
		Design Notes, Mounting Instructions	152
		Lubrication, Mounting the Housing	153
		Design Calculations	154
		Design Calculation Service Form	156
		Notes	158

Product Overview

Nuts and Nut Housings

Nuts	Page
Miniature series	
Miniature single nut with flange FEM-E-B	32
eLINE series	
Screw-in nut ZEV-E-S	34
Single nut with flange and recirculation caps FBZ-E-S	36
ECOplus series	
Single nut with flange and recirculation caps FSZ-E-S	38
Speed series	
Single nut with flange and recirculation caps FEP-E-S	40
Standard series	
Single nut with flange DIN 69 051, Part 5 FEM-E-C	42
Adjustable-preload single nut DIN 69 051, Part 5 SEM-E-C	44
Single nut with flange FEM-E-S	46
Adjustable-preload single nut SEM-E-S	48
Cylindrical single nut ZEM-E-S	50
2-start single nut with flange FED-E-B	52
Double nut with flange DIN 69 051, Part 5 FDM-E-C	54
Double nut with flange FDM-E-S	56

Diameter d_0	Lead P				
	1	2	2.5	5	10
6	■	■			
8	■		■		
12		■		■	■

Diameter d_0	Lead P	
	5	10
12	■	■
16	■	
20	■	
25	■	■
32	■	■

■ Screw-in nut

Diameter d_0	Lead P		
	5	10	20
20	■		
25	■	■	
32	■	■	■
40	■	■	■

■ Single nut with flange FBZ-E-S
■ Single nut with flange FSZ-E-S

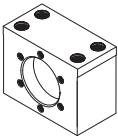
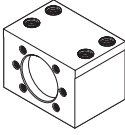
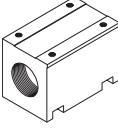
Diameter d_0	Lead P			
	25	32	40	64
20			■	
25	■			
32		■		■

Diameter d_0	Lead P								
	2.5	5	10	12	16	20	25	32	40
8	■								
12		■							
16		■			■				
20		■				■			
25		■					■		
32		■						■	
40		■		■					■
50		■				■			
63		■					■		
80		■						■	

■ Single nut ■ Double nut

Diameter d_0	Lead P		
	20	25	40
40	■		■
50	■		■
63	■		■

■ 2-start single nut with flange FED-E-B

Nut housings	Page
MGS for Standard series FEM-E-S FDM-E-S SEM-E-S FEP-E-S	58
	
MGD for Standard series FEM-E-C FDM-E-C SEM-E-C	60
	
MGA-Z for cylindrical single nut ZEM-E-S	62
	

Lead P

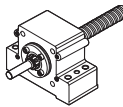
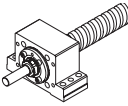
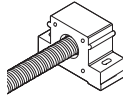
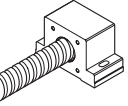
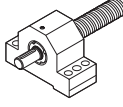
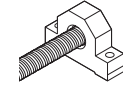
	2.5	5	10	12	16	20	25	32	40
Diameter d_0									
16									
20									
25									
32									
40									
50									
63									
80									

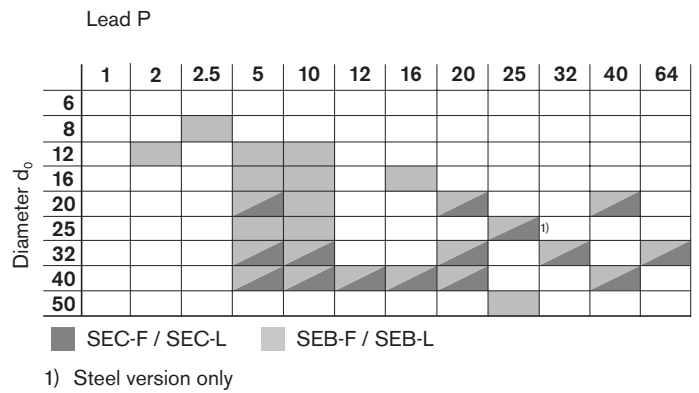
MGD
 MGS

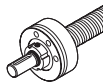
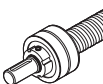


Lead P

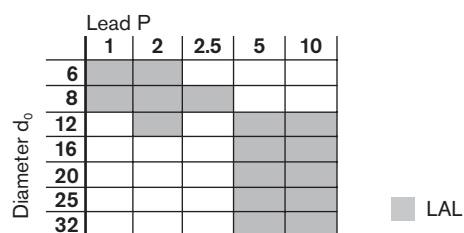
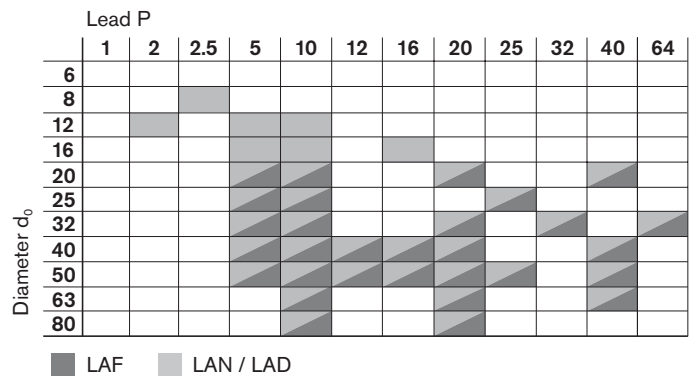
	2.5	5	10	12	16	20	25	32	40
Diameter d_0									
16									
20									
25									
32									
40									
50									
63									
80									




MGA-Z

Pillow block units		Page
SEC-F		92
SES-F		94
SEC-L		96
SES-L		98
SEB-F		100
SEB-L		102



Bearings		Page
LAF		104
LAN		106
LAD		108
LAL		110



Single parts		Page
Slotted nut NMA, NMZ		112
NMG		113
Housing nut GWR		113

eLINE products		Page
ZEV-E-S		128
FBZ-E-S		130

Definition of Precision Ball Screw Assembly

DIN 69 051, Part 1 defines a ball screw as follows:

An assembly comprising a ball screw shaft and a ball nut and which is capable of converting rotary motion into linear motion and vice versa. The rolling elements of the assembly are balls.

As simple as it is to describe the elementary function of a precision ball screw assembly, in practice you are faced with a variety of types and applications.

A new nut series, new sizes in right-hand and left-hand versions, as well as a new nut housing as an accessory have increased the scope of the catalog still further.

Rexroth Precision Ball Screw Assemblies provide technical designers with diverse solutions for positioning and transport tasks with driven screws or also with driven nuts.

With Rexroth, you can be sure of finding products tailored to special applications and uses.

Here are some examples:

- eLINE series: the low-cost solution through to the medium size range in the form of screw-in nut or single nut with flange
- Speed series: maximum linear speeds with simultaneous high load rating and short nut length

The latest 2008 additions to the product range:

- 2-start single nut with flange FED-E-B, provides a distinct increase in the dynamic and static load ratings as a result of two separate ball tracks.
- Single nut with flange, FEM-E-S, left-hand version in several sizes; also available in the size 20x10R
- Nut housing MAG-Z for the cylindrical nut

The nuts with flanges from the Standard series are available in versions with either Rexroth or DIN mounting dimensions. The related standards (DIN 69 051 and ISO 3408) are therefore fully supported by Rexroth.

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

Each individual ball nut part number is assigned to a particular category. Category A parts are always stocked in the quantities of average demand. Certain stocks of Category B parts are also kept, but customers should inquire about the availability of these parts. Category C parts are exclusively made to order.

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

Matching nut housings for the Standard series and several types of end bearings are also stocked.

Precision-rolled screws

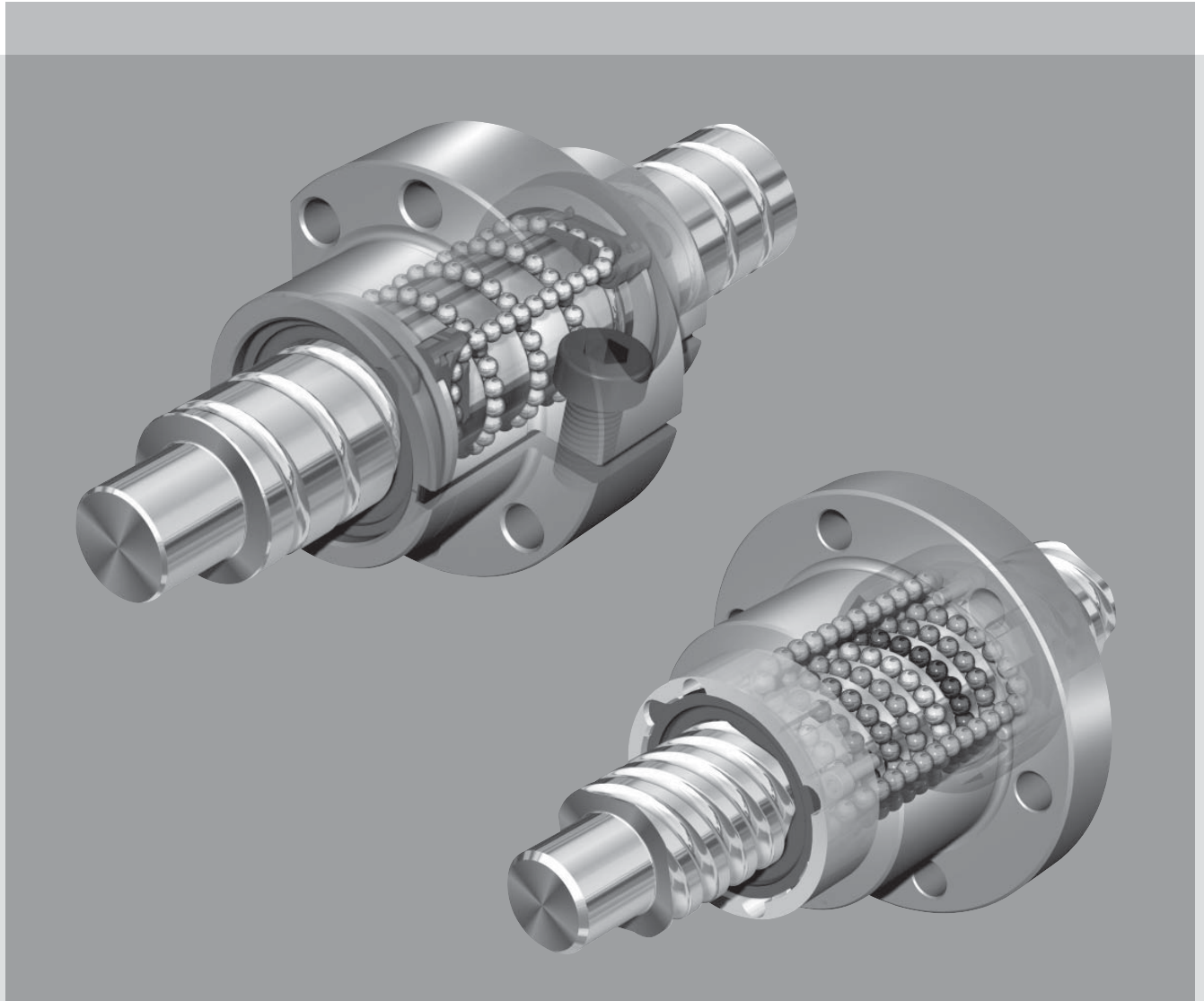
Precision-rolled screws in a variety of sizes and of unequalled quality have long been an essential part of our product range. Our comprehensive, worldwide stocks guarantee fast response times in every location. Availability is one advantage, low prices another. Every nut featured in this catalog can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

Precision-rolled screws can also be supplied without ball nuts to allow customers to machine the screw ends on their own facilities. Since hard machining has meantime become an established method, we no longer anneal the screw ends, a process which was previously necessary but which lowers the quality of the material. For special servicing cases, please consult us.

WINKGT calculation software

The WINKGT calculation software for designing and calculating precision ball screw assemblies for the operating system Windows 95 through XP is available on CD-ROM. This makes it very easy for you to perform your own technical calculations.

Alternatively, you can arrange for Rexroth to produce a technical design calculation on your behalf by completing and returning the "Design Calculation Service Form" at the end of the catalog. For the simplified creation of drawings of our precision ball screw assemblies as a CAD file, see the section headed "Inquiries and Orders" and the "Inquiry/Order" form at the end of the catalog.



Advantages

- Smooth operation due to the design of the internal recirculation and optimal lift-off of balls from the raceway
- 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
- Adjustable-preload single nut

Ball Screw Assembly with Front Lube Unit

Characteristic features

Equipped with Rexroth's efficient, 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 ball 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 depleted reserves of oil in the soap matrix of the grease inside the ball nut. The oil is applied directly to the screw thread 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, thus helping to conserve resources.

Further highlights

- Delivered ready-mounted to the Ball Screw Assembly.
- Attaches to the end of the ball nut, thus saving space.
- Can be used in all mounting orientations in both horizontal and vertical installations.
- Available for almost all ball nut designs in diameters 20 to 40.
- Easy integration into existing constructions through installation either on the flange side or on the opposite side of single-start nuts.
- When installed at both ends of the ball nut, also meets the lubrication needs of high-capacity 2-start nuts (FED-E-B).
- Suitable for all normal conditions of use, except for wet or dusty environments.



Lubrication concept

This logo indicates that Rexroth Precision Ball Screw Assemblies with prelubed ball nut and Front Lube Unit are lubed for life.

Note: The Front Lube Unit is not suitable for use with driven nuts.

Lifelong lubrication

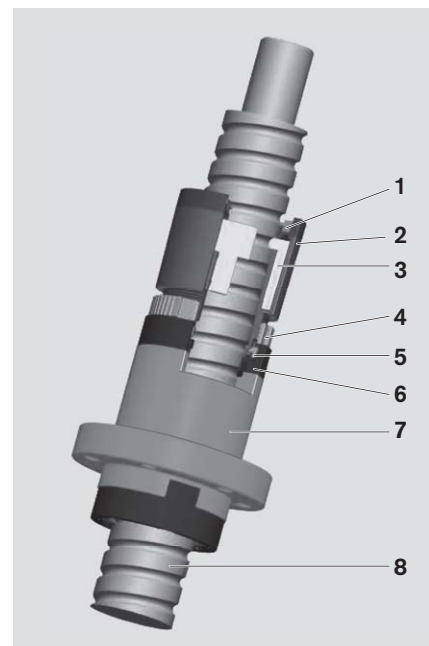
The effective life of the Rexroth Front Lube Unit matches the service life curve of the Ball Screw Assembly. When operated within the recommended load limits, a Ball Screw Assembly equipped with a Front Lube Unit will require no relubrication, thanks to the optimal delivery of lubricant. Based on our 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.

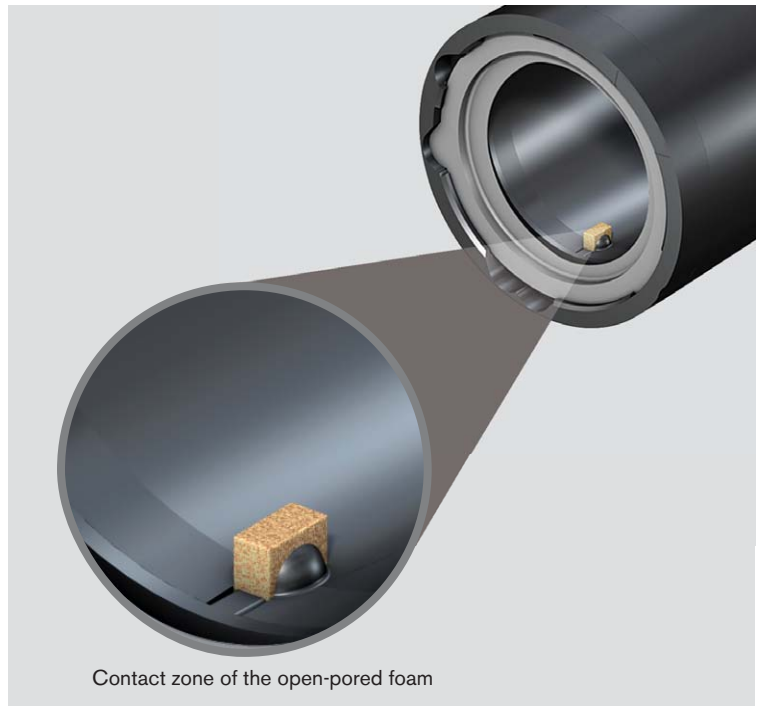
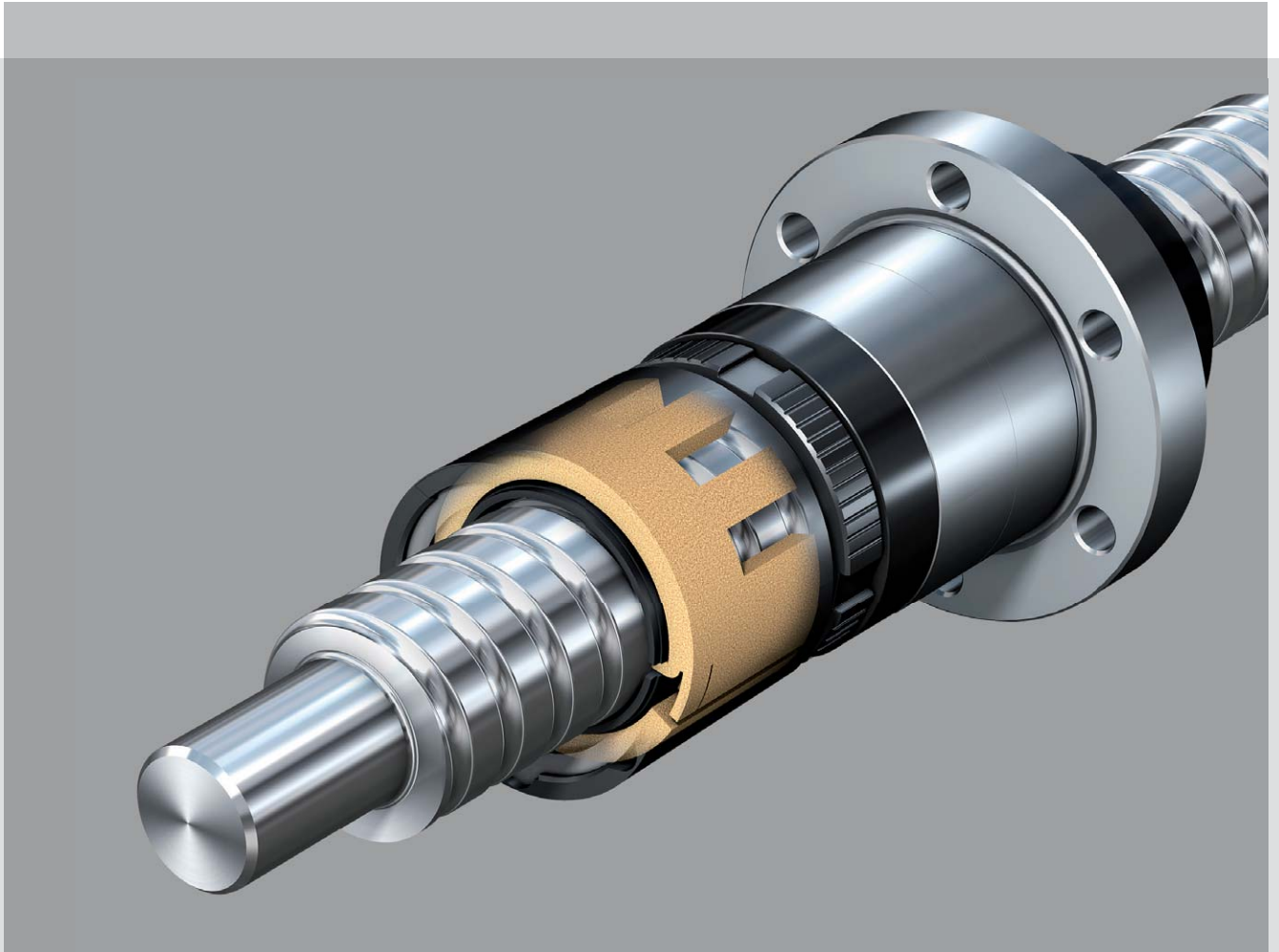
Structural design of front lube units

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

Notes

When calculating the stroke, consider the dimensions of the Front Lube Unit (VSE). When setting up a system, do not allow the VSE to collide with a stop or other components.





Product Overview

Ball Nut with Front Lube Unit

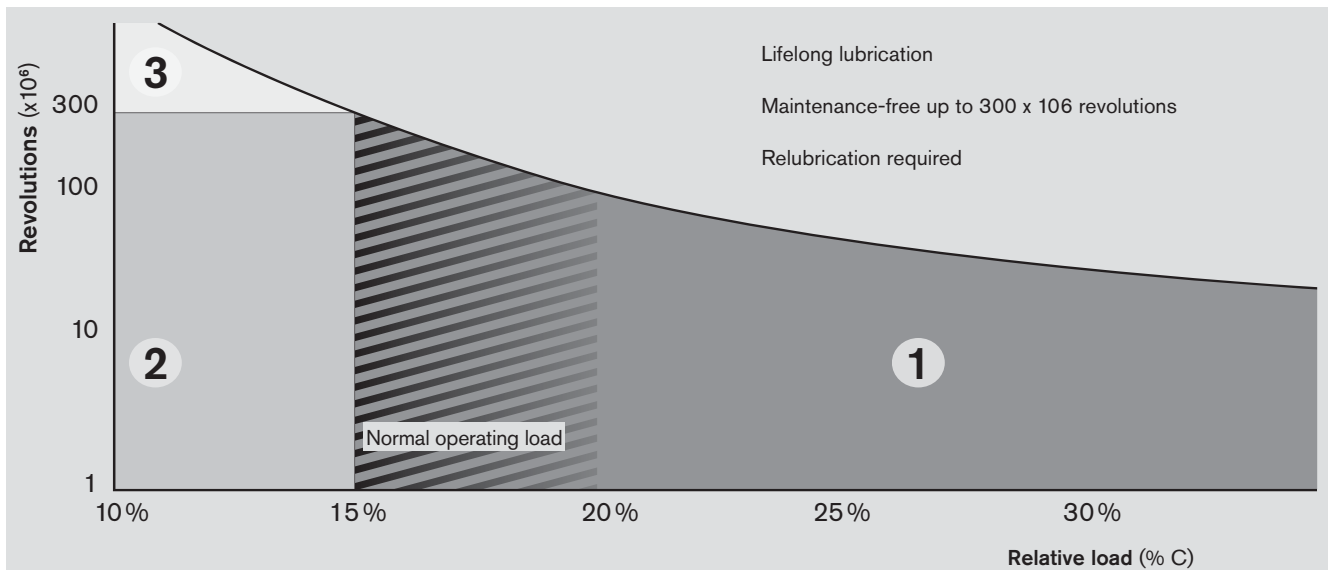
Front Lube Unit

The Front Lube Unit (VSE) has been designed for long-term, maintenance-free operation of Ball Screws. It is attached to the ball 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 ball nut designs:

- FBZ-E-S
- FSZ-E-S
- FEM-E-S
- FEM-E-C
- SEM-E-S
- SEM-E-C
- FED-E-B

Lifelong lubrication



Results confirmed by our extensive tests:

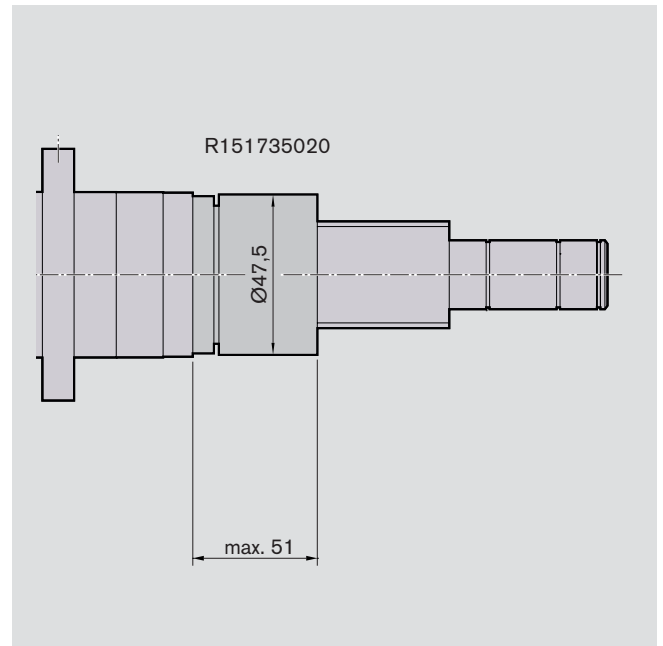
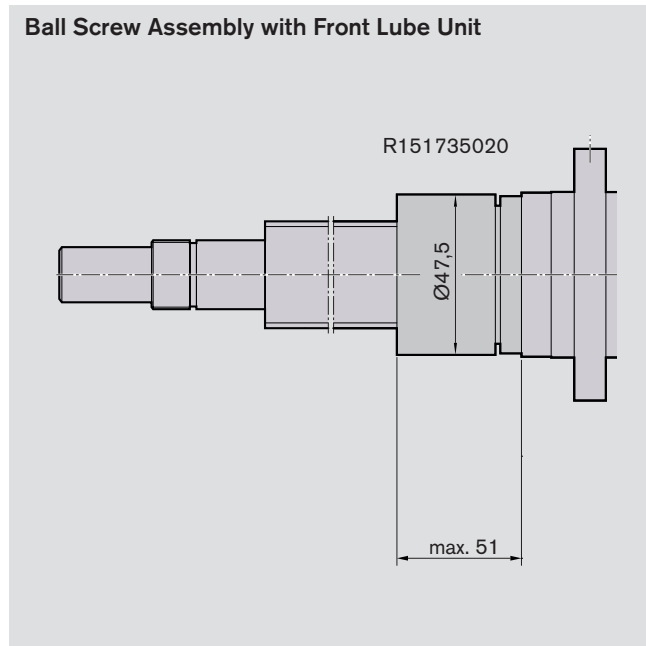
- 1** For axial loads of 15-35% of the dynamic load rating C, the ball nut will be lubed for life.
- 2** For axial loads of < 15% of the dynamic load rating C, the ball screw assembly will require no maintenance for up to 300 million revolutions.

- 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 ball nut.

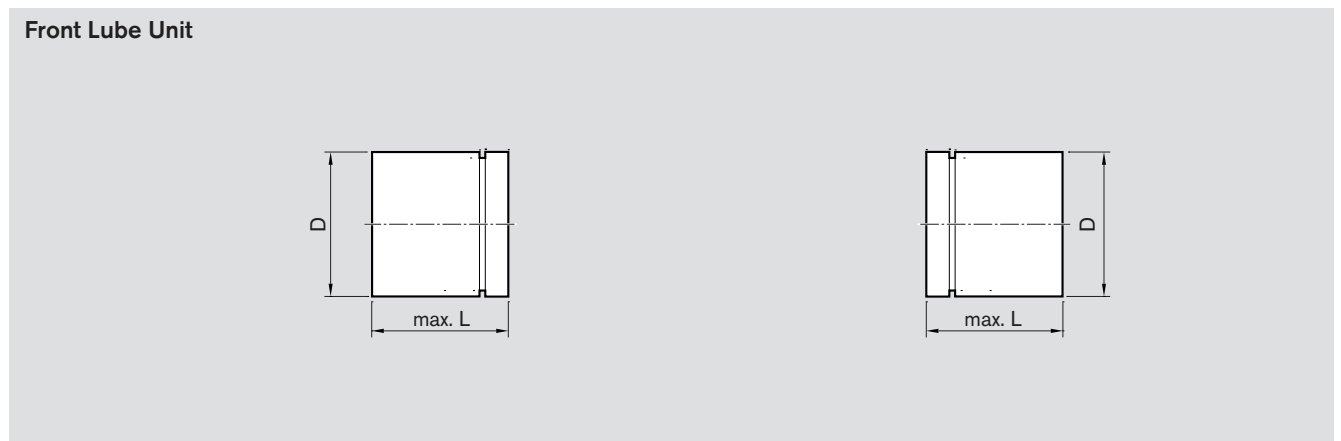
Lead (mm)	Travel s with Front Lube Units ¹⁾ (km)
5	1 500
10	3 000
20	6 000
32	9 600
40	12 000

1) max load up to 0.15C

Technical Data



Front Lube Unit



Note: The Front Lube Unit is delivered ready-mounted to the Ball Screw Assembly.

Size of VSE $d_0 \times P$	Part numbers	D (mm)	L (mm)
20 x 5 R	R151715000	32,60	51,00
20 x 20 R		32,60	51,00
25 x 5 R	R151725010	37,50	51,00
25 x 10		37,50	51,00
25 x 25		37,50	51,00
32 x 5	R151735020	47,50	51,00
32 x 10		47,50	51,00
32 x 20		47,50	51,00
32 x 32		47,50	51,00
40 x 5	R151745030	55,50	53,00
40 x 10	R151745040	62,30	51,00
40 x 20		62,30	51,00
40 x 40		62,30	51,00

Product Overview

eLINE Ball Screw Assemblies

eLINE Ball Screw Assemblies are readily available, configurable assemblies with pre-assembled ball nuts in screw-in or flanged design.

The screw ends are pre-machined for easy combination with LGL end bearings, complete with matching slotted nuts.

Special attention was paid to the load capability of the supporting bearings. By joining the bearing journal to the screw end we were able to enlarge smaller screw diameters and thus increase the load capacity of the end bearings.

This can simplify the choices for many customer-specific transport applications. The reduced design effort and simplified ordering process also offer significant benefits for new applications.

Less stringent tolerances enable very economical solutions. For example, the ball nut is always mounted with clearance.

Seals are integrated as standard.

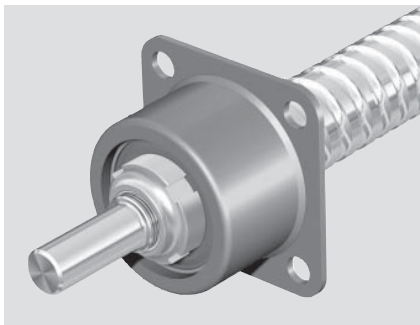
Cost-efficiency is a key consideration throughout.

Economical turnkey solutions made easy.

More information on the individual sub-assemblies can be found in the corresponding sections of this catalog.

Advantages

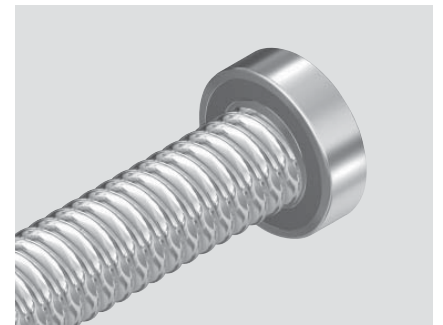
- With seals
- High axial load-bearing capacity
- Readily available
- Ball nuts in flanged or screw-in designs
- Can be supplied complete with end bearings and slotted nuts



Angular contact thrust ball bearing unit with slotted nut, LAL

The fixed bearing with angular-contact ball bearings LGL in an X-array and slotted nut makes an ideal accessory.

- High load rating
- Very easy mounting thanks to flanged housing made of drawn sheet-metal
- Corrosion-protected housing
- Seals keep dirt out
- Bearings can be easily preloaded during fixing
- Maintenance-free for most applications due to the large lubricant reservoir with initial greasing



Deep-groove ball bearing unit with retaining ring, LAD

Floating bearing with deep-groove ball bearing

Ball Screw Assemblies with Flanged Single Nut – Miniature Line

Miniature Line

Miniature Ball Screws are readily available, configurable assemblies with pre-assembled flanged ball nuts.

The screw ends are pre-machined for easy combination with LAL end bearings (angular-contact thrust ball bearings complete with matching slotted nuts).

Special attention was paid to the load capability of the supporting bearings. By joining the bearing journal to the screw end we were able to enlarge smaller screw diameters and thus increase the load capacity of the end bearings. This can simplify the choices for many customer-specific positioning and transport applications.

The reduced design effort and simplified ordering process also offer significant benefits for new applications.

The flanged nut FEM-E-B comes pre-assembled with clearance and seals.

End bearing LGL

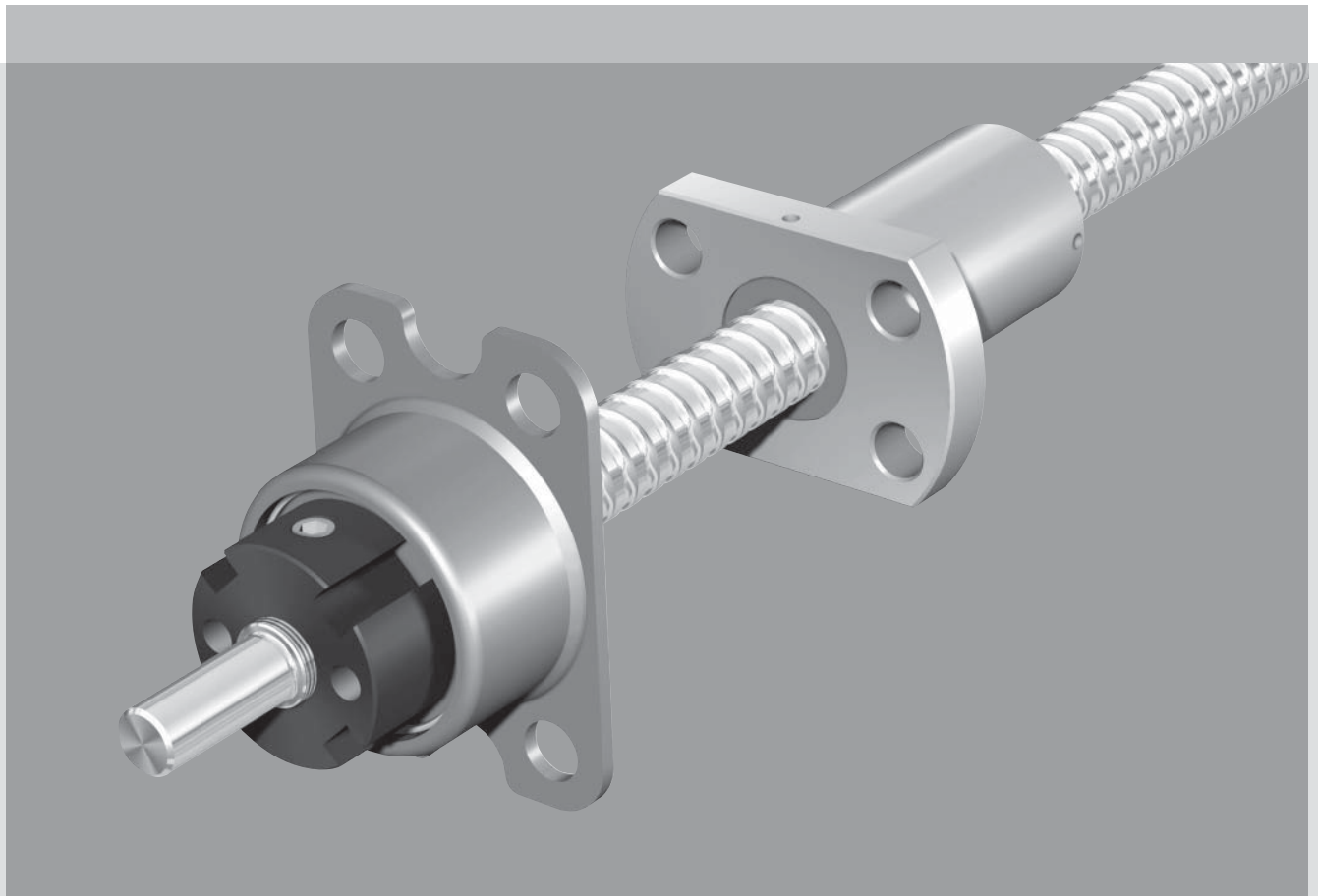
The end bearing LGL with angular contact ball bearing in an X array makes an ideal accessory.

- High load rating
- Very easy mounting thanks to flanged housing made of drawn sheet-metal
- Corrosion-protected housing
- Seals keep dirt out
- Bearings can be easily preloaded during fixing
- Maintenance-free for most applications due to the large lubricant reservoir with initial greasing
- Economical turnkey solutions made easy.

Ordering Data

For explanations concerning the ordering code, please refer to page 28.

FEM-E-B	6 x 1R x 0.8-4	1	1	T7	R	831K061	00K060	255	0	1
FEM-E-B	6 x 2R x 0.8-4	1	1	T7	R	831K061	00K060	255	0	1
FEM-E-B	8 x 1R x 0.8-4	1	1	T7	R	831K063	00K080	355	0	1
FEM-E-B	8 x 2R x 1.2-4	1	1	T7	R	831K063	00K080	355	0	1
FEM-E-B	8 x 2.5R x 1.588-3	1	1	T7	R	831K063	00K080	355	0	1
FEM-E-B	12 x 2R x 1.2-4	1	1	T7	R	81K061	00K120	400	0	1
FEM-E-B	12 x 5R x 2-3	1	1	T7	R	81K061	00K120	400	0	1
FEM-E-B	12 x 10R x 2-2	1	1	T7	R	81K061	00K120	400	0	1



For technical data on ball nuts, screws and end bearings, please refer to the corresponding sections of this catalog.

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

Size $d_0 \times P \times D_w - i$	Part number	Load ratings (N)		Linear speed v_{max} (m/min)	Dimensions (mm)	
		dyn. C	stat. C_0		L_{tot}	L_{thr}
6 x 1R x 0.8-4	R1530 100 40	900	1290	3	255	191
6 x 2R x 0.8-4	R1530 100 41	890	1280	6	255	191
8 x 1R x 0.8-4	R1530 207 20	1020	1740	3	355	291
8 x 2R x 1.2-4	R1530 207 21	1870	2760	6	355	291
8 x 2.5R x 1.588-3	R1530 207 22	2200	2800	5	355	291
12 x 2R x 1.2-4	R1530 410 90	2240	4160	12	400	359
12 x 5R x 2-3	R1530 410 91	3800	5800	30	400	359
12 x 10R x 2-2	R1530 410 92	2500	3600	60	400	359

Product Overview

Precision Ball Screw Assemblies with Driven Screws

End bearings

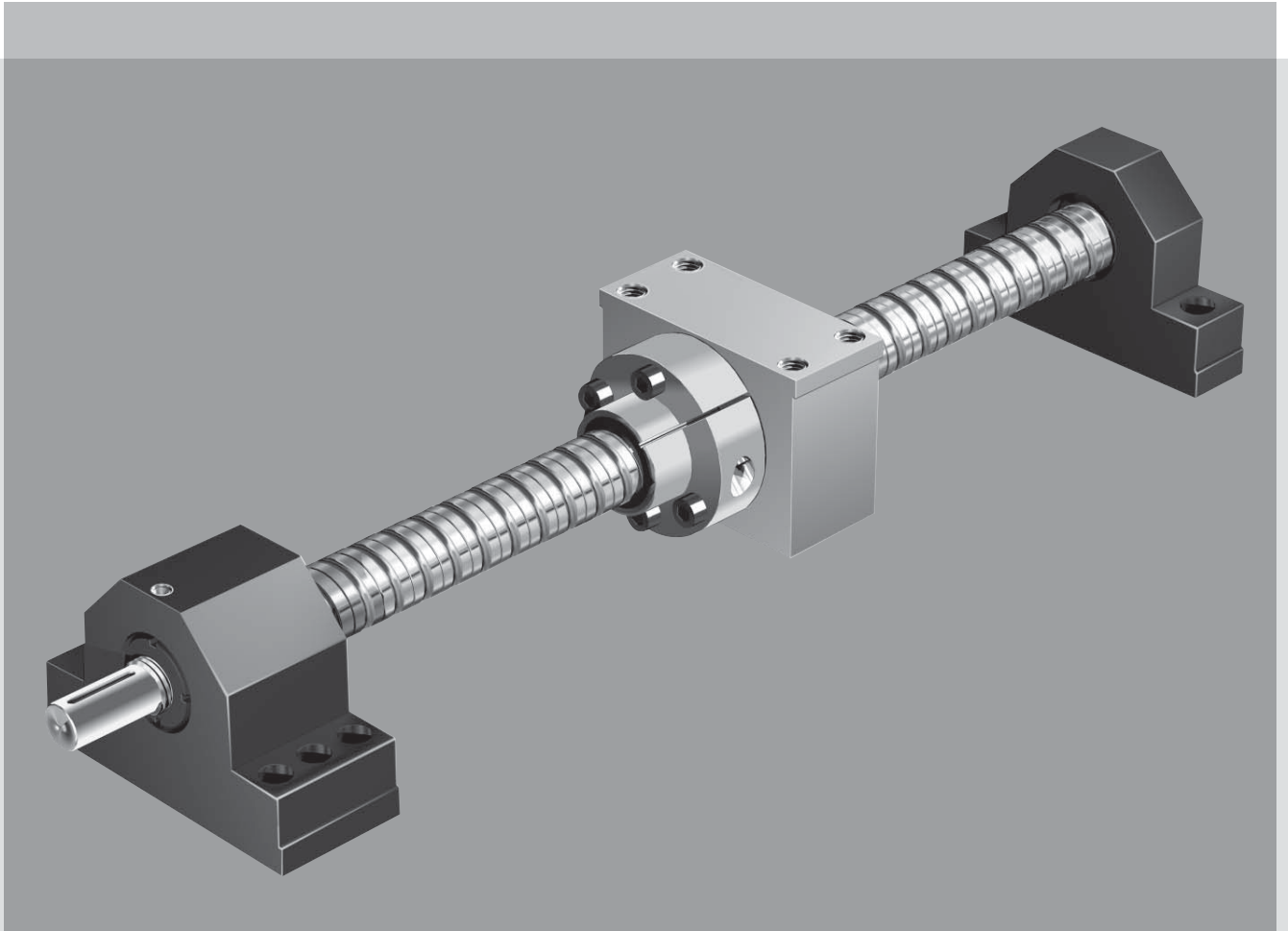
Rexroth precision ball screw assemblies are available with steel or aluminum pillow block units or bearing units complete with matching slotted nuts.

Rexroth precision pillow block units enable:

- Easy installation due to the variable fixture options and reference edges
- Use of premachined pin holes provides increased mounting accuracy

Nut housings

Rexroth nut housings for various flanged nuts and the cylindrical single nut ZEM-E-S complete the ready-to-install Rexroth product range.

**Advantages**

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

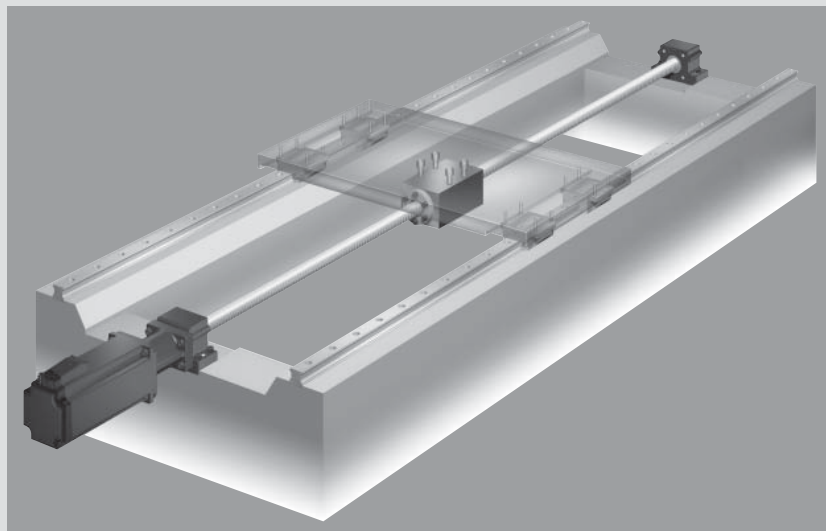
Product Overview

Precision Ball Screw Assemblies for All Applications

Drive units

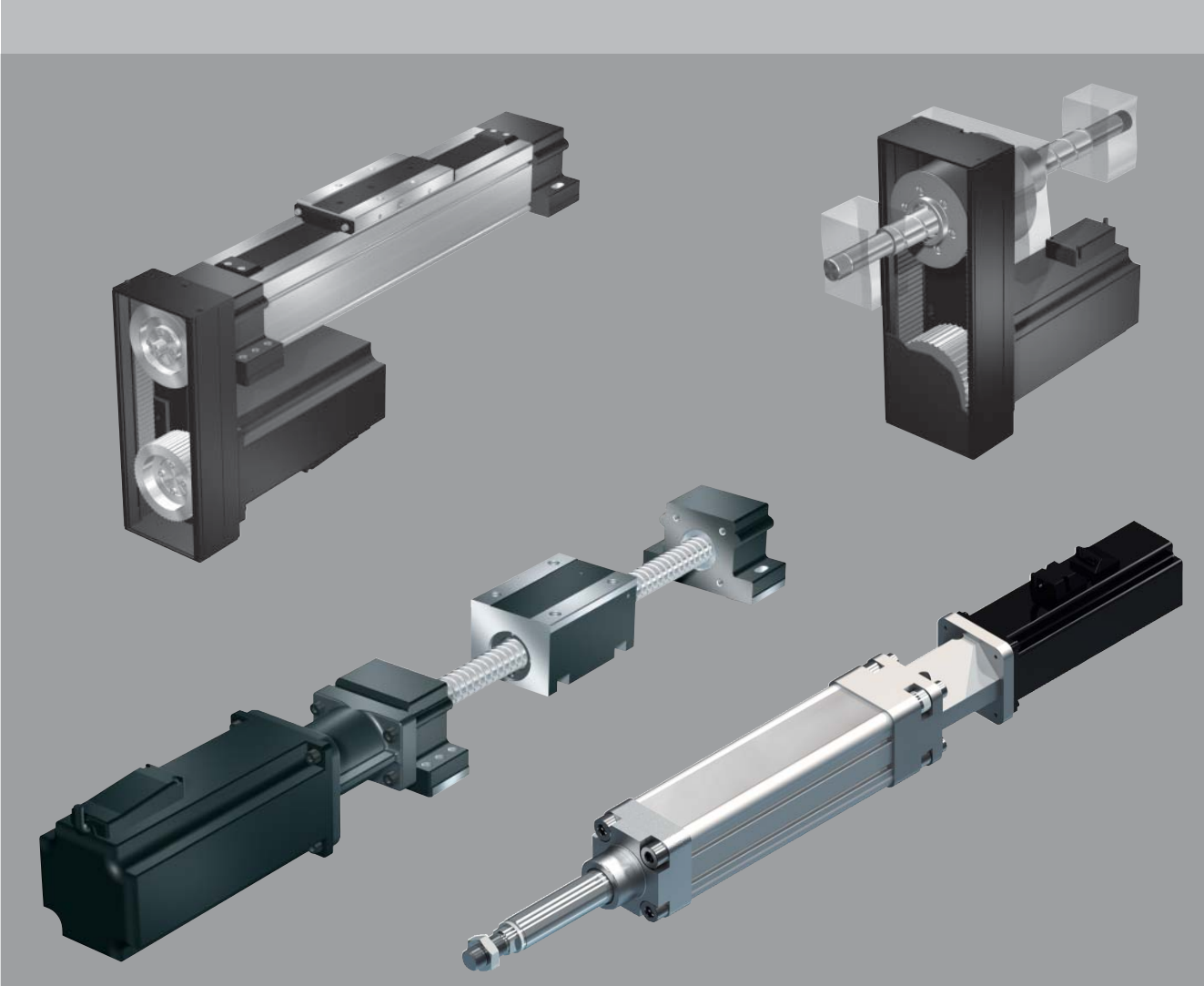
You will find further system solutions in our catalog on Rexroth Drive Units. This catalog contains precision ball screw assemblies with a protecting housing, including versions with integrated screw supports, driven nuts with side drive timing belt and the matching AC servo motors.

To perform particularly demanding positioning tasks we have developed the Integrated Measuring System for Ball Rail and Roller Rail Systems (Catalog R310EN 2350). The linear measuring system in the rail then replaces the positioning information in the ball screw. This way we are able to achieve a maximum of flexibility in design and a maximum of precision in operation.



Available Precision Ball Screw Assembly catalogs

R310EN 3301	Precision Ball Screw Assemblies
R310EN 3304	Drive Units
R310EN 3306	Electromechanical Cylinder



Application Examples

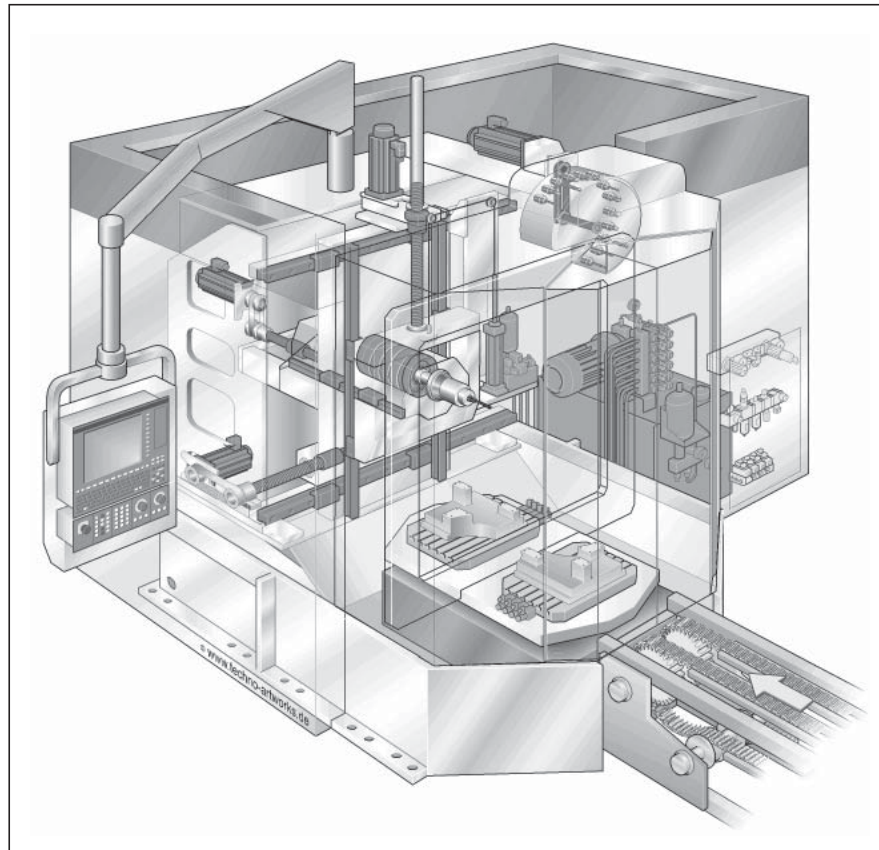
Application Examples

Rexroth Precision Ball Screw Assemblies have been successfully implemented worldwide in the following areas:

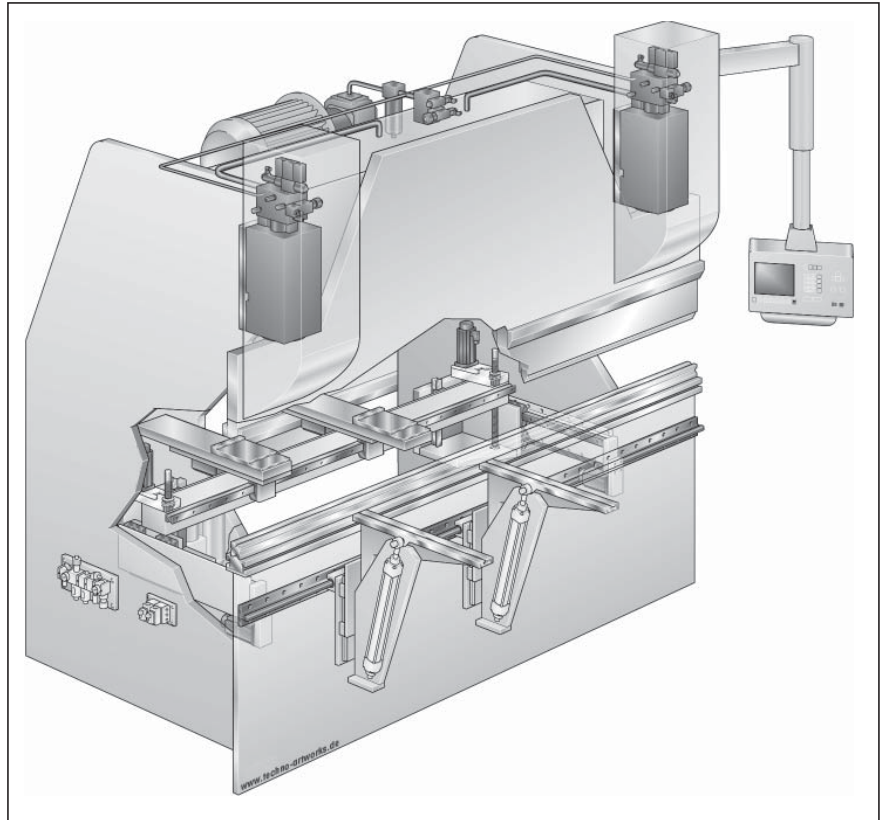
- Cutting machine tools
- Forming machine tools
- Automation and handling
- Woodworking
- Electrical and electronics
- Printing and paper
- Injection molding machines
- Food and packaging industry
- Medical equipment
- Textile industry
- etc.

Machining center

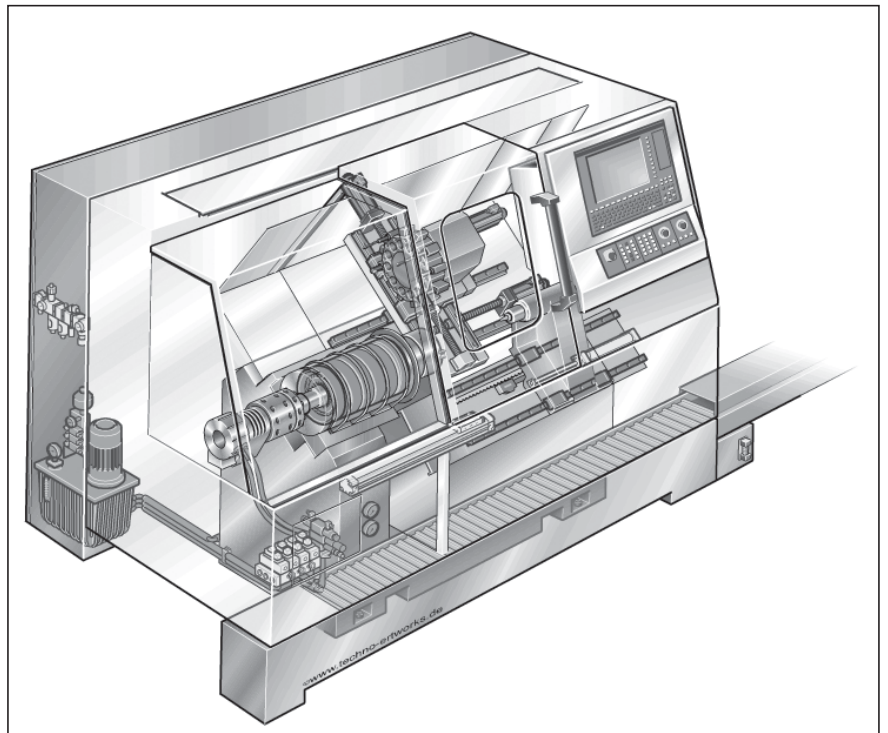
Vertical axis with driven nut



Press brake



Lathe



Inquiries and Orders

Inquiries and Orders

All nuts, screws and end machining de-tails can now be defined with the order code (up to screw diameter 80 mm) as a complete precision ball screw assembly.

We have taken account of all former selection criteria as well as adding new ones. The diversity of possible combinations is limitless.

Attention is focused in particular on the definition of end machining details. For many design versions there is a prepared definition, providing you with a suitable solution for practically every application.

If you wish to send us an inquiry, simply complete the form at the end of this catalog. If no drawing is available, please specify your wishes using the variable order code. You will find a summary of the options on page 27.

Should you already have a drawing available as a CAD file in Pro/E, AutoCAD, STEP or DXF, you can send us the data by e-mail to screws.br@boschrexroth.de.

If the drawing exists on paper only, you can, of course, send it to us by conventional mail.

Each customer-specific precision ball screw assembly is issued with an ID number when an order is placed. If you have any subsequent queries, you need only quote this ID number.

Using the ordering data from the cata-log, you can also easily generate a drawing in AutoCAD format via the functionality provided on our website. A guided dialogue is provided for data input so as to avoid typing errors, and all data selected can be checked within a few minutes against the drawing that has been generated. This drawing can then be used directly by our production departments, which accelerates order processing and delivery. The drawing generation functionality can be used without registering with us or entering a password or customer number. To access this functionality, visit http://www.boschrexroth.com/ball_screws.

From there, you can access the on-line catalog via the link "CAD files: Select individual types" in the right navigation bar. The menu "Ball screw assemblies" on the left brings you to the desired goal.

Data can be input in two ways. In the default mode, "Configuration of options", the dialog is supported by meaningful default settings to minimize input errors. The "Expert configuration" mode allows much more rapid input of data, but requires a certain amount of experience. When the dialogue is completed, a click on the "CAD-Model" button leads to a further dialog box asking for input of the e-mail address for electronic transmission of the drawing to the user.

Registered customers based in Germany can use further eShop functions such as the shopping cart, the inquiry list and order status and can receive direct offers for the inquired precision ball screw assemblies or check the delivery status of current orders.

The screenshot shows the website interface for 'Ball Screw Assemblies'. At the top, there are navigation links for 'Language', 'Imprint', and 'Terms of Use'. Below this, there are tabs for 'Electric Drives and Controls', 'Hydraulics', 'Linear Motion and Assembly Technologies', 'Pneumatics', and 'Service'. The main header includes the 'Rexroth Bosch Group' logo and a search bar. The left sidebar contains a navigation menu with categories like 'Products and Solutions', 'Ball Screw Assemblies', 'Standard Programme', 'eLINE Ball Screw Assemblies', 'Drive Units with Ball Screws', 'Electromechanical Cylinder', 'Linear Motion Systems', 'Multiple-axis systems', 'Ball Transfer Units and Tolerance Rings', 'Basic Mechanical Elements', 'Manual Work Systems', 'Manual Production Systems', 'Material and Information Flow Technology', 'Production plants in miniature format: Desktop Factory', 'CAD and Documentation', 'eShop', 'News and Press', 'Service', 'Events and Fairs', 'Training', 'Contact', and 'Extranet'. The main content area is titled 'Ball Screw Assemblies' and features three images of different ball screw assemblies. Text on the page states: 'Rexroth Ball Screw Assemblies do not only work with greater levels of accuracy and at higher speeds they can also be supplied at very short notice. A wide range of precision screws and preloaded or adjustable-preload single and double nuts is available for all feeding, positioning and conveying tasks.' It also mentions: 'Rexroth ball screw drives are the crucial components in the AOK/AGK drive units as well as in the new Electromechanical Cylinder EMC.' and 'Please note also the eLINE Programme with pre-assembled ball screws ex stock.' A note at the bottom of the main content area says 'For more details, see navigation bar at right'. The right sidebar contains a 'Ball Screw Assemblies' section with links for 'Product Documentation', 'Product Details in the Online Catalogue', 'CAD Files: Select individual types', 'CAD Files: Select all types (capped files)', 'eShop', 'Benefits at a Glance', and 'Information material (order)'. At the bottom of the page, there are links for 'go to top of page' and 'Print'.

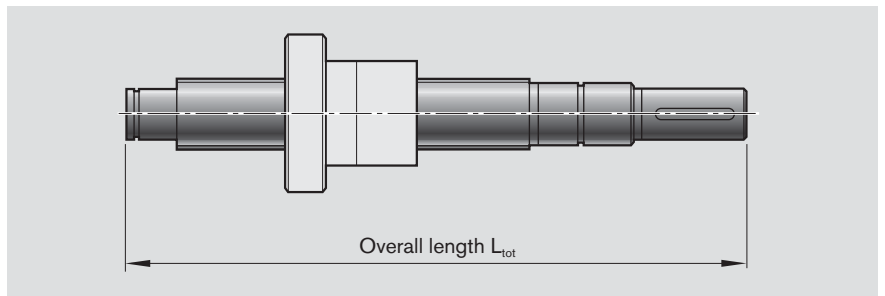
The ordering data given on page 28 covers all the parameters of a precision ball screw assembly. Once you have defined the nominal diameter and lead and entered the total length, the functionality guides you through a succession of dialog boxes allowing you to select the desired options.

Nominal diameters, leads

Nominal diameter d_0	Lead P											
	1	2	2.5	5	10	12	16	20	25	32	40	64
6												
8												
12												
16												
20												
25												
32												
40												
50												
63												
80												

- Available ball nut sizes
- Combinable with VSE

Overall length L_{tot} of a precision ball screw assembly

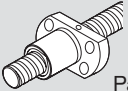
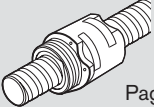
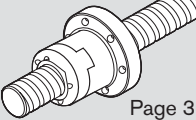
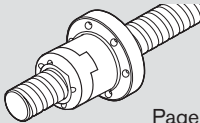
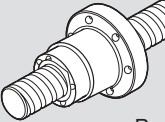
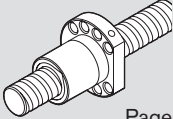
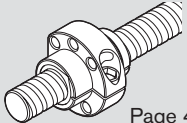
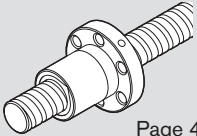
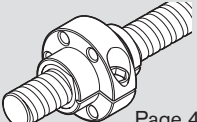
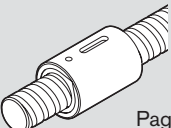
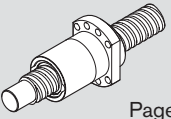
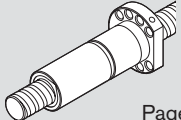
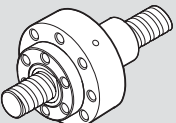
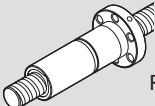


Inquiries and Orders

Inquiries and Orders

Nut type

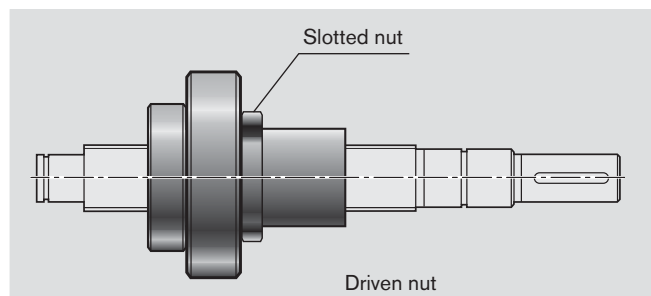
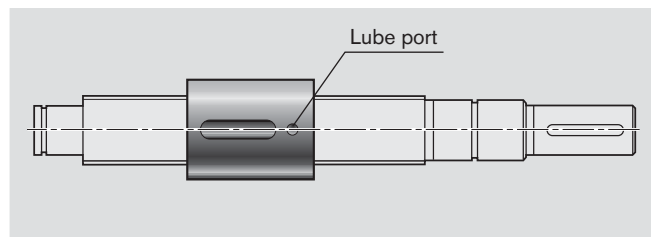
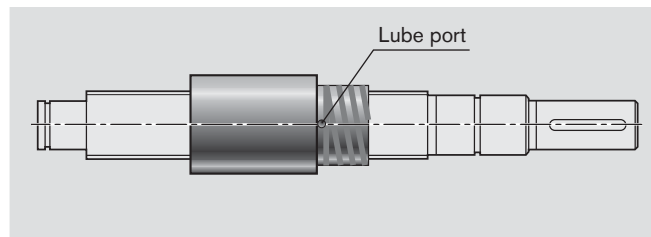
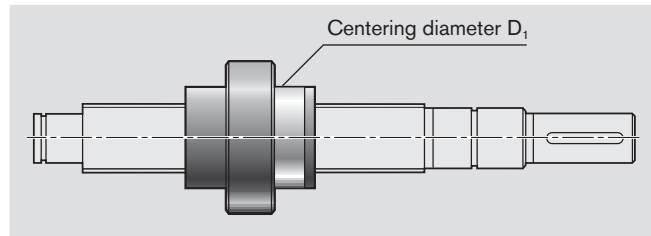
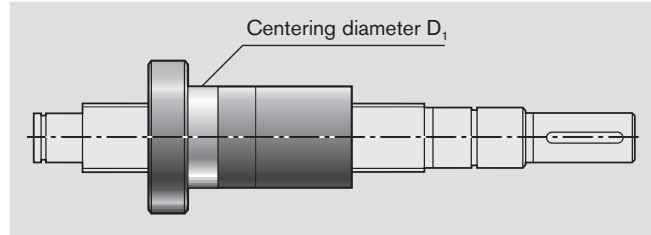
The various series versions and forms are shown below.

<p>FEM-E-B Single nut with flange Miniature series</p>  <p>Page 32</p>	<p>ZEV-E-S Screw-in nut eLINE series</p>  <p>Page 34</p>
<p>FBZ-E-S Single nut with flange eLINE series</p>  <p>Page 36</p>	<p>FSZ-E-S Single nut with flange ECOplus series</p>  <p>Page 38</p>
<p>FEP-E-S Single nut with flange Speed series</p>  <p>Page 40</p>	<p>FEM-E-C Single nut with flange DIN 69 051, Part 5 Standard series</p>  <p>Page 42</p>
<p>SEM-E-C Adjustable-preload single nut, DIN 69 051, Part 5 Standard series</p>  <p>Page 44</p>	<p>FEM-E-S Single nut with flange Standard series</p>  <p>Page 46</p>
<p>SEM-E-S Adjustable-preload single nut, Standard series</p>  <p>Page 48</p>	<p>ZEM-E-S Cylindrical single nut Standard series</p>  <p>Page 50</p>
<p>2-start FED-E-B single nut with flange</p>  <p>Page 52</p>	<p>FDM-E-C Double nut with flange DIN 69 051, Part 5 Standard series</p>  <p>Page 54</p>
<p>FAR-B-S For driven nuts, please refer to catalog R310EN 3304</p> 	<p>FDM-E-S Double nut with flange Standard series</p>  <p>Page 56</p>

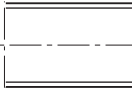
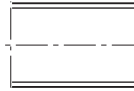
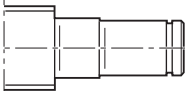
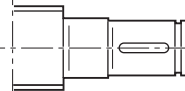
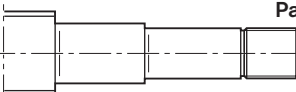
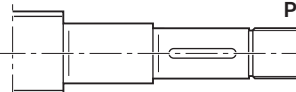

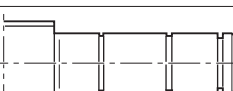
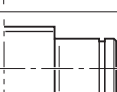

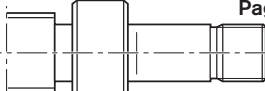
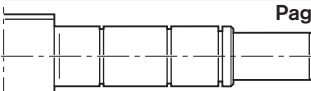
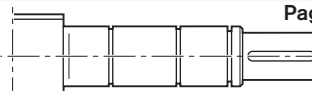
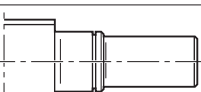
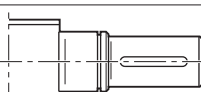
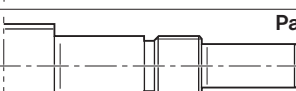
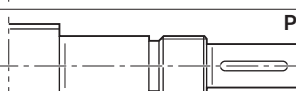
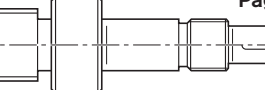


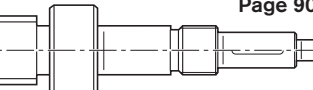
Mounting direction of nut types

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.

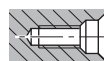


Screw ends, forms for a left or right screw end

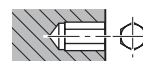
Basic version		With keyway	Cut to size only "T"	
00	 Page 66		00	 Page 66
01	 Page 68	02	 Page 68	
11	 Page 70	12	 Page 70	
21	 Page 72			
31	 Page 74			
41	 Page 76			
51	 Page 78			End mechanically connected with/without keyway
				531  Page 78
61	 Page 80	62	 Page 80	
71	 Page 82	72	 Page 82	
81	 Page 84	82	 Page 84	831/83 841/84  Page 86
91	 Page 88	92	 Page 88	931/93 941/94  Page 90

Machining of end face

Z Centering hole DIN 332-D



S Hex socket

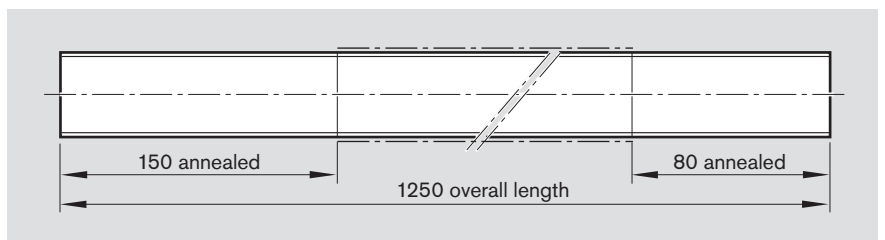


For screws supplied separately; cut to size only "T"

Screw	SN	20 x 5R x 3	X	X	T7	R	00T200	00T200	1250	0	0
Screw designation											
Size	Nominal diameter (mm) — — — — — Lead (mm) - - - - - Direction of lead R ... right, L ... left — — — — — Ball diameter (mm) — — — — —										
Seal	X ... not possible										
Preload	X ... not possible										
Precision	T5, T7, T9										
Screw	R ... precision-rolled screw										
Left screw end	Form — — — — — Option - - - - - T ... cut to size only - - - - - Version — — — — —										
Right screw end	see left screw end										
Overall length L_{tot} (mm)											
Documentation	0 ... standard (acceptance test report) 1 ... lead test report										
Lubrication	0 ... preserved										

For separately supplied screws with annealed ends (special servicing cases)

For special servicing cases involved precision-rolled screw SN-R with annealed ends, please consult us.



Order form: see page 157.

Note: It is also possible to process inquiries based on a customer's drawings.

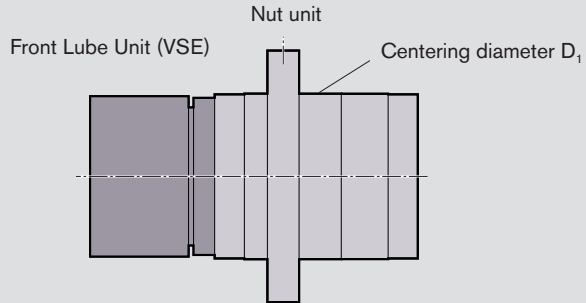
Inquiries and Orders

Ordering Data

Ordering example for Front Lube Unit with illustration of mounting direction

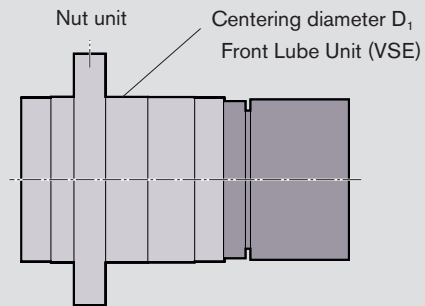
FSZ-E-S 32 x 10R x 3.969-5 1 3 T7 R 81K203 31K200 1000 0 2

Front Lube Unit at left, ball nut with initial greasing



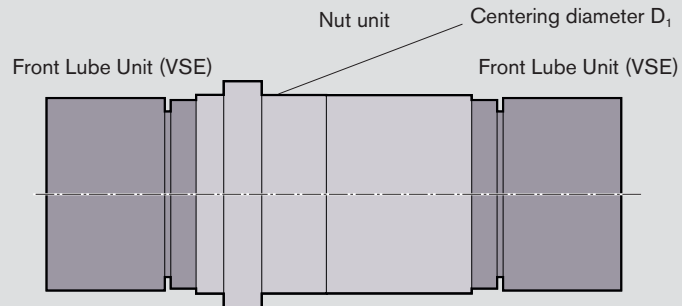
FSZ-E-S 32 x 10R x 3.969-5 1 3 T7 R 81K203 31K200 1000 0 3

Front Lube Unit at right, ball nut with initial greasing



FED-E-B 40 x 20R x 6-4 x 2 1 3 T7 R 81K250 31K300 1000 0 4

Front Lube Unit at both ends, ball nut with initial greasing



Mounting direction for Front Lube Units to ball nut designs

Ball nut design	Mounting direction
FBZ-E-S	2, 3
FSZ-E-S	2, 3
FEM-E-S	2, 3
FEM-E-C	2, 3
SEM-E-S	2, 3
SEM-E-C	2, 3
FED-E-B	4

Nuts

Miniature Single Nut with Flange FEM-E-B

Miniature series

Rexroth mounting dimensions

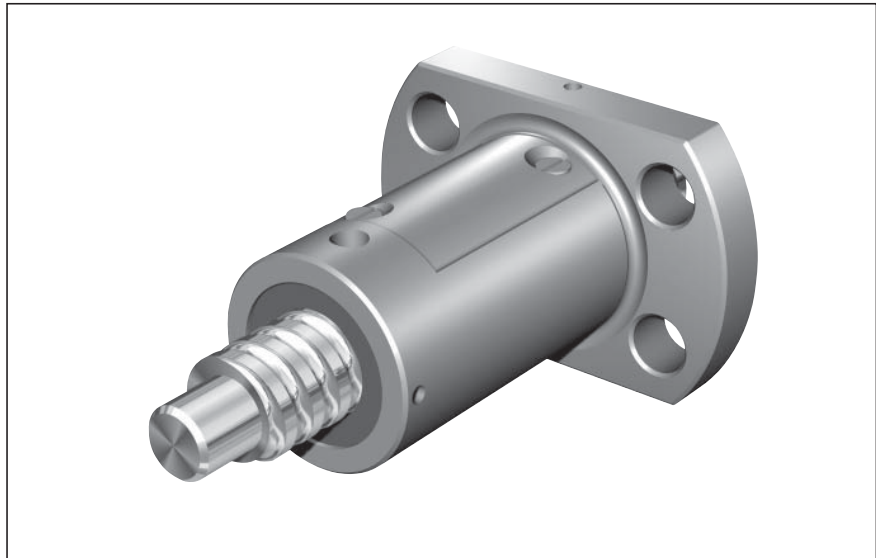
Flange type B

With seals

With backlash or reduced backlash

For precision-rolled screws SN-R
of tolerance grade T5, T7

Supplied only as complete ball screw
assembly.



Ordering code: **FEM-E-B 6 x 2R x 0.8-4 1 1 T7 R 83K060 41K050 250 0 1**

d_0 = nominal diameter

P = lead

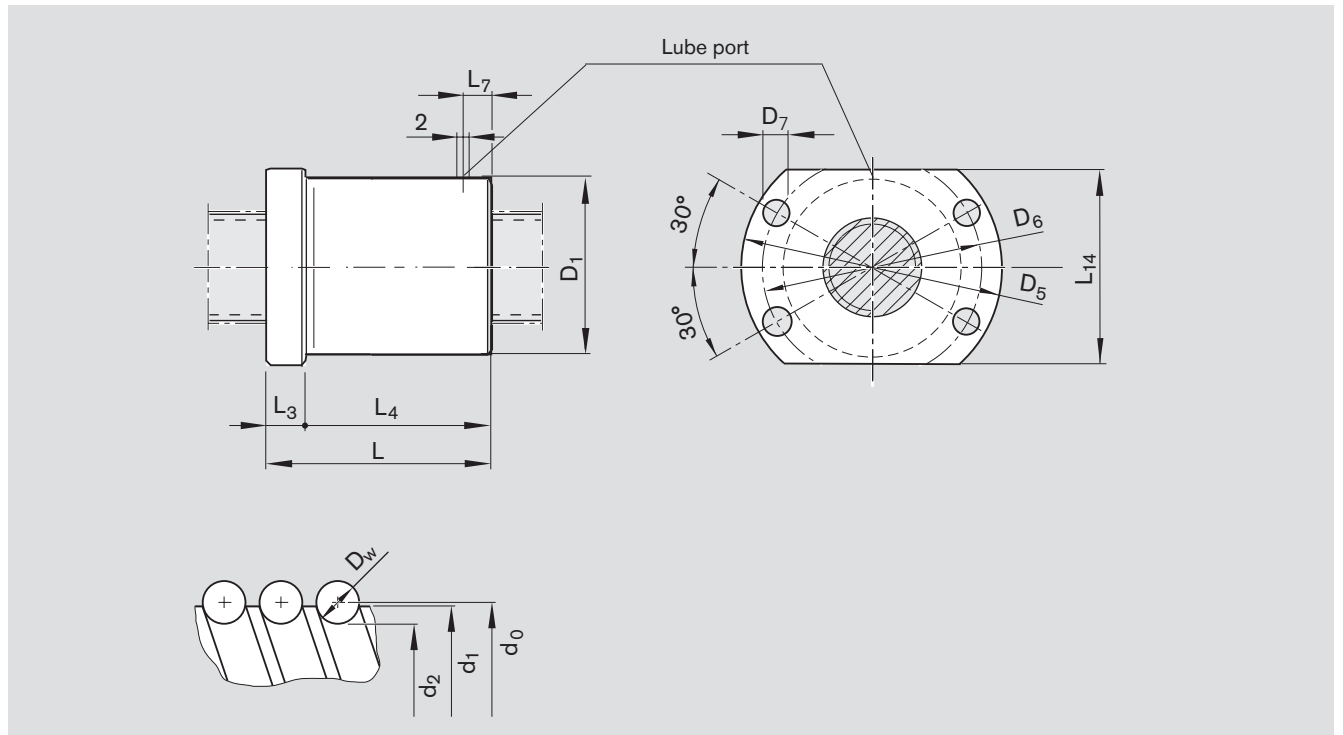
(R = right-hand, L = left-hand)

D_w = ball diameter

i = number of ball track turns

Category	Size $d_0 \times P \times D_w - i$	Part number	Load ratings		Linear speed ¹⁾ v_{max} (m/min)
			dyn. C (N)	stat. C ₀ (N)	
A	6 x 1R x 0.8 - 4	R1532 100 06	900	1290	3
A	6 x 2R x 0.8 - 4	R1532 120 06	890	1280	6
A	8 x 1R x 0.8 - 4	R1532 200 06	1020	1740	3
A	8 x 2R x 1.2 - 4	R1532 220 06	1870	2760	6
B	8 x 2.5R x 1.588 - 3	R1532 230 06	2200	2800	15
B	12 x 2R x 1.2 - 4	R1532 420 06	2240	4160	12
A	12 x 5R x 2 - 3	R1532 460 06	3800	5800	30
B	12 x 10R x 2 - 2	R1532 490 06	2500	3600	60

1) See page 115 Characteristic speed $d_0 \cdot n$ and page 150 Critical speed n_{cr}



Size	Dimensions (mm)											Weight m (kg)
	d_1	d_2	D_1 g6	D_5	D_6	D_7	L	L_3	L_4	L_7	L_{14}	
$d_0 \times P \times D_w - i$												
6 x 1R x 0.8 - 4	6.0	5.3	12	24	18	3.4	19.5	3.5	16	3.5	16	0.020
6 x 2R x 0.8 - 4	6.0	5.3	12	24	18	3.4	22.5	3.5	19	3.0	16	0.020
8 x 1R x 0.8 - 4	8.0	7.3	16	28	22	3.4	22.0	6.0	16	3.5	19	0.035
8 x 2R x 1.2 - 4	8.0	7.0	16	28	22	3.4	25.0	6.0	19	3.0	19	0.050
8 x 2.5R x 1.588 - 3	7.5	6.3	16	28	22	3.4	16.0	6.0	10	3.0	19	0.030
12 x 2R x 1.2 - 4	11.7	10.8	20	37	29	4.5	19.0	8.0	11	2.5	24	0.055
12 x 5R x 2 - 3	11.4	9.9	22	37	29	4.5	28.0	8.0	20	6.0	24	0.075
12 x 10R x 2 - 2	11.4	9.9	22	37	29	4.5	33.0	8.0	25	8.0	24	0.085

Nuts

Screw-in Nut ZEV-E-S

eLINE series

Rexroth mounting dimensions

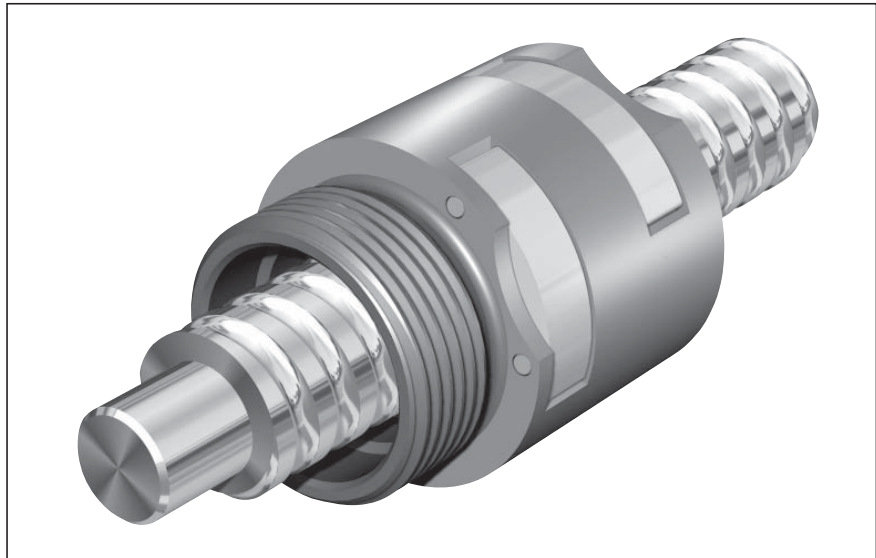
Without seals (no initial greasing)

Low-friction seals on request

With backlash

For precision-rolled screws SN-R
of tolerance grade T7, T9

Supplied only as complete ball screw
assembly.



Ordering code: **ZEV-E-S 20 x 5R x 3-4 0 0 T7 R 81K120 41K120 550 0 0**

d_o = nominal diameter

P = lead

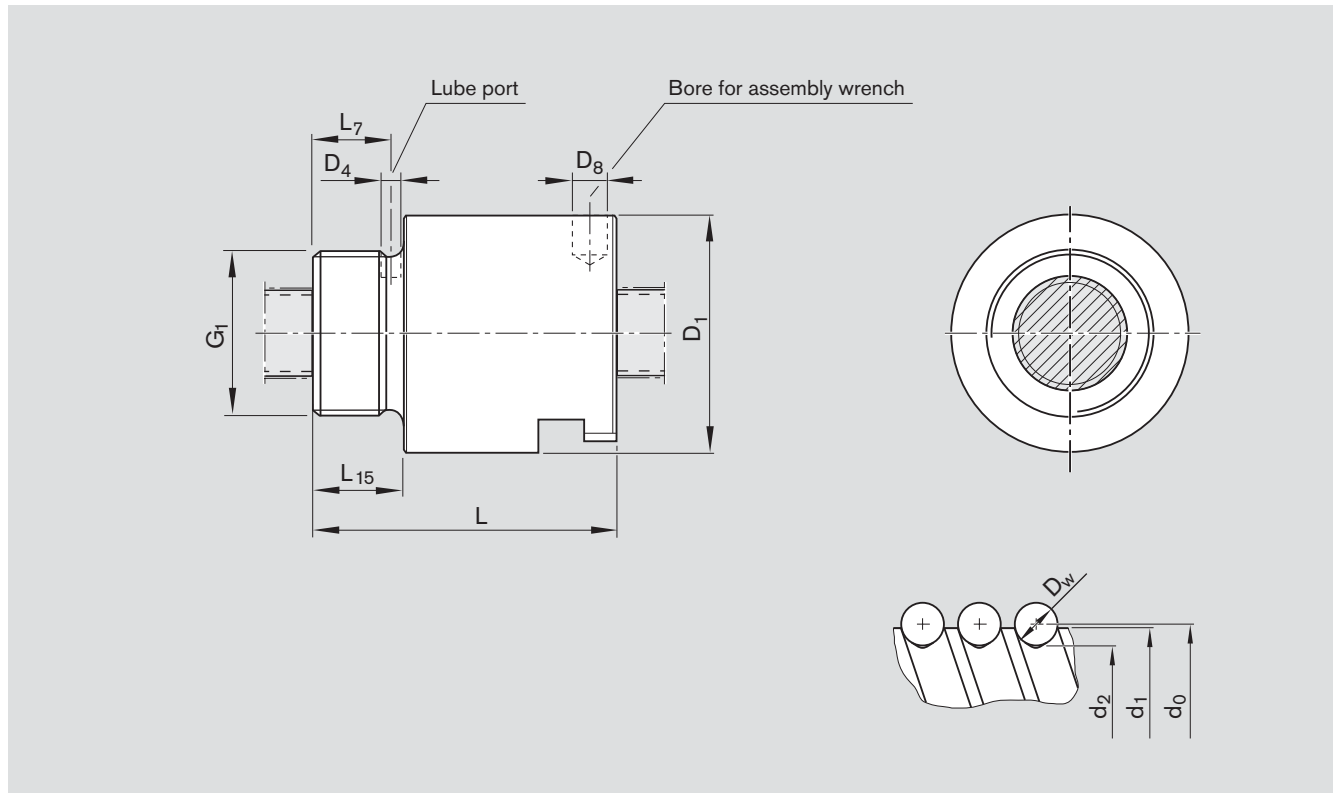
(R = right-hand, L = left-hand)

D_w = ball diameter

i = number of ball track turns

Category	Size $d_o \times P \times D_w - i$	Part number	Load ratings		Linear speed ¹⁾ v_{max} (m/min)
			dyn. C (N)	stat. C ₀ (N)	
A	12 x 5R x 2 - 3	R2542 430 01	2300	3500	30.0
B	12 x 10R x 2 - 2	R2542 430 11	1500	2200	60.0
A	16 x 5R x 3 - 3	R2542 000 01	5600	7100	25.0
B	16 x 10R x 3 - 3	R2542 000 11	5800	7400	50.0
B	20 x 5R x 3 - 4	R2542 100 01	8600	12900	20.0
B	25 x 5R x 3 - 7	R2542 200 01	15700	29200	16.0
B	25 x 10R x 3 - 5	R2542 200 11	11500	20500	32.0
B	32 x 5R x 3.5 - 5	R2542 300 01	15800	30400	12.5
B	32 x 10R x 3.969 - 5	R2542 300 11	19000	34700	25.0

1) See page 115 Characteristic speed $d_o \cdot n$ and page 150 Critical speed n_{cr}



Size	Dimensions (mm)										Max. backlash (mm)	Weight m (kg)
	d_1	d_2	D_1 h10	D_4	D_8	G_1	L ± 0.3	L_7	L_{15}			
$d_0 \times P \times D_w - i$												
12 x 5R x 2 - 3	11.4	9.9	25.5	2.7	3.2	M20 x 1.0	36	8.5	10	0.1	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	0.1	0.10	
16 x 5R x 3 - 3	15.0	12.9	32.5	2.7	4.2	M26 x 1.5	40	10.5	12	0.1	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	0.1	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	0.1	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	0.1	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	0.1	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	0.1	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	0.1	0.88	

Nuts

Single Nut with Flange and Recirculation Caps FBZ-E-S

eLINE series

Rexroth mounting dimensions

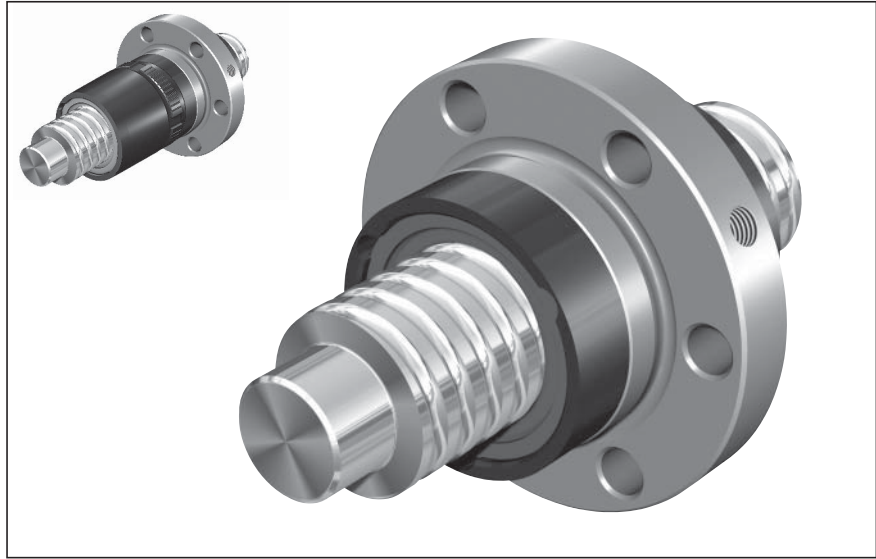
With seals

With backlash

For precision-rolled screws SN-R
of tolerance grade T7, T9

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

⚠ When setting up applications, do not allow components to collide with the Front Lube Unit.



Ordering code: **FBZ-E-S** 20 x 5R x 3-4 1 0 T9 R 81K120 41K120 550 0 1

d_0 = nominal diameter

P = lead

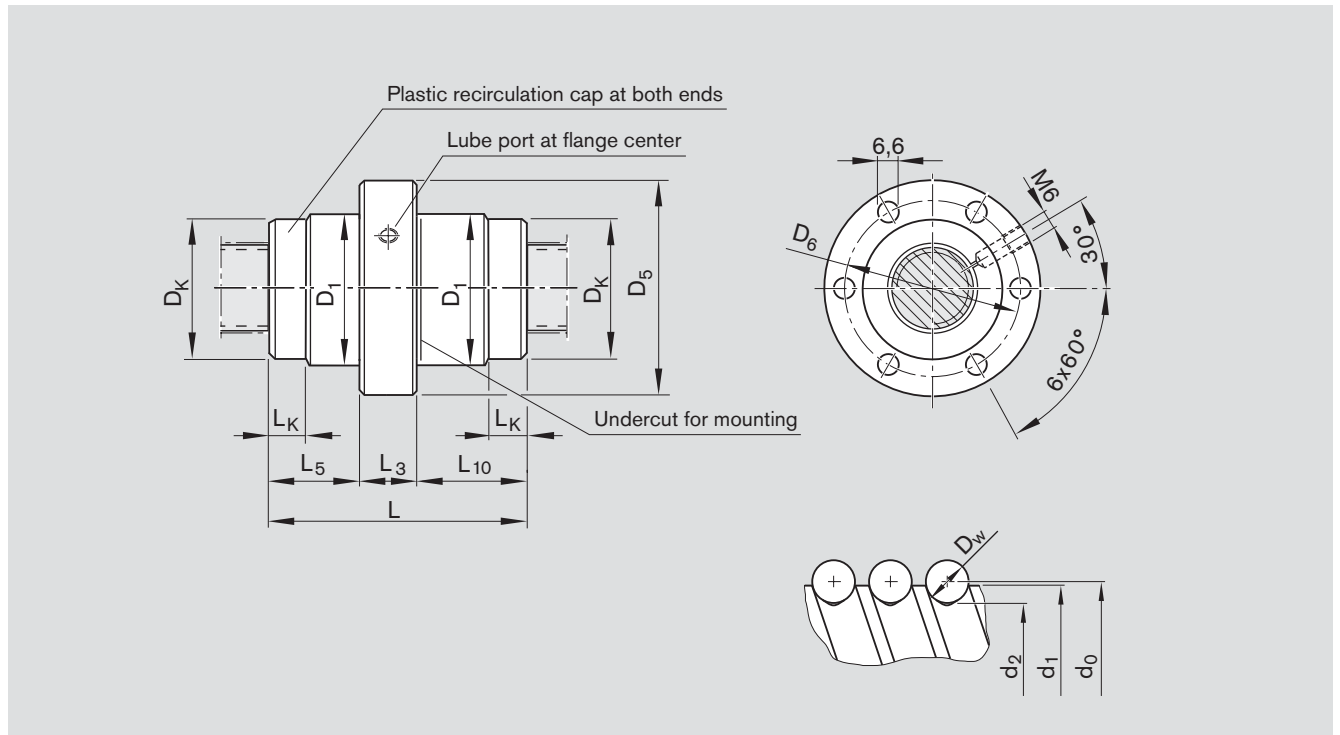
(R = right-hand, L = left-hand)

D_w = ball diameter

i = number of ball track turns

Category	Size $d_0 \times P \times D_w - i$	Part number	Load ratings		Linear speed ¹⁾ v_{max} (m/min)
			dyn. C (N)	stat. C ₀ (N)	
B	20 x 5R x 3 - 4	R2542 100 02	8600	12900	20
C	25 x 5R x 3 - 4	R2542 200 02	9500	16300	16
C	25 x 10R x 3 - 4	R2542 200 12	9400	16200	32
C	32 x 5R x 3.5 - 4	R2542 300 02	13000	24000	13
C	32 x 10R x 3.969 - 5	R2542 300 12	19000	35000	25

1) See page 115 Characteristic speed $d_0 \cdot n$ and page 150 Critical speed n_{cr}



Size	Dimensions (mm)											Max. backlash (mm)	Weight m (kg)
	d_1	d_2	D_1 -0.2	D_5	D_6	D_K	L	L_3	L_5 ± 0.5	L_{10}	L_K		
$d_0 \times P \times D_w - i$													
20 x 5R x 3 - 4	19	16.9	33	58	45	32.5	40	10	15.0	15.0	8.5	0.1	0.22
25 x 5R x 3 - 4	24	21.9	38	63	50	37.5	43	10	16.5	16.5	10.0	0.1	0.25
25 x 10R x 3 - 4	24	21.9	38	63	50	37.5	62	10	16.0	36.0	10.0	0.1	0.34
32 x 5R x 3.5 - 4	31	28.4	48	73	60	47.5	46	12	17.0	17.0	11.0	0.1	0.41
32 x 10R x 3.969 - 5	31	27.9	48	73	60	47.5	77	12	20.0	45.0	11.0	0.1	0.63

Nuts

Single Nut with Flange and Recirculation Caps FSZ-E-S

ECOplus series

Rexroth mounting dimensions

ECOplus load ratings in accordance with Standard series (see page 46)

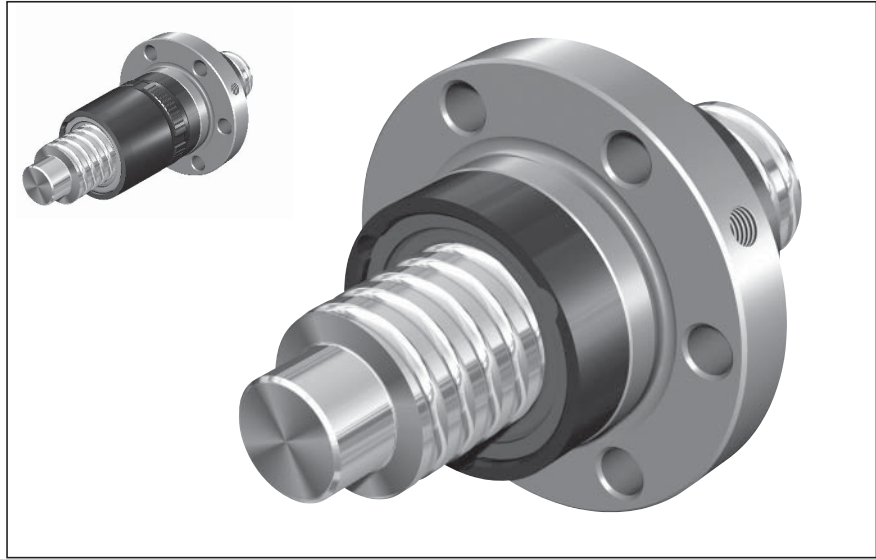
With seals

With backlash, reduced backlash, preload 2%; 3%; 5%

For precision-rolled screws SN-R of tolerance grade T5, T7, T9

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

⚠ When setting up applications, do not allow components to collide with the Front Lube Unit.



Ordering code: **FSZ-E-S 20 x 5R x 3-4 1 0 T7 R 81K120 41K120 550 0 1**

d_0 = nominal diameter

P = lead

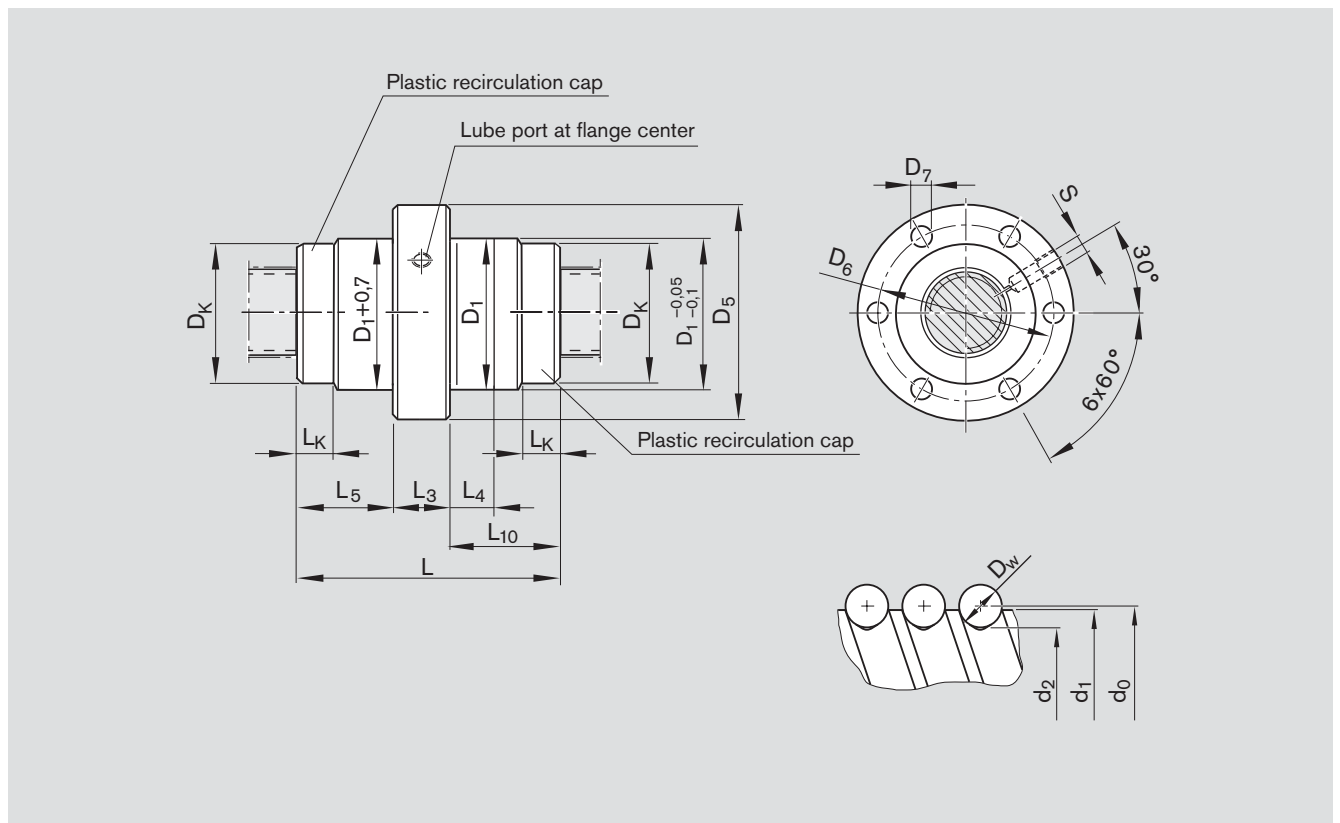
(R = right-hand, L = left-hand)

D_w = ball diameter

i = number of ball track turns

Category	Size $d_0 \times P \times D_w - i$	Part number	Load ratings		Linear speed ¹⁾ v_{max} (m/min)
			dyn. C (N)	stat. C ₀ (N)	
B	20 x 5R x 3 - 4	R1502 110 41	14300	21500	30
B	25 x 5R x 3 - 4	R1502 210 41	15900	27200	30
B	25 x 10R x 3 - 4	R1502 240 41	15700	27000	60
B	32 x 5R x 3.5 - 4	R1502 310 41	21600	40000	23
B	32 x 10R x 3.969 - 5	R1502 340 41	31700	58300	47
B	32 x 20R x 3.969 - 2	R1502 370 41	13500	21800	94
B	40 x 5R x 3.5 - 5	R1502 410 41	29100	64100	19
B	40 x 10R x 6 - 4	R1502 440 41	50000	86400	38
B	40 x 20R x 6 - 3	R1502 470 41	37900	62800	75

1) See page 115 Characteristic speed $d_0 \cdot n$ and page 150 Critical speed n_{cr}



Size	Dimensions (mm)														Weight m (kg)
	d_1	d_2	D_1 g6	D_5	D_6	D_7	D_K	L ± 0.5	L_3	L_4	L_5	L_{10}	L_K	S	
$d_0 \times P \times D_w - i$															
20 x 5R x 3 - 4	19	16.9	33	58	45	6.6	32.5	40	10	6	15.0	15.0	8.5	M6	0.22
25 x 5R x 3 - 4	24	21.9	38	63	50	6.6	37.5	43	10	6	16.5	16.5	10.0	M6	0.25
25 x 10R x 3 - 4	24	21.9	38	63	50	6.6	37.5	62	10	16	16.0	36.0	10.0	M6	0.34
32 x 5R x 3.5 - 4	31	28.4	48	73	60	6.6	47.5	46	12	6	17.0	17.0	11.0	M6	0.41
32 x 10R x 3.969 - 5	31	27.9	48	73	60	6.6	47.5	77	12	16	20.0	45.0	11.0	M6	0.63
32 x 20R x 3.969 - 2	31	27.9	56	80	68	6.6	47.5	65	12	10	19.0	34.0	11.0	M6	0.69
40 x 5R x 3.5 - 5	39	36.4	56	80	68	6.6	55.5	52	14	8	18.5	19.5	11.5	M8x1	0.54
40 x 10R x 6 - 4	38	33.8	63	95	78	9.0	62.5	71	14	16	22.0	35.0	12.5	M8x1	1.06
40 x 20R x 6 - 3	38	33.8	63	95	78	9.0	62.5	89	14	25	22.0	53.0	12.5	M8x1	1.30

Nuts

Single Nut with Flange and Recirculation Caps FEP-E-S

Speed series

Rexroth mounting dimensions

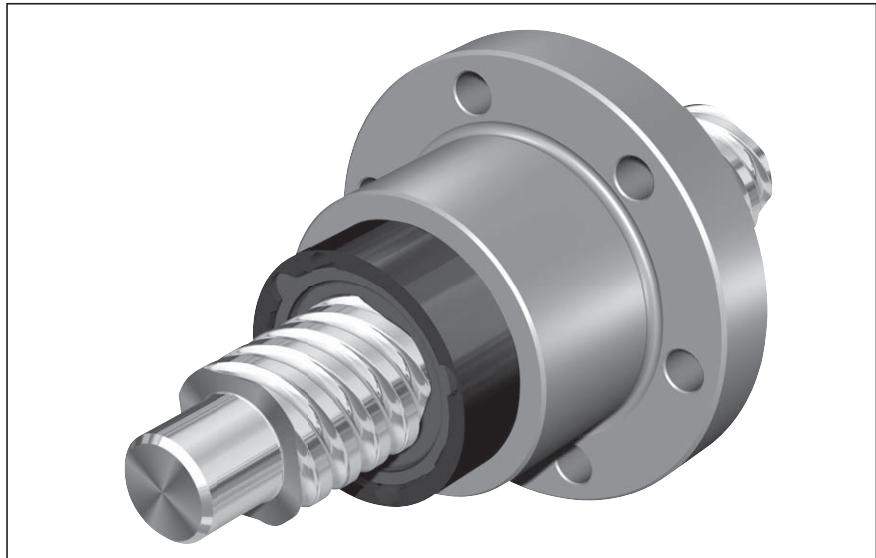
With seals

With backlash, reduced backlash
or preload 2%

For precision-rolled screws SN-R
(4-start) of 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 code: **FEP-E-S 25 x 25R x 3.5-1.2x4 1 0 T5 R 81K120 41K120 1100 0 1**

d_0 = nominal diameter

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

D_w = ball diameter

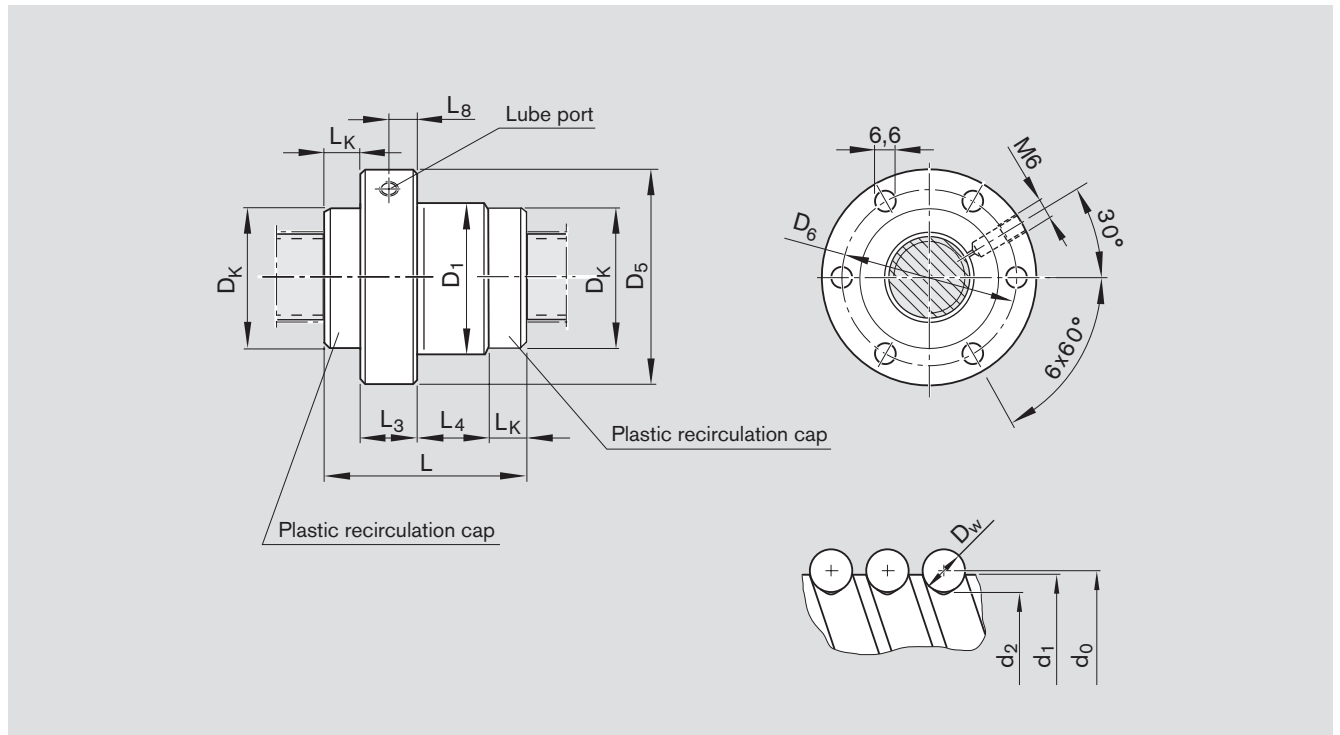
i = $a \times b$

a = Bearing turns per thread

b = number of load-carrying threads
on the screw

Category	Size $d_0 \times P \times D_w - i \times b$	Part number	Load ratings		Linear speed ¹⁾ v_{max} (m/min)
			dyn. C (N)	stat. C_0 (N)	
A	20 x 40R x 3.5 - 1 x 4	R2522 100 11	14000	26200	240
B	25 x 25R x 3.5 - 1.2 x 4	R2522 200 01	19700	39400	120
B	32 x 32R x 3.969 - 1.2 x 4	R2522 300 01	26300	57600	120
A	32 x 64R x 3.969 - 1 x 4	R2522 300 21	21100	49000	240

1) See page 115 Characteristic speed $d_0 \cdot n$ and page 150 Critical speed n_{cr}



Size	Dimensions (mm)											Weight 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	
d ₀ x P x D _w - i x b												
20 x 40R x 3.5 - 1 x 4	19	16.4	38	63	50	37.5	57	12	23	8.0	11	0.51
25 x 25R x 3.5 - 1.2 x 4	24	21.4	48	73	60	40.0	52	12	14	5.0	13	0.51
32 x 32R x 3.969 - 1.2 x 4	31	27.9	56	80	68	50.0	68	15	21	7.7	16	0.78
32 x 64R x 3.969 - 1 x 4	31	27.9	56	80	68	50.0	88	15	45	7.5	14	1.06

Nuts

Single Nut with Flange FEM-E-C

Standard series

Mounting dimensions
per DIN 69 051, Part 5
Flange type C

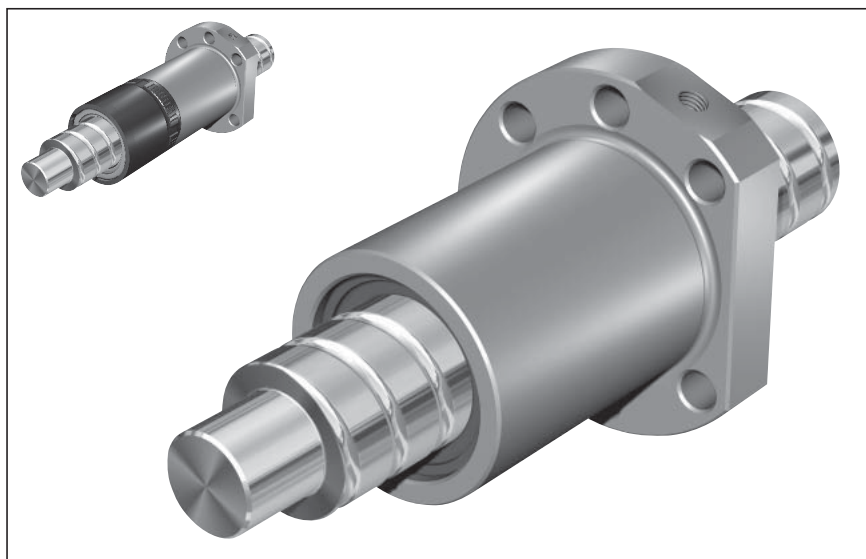
With standard seals

Reinforced seals, see page 126

With backlash, reduced backlash,
preload 2%; 3%; 5%

For precision-rolled screws SN-R
of tolerance grade T5, T7, T9

⚠ When setting up applications, do
not allow components to collide with
the Front Lube Unit.



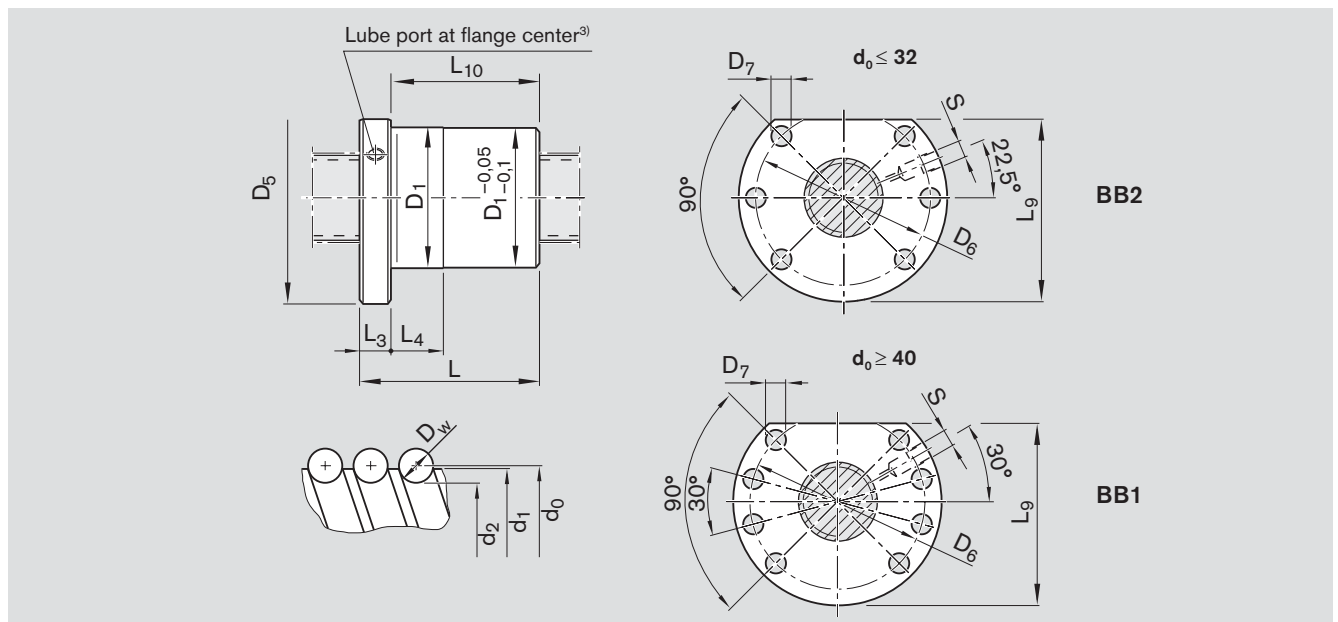
Ordering code: **FEM-E-C** 20 x 5R x 3-4 1 2 T7 R 82Z120 41Z120 1250 0 1

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

Category	Size $d_o \times P \times D_w - i$	Part number	Load ratings		Linear speed ¹⁾ v_{max} (m/min)
			dyn. C (N)	stat. C ₀ (N)	
A	16 x 5R x 3 - 4	R1502 010 65	12300	16100	30
B	16 x 10R x 3 - 3	R1502 040 85	9600	12300	60
B	16 x 16R x 3 - 3	R1502 060 65	9300	12000	96
A	20 x 5R x 3 - 4	R1502 110 85	14300	21500	30
A	20 x 20R x 3.5 - 3	R1502 170 65	13300	18800	120
A	25 x 5R x 3 - 4	R1502 210 85	15900	27200	30
A	25 x 10R x 3 - 4	R1502 240 85	15700	27000	60
A	25 x 25R x 3.5 - 3	R1502 280 65	14700	23300	150
A	32 x 5R x 3.5 - 4	R1502 310 85	21600	40000	23
A	32 x 10R x 3.969 - 5	R1502 340 86	31700	58300	47
A	32 x 20R x 3.969 - 3	R1502 370 65	19700	33700	94
A	32 x 32R x 3.969 - 3	R1502 390 65	19500	34000	150
B	40 x 5R x 3.5 - 5	R1502 410 86	29100	64100	19
B	40 x 10R x 6 - 4	R1502 440 85	50000	86400	38
C	40 x 12R x 6 - 4	R1502 450 65	49900	86200	45
B	40 x 16R x 6 - 4	R1502 460 65	49700	85900	60
A	40 x 20R x 6 - 3	R1502 470 85	37900	62800	75
A	40 x 40R x 6 - 3	R1502 490 65	37000	62300	150
B	50 x 5R x 3.5 - 5	R1502 510 86	32000	81300	15
A	50 x 10R x 6 - 6	R1502 540 86	79700	166500	30
C	50 x 12R x 6 - 6	R1502 550 66	79600	166400	36
B	50 x 16R x 6 - 6	R1502 560 66	79400	166000	48
A	50 x 20R x 6.5 - 5	R1502 570 86	75700	149700	60
B	50 x 40R x 6.5 - 3	R1502 590 65	46500	85900	120
B	63 x 10R x 6 - 6	R1502 640 86	88800	214300	24
B	63 x 20R x 6.5 - 5	R1502 670 86	83900	190300	48
B	63 x 40R x 6.5 - 3	R1502 690 65	53400	114100	95
C	80 x 10R x 6.5 - 6	R1502 740 86	108400	291700	19
B	80 x 20R x 12.7 - 6 ²⁾	R1502 770 96	262700	534200	30

1) See page 115 Characteristic speed $d_o \cdot n$ and page 150 Critical speed n_{cr}

2) Nuts 80 x 20R x 12.7 - 6 available up to a thread length of 2500 mm, with preload



Size $d_0 \times P \times D_w - i$	Dimensions (mm)													Weight m (kg)
	d_1	d_2	D_1 g6	D_5	Hole pattern	D_6	D_7	L	L_3	L_4	L_9	L_{10}	$S^3)$	
16 x 5R x 3 - 4	15.0	12.9	28	48	BB2	38	5.5	38	12	10	44.0	26	M6	0.19
16 x 10R x 3 - 3	15.0	12.9	28	48	BB2	38	5.5	45	12	16	44.0	33	M6	0.21
16 x 16R x 3 - 3	15.0	12.9	28	48	BB2	38	5.5	61	12	20	44.0	49	M6	0.26
20 x 5R x 3 - 4	19.0	16.9	36	58	BB2	47	6.6	40	12	10	51.0	28	M6	0.31
20 x 20R x 3.5 - 3	19.0	16.7	36	58	BB2	47	6.6	77	12	25	51.0	65	M6	0.49
25 x 5R x 3 - 4	24.0	21.9	40	62	BB2	51	6.6	45	12	10	55.0	33	M6	0.36
25 x 10R x 3 - 4	24.0	21.9	40	62	BB2	51	6.6	64	12	16	55.0	52	M6	0.47
25 x 25R x 3.5 - 3	24.0	21.4	40	62	BB2	51	6.6	95	12	30	55.0	83	M6	0.63
32 x 5R x 3.5 - 4	31.0	28.4	50	80	BB2	65	9.0	48	13	10	71.0	35	M6	0.62
32 x 10R x 3.969 - 5	31.0	27.9	50	80	BB2	65	9.0	77	13	16	71.0	64	M6	0.84
32 x 20R x 3.969 - 3	31.0	27.9	50	80	BB2	65	9.0	84	13	25	71.0	71	M6	0.90
32 x 32R x 3.969 - 3	31.0	27.9	50	80	BB2	65	9.0	120	13	40	71.0	107	M6	1.21
40 x 5R x 3.5 - 5	39.0	36.4	63	93	BB1	78	9.0	54	15	10	81.5	39	M8x1	1.03
40 x 10R x 6 - 4	38.0	33.8	63	93	BB1	78	9.0	70	15	16	81.5	55	M8x1	1.19
40 x 12R x 6 - 4	38.0	33.8	63	93	BB1	78	9.0	75	15	25	81.5	60	M8x1	1.27
40 x 16R x 6 - 4	38.0	33.8	63	93	BB1	78	9.0	90	15	25	81.5	75	M8x1	1.51
40 x 20R x 6 - 3	38.0	33.8	63	93	BB1	78	9.0	88	15	25	81.5	73	M8x1	1.44
40 x 40R x 6 - 3	38.0	33.8	63	93	BB1	78	9.0	142	15	45	81.5	127	M8x1	2.16
50 x 5R x 3.5 - 5	49.0	46.4	75	110	BB1	93	11.0	54	15	10	97.5	39	M8x1	1.39
50 x 10R x 6 - 6	48.0	43.8	75	110	BB1	93	11.0	90	18	16	97.5	72	M8x1	2.14
50 x 12R x 6 - 6	48.0	43.8	75	110	BB1	93	11.0	105	18	25	97.5	87	M8x1	2.38
50 x 16R x 6 - 6	48.0	43.8	75	110	BB1	93	11.0	128	18	25	97.5	110	M8x1	2.75
50 x 20R x 6.5 - 5	48.0	43.4	75	110	BB1	93	11.0	132	18	25	97.5	114	M8x1	2.73
50 x 40R x 6.5 - 3	48.0	43.4	75	110	BB1	93	11.0	149	18	45	97.5	131	M8x1	3.04
63 x 10R x 6 - 6	61.0	56.8	90	125	BB1	108	11.0	90	22	16	110.0	68	M8x1	2.56
63 x 20R x 6.5 - 5	61.0	56.4	95	135	BB1	115	13.5	132	22	25	117.5	110	M8x1	4.51
63 x 40R x 6.5 - 3	61.0	56.4	95	135	BB1	115	13.5	149	22	45	117.5	127	M8x1	5.04
80 x 10R x 6.5 - 6	78.0	73.3	105	145	BB1	125	13.5	95	22	16	127.5	73	M8x1	3.40
80 x 20R x 12.7 - 6	76.0	67.0	125	165	BB1	145	13.5	170	25	25	147.5	145	M8x1	10.20

3) Lube port machining: flat surface $L_3 \leq 13$ mm, countersink $L_3 > 14$ mm

Nuts

Adjustable-Preload Single Nut SEM-E-C

Standard series

Mounting dimensions
per DIN 69 051, Part 5
Flange type C

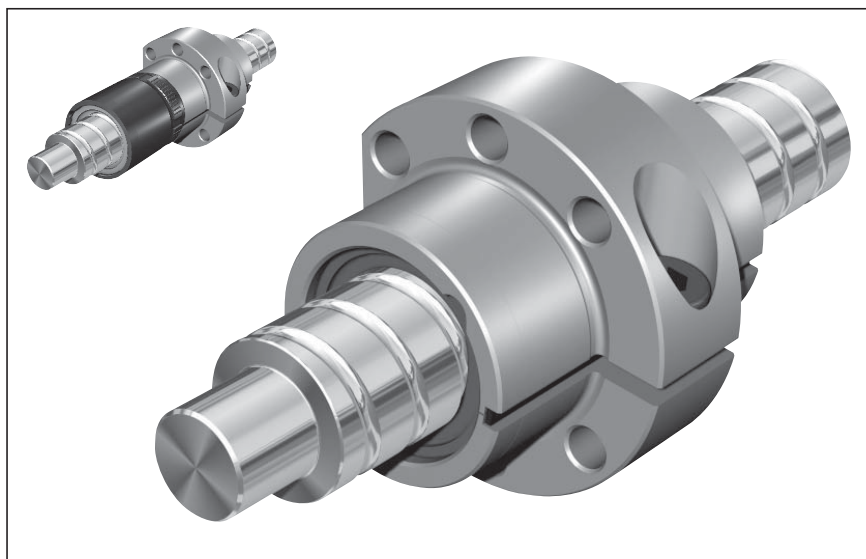
With standard seals

Reinforced seals, see page 126

Adjustable preload

For precision-rolled screws SN-R
of tolerance grade 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, L = left-hand)

D_w = ball diameter

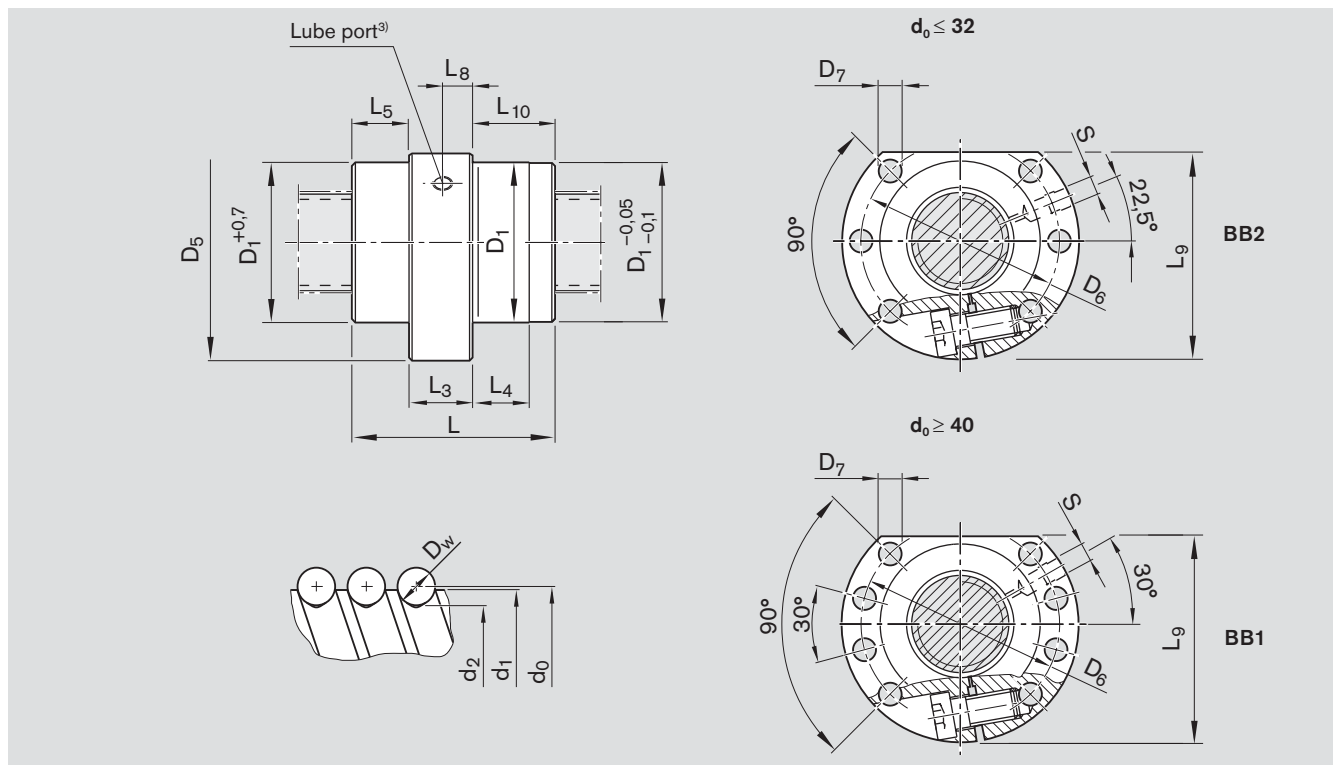
i = number of ball track turns

Ordering code: **SEM-E-C 20 x 5R x 3-4 1 2 T7 R 82Z120 41Z120 1250 0 1**

Category	Size $d_0 \times P \times D_w - i$	Part number	Load ratings		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	12300	16100	30	27.940	27.975
C	16 x 10R x 3 - 3	R1512 040 75	9600	12300	60	27.940	27.975
C	16 x 16R x 3 - 3	R1512 060 55	9300	12000	96	27.950	27.978
B	20 x 5R x 3 - 4	R1512 110 75	14300	21500	30	35.935	35.970
B	20 x 20R x 3.5 - 3	R1512 170 55	13300	18800	120	35.945	35.973
B	25 x 5R x 3 - 4	R1512 210 75	15900	27200	30	39.935	39.970
B	25 x 10R x 3 - 4	R1512 240 75	15700	27000	60	39.935	39.970
C	25 x 25R x 3.5 - 3	R1512 280 55	14700	23300	150	39.945	39.973
B	32 x 5R x 3.5 - 4	R1512 310 75	21600	40000	23	49.935	49.970
B	32 x 10R x 3.969 - 5	R1512 340 75	31700	58300	47	49.935	49.970
C	32 x 20R x 3.969 - 3	R1512 370 55	19700	33700	94	49.945	49.973
C	32 x 32R x 3.969 - 3	R1512 390 55	19500	34000	150	49.945	49.973
B	40 x 5R x 3.5 - 5	R1512 410 75	29100	64100	19	62.931	62.966
C	40 x 10R x 6 - 4	R1512 440 75	50000	86400	38	62.931	62.966
C	40 x 12R x 6 - 4	R1512 450 55	49900	86200	45	62.931	62.966
C	40 x 20R x 6 - 3	R1512 470 75	37900	62800	75	62.941	62.969
C	40 x 40R x 6 - 3	R1512 490 55	37000	62300	150	62.941	62.969
C	50 x 5R x 3.5 - 5	R1512 510 75	32000	81300	15	74.931	74.966
B	50 x 10R x 6 - 6	R1512 540 75	79700	166500	30	74.931	74.966
C	50 x 12R x 6 - 6	R1512 550 55	79600	166400	36	74.931	74.966
B	50 x 20R x 6.5 - 5	R1512 570 76	75700	149700	60	74.941	74.969
B	50 x 40R x 6.5 - 3	R1512 590 55	46500	85900	120	74.941	74.969
C	63 x 10R x 6 - 6	R1512 640 75	88800	214300	24	89.926	89.961
B	63 x 20R x 6.5 - 5	R1512 670 76	83900	190300	48	94.936	94.964
C	63 x 40R x 6.5 - 3	R1512 690 55	53400	114100	95	94.936	94.964
C	80 x 10R x 6.5 - 6	R1512 740 75	108400	291700	19	104.926	104.961
C	80 x 20R x 12.7 - 6 ²⁾	R1512 770 56	262700	534200	30	124.931	124.959

1) See page 115 Characteristic speed $d_0 \cdot n$ and page 150 Critical speed n_{cr}

2) Nuts 80 x 20R x 12.7 - 6 available up to a thread length of 2500 mm, with preload



Size	Dimensions (mm)													Weight		
	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 ³⁾	m (kg)
d ₀ x P x D _w - i																
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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	5.36
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	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	13.50

3) Lube port machining: flat surface $L_3 \leq 13$ mm, countersink $L_3 > 14$ mm

Nuts

Single Nut with Flange FEM-E-S

Standard series

Rexroth mounting dimensions

With standard seals

With left-hand thread in some versions

Reinforced seals, see page 126

With backlash, reduced backlash,

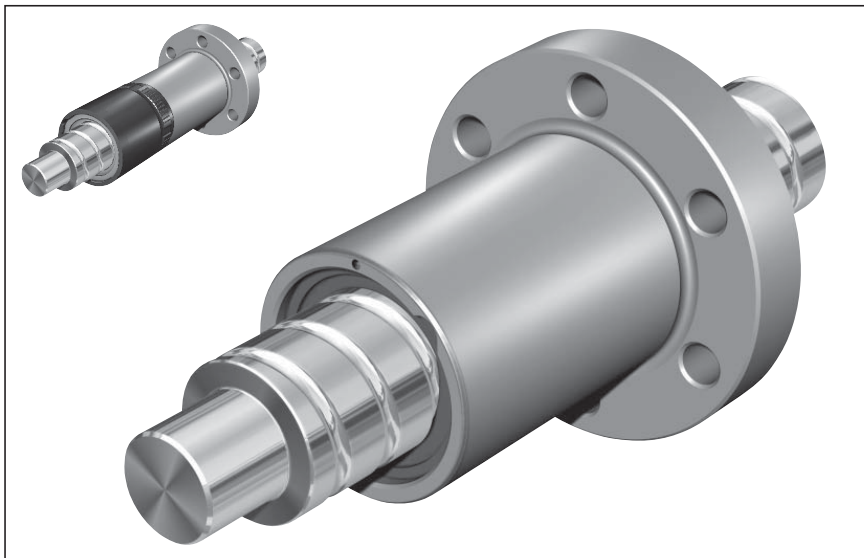
preload 2%; 3%; 5%

For precision-rolled screws SN-R

of tolerance grade T5, T7, T9

Note: The Front Lube Unit is only available for right-hand screw threads.

⚠ When setting up applications, do not allow components to collide with the Front Lube Unit.



Ordering code: **FEM-E-S** 20 x 5R x 3-4 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

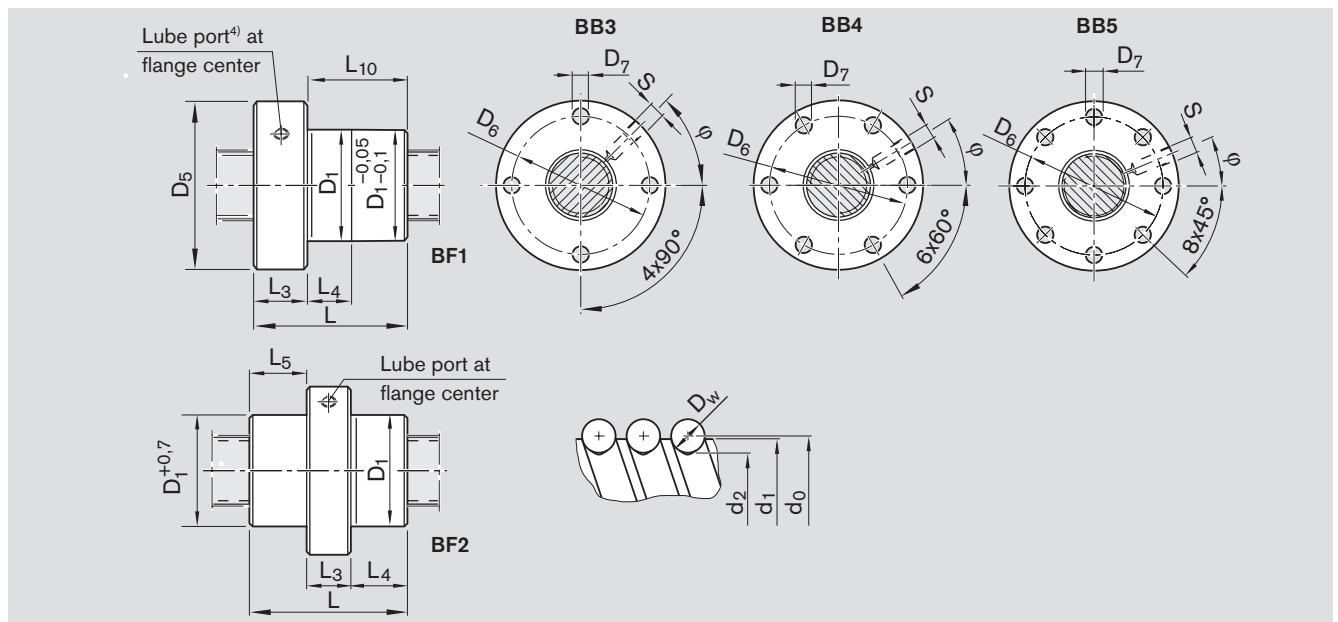
i = number of ball track turns

Category	Size $d_0 \times P \times D_w - i$	Part number	Load ratings		Linear speed ¹⁾ v_{max} (m/min)
			dyn. C (N)	stat. C ₀ (N)	
A	8 x 2.5R x 1.588 - 3	R1532 230 03	2200	2800	15
A	12 x 5R x 2 - 3	R1532 460 23	3800	5800	30
B	12 x 10R x 2 - 2	R1532 490 13	2500	3600	60
A	16 x 5R x 3 - 4	R1512 010 23	12300	16100	30
C	16 x 5L x 3 - 4	R1552 010 03	12300	16100	30
A	16 x 10R x 3 - 3	R1512 040 13	9600	12300	60
B	16 x 16R x 3 - 2	R1512 060 13	6300	7600	96
A ²⁾	20 x 5R x 3 - 4	R1512 110 13	14300	21500	30
B	20 x 5L x 3 - 4	R1552 110 13	14300	21500	30
A	20 x 10R x 3 - 4	R1512 140 13	14100	21300	60
A	20 x 20R x 3.5 - 2	R1512 170 13	9100	12100	120
B	20 x 20L x 3.5 - 2	R1552 170 13	9100	12100	120
A ²⁾	25 x 5R x 3 - 4	R1512 210 13	15900	27200	30
B	25 x 5 L x 3 - 4	R1552 210 13	15900	27200	30
A ²⁾	25 x 10R x 3 - 4	R1512 240 13	15700	27000	60
A	25 x 25R x 3.5 - 2	R1512 280 13	10100	15100	150
B	25 x 25 L x 3.5 - 2	R1552 280 13	10100	15100	150
A ²⁾	32 x 5R x 3.5 - 4	R1512 310 13	21600	40000	23
A ²⁾	32 x 10R x 3.969 - 5	R1512 340 13	31700	58300	47
A ²⁾	32 x 20R x 3.969 - 2	R1512 370 13	13500	21800	94
A	32 x 32R x 3.969 - 2	R1512 390 13	13400	22000	150
A	40 x 5R x 3.5 - 5	R1512 410 13	29100	64100	19
A ²⁾	40 x 10R x 6 - 4	R1512 440 13	50000	86400	38
A ²⁾	40 x 20R x 6 - 3	R1512 470 13	37900	62800	75
B	40 x 40R x 6 - 2	R1512 490 13	25500	40300	150
B	50 x 5R x 3.5 - 5	R1512 510 13	32000	81300	15
A	50 x 10R x 6 - 6	R1512 540 13	79700	166500	30
C	50 x 16R x 6 - 6	R1512 560 13	79400	166000	48
B	50 x 20R x 6.5 - 3	R1512 570 13	47900	87900	60
B	50 x 40R x 6.5 - 2	R1512 590 13	32100	55800	120
A	63 x 10R x 6 - 6	R1512 640 13	88800	214300	24
B	63 x 20R x 6.5 - 3	R1512 670 13	53200	112100	48
C	63 x 40R x 6.5 - 2	R1512 690 13	36900	74300	95
B	80 x 10R x 6.5 - 6	R1512 740 13	108400	291700	19
B	80 x 20R x 12.7 - 6 ³⁾	R1512 770 23	262700	534200	30

1) See page 115 Characteristic speed $d_0 \cdot n$ and page 150 Critical speed n_{cr}

2) Can be replaced in these sizes by FSZ-E-S

3) Nuts 80 x 20R x 12.7 - 6 available up to a thread length of 2500 mm, with preload



Size $d_0 \times P \times D_w - i$	Dimensions (mm)														φ (°)	Weight m (kg)
	d_1	d_2	D_1 g6	D_5	Hole pattern	D_6	D_7	Type	L	L_3	L_4	L_5	L_{10}	$S^{4)}$		
8 x 2.5R x 1.588 - 3	7.5	6.3	16	30	BB4	23	3.4	BF1	16	8	8.0	-	8	M4	30.0	0.05
12 x 5R x 2 - 3	11.4	9.9	24	40	BB4	32	4.5	BF1	28	12	10.0	-	16	M6	330.0	0.12
12 x 10R x 2 - 2	11.4	9.9	24	40	BB4	32	4.5	BF1	33	12	16.0	-	21	M6	330.0	0.14
16 x 5R x 3 - 4	15.0	12.9	28	53	BB3	40	6.6	BF1	38	12	10.0	-	26	M6	315.0	0.24
16 x 5L x 3 - 4	15.0	12.9	28	53	BB3	40	6.6	BF1	38	12	10.0	-	26	M6	45.0	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	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	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	30.0	0.28
20 x 5L x 3 - 4	19.0	16.9	33	58	BB4	45	6.6	BF1	40	12	10.0	-	28	M6	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	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	30.0	0.60
20 x 20L x 3.5 - 2	19.0	16.7	38	63	BB4	50	6.6	BF2	57	20	18.5	18.5	-	M6	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	30.0	0.35
25 x 5L x 3 - 4	24.0	21.9	38	63	BB4	50	6.6	BF1	45	12	10.0	-	33	M6	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	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	18.0	1.09
25 x 25L x 3.5 - 2	24.0	21.4	48	73	BB4	60	6.6	BF2	70	25	22.5	22.5	-	M6	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	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	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	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	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	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	30.0	1.29
40 x 20R x 6 - 3	38.0	33.8	63	95	BB4	78	9.0	BF1	88	15	25.0	-	73	M8x1	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	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	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	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	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	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	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	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	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	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	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	22.5	11.00

4) Lube port machining: flat surface $L_3 \leq 13$ mm, countersink $L_3 > 14$ mm. For size 8 x 2.5, a funnel-type lube nipple DIN 3405 is provided.

Nuts

Adjustable-Preload Single Nut SEM-E-S

Standard series

Rexroth mounting dimensions

With standard seals

Reinforced seals, see page 126

Adjustable preload

For precision-rolled screws SN-R

of tolerance grade T5, T7

With left-hand thread in some versions

Note: The Front Lube Unit is only available for right-hand screw threads.

⚠ When setting up applications, do not allow components to collide with the Front Lube Unit.

d_0 = nominal diameter

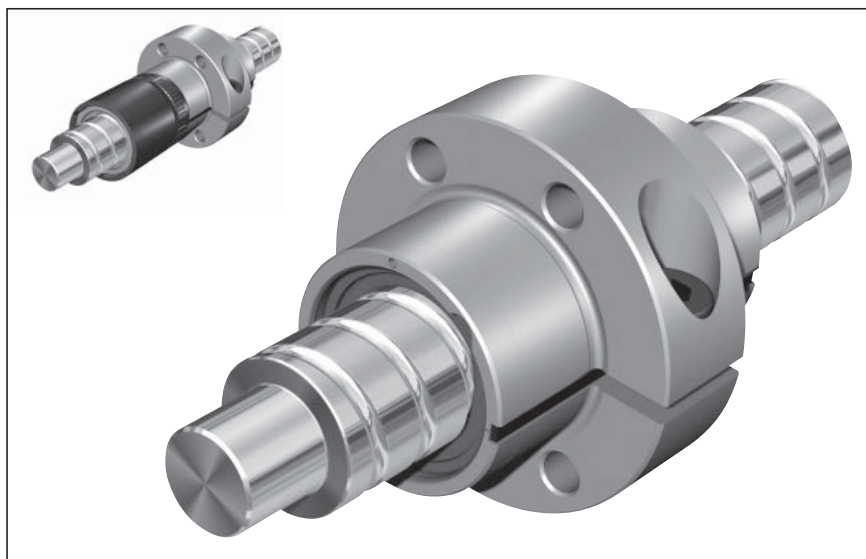
P = lead

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

D_w = ball diameter

i = number of ball track turns

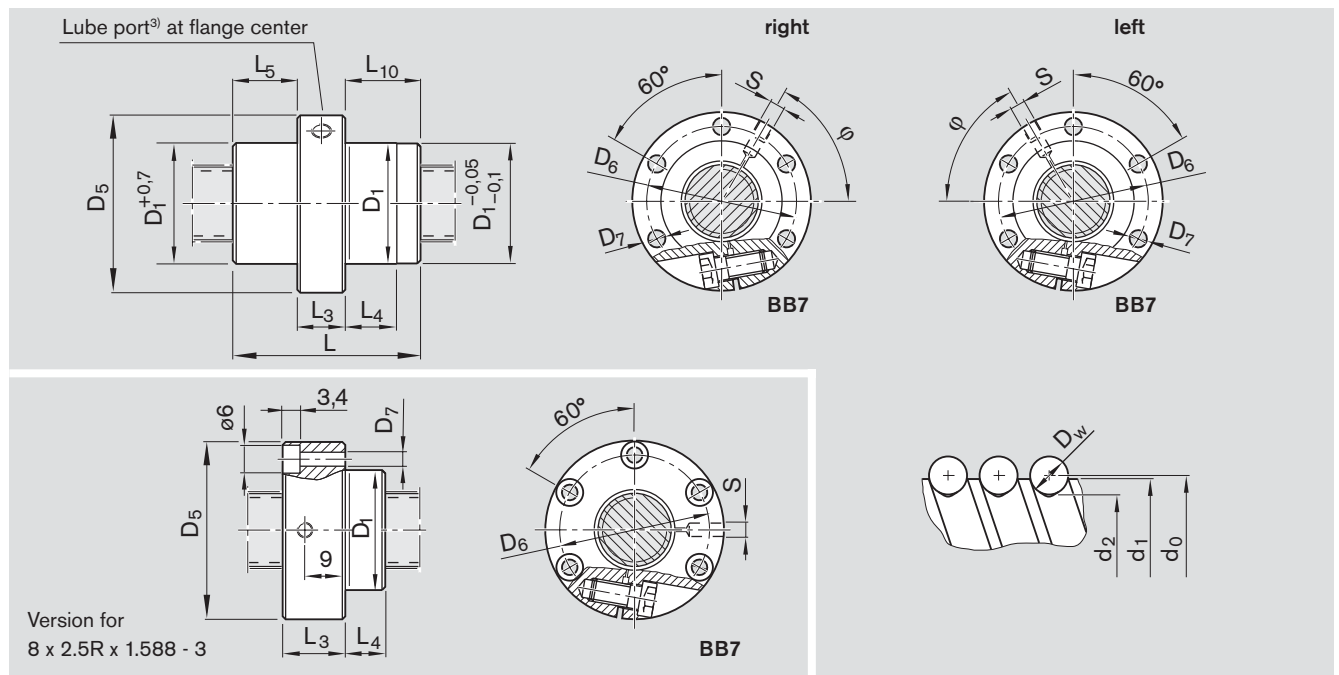
Ordering code: **SEM-E-S 20 x 5R x 3-4 1 2 T7 R 82Z120 41Z120 1250 0 1**



Category	Size $d_0 \times P \times D_w - i$	Part number	Load ratings		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	8 x 2.5R x 1.588 - 3	R1532 230 04	2200	2800	15	15.953	15.987
B	12 x 5R x 2 - 3	R1532 460 24	3800	5800	30	23.940	23.975
C	12 x 10R x 2 - 2	R1532 490 14	2500	3600	60	23.940	23.975
B	16 x 5R x 3 - 4	R1512 010 24	12300	16100	30	27.940	27.975
C	16 x 10R x 3 - 3	R1512 040 14	9600	12300	60	27.940	27.975
C	16 x 16R x 3 - 2	R1512 060 14	6300	7600	96	32.945	32.973
B	20 x 5R x 3 - 4	R1512 110 14	14300	21500	30	32.935	32.970
B	20 x 20R x 3.5 - 2	R1512 170 14	9100	12100	120	37.945	37.973
B	25 x 5R x 3 - 4	R1512 210 14	15900	27200	30	37.935	37.970
B	25 x 10R x 3 - 4	R1512 240 14	15700	27000	60	37.935	37.970
B	25 x 25R x 3.5 - 2	R1512 280 14	10100	15100	150	47.945	47.973
B	32 x 5R x 3.5 - 4	R1512 310 14	21600	40000	23	47.935	47.970
A	32 x 5L x 3.5 - 4	R1552 310 04	21600	40000	23	47.935	47.970
B	32 x 10R x 3.969 - 5	R1512 340 14	31700	58300	47	47.935	47.970
B	32 x 20R x 3.969 - 2	R1512 370 14	13500	21800	94	55.941	55.969
B	32 x 32R x 3.969 - 2	R1512 390 14	13400	22000	150	55.941	55.969
B	40 x 5R x 3.5 - 5	R1512 410 14	29100	64100	19	55.931	55.966
B	40 x 5L x 3.5 - 5	R1552 410 04	29100	64100	19	55.931	55.966
B	40 x 10R x 6 - 4	R1512 440 14	50000	86400	38	62.931	62.966
B	40 x 10L x 6 - 4	R1552 440 04	50000	86400	38	62.931	62.966
B	40 x 20R x 6 - 3	R1512 470 14	37900	62800	75	62.941	62.969
B	40 x 40R x 6 - 2	R1512 490 14	25500	40300	150	71.941	71.969
C	50 x 5R x 3.5 - 5	R1512 510 14	32000	81300	15	67.931	67.966
B	50 x 10R x 6 - 6	R1512 540 14	79700	166500	30	71.931	71.966
B	50 x 20R x 6.5 - 3	R1512 570 14	47900	87900	60	84.936	84.964
B	50 x 40R x 6.5 - 2	R1512 590 14	32100	55800	120	84.936	84.964
B	63 x 10R x 6 - 6	R1512 640 14	88800	214300	24	84.926	84.961
C	63 x 20R x 6.5 - 3	R1512 670 14	53200	112100	48	94.936	94.964
C	63 x 40R x 6.5 - 2	R1512 690 14	36900	74300	95	94.936	94.964
C	80 x 10R x 6.5 - 6	R1512 740 14	108400	291700	19	104.926	104.961
C	80 x 20R x 12.7 - 6 ²⁾	R1512 770 24	262700	534200	30	124.931	124.959

1) See page 115 Characteristic speed $d_0 \cdot n$ and page 150 Critical speed n_{cr}

2) Nuts 80 x 20R x 12.7 - 6 available up to a thread length of 2500 mm, with preload



Size $d_0 \times P \times D_w - i$	Dimensions (mm)													$S^3)$	φ (°)	Weight 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_{10}				
8 x 2.5R x 1.588 - 3	7.5	6.3	16	30	BB7	23	3.4	16	13	3.0	-	3.0	M4	0	0.06	
12 x 5R x 2 - 3	11.4	9.9	24	40	BB7	32	4.5	28	12	8.0	8.0	8.0	M6	55	0.12	
12 x 10R x 2 - 2	11.4	9.9	24	40	BB7	32	4.5	33	12	10.5	10.5	10.5	M6	55	0.13	
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	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	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	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	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	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	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	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	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	60	0.64	
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	59	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	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	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	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	65	0.87	
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	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	57	1.53	
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	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	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	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	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	61	2.44	
50 x 20R x 6.5 - 3	48.0	43.4	85	125	BB7	105	11.0	92	30	25.0	31.0	31.0	M8x1	180	3.94	
50 x 40R x 6.5 - 2	48.0	43.4	85	125	BB7	105	11.0	109	30	39.5	39.5	39.5	M8x1	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	65	2.94	
63 x 20R x 6.5 - 3	61.0	56.4	95	140	BB7	118	14.0	92	30	25.0	31.0	31.0	M8x1	190	4.45	
63 x 40R x 6.5 - 2	61.0	56.4	95	140	BB7	118	14.0	109	30	39.5	39.5	39.5	M8x1	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	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	60	13.30	

3) Lube port machining: flat surface $L_3 \leq 13$ mm, countersink $L_3 > 14$ mm. For size 8 x 2.5, a funnel-type lube nipple DIN 3405 is provided.

Nuts

Cylindrical Single Nut ZEM-E-S

Standard series

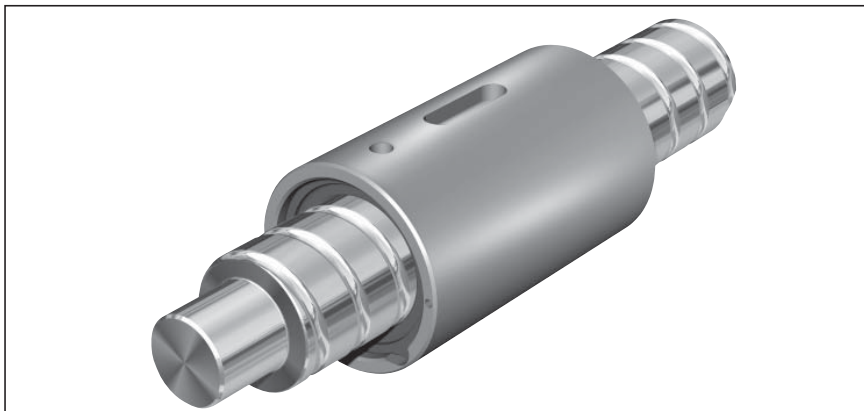
Rexroth mounting dimensions

With standard seals

Reinforced seals, see page 126

With backlash, reduced backlash,
preload 2%; 3%; 5%For precision-rolled screws SN-R
of tolerance grade T5, T7, T9

With left-hand thread in some versions

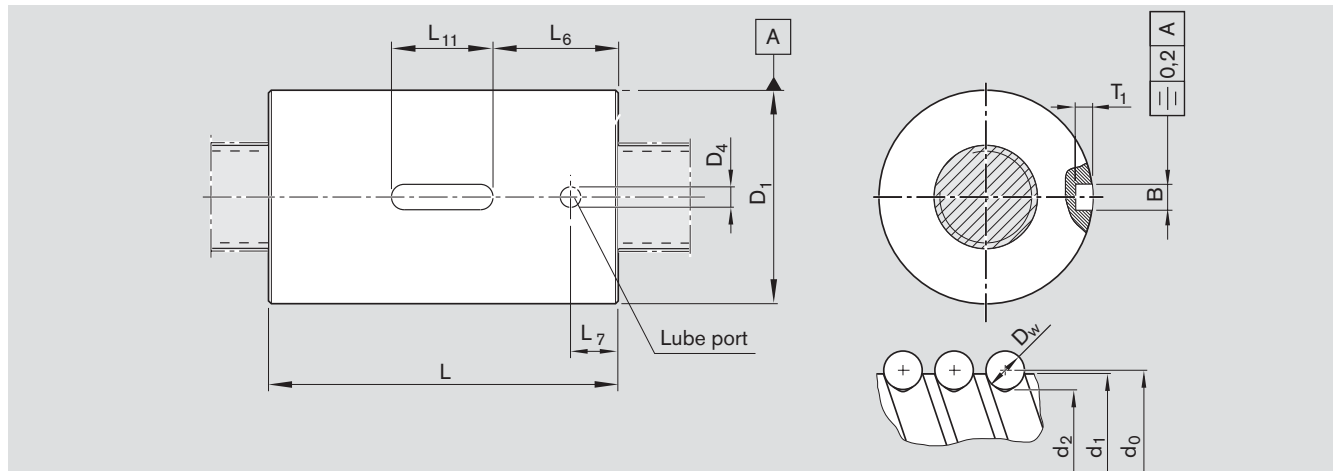
Ordering code: **ZEM-E-S 20 x 5R x 3-5 1 2 T7 R 82Z120 41Z120 1250 0 1**

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		Linear speed ¹⁾ v_{max} (m/min)
			dyn. C (N)	stat. C ₀ (N)	
A	8 x 2.5R x 1.588 - 3	R1532 230 02	2200	2800	15
B ²⁾	12 x 2R x 1.2 - 4	R1532 422 01	2240	4160	12
A	12 x 5R x 2 - 3	R1532 460 32	3800	5800	30
A ²⁾	12 x 5R x 2 - 3	R1532 462 25	3800	5800	30
B	12 x 10R x 2 - 2	R1532 490 22	2500	3600	60
B ²⁾	12 x 10R x 2 - 2	R1532 492 00	2500	3600	60
A	16 x 5R x 3 - 4	R1512 010 22	12300	16100	30
B	16 x 5L x 3 - 4	R1552 010 02	12300	16100	30
B ²⁾	16 x 5R x 3 - 4	R1512 012 67	12300	16100	30
A	16 x 10R x 3 - 3	R1512 040 12	9600	12300	60
B ²⁾	16 x 10R x 3 - 3	R1512 042 08	9600	12300	60
B ²⁾	16 x 10R x 3 - 3	R1512 042 09	9600	12300	60
B	16 x 16R x 3 - 2	R1512 060 12	6300	7600	96
B ²⁾	16 x 16R x 3 - 2	R1512 062 10	6300	7600	96
B ²⁾	16 x 16R x 3 - 3	R1512 062 11	9600	12300	96
A	20 x 5R x 3 - 5	R1512 110 12	17500	27300	30
B ²⁾	20 x 5R x 3 - 4	R1512 112 43	14300	21500	30
A	20 x 10R x 3 - 4	R1512 140 12	14100	21300	60
A	20 x 20R x 3.5 - 2	R1512 170 12	9100	12100	120
B	20 x 20R x 3.5 - 3	R1512 170 52	13300	18800	120
B ²⁾	20 x 20R x 3.5 - 3	R1512 172 07	13300	18800	120
A	25 x 5R x 3 - 4	R1512 210 12	15900	27200	30
A	25 x 10R x 3 - 4	R1512 240 12	15700	27000	60
B	25 x 25R x 3.5 - 2	R1512 280 12	10100	15100	150
B	25 x 25R x 3.5 - 3	R1512 280 52	14700	23300	150
B	32 x 5R x 3.5 - 4	R1512 310 12	21600	40000	23
B	32 x 5R x 3.5 - 4	R1512 310 52	21600	40000	23
A	32 x 10R x 3.969 - 5	R1512 340 12	31700	58300	47
B	32 x 10R x 3.969 - 5	R1512 340 52	31700	58300	47
C	32 x 20R x 3.969 - 2	R1512 370 12	13500	21800	94
B	32 x 20R x 3.969 - 3	R1512 370 52	19700	33700	94
C	32 x 32R x 3.969 - 2	R1512 390 12	13400	22000	150
B	32 x 32R x 3.969 - 3	R1512 390 52	19500	34000	150
C	40 x 5R x 3.5 - 5	R1512 410 12	29100	64100	19
B ²⁾	40 x 5R x 3.5 - 5	R1512 412 21	29100	64100	19
B	40 x 10R x 6 - 4	R1512 440 12	50000	86400	38
B	40 x 20R x 6 - 3	R1512 470 12	37900	62800	75
C	40 x 40R x 6 - 2	R1512 490 12	25500	40300	150
B	40 x 40R x 6 - 3	R1512 490 52	37000	62300	150
C	50 x 5R x 3.5 - 5	R1512 510 12	32000	81300	15
C	50 x 10R x 6 - 6	R1512 540 12	79700	166500	30
C	50 x 20R x 6.5 - 3	R1512 570 12	47900	87900	60
C	63 x 10R x 6 - 6	R1512 640 12	88800	214300	24

1) See page 115 Characteristic speed $d_0 \cdot n$ and page 150 Critical speed n_c

2) Special nuts for Rexroth modules and drive units



Size	Dimensions (mm)											Weight	
	d_1	d_2	D_1 g6	D_4	L $\pm 0,1$	L_6	L_7	L_{11} $+0,2$	B P9	T_1 $+0,1$	m (kg)		
$8 \times 2.5R \times 1.588 - 3$	7.5	6.3	16	2	16	5.0	3.5	6	3	1.8	0.02		
$12 \times 2R \times 1.2 - 4$	11.7	10.8	21	2	19	5.5	3.5	8	3	1.8	0.03		
$12 \times 5R \times 2 - 3$	11.4	9.9	24	2	28	8.0	3.5	12	5	3.0	0.06		
$12 \times 5R \times 2 - 3$	11.4	9.9	21	2	28	8.0	3.5	12	3	1.8	0.04		
$12 \times 10R \times 2 - 2$	11.4	9.9	24	2	33	10.5	3.5	12	5	3.0	0.07		
$12 \times 10R \times 2 - 2$	11.4	9.9	21	2	33	10.5	3.5	12	3	1.8	0.05		
$16 \times 5R \times 3 - 4$	15.0	12.9	28	4	35	14.5	9.5	12	5	3.0	0.09		
$16 \times 5L \times 3 - 4$	15.0	12.9	28	4	35	14.5	9.5	12	5	3.0	0.09		
$16 \times 5R \times 3 - 4$	15.0	12.9	33	2	45	14.5	9.5	16	5	3.0	0.17		
$16 \times 10R \times 3 - 3$	15.0	12.9	28	4	45	14.5	9.5	16	5	3.0	0.12		
$16 \times 10R \times 3 - 3$	15.0	12.9	38	4	54	19.0	9.5	16	5	3.0	0.35		
$16 \times 10R \times 3 - 3$	15.0	12.9	33	4	45	14.5	9.5	16	5	3.0	0.20		
$16 \times 16R \times 3 - 2$	15.0	12.9	33	4	45	14.5	9.5	16	5	3.0	0.20		
$16 \times 16R \times 3 - 2$	15.0	12.9	28	4	45	14.5	9.5	16	5	3.0	0.12		
$16 \times 16R \times 3 - 3$	15.0	12.9	38	4	61	22.5	9.5	16	5	3.0	0.42		
$20 \times 5R \times 3 - 5$	19.0	16.9	33	4	45	14.5	9.5	16	5	3.0	0.16		
$20 \times 5R \times 3 - 4$	19.0	16.9	38	4	40	21.0	9.5	12	5	3.0	0.21		
$20 \times 10R \times 3 - 4$	19.0	16.9	33	4	60	22.0	9.5	16	5	3.0	0.16		
$20 \times 20R \times 3.5 - 2$	19.0	16.7	38	4	64	22.0	9.5	20	5	3.0	0.34		
$20 \times 20R \times 3.5 - 3$	19.0	16.7	36	4	77	28.5	9.5	20	5	3.0	0.37		
$20 \times 20R \times 3.5 - 3$	19.0	16.7	38	4	77	28.5	9.5	20	5	3.0	0.44		
$25 \times 5R \times 3 - 4$	24.0	21.9	38	4	45	14.5	9.5	16	5	3.0	0.19		
$25 \times 10R \times 3 - 4$	24.0	21.9	38	4	64	22.0	9.5	20	5	3.0	0.28		
$25 \times 25R \times 3.5 - 2$	24.0	21.4	48	4	80	30.0	10.5	20	5	3.0	0.73		
$25 \times 25R \times 3.5 - 3$	24.0	21.4	40	4	95	37.5	10.5	20	5	3.0	0.50		
$32 \times 5R \times 3.5 - 4$	31.0	28.4	48	4	48	14.0	9.5	20	5	3.0	0.32		
$32 \times 5R \times 3.5 - 4$	31.0	28.4	50	4	48	14.0	9.5	20	5	3.0	0.35		
$32 \times 10R \times 3.969 - 5$	31.0	27.9	48	4	77	28.5	9.5	20	5	3.0	0.50		
$32 \times 10R \times 3.969 - 5$	31.0	27.9	50	4	77	28.5	9.5	20	5	3.0	0.61		
$32 \times 20R \times 3.969 - 2$	31.0	27.9	56	4	64	22.0	9.5	20	5	3.0	0.74		
$32 \times 20R \times 3.969 - 3$	31.0	27.9	50	4	84	32.0	9.5	20	5	3.0	0.66		
$32 \times 32R \times 3.969 - 2$	31.0	27.9	56	4	88	34.0	9.5	20	5	3.0	1.03		
$32 \times 32R \times 3.969 - 3$	31.0	27.9	50	4	120	50.0	9.5	20	5	3.0	0.97		
$40 \times 5R \times 3.5 - 5$	39.0	36.4	56	4	54	17.0	9.5	20	5	3.0	0.44		
$40 \times 5R \times 3.5 - 5$	39.0	36.4	63	4	70	25.0	14.0	20	5	3.0	0.82		
$40 \times 10R \times 6 - 4$	38.0	33.8	63	4	70	25.0	14.0	20	5	3.0	0.88		
$40 \times 20R \times 6 - 3$	38.0	33.8	63	4	88	34.0	14.0	20	5	3.0	1.13		
$40 \times 40R \times 6 - 2$	38.0	33.8	72	4	113	46.5	14.0	20	5	3.0	2.23		
$40 \times 40R \times 6 - 3$	38.0	33.8	63	4	142	61.0	14.0	20	5	3.0	1.85		
$50 \times 5R \times 3.5 - 5$	49.0	46.4	68	4	54	17.0	9.5	20	5	3.0	0.62		
$50 \times 10R \times 6 - 6$	48.0	43.8	72	5	90	35.0	14.0	20	5	3.0	1.34		
$50 \times 20R \times 6.5 - 3$	48.0	43.4	85	5	92	30.0	14.0	32	6	3.5	2.39		
$63 \times 10R \times 6 - 6$	61.0	56.8	85	5	90	29.0	14.0	32	6	3.5	1.59		

Nuts

2-start Single Nut with Flange FED-E-B

Standard series

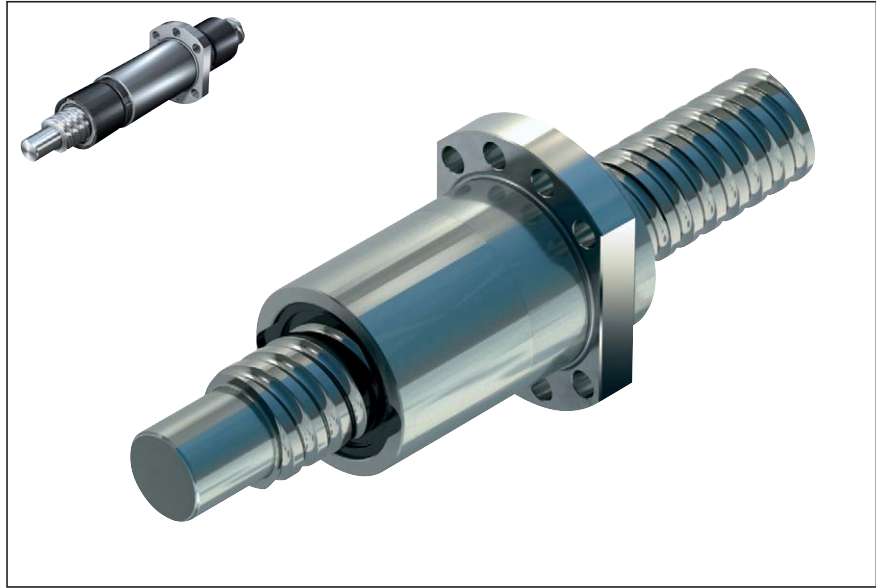
Mounting dimensions similar to
DIN 69 051, Part 5
Flange type B

2-start nuts to distinctly increase the
dynamic and static load rating
Mounting dimensions correspond to
those of the Rexroth standard series

With standard seals
With backlash, reduced backlash,
preload 2%, 3%
For precision-rolled screws SN-R
of tolerance grade 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.



Ordering code: FED-E-B 40 x 20R x 6 - 4 x 2 1 6 T5 R 13Z400 41K300 0 1

Category	Size $d_o \times P \times D_w - i \times b$	Part number	Load ratings		Max. static load ^{1) 2)} (kN)	Linear speed v_{max} (m/min)
			dyn. C (kN)	stat. C ₀ (kN)		
B	40 x 20 R x 6 - 4 x 2	R1512 470 32	76.4	171.1	87	75
B	40 x 40 R x 6 - 3 x 2	R1512 490 32	57.2	124.5	83	150
B	50 x 20 R x 6.5 - 4 x 2	R1512 570 32	93.2	228.0	120	60
B	50 x 25 R x 6.5 - 3 x 2	R1512 580 32	74.1	175.1	117	75
B	50 x 40 R x 6.5 - 3 x 2	R1512 590 32	71.4	171.5	119	120
B	63 x 20 R x 6.5 - 4 x 2	R1512 670 32	104.6	292.0	142	48
B	63 x 40 R x 6.5 - 3 x 2	R1512 690 32	80.0	217.0	148	95

1) The load-bearing capability of the rolling contact is greater than the mechanical strength of the nut body, therefore, maximum static load data has been included.

2) When selecting end bearings, please contact your local sales partner for assistance.

d_o = nominal diameter

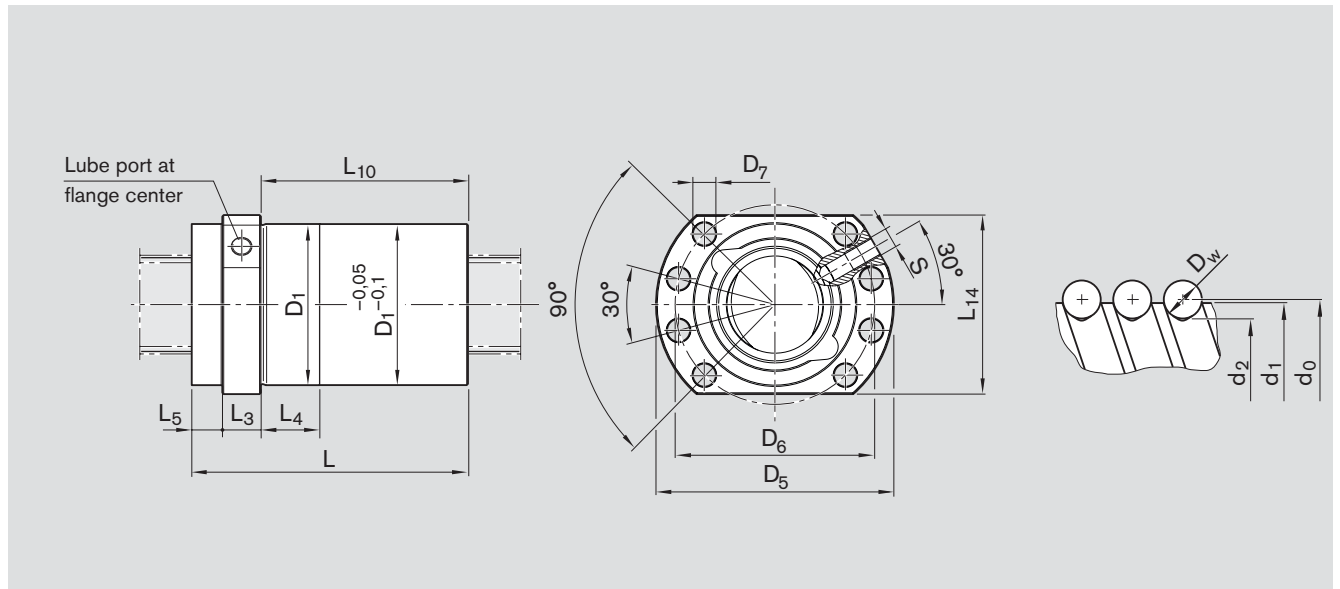
P = lead, (R = right-hand, L = left-hand)

D_w = ball diameter

i = a x b

a = load-carrying turns

b = number of load-carrying threads on the screw



Size	Dimensions (mm)													Weight m (kg)
	d_1	d_2	D_1 g6	D_5	D_6	D_7	L	L_3	L_4	L_5	L_{10}	L_{14}	S	
$d_0 \times P \times D_w - i \times b$														
40 x 20 R x 6 - 4 x 2	38.0	33.8	63	93	78	9.0	108	15	25	13.0	80.0	70	M8x1	1.85
40 x 40 R x 6 - 3 x 2	38.0	33.8	63	93	78	9.0	142	15	45	11.5	115.5	70	M8x1	2.35
50 x 20 R x 6.5 - 4 x 2	48.0	43.4	75	110	93	11.0	112	18	25	13.0	81.0	85	M8x1	2.50
50 x 25 R x 6.5 - 3 x 2	48.0	43.4	75	110	93	11.0	107	18	25	13.5	75.5	85	M8x1	2.45
50 x 40 R x 6.5 - 3 x 2	48.0	43.4	75	110	93	11.0	149	18	45	15.0	116.0	85	M8x1	3.40
63 x 20 R x 6.5 - 4 x 2	61.0	56.4	95	135	115	13.5	112	22	25	11.0	79.0	100	M8x1	3.90
63 x 40 R x 6.5 - 3 x 2	61.0	56.4	95	135	115	13.5	149	22	45	12.0	115.0	100	M8x1	5.05

Nuts

Double Nut with Flange FDM-E-C

Standard series

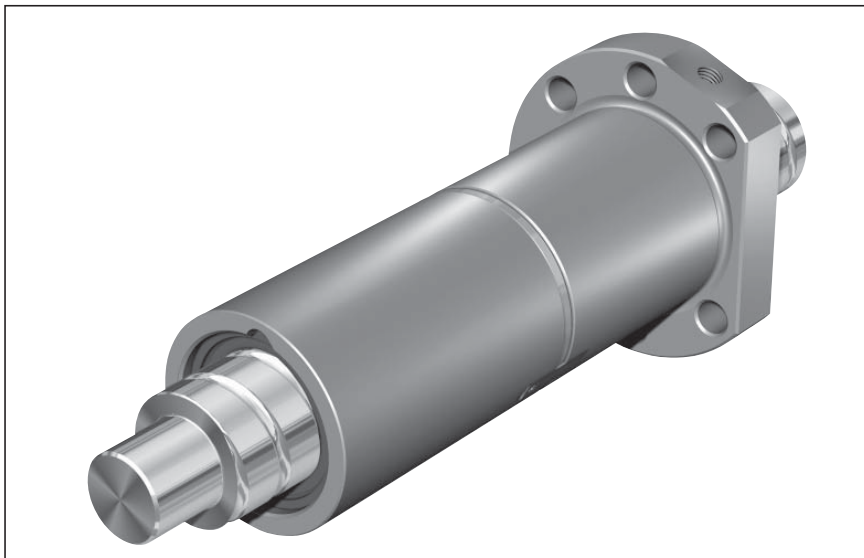
Mounting dimensions
per DIN 69 051, Part 5
Flange type C

With standard seals

Reinforced seals, see page 126

With preload 7% or 10%

For precision-rolled screws SN-R
of tolerance grade T5, T7



Ordering code: **FDM-E-C 20 x 5R x 3-4 1 2 T7 R 82Z120 41Z120 1250 0 1**

d_0 = nominal diameter

P = lead

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

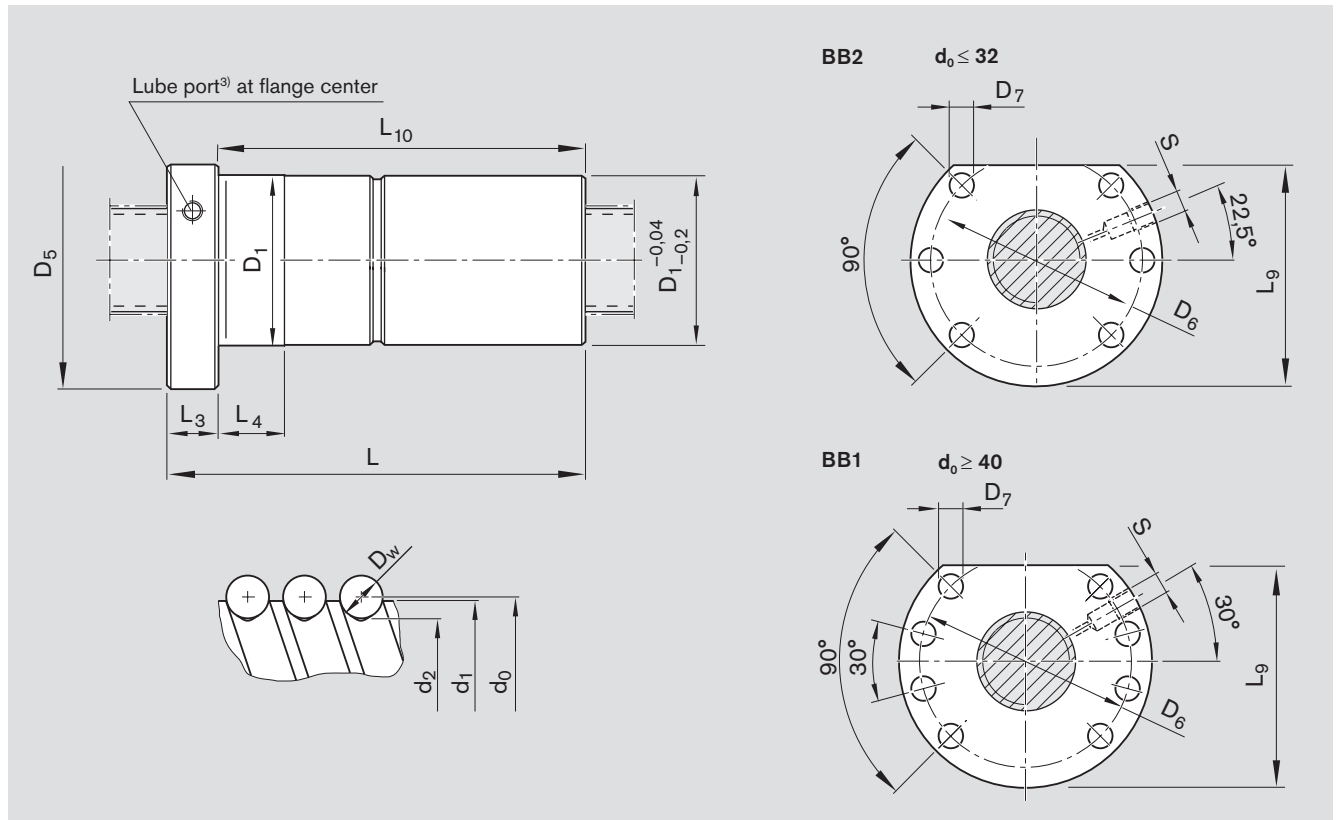
D_w = ball diameter

i = number of ball track turns

Category	Size $d_0 \times P \times D_w - i$	Part number	Load ratings		Linear speed ¹⁾ v_{max} (m/min)
			dyn. C (N)	stat. C_0 (N)	
C	16 x 5R x 3 - 4	R1502 010 55	12300	16100	30
C	20 x 5R x 3 - 4	R1502 110 75	14300	21500	30
C	25 x 5R x 3 - 4	R1502 210 75	15900	27200	30
C	25 x 10R x 3 - 4	R1502 240 75	15700	27000	60
C	32 x 5R x 3.5 - 4	R1502 310 75	21600	40000	23
C	32 x 10R x 3.969 - 5	R1502 340 76	31700	58300	47
C	40 x 5R x 3.5 - 5	R1502 410 76	29100	64100	19
C	40 x 10R x 6 - 4	R1502 440 75	50000	86400	38
C	40 x 10R x 6 - 6	R1502 440 76	72100	132200	38
C	40 x 20R x 6 - 3	R1502 470 75	37900	62800	75
C	50 x 5R x 3.5 - 5	R1502 510 76	32000	81300	15
C	50 x 10R x 6 - 4	R1502 540 75	55400	109000	30
C	50 x 10R x 6 - 6	R1502 540 76	79700	166500	30
C	50 x 20R x 6.5 - 5	R1502 570 76	75700	149700	60
C	63 x 10R x 6 - 4	R1502 640 75	61800	140500	24
C	63 x 10R x 6 - 6	R1502 640 76	88800	214300	24
C	63 x 20R x 6.5 - 5	R1502 670 76	83900	190300	48
C	80 x 10R x 6.5 - 6	R1502 740 76	108400	291700	19
C	80 x 20R x 12.7 - 6 ²⁾	R1502 770 46	262700	534200	30

1) See page 115 Characteristic speed $d_0 \cdot n$ and page 150 Critical speed n_{cr}

2) Nuts 80 x 20R x 12.7 - 6 available up to a thread length of 2500 mm, with preload



Size $d_0 \times P \times D_w - i$	Dimensions (mm)													Weight	
	d_1	d_2	D_1 g6	D_5	Hole pattern	D_6	D_7	L	L_3	L_4	L_5	L_{10}	$S^3)$	m (kg)	
16 x 5R x 3 - 4	15.0	12.9	28	48	BB2	38	5.5	72	12	10	44.0	60	M6	0.29	
20 x 5R x 3 - 4	19.0	16.9	36	58	BB2	47	6.6	82	12	10	51.0	70	M6	0.53	
25 x 5R x 3 - 4	24.0	21.9	40	62	BB2	51	6.6	82	12	10	55.0	70	M6	0.57	
25 x 10R x 3 - 4	24.0	21.9	40	62	BB2	51	6.6	120	12	16	55.0	108	M6	0.77	
32 x 5R x 3.5 - 4	31.0	28.4	50	80	BB2	65	9.0	88	13	10	71.0	75	M6	0.96	
32 x 10R x 3.969 - 5	31.0	27.9	50	80	BB2	65	9.0	146	13	16	71.0	133	M6	1.34	
40 x 5R x 3.5 - 5	39.0	36.4	63	93	BB1	78	9.0	100	15	10	81.5	85	M8x1	1.68	
40 x 10R x 6 - 4	38.0	33.8	63	93	BB1	78	9.0	140	15	16	81.5	125	M8x1	2.15	
40 x 10R x 6 - 6	38.0	33.8	63	93	BB1	78	9.0	180	15	16	81.5	165	M8x1	2.73	
40 x 20R x 6 - 3	38.0	33.8	63	93	BB1	78	9.0	175	15	25	81.5	160	M8x1	2.56	
50 x 5R x 3.5 - 5	49.0	46.4	75	110	BB1	93	11.0	100	15	10	97.5	85	M8x1	2.25	
50 x 10R x 6 - 4	48.0	43.8	75	110	BB1	93	11.0	140	18	16	97.5	122	M8x1	2.97	
50 x 10R x 6 - 6	48.0	43.8	75	110	BB1	93	11.0	180	18	16	97.5	162	M8x1	3.73	
50 x 20R x 6.5 - 5	48.0	43.4	75	110	BB1	93	11.0	255	18	25	97.5	237	M8x1	4.93	
63 x 10R x 6 - 4	61.0	56.8	90	125	BB1	108	11.0	140	22	16	110.0	118	M8x1	4.00	
63 x 10R x 6 - 6	61.0	56.8	90	125	BB1	108	11.0	180	22	16	110.0	158	M8x1	4.45	
63 x 20R x 6.5 - 5	61.0	56.4	95	135	BB1	115	13.5	255	22	25	117.5	233	M8x1	8.21	
80 x 10R x 6.5 - 6	78.0	73.3	105	145	BB1	125	13.5	190	22	16	127.5	168	M8x1	5.93	
80 x 20R x 12.7 - 6	76.0	67.0	125	165	BB1	145	13.5	340	25	25	147.5	315	M8x1	19.40	

3) Lube port machining: flat surface $L_3 \leq 13$ mm, countersink $L_3 > 14$ mm

Nuts

Double Nut with Flange FDM-E-S

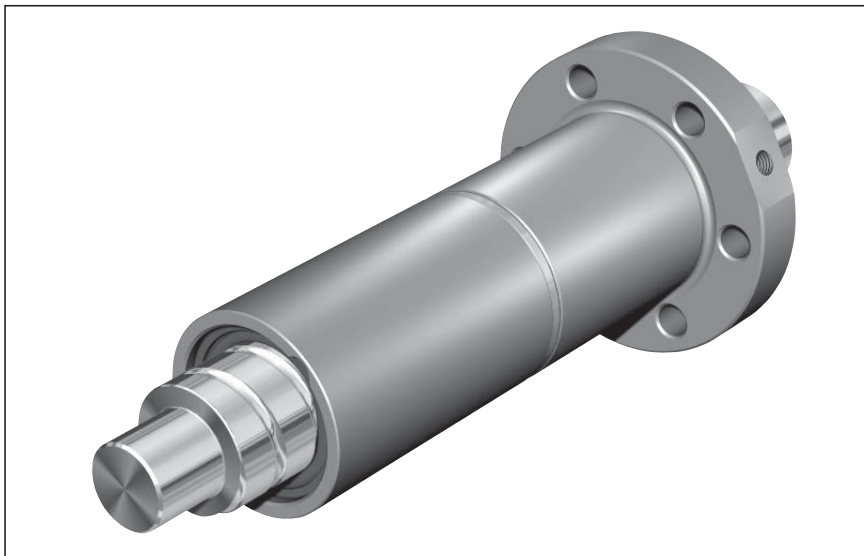
Standard series

Rexroth mounting dimensions

With standard seals

Reinforced seals, see page 126

With preload 7% or 10%

For precision-rolled screws SN-R
of tolerance grade T5, T7Ordering code: **FDM-E-S 20 x 5R x 3-4 1 2 T7 R 82Z120 41Z120 1250 0 1** d_0 = nominal diameter P = lead

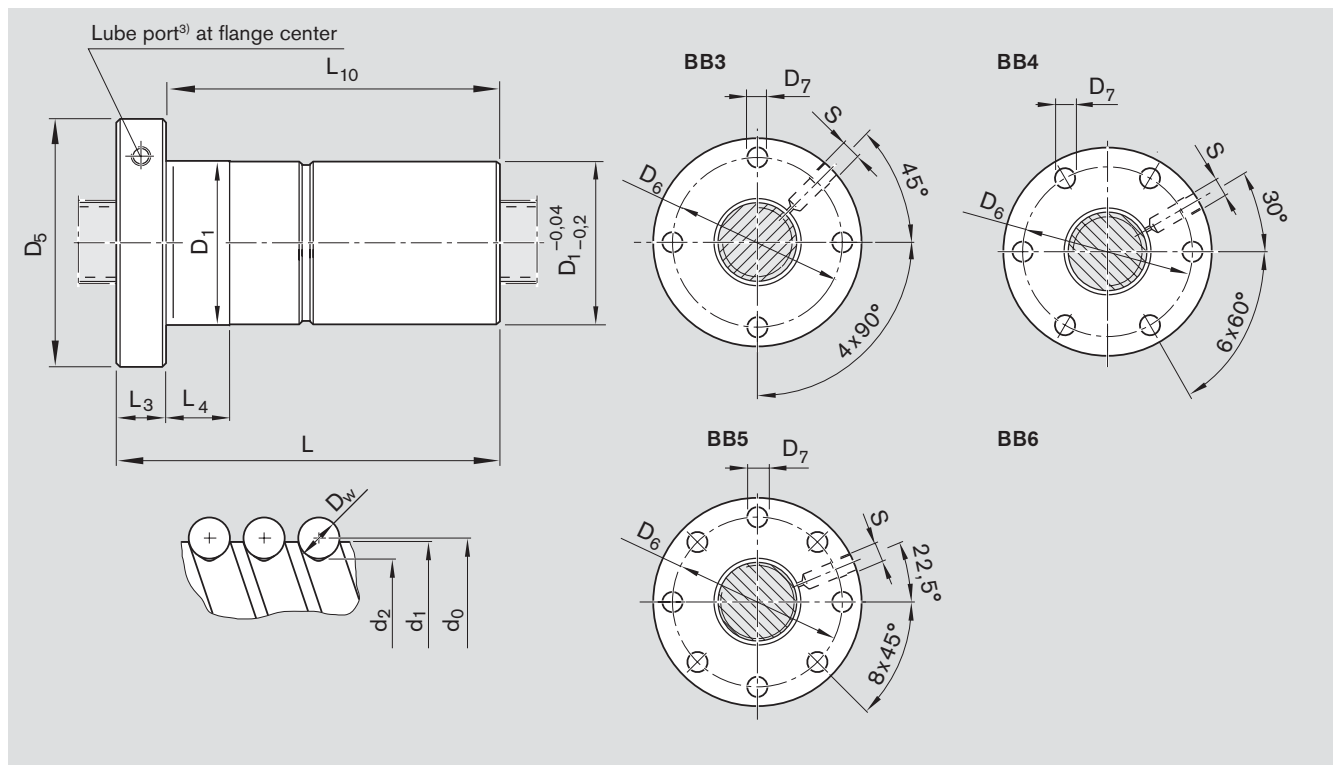
(R = right-hand, L = left-hand)

 D_w = ball diameter i = number of ball track turns

Category	Size $d_0 \times P \times D_w - i$	Part number	Load ratings		Linear speed ¹⁾ v_{max} (m/min)
			dyn. C (N)	stat. C_0 (N)	
C	16 x 5R x 3 - 4	R1502 010 23	12300	16100	30
C	20 x 5R x 3 - 4	R1502 110 33	14300	21500	30
C	25 x 5R x 3 - 4	R1502 210 33	15900	27200	30
C	25 x 10R x 3 - 4	R1502 240 33	15700	27000	60
C	32 x 5R x 3.5 - 4	R1502 310 33	21600	40000	23
C	32 x 10R x 3.969 - 5	R1502 340 33	31700	58300	47
C	40 x 5R x 3.5 - 5	R1502 410 33	29100	64100	19
C	40 x 10R x 6 - 4	R1502 440 33	50000	86400	38
C	40 x 10R x 6 - 6	R1502 440 34	72100	132200	38
C	40 x 20R x 6 - 3	R1502 470 33	37900	62800	75
C	50 x 5R x 3.5 - 5	R1502 510 33	32000	81300	15
C	50 x 10R x 6 - 4	R1502 540 33	55400	109000	30
C	50 x 10R x 6 - 6	R1502 540 34	79700	166500	30
C	50 x 20R x 6.5 - 5	R1502 570 34	75700	149700	60
C	63 x 10R x 6 - 4	R1502 640 33	61800	140500	24
C	63 x 10R x 6 - 6	R1502 640 34	88800	214300	24
C	63 x 20R x 6.5 - 5	R1502 670 34	83900	190300	48
C	80 x 10R x 6.5 - 6	R1502 740 34	108400	291700	19
C	80 x 20R x 12.7 - 6 ²⁾	R1502 770 04	262700	534200	30

1) See page 115 Characteristic speed $d_0 \cdot n$ and page 150 Critical speed n_{cr}

2) Nuts 80 x 20R x 12.7 - 6 available up to a thread length of 2500 mm, with preload



Size	Dimensions (mm)											Weight 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 ³⁾
d ₀ x P x D _w - i													
16 x 5R x 3 - 4	15.0	12.9	28	53	BB3	40	6.6	72	12	10	60	M6	0.33
20 x 5R x 3 - 4	19.0	16.9	33	58	BB4	45	6.6	82	12	10	70	M6	0.45
25 x 5R x 3 - 4	24.0	21.9	38	63	BB4	50	6.6	82	12	10	70	M6	0.53
25 x 10R x 3 - 4	24.0	21.9	38	63	BB4	50	6.6	120	12	16	108	M6	0.70
32 x 5R x 3.5 - 4	31.0	28.4	48	73	BB4	60	6.6	88	13	10	75	M6	0.84
32 x 10R x 3.969 - 5	31.0	27.9	48	73	BB4	60	6.6	146	13	16	133	M6	1.22
40 x 5R x 3.5 - 5	39.0	36.4	56	80	BB4	68	6.6	100	15	10	85	M8x1	1.13
40 x 10R x 6 - 4	38.0	33.8	63	95	BB4	78	9.0	140	15	16	125	M8x1	2.25
40 x 10R x 6 - 6	38.0	33.8	63	95	BB4	78	9.0	180	15	16	165	M8x1	2.83
40 x 20R x 6 - 3	38.0	33.8	63	95	BB4	78	9.0	175	15	25	160	M8x1	2.66
50 x 5R x 3.5 - 5	49.0	46.4	68	98	BB4	82	9.0	100	15	10	85	M8x1	1.60
50 x 10R x 6 - 4	48.0	43.8	72	110	BB4	90	11.0	140	18	16	122	M8x1	2.74
50 x 10R x 6 - 6	48.0	43.8	72	110	BB4	90	11.0	180	18	16	162	M8x1	3.39
50 x 20R x 6.5 - 5	48.0	43.4	85	125	BB4	105	11.0	255	22	25	233	M8x1	6.71
63 x 10R x 6 - 4	61.0	56.8	85	125	BB4	105	11.0	140	22	16	118	M8x1	3.53
63 x 10R x 6 - 6	61.0	56.8	85	125	BB4	105	11.0	180	22	16	158	M8x1	4.32
63 x 20R x 6.5 - 5	61.0	56.4	95	140	BB4	118	14.0	255	22	25	233	M8x1	8.65
80 x 10R x 6.5 - 6	78.0	73.3	105	150	BB4	125	14.0	190	22	16	168	M8x1	6.35
80 x 20R x 12.7 - 6	76.0	67.0	125	180	BB5	152	18.0	340	25	25	315	M8x1	20.20

3) Lube port machining: flat surface $L_3 \leq 13$ mm, countersink $L_3 > 14$ mm

Nut Housings

Nut Housing MGS

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

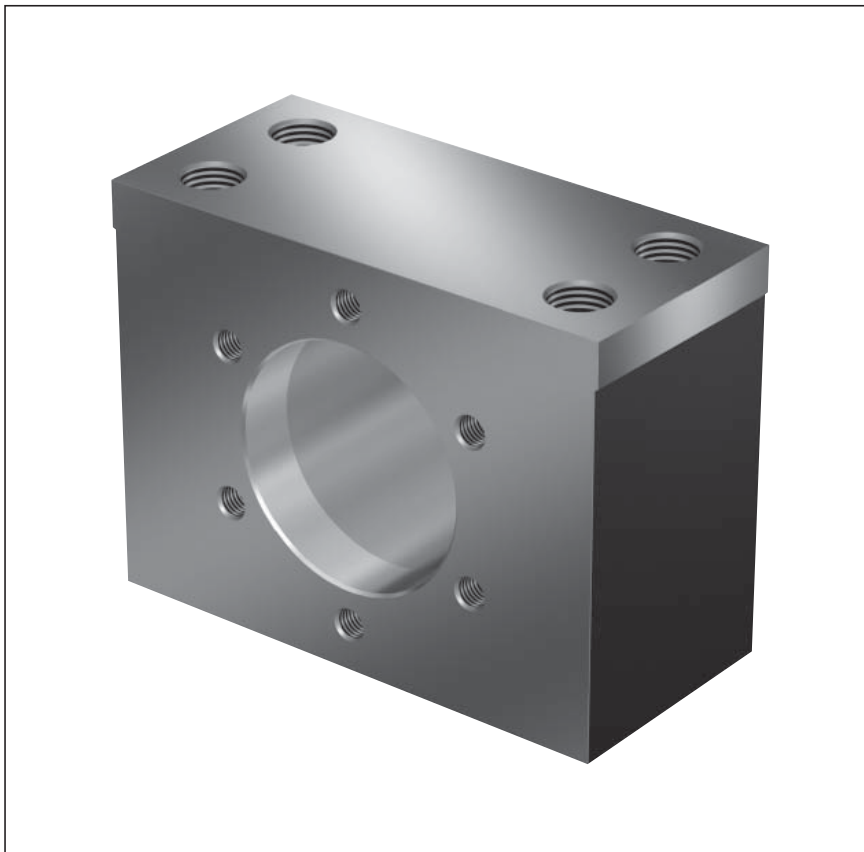
We recommend using screws with a strength class of 8.8.

Tightening torque

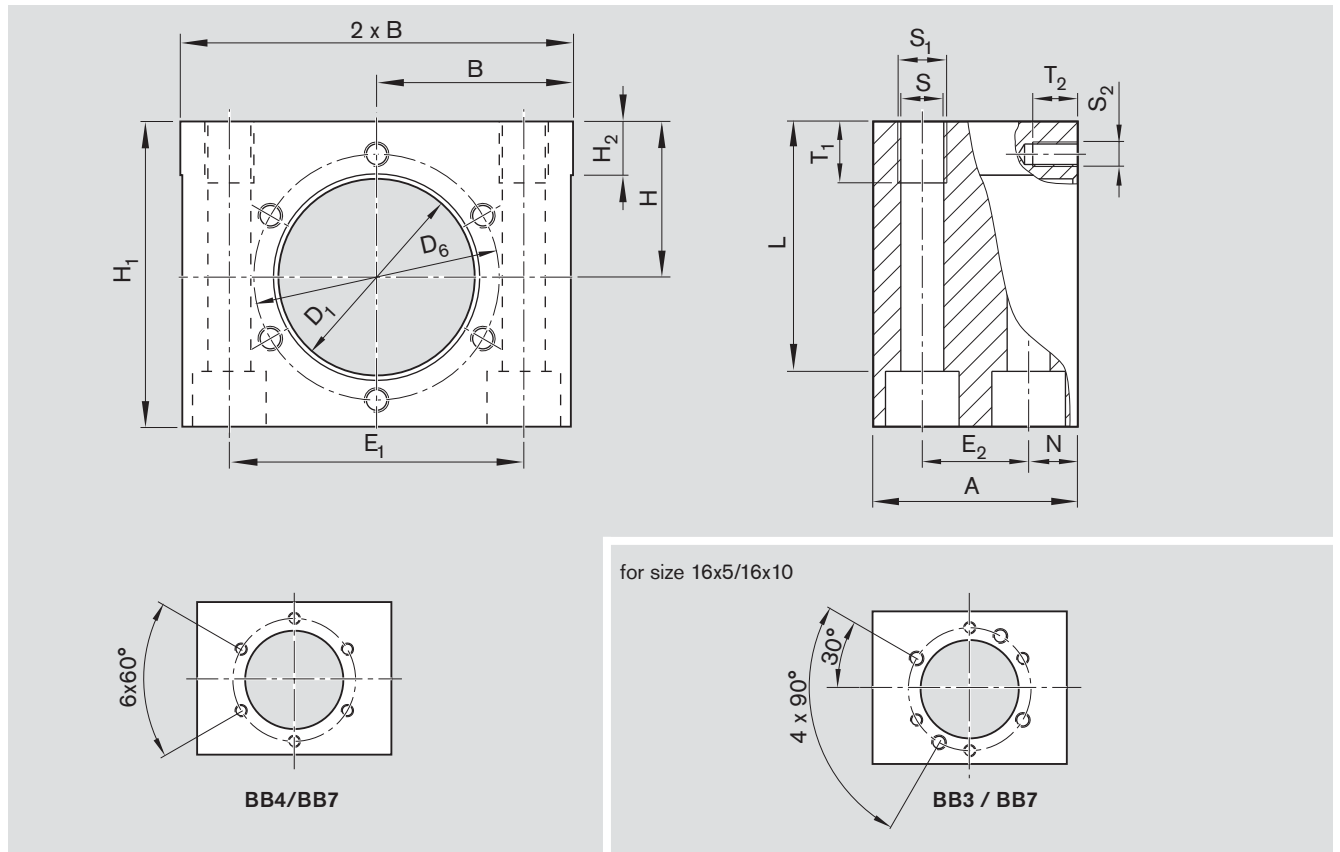
see "Mounting"

Reference edges are formed on both sides.

⚠ If Ball Screws are used with Front Lube Units, 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	Weight (kg)	Hole pattern		Hex socket cap screw ISO 4762
			FEM-E-S FDM-E-S FEP-E-S	SEM-E-S	
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/L x 3.5					
20x40R x 3.5	R1506 200 20	1.178	BB4	BB7	M8
25x5R/L x 3					
25x10R x 3					
25x25R/L 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 6					
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
50x20R x 6.5	R1506 600 20	7.173	BB4	BB7	M16
50x40R x 6.5					
63x10R x 6					
80x10R x 6.5					
80x10R x 6.5	R1506 700 20	9.334	BB4	BB7	M16



Size $d_0 \times P \times D_w$	Dimensions (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/L 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/L 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
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 Housings

Nut Housing MGD

Steel nut housings MGD are designed for FEM-E-C, FDM-E-C and SEM-E-C ball 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).

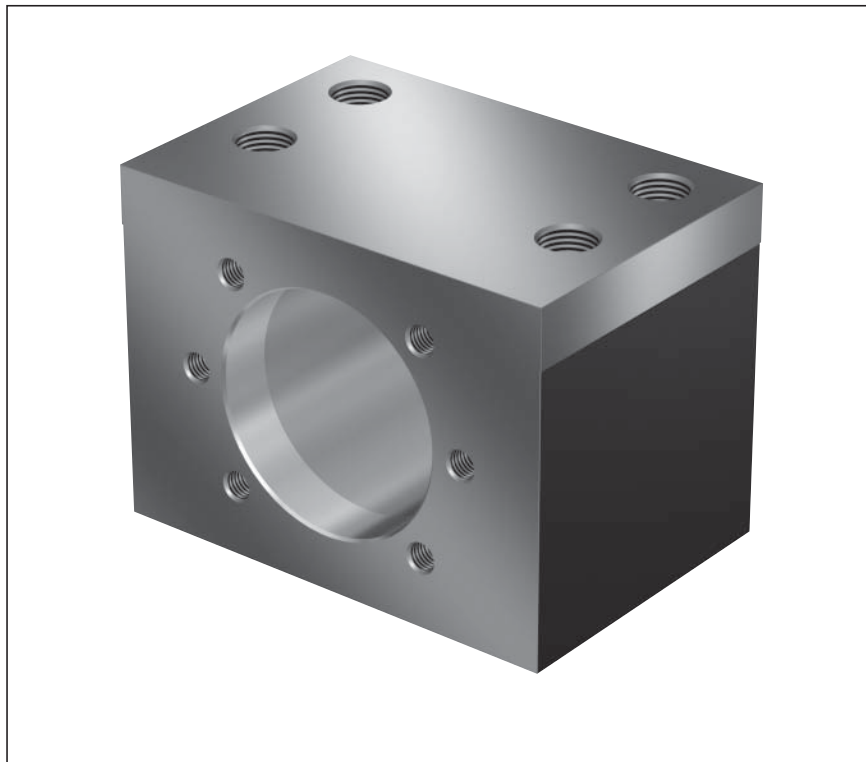
We recommend using screws with a strength class of 8.8.

Tightening torque

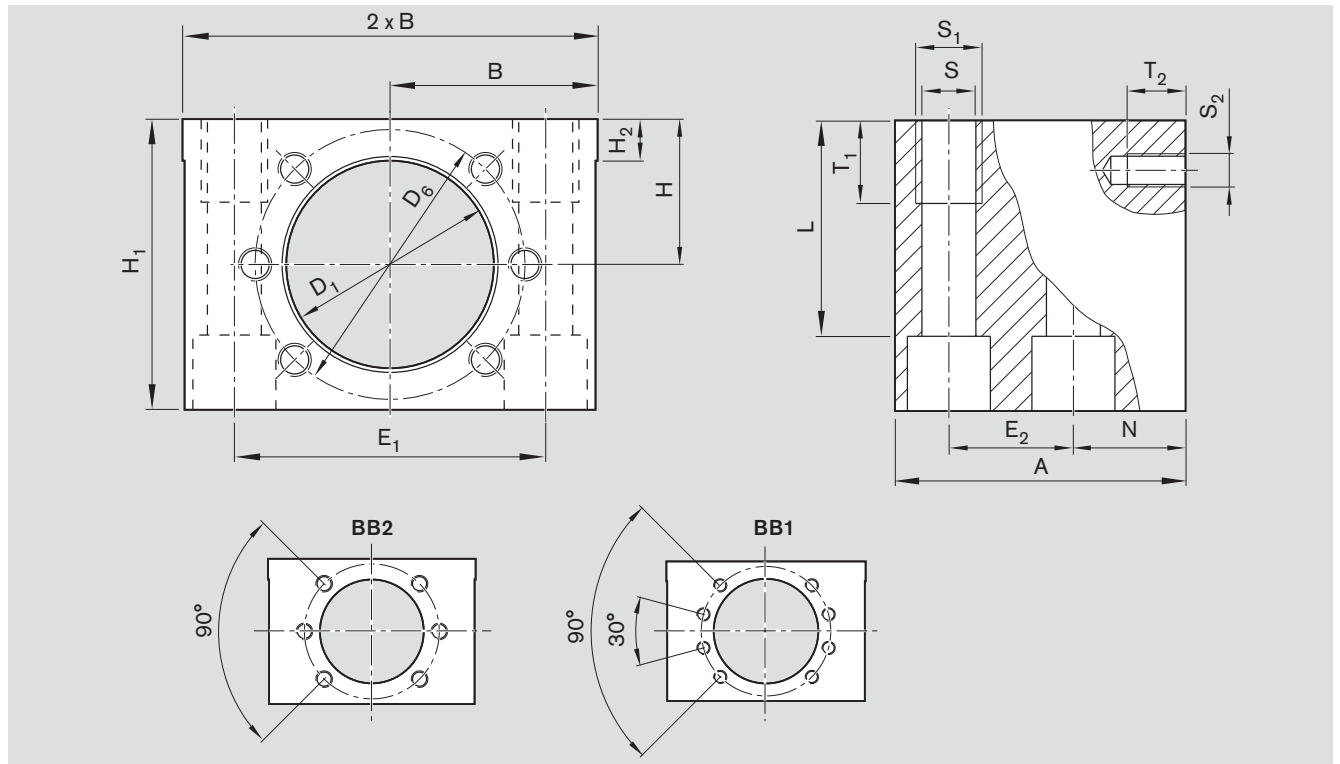
see "Mounting"

Reference edges are formed on both sides.

⚠ If Ball Screws are used with Front Lube Units, the Front Lube Unit may project beyond the housing. This must be considered when calculating the stroke.



Size	Part number	Weight	Hole pattern	Hex socket cap screw ISO 4762
$d_o \times P \times D_w$		(kg)		
16 x 5R x 3	R1506 000 50	0.91	BB2	M8
16 x 10R x 3				
16 x 16R x 3				
20 x 5R x 3	R1506 100 50	1.18	BB2	M8
20 x 20R x 3.5				
25 x 5R x 3	R1506 200 50	1.33	BB2	M8
25 x 10R x 3				
25 x 25R x 3.5				
32 x 5R 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	R1506 400 50	3.61	BB1	M14
40 x 5R x 3.5				
40 x 10R x 6				
40 x 12R x 6				
40 x 16R x 6				
40 x 20R 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 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



Size $d_0 \times P \times D_w$	Dimensions (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 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 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 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 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 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 x 6																
40 x 12R x 6																
40 x 16R x 6																
40 x 20R 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 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	95	115	100	80	58	116	15	130±0.2	46±0.15	37	17.0	M20	30	M12	20	95.0
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	125	145	100	95	73	146	15	160±0.2	46±0.15	37	17.0	M20	30	M12	22	125.0

Nut Housings

Nut Housing MGA-Z

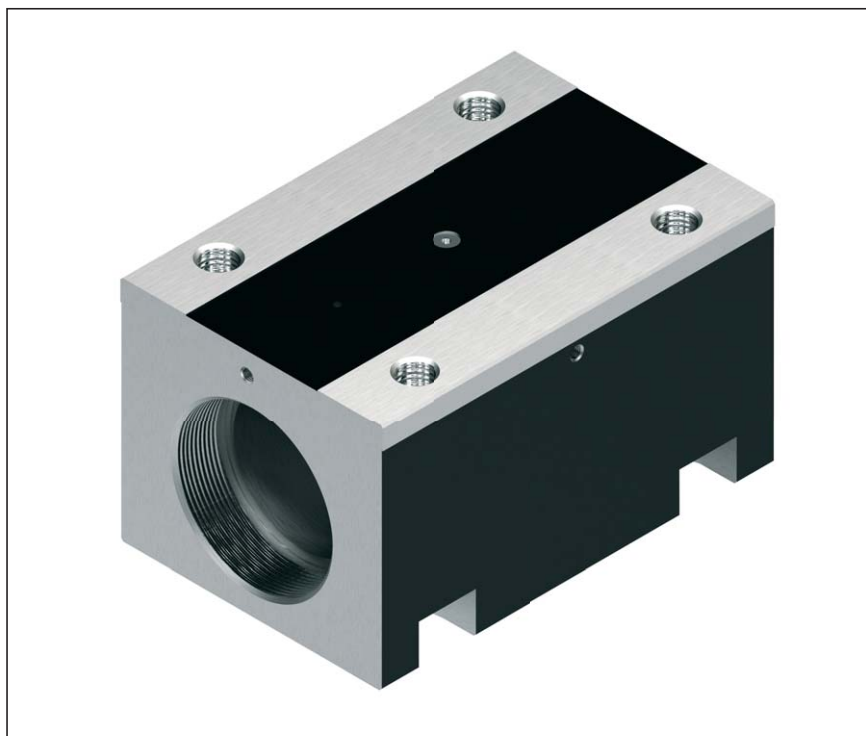
Aluminum nut housings MGA are designed for ZEM-E-S ball nuts.

We recommend using screws with a strength class of 8.8.

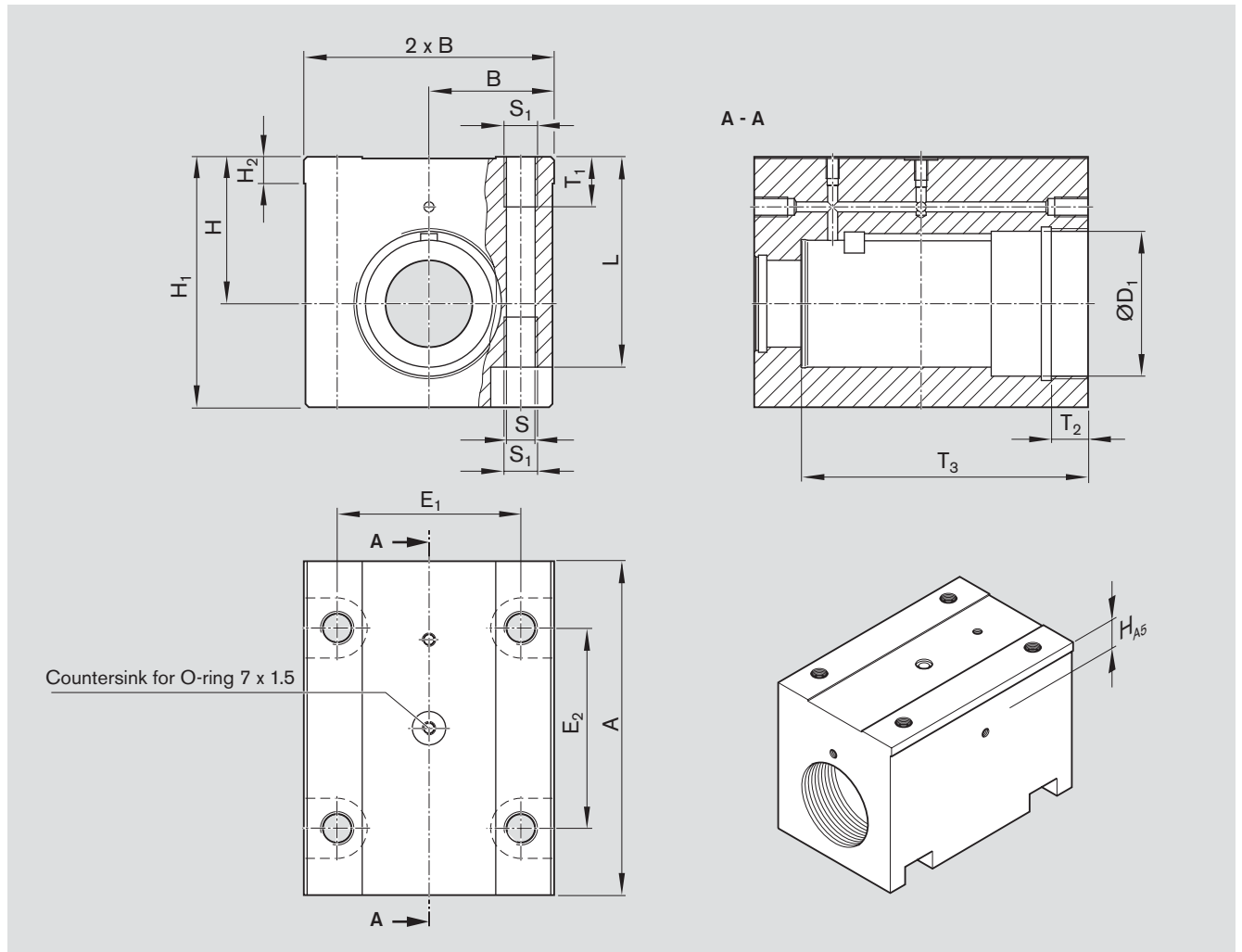
Tightening torque
see "Mounting"

Reference edges are formed on both sides.

Scope of supply: Includes set screws, spacer ring, ring nut, key



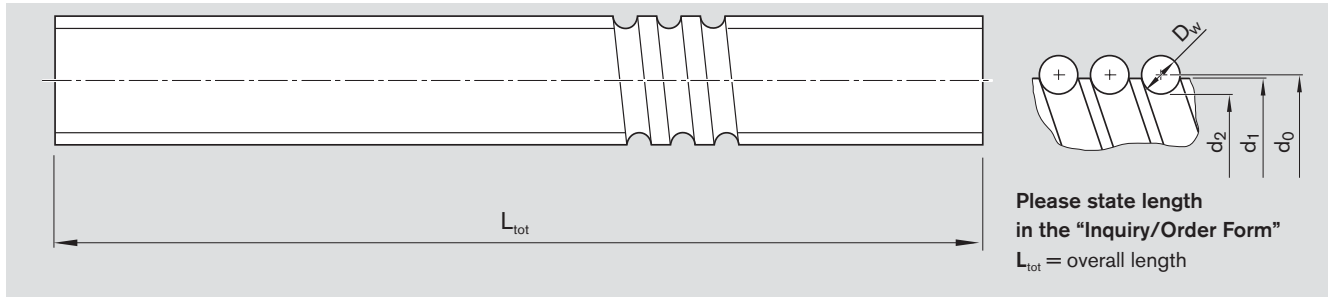
Size	Part number	Weight (kg)	Hex socket cap screw for screwing from below ISO 4762
$d_0 \times P \times D_w$			
20 x 5R x 3	R1506 100 70	1.10	M8
20 x 10R x 3			
20 x 20R x 3.5			
32 x 5R x 3.5	R1506 300 70	2.31	M10
32 x 10R x 3.969			
32 x 20R x 3.969			
32 x 32R x 3.969			
40 x 5R x 3.5	R1506 400 70	4.323	M14
40 x 10R x 6			
40 x 20R x 6			
40 x 40R x 6			



Size d ₀ x P x D _w	Dimensions (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
20 x 5R x 3	100	37.5	38	55	60	44	75	8	15	8.6	M10	15	11	86	63
20 x 10R x 3															
20 x 20R x 3.5															
32 x 5R x 3.5	150	50.0	50	75	100	49	80	9	16	10.5	M12	18	15	131	66
32 x 10R x 3.969															
32 x 20R x 3.969															
32 x 32R x 3.969															
40 x 5R x 3.5	180	60.0	63	90	120	59	105	10	18	14.5	M16	24	20	155	86
40 x 10R x 6															
40 x 20R x 6															
40 x 40R x 6															

Screws

Precision-Rolled Screw SN-R



Ordering code: SN 20 x 5R x 3 X X T7 R 00T200 00T200 1250 1 0

Size d ₀ x P x D _w	Part number			Dimensions (mm)		Moment of inertia J _s (kgcm ² /m)	Maximum length (mm)		Weight (kg/m)
	Tolerance grade T5	Tolerance grade T7	Tolerance grade T9	d ₁	d ₂		Standard	On request	
6 x 1R x 0.8	R1531 105 00	R1531 107 00	R1531 109 00	6.0	5.3	0.02			0.19
6 x 2R x 0.8	R1531 125 00	R1531 127 00	R1531 129 00	6.0	5.3	0.02			0.19
8 x 1R x 0.8	R1531 205 00	R1531 207 00	R1531 209 00	8.0	7.3	0.04			0.36
8 x 2R x 1.2	R1531 225 00	R1531 227 00	R1531 229 00	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			0.30
12 x 2R x 1.2	R1531 425 00	R1531 427 00	R1531 429 00	11.7	10.8	0.13	1500	2500	0.79
12 x 5R x 2	R1531 465 10	R1531 467 10	R1531 469 10	11.4	9.9	0.11			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			1.24
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			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 40R x 3.5-4	R2521 150 00	R2521 170 00	R2521 190 00	19.0	16.4	0.86			2.06
20 x 20R x 3.5	R1511 175 10	R1511 177 10	R1511 179 10	19.0	16.7	0.81			1.99
20 x 20L x 3.5	R1551 175 10	R1551 177 10	R1551 179 10	19.0	16.7	0.81			1.99
25 x 5R x 3	R1511 215 00	R1511 217 00	R1511 219 00	24.0	21.9	2.22	2500	5000	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
25 x 25L x 3.5	R1551 285 10	R1551 287 10	R1551 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			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 x 64R x 3.969	R2521 350 00	R2521 370 00	R2521 390 00	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	4500	5000	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	4500	7500	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			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			8.14
40 x 40R x 6	R1511 495 10	R1511 497 10	R1511 499 10	38.0	33.8	13.42			8.11
50 x 5R x 3.5	R1511 515 00	R1511 517 00	R1511 519 00	49.0	46.4	40.03	4500	5000	14.05
50 x 10R x 6	R1511 545 00	R1511 547 00	R1511 549 00	48.0	43.8	35.71	4500	7500	13.25
50 x 12R x 6	R1511 555 00	R1511 557 00	R1511 559 00	48.0	43.8	36.58			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			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 40R x 6.5	R1511 595 10	R1511 597 10	R1511 599 10	48.0	43.3	34.34			12.98
63 x 10R x 6	R1511 645 00	R1511 647 00	R1511 649 00	61.0	56.8	95.82			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			35.58
80 x 20R x 12.7	R1571 775 00	R1571 777 00	R1571 779 00	76.0	66.9	211.51	2500	¹⁾	32.16

1) on request

Precision-rolled screws SN-R, with mechanically connected screw ends

These screws consist of

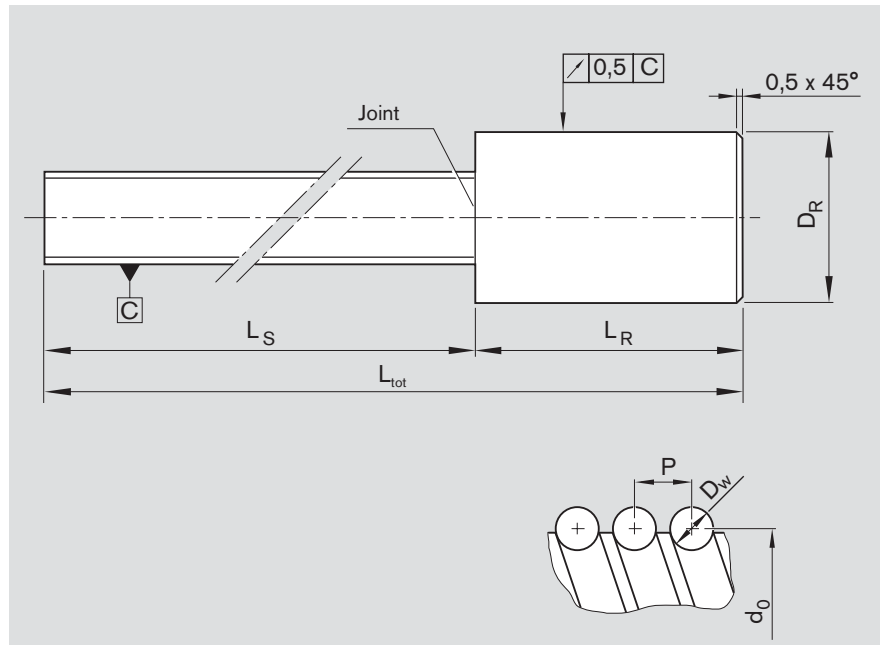
- a precision-rolled screw part and
- an unmachined spigot.

The spigot is mechanically connected on one side and is available in different sizes.

We have a solution to prevent problems arising from big end bearing diameters (e.g. visible thread grooves or axial contact faces which are too small for the fixed bearing).

Please ask.

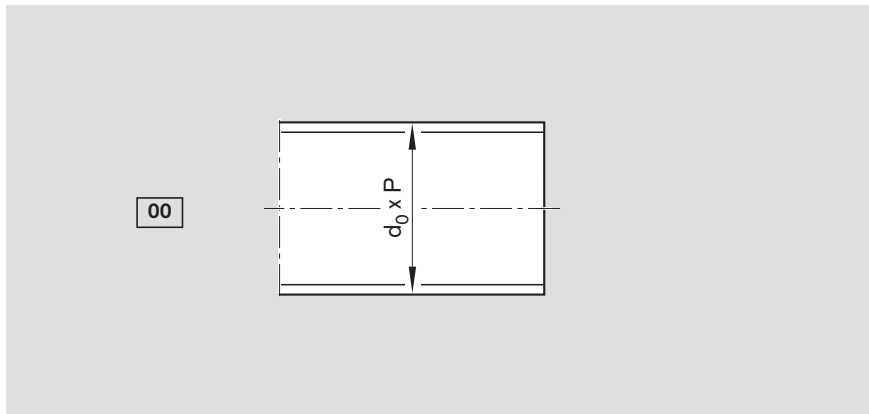
Separate delivery of a screw without end machining and without nut is not planned.



Size	Tolerance grade	Dimensions (mm)			
		D_R	L_R	L_{tot}	L_S
$d_o \times P \times D_w$		-1	+2		
6 x 1R x 0.8		On request			
6 x 2R x 0.8		On request			
8 x 1R x 0.8		On request			
8 x 2R x 1.2		On request			
8 x 2.5R x 1.588	T5	14.25	100	1600	1500
12 x 2R x 1.2	T5	23.25	100	1600	1500
12 x 5R x 2	T5	23.25	150	1650	1500
12 x 10R x 2	T5	23.30	150	1650	1500
16 x 5R x 3	T5	30.35	200	1700	1500
16 x 10R x 3	T5	30.35	200	1700	1500
16 x 16R x 3	T5	30.35	200	1700	1500
20 x 5R x 3	T5	31.50	200	1700	1500
20 x 20R x 3.5	T5	30.35	160	1160	1000
25 x 5R x 3	T5	36.60	200	1700	1500
25 x 10R x 3	T5	36.60	200	1700	1500
25 x 25R x 3.5	T5	36.60	200	1700	1500
32 x 5R x 3.5	T5	46.60	250	2050	1800
32 x 10R x 3.969	T5	46.60	250	2050	1800
32 x 20R x 3.969	T5	46.60	250	2050	1800
32 x 32R x 3.969	T5	46.60	250	2050	1800
40 x 10R x 6	T5	49.30	300	2300	2000
40 x 20R x 6	T5	49.30	300	2300	2000
50 x 10R x 6	T5	61.30	300	2300	2000
50 x 20R x 6.5	T5	61.30	300	2300	2000

Screw Ends

Form 00, end cut to size, machining of end face

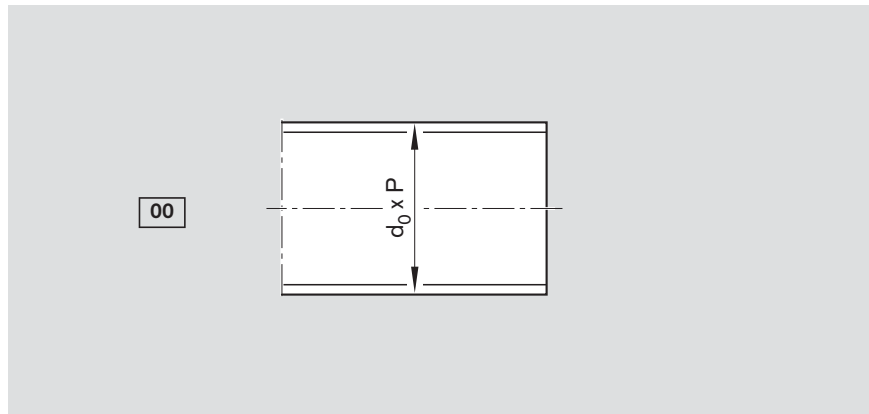


Option (machining of end face)	
Z	
S	
K	None, ball entry zone rounded

Ordering code: SEM-E-S 20 x 5R x 3-4 X X T7 R 00Z200 82Z120 1250 1 0

Form	Version	Ball screw size		Centering hole		Hex socket	
		d_0	P	Z	t_z	S	t_s
00	060	6	1/2	-	-	-	-
	080	8	1/2/2,5	-	-	-	-
	120	12	2/5/10	-	-	4	4
	160	16	5/10/16	M4	10	5	5
	200	20	5/10/20/40	M6	16	8	8
	250	25	5/10/25	M8	19	10	10
	320	32	5/10/20/32/64	M10	22	12	12
	400	40	5/10/12/16/20/40	M12	28	14	14
	500	50	5/10/12/16/20/40	M16	36	17	17
	630	63	10/20/40	M20	42	17	17
800	80	10/20	M20	42	17	17	

Form 00, end cut to size only "T", for separately delivered screw SN



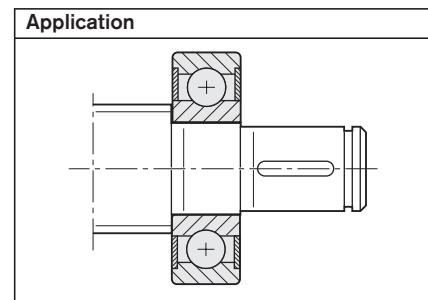
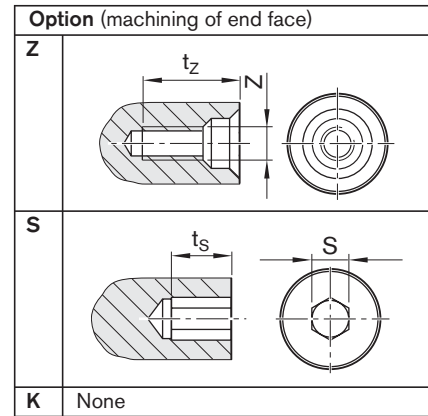
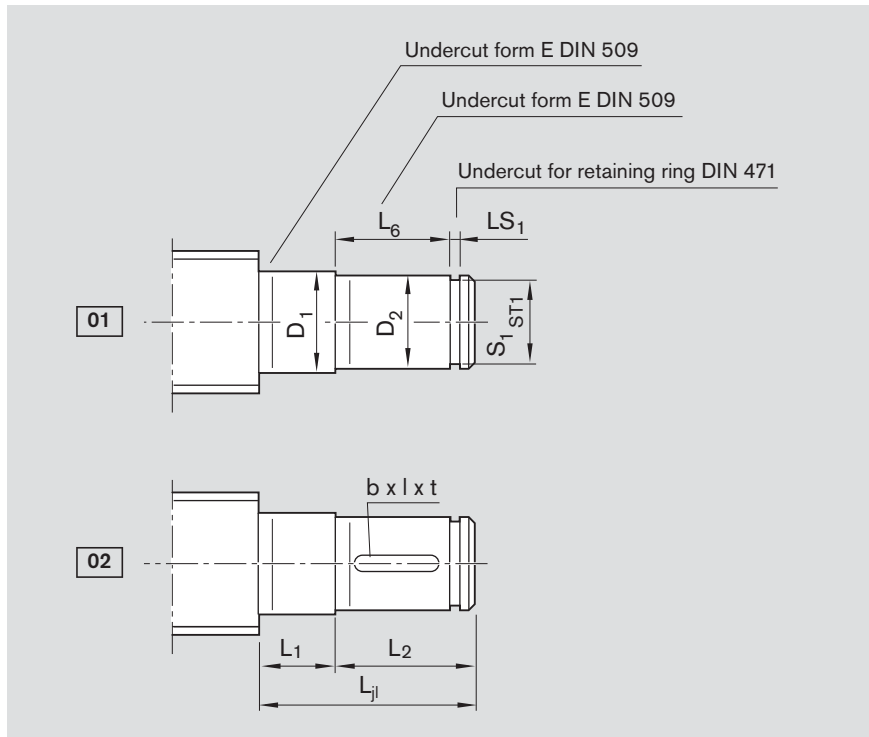
Option (machining of end face)	
T	None, cut to size only, not prepared for ball nut mounting

Ordering code: SN 20 x 5R x 3-4 X X T7 R 00T200 00T200 1250 1 0

Form	Version	Ball screw size	
		d ₀	P
00	060	6	1/2
	080	8	1/2/2.5
	120	12	2/5/10
	160	16	5/10/16
	200	20	5/20/40
	250	25	5/10/25
	320	32	5/10/20/32
	400	40	5/10/12/16/20/40
	500	50	5/10/12/16/20/40
	630	63	10/20/40
800	80	10/20	

Screw Ends

Form 01-02



Ordering code: SEM-E-S 20 x 5R x 3-4 X X T7 R 02Z120 82Z120 1250 1 0

Form	Ver- sion ¹⁾	Size		Dimensions (mm)										Keyway per DIN 6885			Centering hole		Hex socket	
		d ₀	P	L _{j1}	D ₁ j6	L ₁	D ₂ h7	L ₂	L ₆	S ₁	ST1	LS ₁ H13	b P9	l	t	Z	t _z	S	t _s	
01	050	8	2.5	19	5	5	4	14	12	3.8	h10	0.50	-	-	-	-	-	-	-	
	060	12	2/5/10	24	6	6	5	18	16	4.8	h10	0.70	-	-	-	-	-	-	-	
	100	16	5/10/16	32	10	9	8	23	20	7.6	h10	1.10	-	-	-	-	-	-	-	
	120	20	5/10/20/40	38	12	10	10	28	25	9.6	h10	1.10	-	-	-	-	-	4	4	
	150	20	5/10/20/40	39	15	11	12	28	25	11.5	h11	1.10	-	-	-	M4	10	4	4	
	170	25	5/10/25	45	17	12	15	33	30	14.3	h11	1.10	-	-	-	M5	12	4	4	
	200	32	5/10/20/32/64	58	20	14	18	44	40	17.0	h11	1.30	-	-	-	M6	16	5	5	
	250	32	5/10/20/32/64	69	25	15	22	54	50	21.0	h11	1.30	-	-	-	M8	19	6	6	
	300	40	5/10/12/16/20/40	70	30	16	28	54	50	26.6	h12	1.60	-	-	-	M10	22	10	10	
	350	50	5/10/12/16/20/40	82	35	17	32	65	60	30.3	h12	1.60	-	-	-	M12	28	10	10	
500	63	10/20/40	107	50	20	48	87	80	45.5	h12	1.85	-	-	-	M16	36	17	17		
600	80	10/20	109	60	22	58	87	80	55.0	h12	2.15	-	-	-	M20	42	17	17		
02	120	20	5/10/20/40	38	12	10	10	28	25	9.6	h10	1.10	3	20	1.8	-	-	4	4	
	150	20	5/10/20/40	39	15	11	12	28	25	11.5	h11	1.10	4	20	2.5	M4	10	4	4	
	170	25	5/10/25	45	17	12	15	33	30	14.3	h11	1.10	5	25	3.0	M5	12	4	4	
	200	32	5/10/20/32/64	58	20	14	18	44	40	17.0	h11	1.30	6	28	3.5	M6	16	5	5	
	250	32	5/10/20/32/64	69	25	15	22	54	50	21.0	h11	1.30	6	36	3.5	M8	19	6	6	
	300	40	5/10/12/16/20/40	70	30	16	28	54	50	26.6	h12	1.60	8	36	4.0	M10	22	10	10	
	350	50	5/10/12/16/20/40	82	35	17	32	65	60	30.3	h12	1.60	10	40	5.0	M12	28	10	10	
	500	63	10/20/40	107	50	20	48	87	80	45.5	h12	1.85	14	63	6.0	M16	36	17	17	
600	80	10/20	109	60	22	58	87	80	55.0	h12	2.15	16	63	6.0	M20	42	17	17		

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

End bearings for screw ends form 01–02

Deep-groove ball bearing per DIN 625



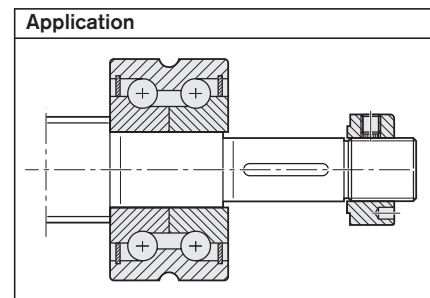
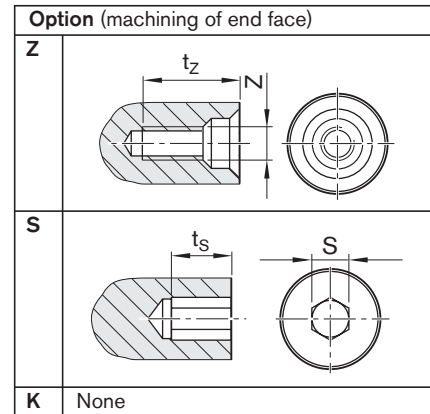
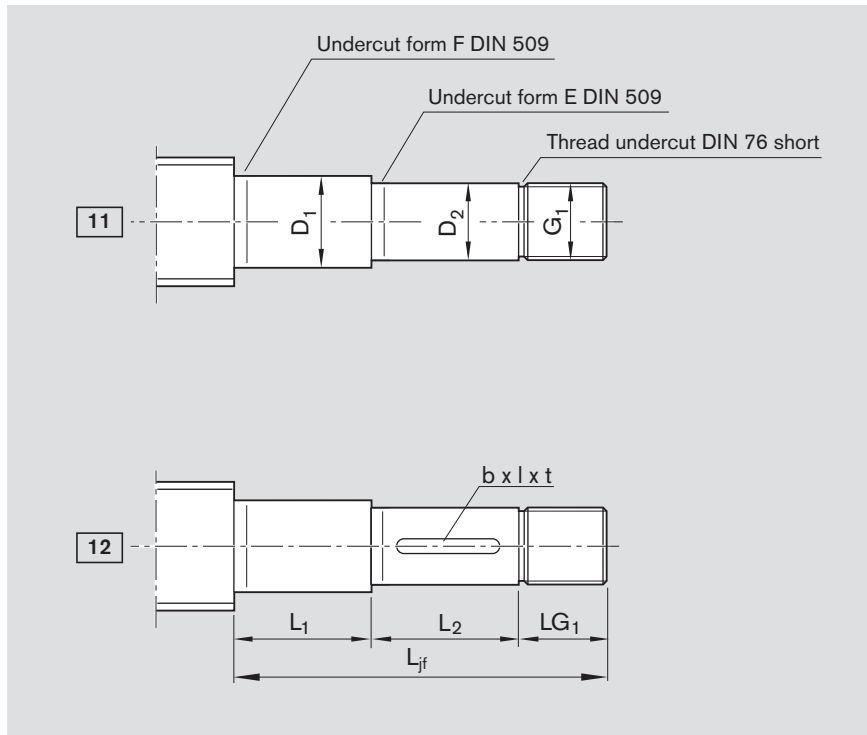
Retaining ring per DIN 471



Form	Ver- sion	Size		Deep-groove ball bearing per DIN 625		Retaining ring per DIN 471	
		d ₀	P	Desig- nation	Part number	Desig- nation	Part number
01	050	8	2.5	625.2RS	R3414 048 00	4x0.4	R3410 765 00
	060	12	2/5/10	626.2RS	R3414 043 00	5x0.6	R3410 742 00
	100	16	5/10/16	6200.2RS	R3414 049 00	8x0.8	R3410 737 00
	120	20	5/10/20/40	6201.2RS	R3414 042 00	10x1	R3410 745 00
	150	20	5/10/20/40	6202.2RS	R3414 074 00	12x1	R3410 712 00
	170	25	5/10/25	6203.2RS	R3414 050 00	15x1	R3410 748 00
	200	32	5/10/20/32/64	6204.2RS	R3414 038 00	18x1.2	R3410 723 00
	250	32	5/10/20/32/64	6205.2RS	R3414 063 00	22x1.2	R3410 714 00
	300	40	5/10/12/16/20/40	6206.2RS	R3414 051 00	28x1.5	R3410 752 00
	350	50	5/10/12/16/20/40	6207.2RS	R3414 075 00	32x1.5	R3410 753 00
	500	63	10/20/40	6210.2RS	R3414 077 00	48x1.75	R3410 718 00
600	80	10/20	6212.2RS	R3414 078 00	58x2	R3410 728 00	
02	120	20	5/10/20/40	6201.2RS	R3414 042 00	10x1	R3410 745 00
	150	20	5/10/20/40	6202.2RS	R3414 074 00	12x1	R3410 712 00
	170	25	5/10/25	6203.2RS	R3414 050 00	15x1	R3410 748 00
	200	32	5/10/20/32/64	6204.2RS	R3414 038 00	18x1.2	R3410 723 00
	250	32	5/10/20/32/64	6205.2RS	R3414 063 00	22x1.2	R3410 714 00
	300	40	5/10/12/16/20/40	6206.2RS	R3414 051 00	28x1.5	R3410 752 00
	350	50	5/10/12/16/20/40	6207.2RS	R3414 075 00	32x1.5	R3410 753 00
	500	63	10/20/40	6210.2RS	R3414 077 00	48x1.75	R3410 718 00
600	80	10/20	6212.2RS	R3414 078 00	58x2	R3410 728 00	

Screw Ends

Form 11–12



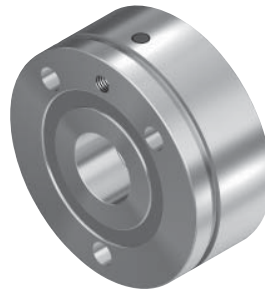
Ordering code: SEM-E-S 20 x 5R x 3-4 1 2 T7 R 12Z120 41Z120 1250 1 0

Form	Version ¹⁾	Size		Dimensions (mm)							Keyway per DIN 6885			Centering hole		Hex socket	
		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	S	t _s
11	100	16	5/10/16	48	10	18	8	20	M6x0.5	10	-	-	-	-	-	-	-
	120	20	5/10/20/40	60	12	23	10	25	M10x1	12	-	-	-	-	-	4	4
	170	25	5/10/25	75	17	23	15	30	M15x1	22	-	-	-	M5	12	4	4
	200	32	5/10/20/32/64	88	20	26	18	40	M17x1	22	-	-	-	M5	12	5	5
	250	40	10/12/16/20/40	126	25	54	22	50	M20x1	22	-	-	-	M6	16	5	5
	300	40	5	101	30	25	28	50	M25x1.5	26	-	-	-	M8	19	8	8
	301	50	10/12/16/20/40	130	30	54	28	50	M25x1.5	26	-	-	-	M8	19	8	8
	350	50	5	118	35	32	32	60	M30x1.5	26	-	-	-	M10	22	10	10
	400	63	10/20/40	132	40	44	38	60	M35x1.5	28	-	-	-	M12	28	12	21
	500	80	10/20	160	50	52	48	80	M40x1.5	28	-	-	-	M16	36	12	12
12	120	20	5/10/20/40	60	12	23	10	25	M10x1	12	3	20	1.8	-	-	4	4
	170	25	5/10/25	75	17	23	15	30	M15x1	22	5	25	3.0	M5	12	4	4
	200	32	5/10/20/32/64	88	20	26	18	40	M17x1	22	6	28	3.5	M5	12	5	5
	250	40	10/12/16/20/40	126	25	54	22	50	M20x1	22	6	36	3.5	M6	16	5	5
	300	40	5	101	30	25	28	50	M25x1.5	26	8	36	4.0	M8	19	8	8
	301	50	10/12/16/20/40	130	30	54	28	50	M25x1.5	26	8	36	4.0	M8	19	8	8
	350	50	5	118	35	32	32	60	M30x1.5	26	10	40	5.0	M10	22	10	10
	400	63	10/20/40	132	40	44	38	60	M35x1.5	28	10	40	5.0	M12	28	12	12
500	80	10/20	160	50	52	48	80	M40x1.5	28	14	63	5.5	M16	36	12	12	

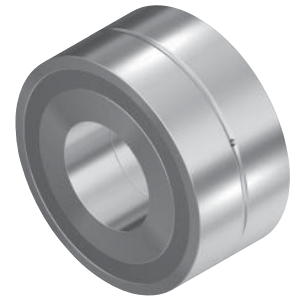
1) The allocation of screw ends to the bearing is defined by the version.

End bearings for screw ends form 11–12

Angular-contact thrust ball bearing LGF



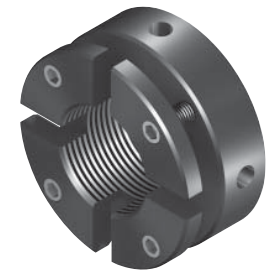
Angular-contact thrust ball bearing LGN



Slotted nut NMZ



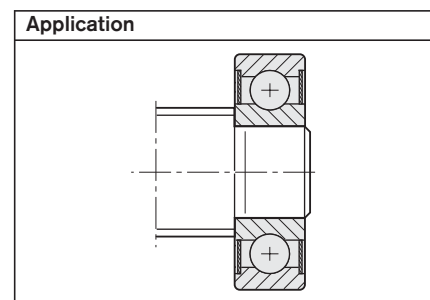
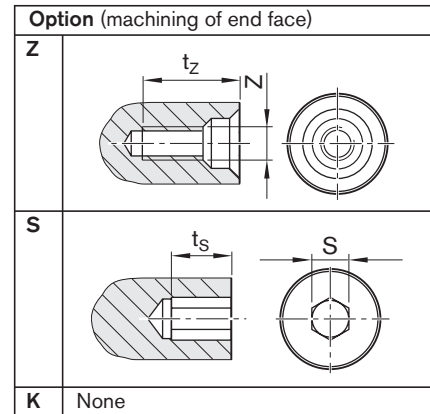
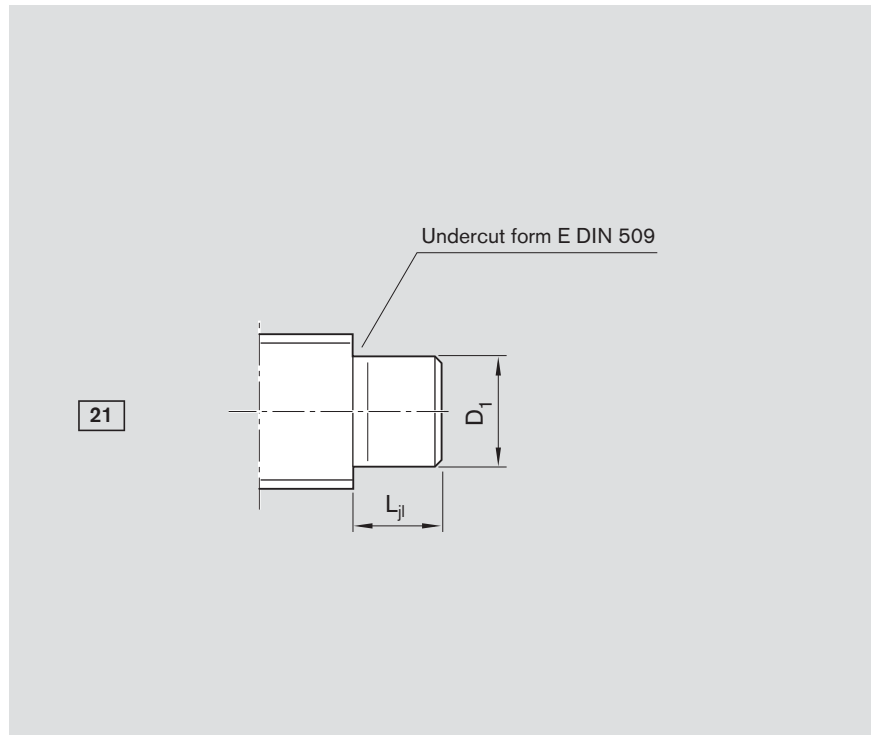
Slotted nut NMA



Form	Version	Size		Angular-contact thrust ball bearing				Slotted nut	
		d ₀	P	LGF Designation	Part number	LGN Designation	Part number	Designation	Part number
11	100	16	5/10/16	–	–	LGN-B-1034	R3414 003 06	NMZ6x0.5	R3446 001 04
	120	20	5/10/20/40	LGF-B-1255	R3414 009 06	LGN-B-1242	R3414 004 06	NMZ10x1	R3446 002 04
	170	25	5/10/25	LGF-B-1762	R3414 010 06	LGN-B-1747	R3414 005 06	NMA15x1	R3446 020 04
	200	32	5/10/20/32/64	LGF-B-2068	R3414 001 06	LGN-B-2052	R3414 006 06	NMA17x1	R3446 014 04
	250	40	10/12/16/20/40	LGF-C-2575	R3414 015 06	LGN-C-2557	R3414 014 06	NMA20x1	R3446 015 04
	300	40	5	LGF-B-3080	R3414 011 06	LGN-B-3062	R3414 007 06	NMA25x1.5	R3446 011 04
	301	50	10/12/16/20/40	LGF-C-3080	R3414 027 06	LGN-C-3062	R3414 023 06	NMA25x1.5	R3446 011 04
	350	50	5	LGF-B-3590	R3414 026 06	LGN-B-3572	R3414 022 06	NMA30x1.5	R3446 016 04
	400	63	10/20/40	LGF-B-40115	R3414 028 06	LGN-A-4090	R3414 024 06	NMA35x1.5	R3446 012 04
	500	80	10/20	LGF-A-50140	R3414 029 06	LGN-A-50110	R3414 025 06	NMA40x1.5	R3446 018 04
12	120	20	5/10/20/40	LGF-B-1255	R3414 009 06	LGN-B-1242	R3414 004 06	NMZ10x1	R3446 002 04
	170	25	5/10/25	LGF-B-1762	R3414 010 06	LGN-B-1747	R3414 005 06	NMA15x1	R3446 020 04
	200	32	5/10/20/32/64	LGF-B-2068	R3414 001 06	LGN-B-2052	R3414 006 06	NMA17x1	R3446 014 04
	250	40	10/12/16/20/40	LGF-B-2575	R3414 015 06	LGN-C-2557	R3414 014 06	NMA20x1	R3446 015 04
	300	40	5	LGF-B-3080	R3414 011 06	LGN-B-3062	R3414 007 06	NMA25x1.5	R3446 011 04
	301	50	10/12/16/20/40	LGF-C-3080	R3414 027 06	LGN-C-3062	R3414 023 06	NMA25x1.5	R3446 011 04
	350	50	5	LGF-B-3590	R3414 026 06	LGN-B-3572	R3414 022 06	NMA30x1.5	R3446 016 04
	400	63	10/20/40	LGF-B-40115	R3414 028 06	LGN-A-4090	R3414 024 06	NMA35x1.5	R3446 012 04
500	80	10/20	LGF-A-50140	R3414 029 06	LGN-A-50110	R3414 025 06	NMA40x1.5	R3446 018 04	

Screw Ends

Form 21



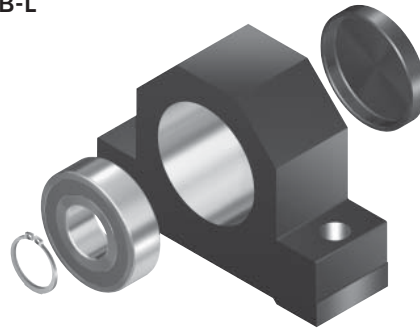
Ordering code: SEM-E-S 20 x 5R x 3-4 1 2 T7 R 21Z120 82Z120 1250 1 0

Form	Version ¹⁾	Size		Dimensions (mm)		Centering hole		Hex socket	
		d_0	P	D_1 j6	L_{j1}	Z	t_z	S	t_s
21	050	8	2.5	5	5	-	-	-	-
	060	12	2/5/10	6	6	-	-	-	-
	100	16	5/10/16	10	9	-	-	4	4
	120	20	5/10/20/40	12	10	M4	10	4	4
	150	20	5/10/20/40	15	11	M5	12	4	4
	170	25	5/10/25	17	12	M6	16	5	5
	200	32	5/10/20/32/64	20	14	M6	19	5	5
	250	32	5/10/20/32/64	25	15	M10	22	8	8
	300	40	5	30	16	M10	22	10	10
	300	40	10/12/16/20/40	30	16	M10	22	10	10
	350	50	5	35	17	M12	18	12	12
	350	50	10/12/16/20/40	35	17	M12	18	12	12
	500	63	10/20/40	50	20	M16	36	17	17
600	80	10/20	60	22	M20	42	17	17	

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

End bearings for screw ends form 21

Pillow block unit SEB-L



Bearing LAD²⁾

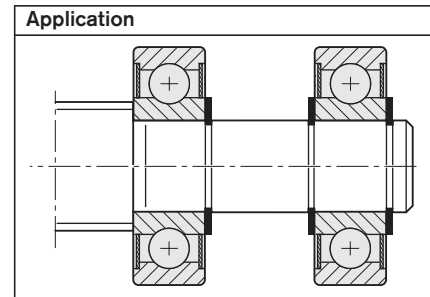
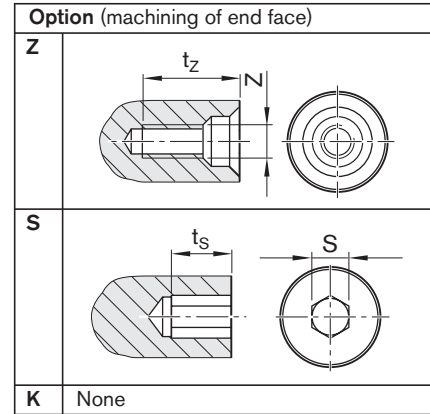
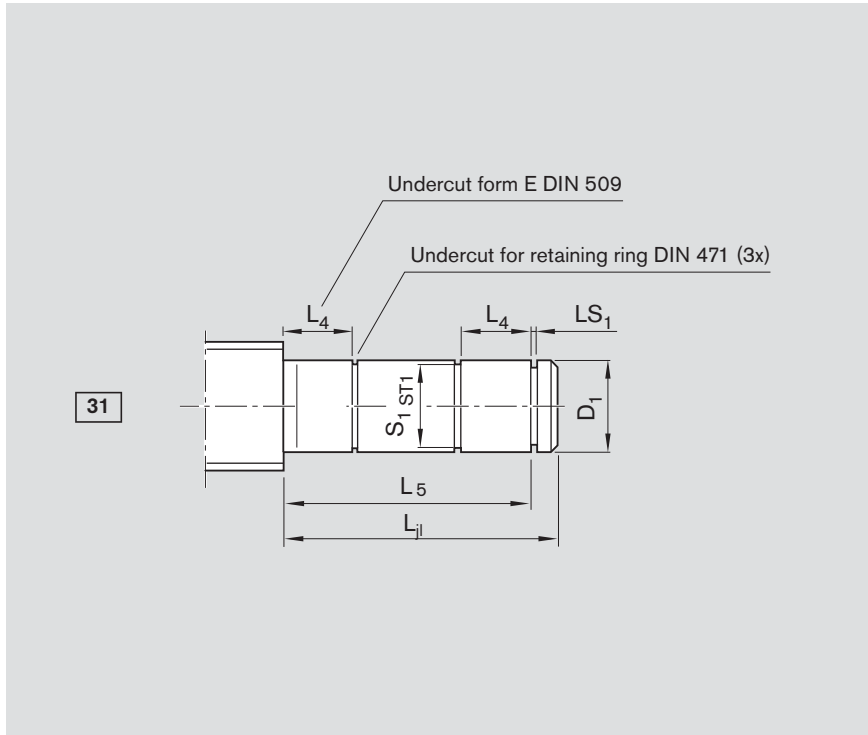


Form	Version	Size		Pillow block unit SEB-L Part number	Bearing LAD ²⁾ Part number
		d ₀	P		
21	050	8	2.5	R1591 605 00	R1590 605 00
	060	12	2/5/10	R1591 606 20	R1590 606 00
	100	16	5/10/16	R1591 610 20	R1590 610 00
	120	20	5/10/20/40	R1591 612 20	R1590 612 00
	150	20	5/10/20/40	–	R1590 615 00
	170	25	5/10/25	R1591 617 20	R1590 617 00
	200	32	5/10/20/32/64	R1591 620 20	R1590 620 00
	250	32	5/10/20/32/64	–	R1590 625 00
	300	40	5	R1591 630 20	R1590 630 00
	300	40	10/12/16/20/40	R1591 630 10	
	350	50	5	R1591 635 10	R1590 635 00
	350	50	10/12/16/20/40	R1591 635 20	
	500	63	10/20/40	R1591 650 20	R1590 650 00
	600	80	10/20	R1591 660 20	R1590 660 00

2) Items delivered: 1 bearing, 2 retaining rings.

Screw Ends

Form 31



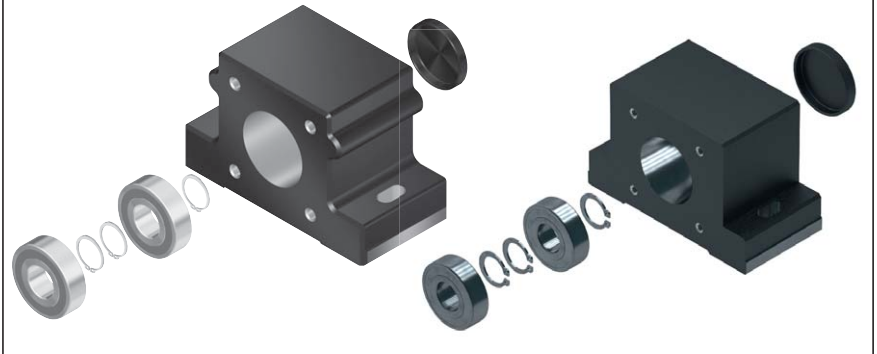
Ordering code: SEM-E-S 20 x 5R x 3-4 1 2 T7 R 31Z120 82Z120 1250 1 0

Form	Version ¹⁾	Size		Dimensions (mm)							Centering hole		Hex socket	
		d_0	P	D_1 j6	L_j	L_4	L_5	S_1	ST1	LS_1 H13	Z	t_z	S	t_s
31	050	8	2.5	5	22	5	20	4.8	h10	0.70	-	-	-	-
	060	12	2/5/10	6	26	6	24	5.7	h10	0.80	-	-	-	-
	100	16	5/10/16	10	39	9	36	9.6	h10	1.10	-	-	4	4
	120	20	5/10/20/40	12	43	10	40	11.5	h11	1.10	M4	10	4	4
	150	20	5/10/20/40	15	47	11	44	14.3	h11	1.10	M5	12	4	4
	170	25	5/10/25	17	51	12	48	16.2	h11	1.10	M6	16	5	5
	200	32	5/10/20/32/64	20	60	14	56	19.0	h11	1.30	M6	16	5	5
	250	32	5/10/20/32/64	25	64	15	60	23.9	h12	1.30	M10	22	8	8
	300	40	5/10/12/16/20/40	30	68	16	64	28.6	h12	1.60	M10	22	10	10
	350	50	5/10/12/16/20/40	35	73	17	68	33.0	h12	1.60	M12	28	12	12
500	63	10/20/40	50	87	20	80	47.0	h12	2.15	M16	36	17	17	
600	80	10/20	60	95	22	88	57.0	h12	2.15	M20	42	17	17	

1) The allocation of screw ends to the bearing is defined by the version.
 Note: Form 31 with double floating bearing increases the critical speed, see page 150.

End bearings for screw ends form 31

Pillow block unit SEC-L



Bearing LAD²⁾

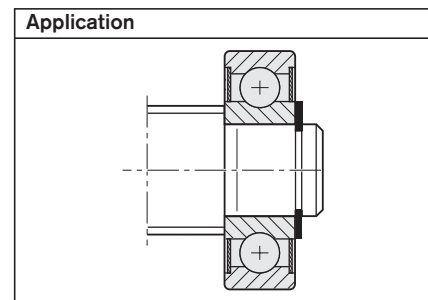
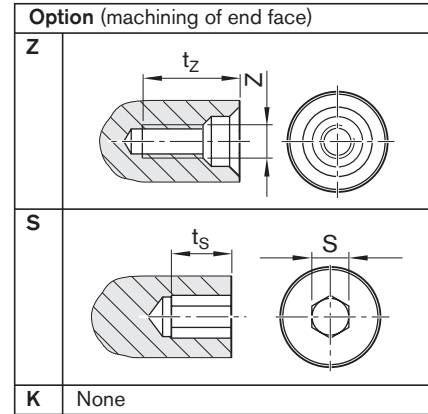
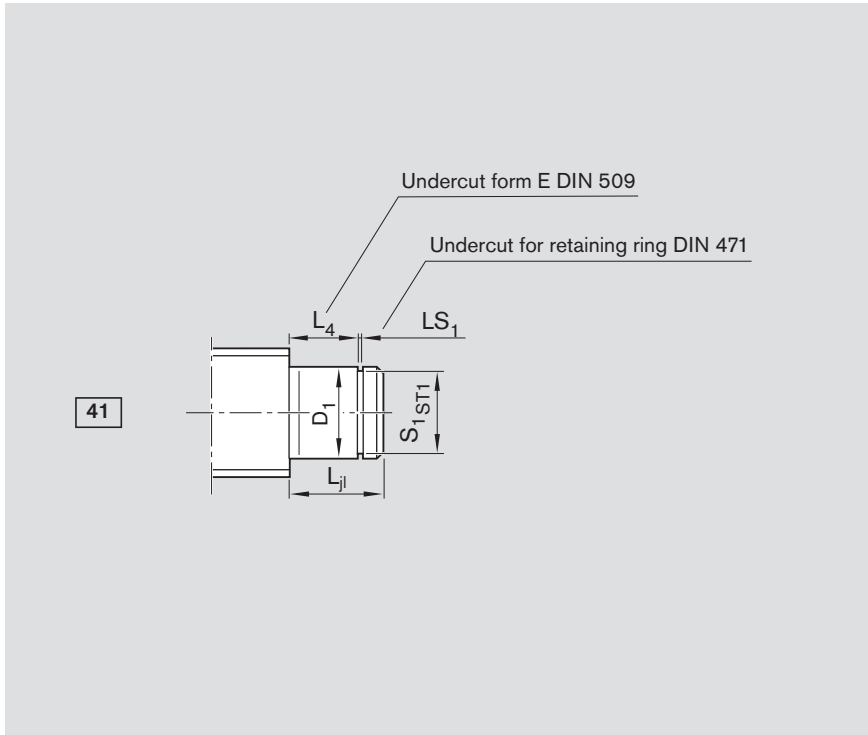


Form	Version	Size		Pillow block unit SEC-L Part number	Pillow block unit SES-L Part number	Bearing LAD ²⁾ Part number
		d ₀	P			
31	050	8	2.5	-	-	R1590 605 00
	060	12	2/5/10	-	-	R1590 606 00
	100	16	5/10/16	-	-	R1590 610 00
	120	20	5/10/20/40	-	-	R1590 612 00
	150	20	5/10/20/40	R1594 615 00	R1595 615 00	R1590 615 00
	170	25	5/10/25	-	R1595 617 00	R1590 617 00
	200	32	5/10/20/32/64	R1594 620 00	R1595 620 00	R1590 620 00
	250	32	5/10/20/32/64	-	-	R1590 625 00
	300	40	5/10/12/16/20/40	R1594 630 00	R1595 630 00	R1590 630 00
	350	50	5/10/12/16/20/40	-	-	R1590 635 00
	500	63	10/20/40	-	-	R1590 650 00
	600	80	10/20	-	-	R1590 660 00

2) Items delivered per bearing LAD: 1 bearing, 2 retaining rings. Two sets are required for applications with Form 31.

Screw Ends

Form 41



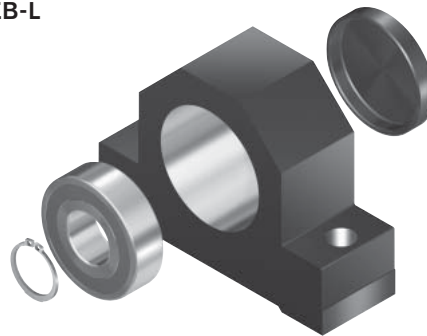
Ordering code: SEM-E-S 20 x 5R x 3-4 1 2 T7 R 41Z120 82Z120 1250 1 0

Form	Version ¹⁾	Size		Dimensions (mm)						Centering hole		Hex socket	
		d ₀	P	D ₁ j6	L _{II}	L ₄	S ₁	ST1	LS ₁ H13	Z	t _z	S	t _s
41	050	8	1/2/2.5	5	7	5	4.8	h10	0.70	-	-	-	-
	060	12	2/5/10	6	8	6	5.7	h10	0.80	-	-	-	-
	100	16	5/10/16	10	12	9	9.6	h10	1.10	-	-	4	4
	120	20	5/10/20/40	12	13	10	11.5	h11	1.10	M4	10	4	4
	150	20	5/10/20/40	15	14	11	14.3	h11	1.10	M5	12	4	4
	170	25	5/10/25	17	15	12	16.2	h11	1.10	M6	16	5	5
	200	32	5/10/20/32/64	20	18	14	19.0	h11	1.30	M6	16	5	5
	250	32	5/10/20/32/64	25	19	15	23.9	h12	1.30	M10	22	8	8
	300	40	5	30	20	16	28.6	h12	1.60	M10	22	10	10
	300	40	10/12/16/20/40	30	20	16	28.6	h12	1.60	M10	22	10	10
	350	50	5	35	22	17	33.0	h12	1.60	M12	28	12	12
	350	50	10/12/16/20/40	35	22	17	33.0	h12	1.60	M12	28	12	12
	500	63	10/20/40	50	27	20	47.0	h12	2.15	M16	36	17	17
600	80	10/20	60	29	22	57.0	h12	2.15	M20	42	17	17	

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

End bearings for screw ends form 41

Pillow block unit SEB-L



Bearing LAD²⁾

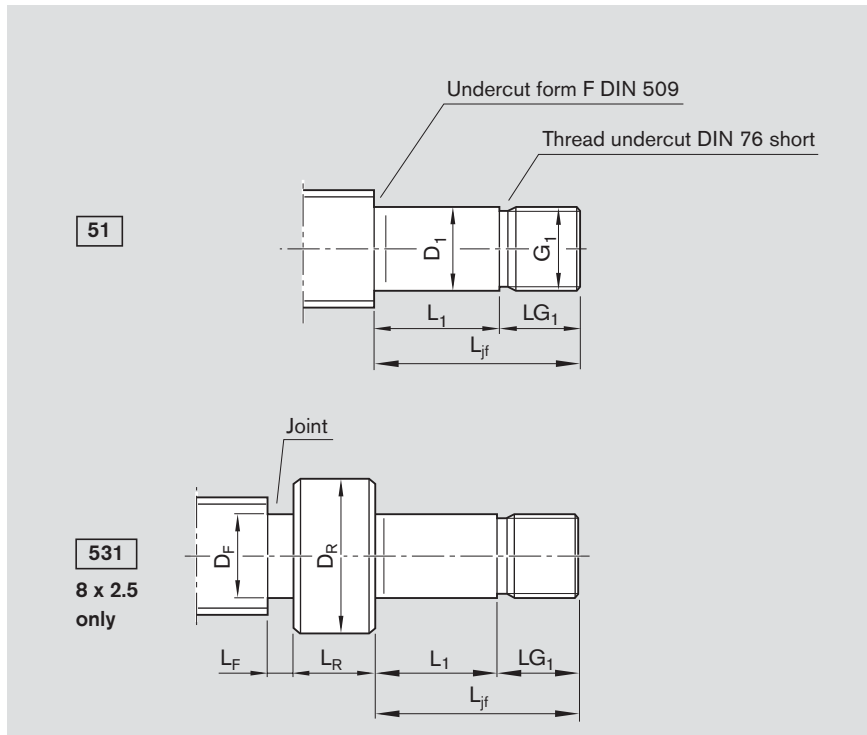


Form	Version	Size		Bearing LAD ²⁾ Part number	Pillow block unit SEB-L Part number
		d ₀	P		
41	050	8	1/2/2.5	R1590 605 00	R1591 605 00
	060	12	2/5/10	R1590 606 00	R1591 606 20
	100	16	5/10/16	R1590 610 00	R1591 610 20
	120	20	5/10/20/40	R1590 612 00	R1591 612 20
	150	20	5/10/20/40	R1590 615 00	–
	170	25	5/10/25	R1590 617 00	R1591 617 20
	200	32	5/10/20/32/64	R1590 620 00	R1591 620 20
	250	32	5/10/20/32/64	R1590 625 00	–
	300	40	5	R1590 630 00	R1591 630 20
	300	40	10/12/16/20/40	R1590 630 00	R1591 630 10
	350	50	5	R1590 635 00	R1591 635 10
	350	50	10/12/16/20/40	R1590 635 00	R1591 635 20
	500	63	10/20/40	R1590 650 00	R1591 650 20
600	80	10/20	R1590 660 00	R1591 660 20	

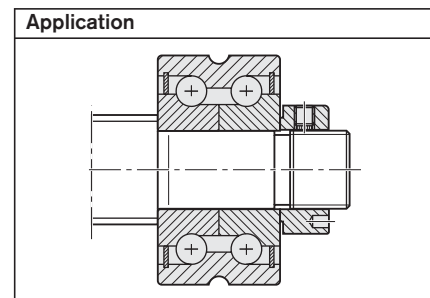
2) Items delivered: 1 bearing, 2 retaining rings.

Screw Ends

Form 51–531



Option (machining of end face)	
Z	
S	
K	None



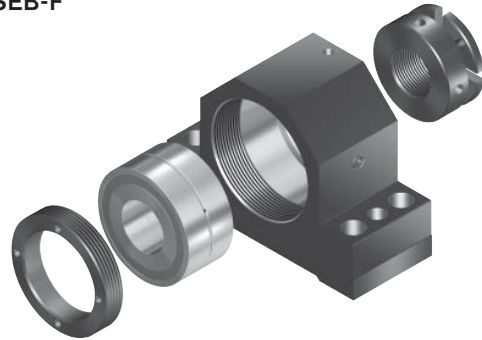
Ordering code: SEM-E-S 20 x 5R x 3-4 1 2 T7 R 51Z120 82Z120 1250 1 0

Form	Version ¹⁾	Size		Dimensions (mm)					Centering hole		Hex socket	
		d ₀	P	L _{jf}	D ₁ h6	L ₁	G ₁	LG ₁	Z	t _z	S	t _s
51	060	12	2/5/10	24	6	14	M6x0.5	10	–	–	–	–
	100	16	5/10/16	30	10	18	M10x1	12	–	–	4	4
	120	20	5/10/20/40	35	12	23	M12x1	12	M4	10	4	4
	170	25	5/10/25	45	17	23	M17x1	22	M5	12	5	5
	200	32	5/10/20/32/64	48	20	26	M20x1	22	M6	16	5	5
	250	40	10/12/16/20/40	80	25	54	M25x1.5	26	M8	19	8	8
	300	40	5	51	30	25	M30x1.5	26	M10	22	10	10
	300	40	10/12/16/20/40	51	30	25	M30x1.5	26	M10	22	10	10
	301	50	10/12/16/20/40	80	30	54	M30x1.5	26	M10	22	10	10
	350	50	5	60	35	32	M35x1.5	28	M12	28	12	12
400	63	10/20/40	72	40	44	M40x1.5	28	M16	36	12	12	
500	80	10/20	84	50	52	M50x1.5	32	M16	36	17	17	
531	060	8	1/2/2.5	24	6	14	M6x0.5	10	–	–	–	–

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

End bearings for screw ends form 51–531

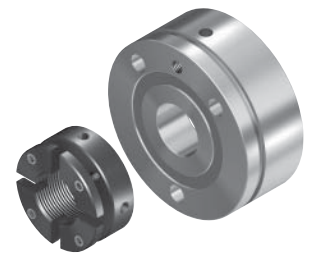
Pillow block unit SEB-F



Bearing LAN



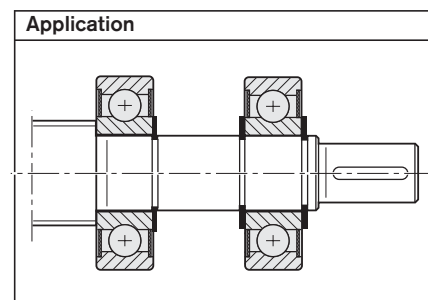
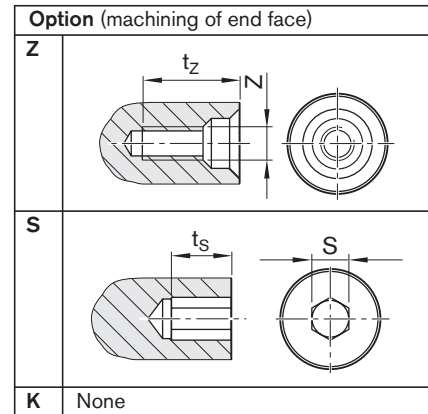
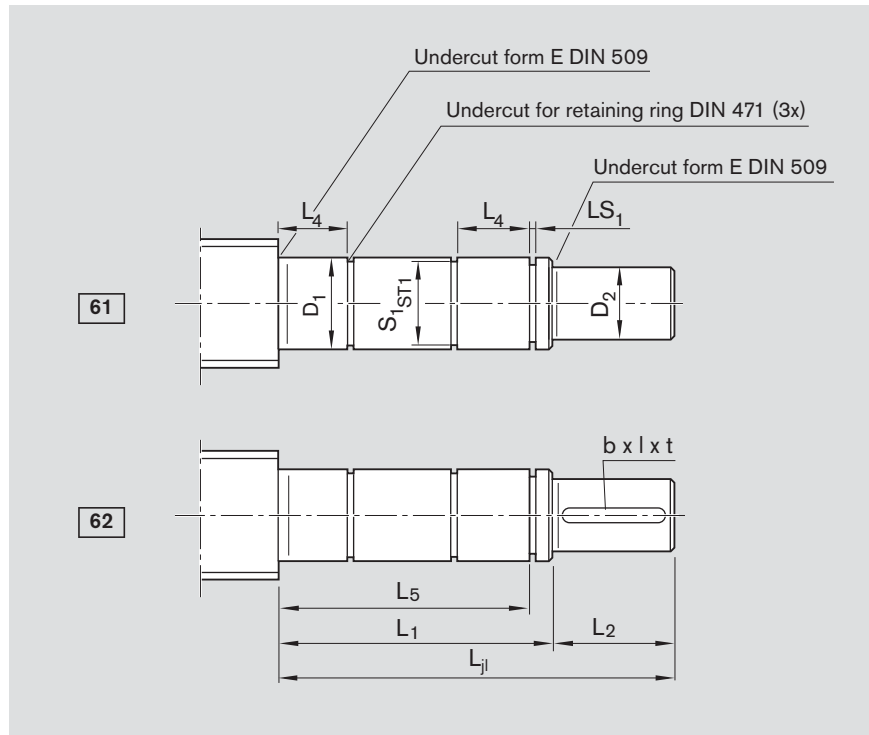
Bearing LAF



Form	Version	Size		Dimensions (mm)				Pillow block unit SEB-F Part numbe	Bearing LAF Part numbe	LAN Part numbe
		d ₀	P	D _R	L _R	D _F	L _F			
51	060	12	2/5/10	-	-	-	-	R1591 106 20	-	R1590 106 00
	100	16	5/10/16	-	-	-	-	R1591 110 20	-	R1590 110 00
	120	20	5/10/20/40	-	-	-	-	R1591 112 20	R1590 012 00	R1590 112 00
	170	25	5/10/25	-	-	-	-	R1591 117 30	R1590 017 30	R1590 117 30
	200	32	5/10/20/32/64	-	-	-	-	R1591 120 30	R1590 020 30	R1590 120 30
	250	40	10/12/16/20/40	-	-	-	-	R1591 225 30	R1590 325 30	R1590 225 30
	300	40	5	-	-	-	-	R1591 130 30	R1590 030 30	R1590 130 30
	300	40	10/12/16/20/40	-	-	-	-	-	-	-
	301	50	10/12/16/20/40	-	-	-	-	R1591 230 30	R1590 330 30	R1590 230 30
	350	50	5	-	-	-	-	R1591 135 30	R1590 035 30	R1590 135 30
	400	63	10/20/40	-	-	-	-	R1591 140 30	R1590 040 30	R1590 140 30
500	80	10/20	-	-	-	-	R1591 150 30	R1590 050 30	R1590 150 30	
531	060	8	1/2/2.5	12	15	6	1	R1591 106 00	-	R1590 106 00

Screw Ends

Form 61–62



Ordering code: SEM-E-S 20 x 5R x 3-4 1 2 T7 R 62Z120 51Z120 1250 1 0

Form	Version ¹⁾	Size		Dimensions (mm)										Keyway per DIN 6885			Centering hole		Hex socket	
		d ₀	P	L _{ji}	D ₁ j6	L ₁	D ₂ h7	L ₂	L ₄	L ₅	S ₁	ST1	LS ₁ H13	b P9	l	t	Z	t _z	S	t _s
61	050	8	2.5	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	-	-	-	-	4	4	-
	150	20	5/10/20/40	72	15	47	12	25	11	44	14.3	h11	1.10	-	-	-	M4	10	4	4
	170	25	5/10/25	81	17	51	15	30	12	48	16.2	h11	1.10	-	-	-	M5	12	4	4
	200	32	5/10/20/32/64	100	20	60	18	40	14	56	19.0	h11	1.30	-	-	-	M6	16	5	5
	250	32	5/10/20/32/64	114	25	64	22	50	15	60	23.9	h12	1.30	-	-	-	M8	19	6	6
	300	40	5/10/12/16/20/40	118	30	68	28	50	16	64	28.6	h12	1.60	-	-	-	M10	22	10	10
	350	50	5/10/12/16/20/40	133	35	73	32	60	17	68	33.0	h12	1.60	-	-	-	M12	28	10	10
62	500	63	10/20/40	167	50	87	48	80	20	80	47.0	h12	2.15	-	-	-	M16	36	17	17
	600	80	10/20	175	60	95	58	80	22	88	57.0	h12	2.15	-	-	-	M20	42	17	17
	120	20	5/10/20/40	68	12	43	10	25	10	40	11.5	h11	1.10	3	20	1.8	-	-	4	4
	150	20	5/10/20/40	72	15	47	12	25	11	44	14.3	h11	1.10	4	20	2.5	M4	10	4	4
	170	25	5/10/25	81	17	51	15	30	12	48	16.2	h11	1.10	5	25	3.0	M5	12	4	4
	200	32	5/10/20/32/64	100	20	60	18	40	14	56	19.0	h11	1.30	6	28	3.5	M6	16	5	5
	250	32	5/10/20/32/64	114	25	64	22	50	15	60	23.9	h12	1.30	6	36	3.5	M8	19	6	6
	300	40	5/10/12/16/20/40	118	30	68	28	50	16	64	28.6	h12	1.60	8	36	4.0	M10	22	10	10
	350	50	5/10/12/16/20/40	133	35	73	32	60	17	68	33.0	h12	1.60	10	40	5.0	M12	28	10	10
	500	63	10/20/40	167	50	87	48	80	20	80	47.0	h12	2.15	14	63	5.5	M16	36	17	17
600	80	10/20	175	60	95	58	80	22	88	57.0	h12	2.15	16	63	6.0	M20	46	17	17	

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

End bearings for screw ends form 61–62

Bearing LAD²⁾

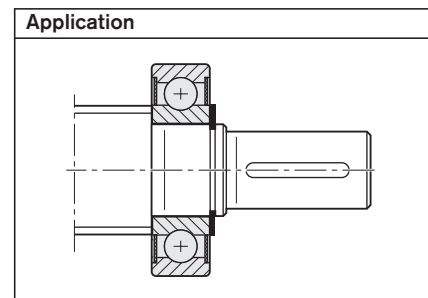
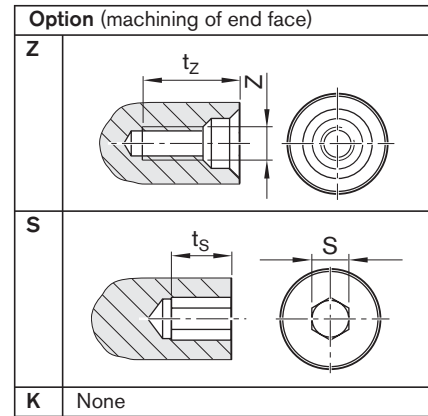
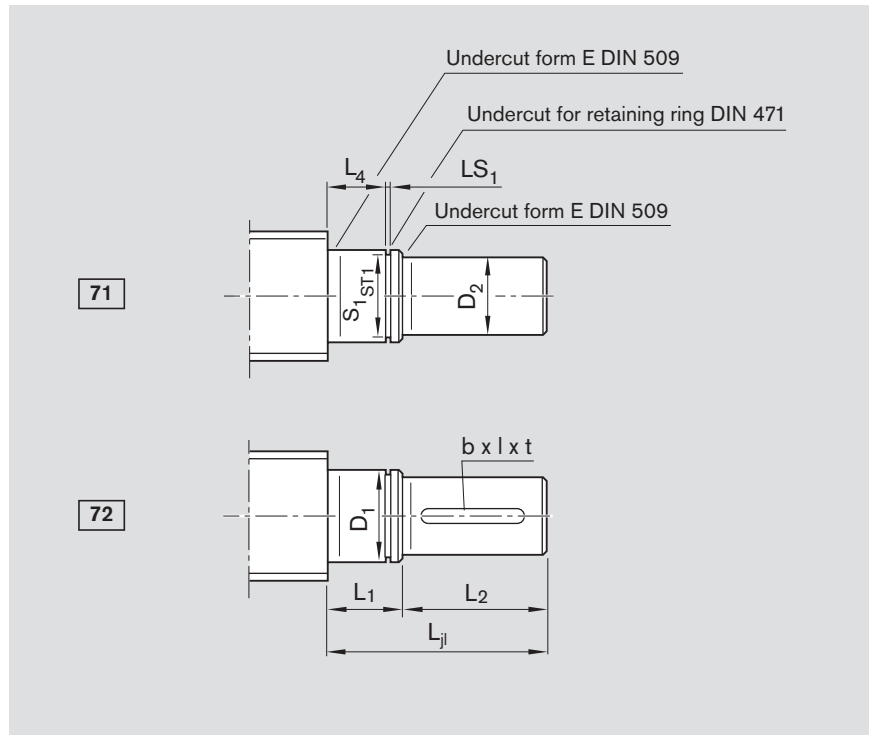


Form	Version	Size		Bearing LAD ²⁾ Part number
		d ₀	P	
61	050	8	2.5	R1590 605 00
	060	12	2/5/10	R1590 606 00
	100	16	5/10/16	R1590 610 00
	120	20	5/10/20/40	R1590 612 00
	150	20	5/10/20/40	R1590 615 00
	170	25	5/10/25	R1590 617 00
	200	32	5/10/20/32/64	R1590 620 00
	250	32	5/10/20/32/64	R1590 625 00
	300	40	5/10/12/16/20/40	R1590 630 00
	350	50	5/10/12/16/20/40	R1590 635 00
	500	63	10/20/40	R1590 650 00
	600	80	10/20	R1590 660 00
62	120	20	5/10/20/40	R1590 612 00
	150	20	5/10/20/40	R1590 615 00
	170	25	5/10/25	R1590 617 00
	200	32	5/10/20/32/64	R1590 620 00
	250	32	5/10/20/32/64	R1590 625 00
	300	40	5/10/12/16/20/40	R1590 630 00
	350	50	5/10/12/16/20/40	R1590 635 00
	500	63	10/20/40	R1590 650 00
600	80	10/20	R1590 660 00	

2) Items delivered per bearing: 1 bearing, 2 retaining rings.
Two sets are required for applications with Form 61–62.

Screw Ends

Form 71-72



Ordering code: SEM-E-S 20 x 5R x 3-4 1 2 T7 R 72Z120 51Z120 1250 1 0

Form	Version ¹⁾	Size		Dimensions (mm)										Keyway per DIN 6885			Centering hole		Hex socket	
		d ₀	P	L _{j1}	D ₁ j6	L ₁	D ₂ h7	L ₂	L ₄	S ₁	ST1	LS ₁ H13	b P9	l	t	Z	t _z	S	t _s	
71	050	8	2.5	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	-	-	-	-	-	4	4	
	150	20	5/10/20/40	39	15	14	12	25	11	14.3	h11	1.10	-	-	-	M4	10	4	4	
	170	25	5/10/25	45	17	15	15	30	12	16.2	h11	1.10	-	-	-	M5	12	4	4	
	200	32	5/10/20/32/64	58	20	18	18	40	14	19.0	h11	1.30	-	-	-	M6	16	5	5	
	250	32	5/10/20/32/64	69	25	19	22	50	15	23.9	h12	1.30	-	-	-	M8	19	6	6	
	300	40	5/10/12/16/20/40	70	30	20	28	50	16	28.6	h12	1.60	-	-	-	M10	22	10	10	
	350	50	5/10/12/16/20/40	82	35	22	32	60	17	33.0	h12	1.60	-	-	-	M12	28	10	10	
72	500	63	10/20/40	107	50	27	48	80	20	47.0	h12	2.15	-	-	-	M16	36	17	17	
	600	80	10/20	109	60	29	58	80	22	57.0	h12	2.15	-	-	-	M20	42	17	17	
	120	20	5/10/20/40	38	12	13	10	25	10	11.5	h11	1.10	3	20	1.8	-	-	4	4	
	150	20	5/10/20/40	39	15	14	12	25	11	14.3	h11	1.10	4	20	2.5	M4	10	4	4	
	170	25	5/10/25	45	17	15	15	30	12	16.2	h11	1.10	5	25	3.0	M5	12	4	4	
	200	32	5/10/20/32/64	58	20	18	18	40	14	19.0	h11	1.30	6	28	3.5	M6	16	5	5	
	250	32	5/10/20/32/64	69	25	19	22	50	15	23.9	h12	1.30	6	36	3.5	M8	19	6	6	
	300	40	5/10/12/16/20/40	70	30	20	28	50	16	28.6	h12	1.60	8	36	4.0	M10	22	10	10	
	350	50	5/10/12/16/20/40	82	35	22	32	60	17	33.0	h12	1.60	10	40	5.0	M12	28	10	10	
	500	63	10/20/40	107	50	27	48	80	20	47.0	h12	2.15	14	63	5.5	M16	36	17	17	
600	80	10/20	109	60	29	58	80	22	57.0	h12	2.15	16	63	6.0	M20	42	17	17		

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

End bearings for screw ends form 71–72

Bearing LAD²⁾

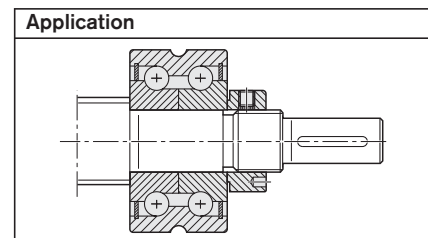
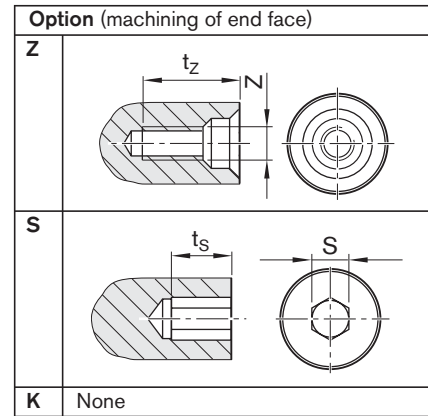
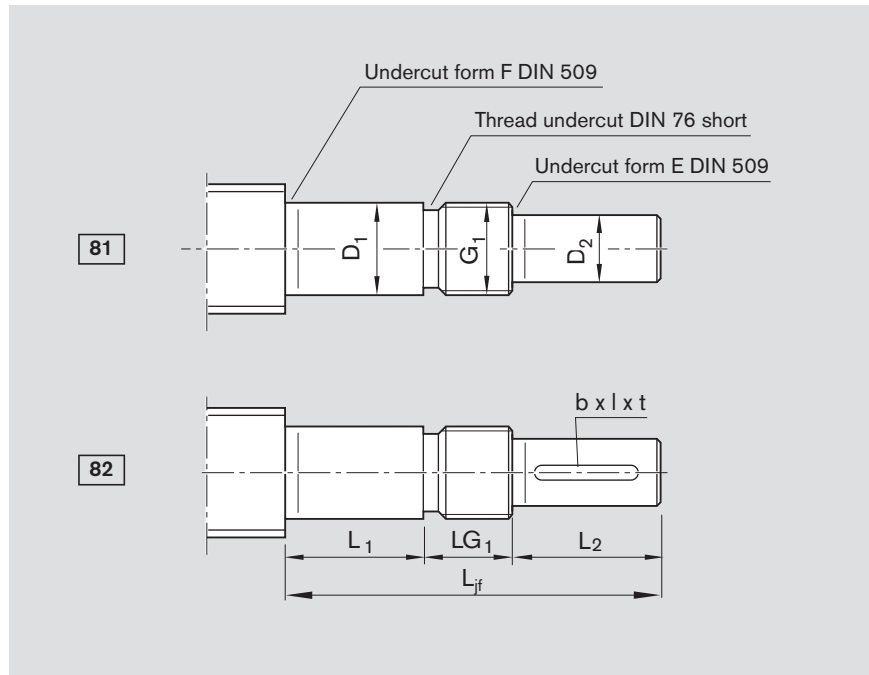


Form	Version	Size		Bearing LAD ²⁾ Part number
		d ₀	P	
71	050	8	2.5	R1590 605 00
	060	12	2/5/10	R1590 606 00
	100	16	5/10/16	R1590 610 00
	120	20	5/10/20/40	R1590 612 00
	150	20	5/10/20/40	R1590 615 00
	170	25	5/10/25	R1590 617 00
	200	32	5/10/20/32/64	R1590 620 00
	250	32	5/10/20/32/64	R1590 625 00
	300	40	5/10/12/16/20/40	R1590 630 00
	350	50	5/10/12/16/20/40	R1590 635 00
	500	63	10/20/40	R1590 650 00
600	80	10/20	R1590 660 00	
72	120	20	5/10/20/40	R1590 612 00
	150	20	5/10/20/40	R1590 615 00
	170	25	5/10/25	R1590 617 00
	200	32	5/10/20/32/64	R1590 620 00
	250	32	5/10/20/32/64	R1590 625 00
	300	40	5/10/12/16/20/40	R1590 630 00
	350	50	5/10/12/16/20/40	R1590 635 00
	500	63	10/20/40	R1590 650 00
600	80	10/20	R1590 660 00	

2) Items delivered: 1 bearing, 2 retaining rings.

Screw Ends

Form 81–82

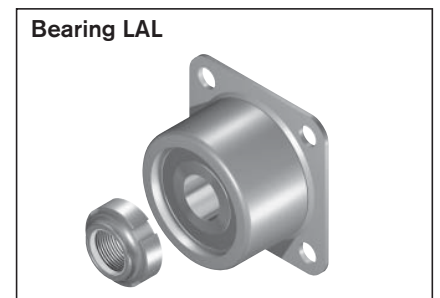
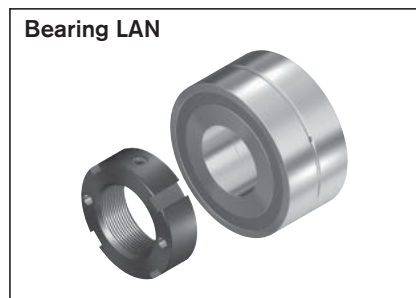
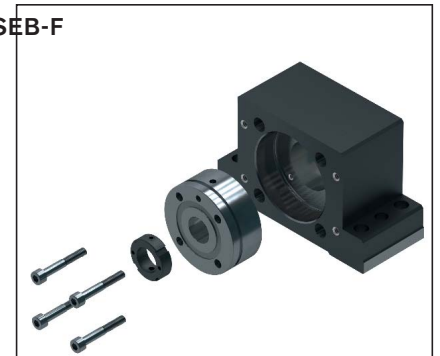
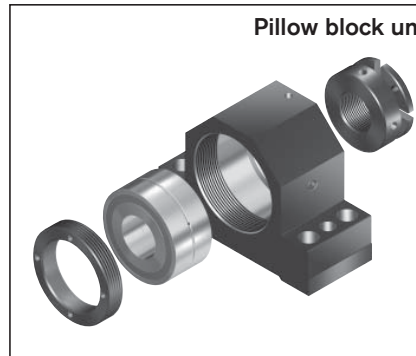
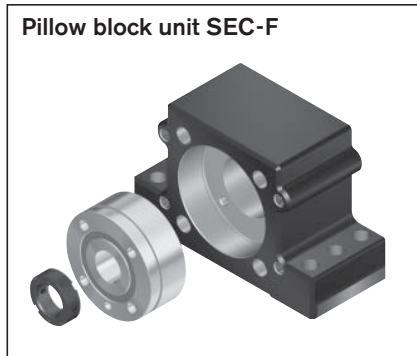


Ordering code: SEM-E-S 20 x 5R x 3-4 1 2 T7 R 82Z120 41Z120 1250 1 0

Form	Version ¹⁾	Size		Dimensions (mm)							Keyway per DIN 6885				Centering hole		Hex socket	
		d ₀	P	L _{jf}	D ₁ h6	L ₁	D ₂ h7	L ₂	G ₁	LG ₁	b	l	t	Z	t _z	S	t _s	
81	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	-	-	-	-	-	-	-	
	120	20	5/10/20/40	60	12	23	10	25	M12x1	12	-	-	-	-	-	4	4	
	122	20	5	60	12	17	10	25	M12x1	18	-	-	-	-	-	4	4	
	151	25	5/10	60	15	19	12	25	M15x1	16	-	-	-	M4	10	4	4	
	170	25	5/10/25	75	17	23	15	30	M17x1	22	-	-	-	M5	12	4	4	
	200	32	5/10/20/32/64	88	20	26	18	40	M20x1	22	-	-	-	M6	16	5	5	
	203	32	5/10/20/32/64	78	20	26	16	35	M20x1	17	-	-	-	M5	12	4	4	
	204	32	5/10	80	20	25	18	40	M20x1	15	-	-	-	M5	12	4	4	
	250	40	10/12/16/20/40	130	25	54	22	50	M25x1.5	26	-	-	-	M8	19	6	6	
	300	40	5	101	30	25	25	50	M30x1.5	26	-	-	-	M10	22	8	8	
	301	40	5/10/12/16/20/40	93	30	25	25	50	M30x1.5	18	-	-	-	M10	22	8	8	
	302	40	10/12/16/20/40	130	30	54	25	50	M30x1.5	26	-	-	-	M10	22	8	8	
		50	10/12/16/20/40	130	30	54	25	50	M30x1.5	26	-	-	-	M10	22	8	8	
	350	50	5	110	35	32	30	50	M35x1.5	28	-	-	-	M10	22	10	10	
400	63	10/20/40	132	40	44	36	60	M40x1.5	28	-	-	-	M12	28	12	12		
500	80	10/20	154	50	52	40	70	M50x1.5	32	-	-	-	M16	36	12	12		
82	120	20	5/10/20/40	60	12	23	10	25	M12x1	12	3	20	1.8	-	-	4	4	
	170	25	5/10/25	75	17	23	15	30	M17x1	22	5	25	3.0	M5	12	4	4	
	200	32	5/10/20/32/64	88	20	26	18	40	M20x1	22	6	28	3.5	M6	16	5	5	
	203	32	5/10/20/32/64	78	20	26	16	35	M20x1	17	5	28	3.0	M5	12	4	4	
	250	40	10/12/16/20/40	130	25	54	22	50	M25x1.5	26	6	36	3.5	M8	19	6	6	
	300	40	5	101	30	25	25	50	M30x1.5	26	8	36	4.0	M10	22	8	8	
	301	40	5/10/12/16/20/40	93	30	25	25	50	M30x1.5	18	8	36	4.0	M10	22	8	8	
	302	40	10/12/16/20/40	130	30	54	25	50	M30x1.5	26	8	36	4.0	M10	22	8	8	
		50	10/12/16/20/40	130	30	54	25	50	M30x1.5	26	8	36	4.0	M10	22	8	8	
	350	50	5	110	35	32	30	50	M35x1.5	28	8	36	4.0	M10	22	10	10	
	400	63	10/20/40	132	40	44	36	60	M40x1.5	28	10	40	5.0	M12	28	12	12	
500	80	10/20	154	50	52	40	70	M50x1.5	32	12	50	5.0	M16	36	12	12		

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

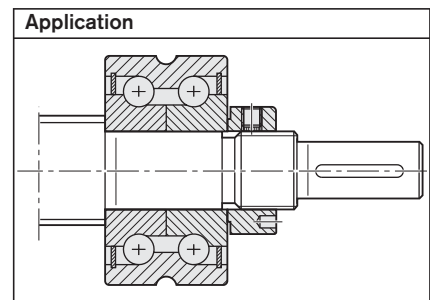
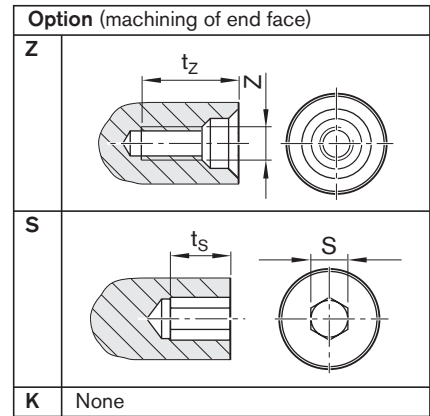
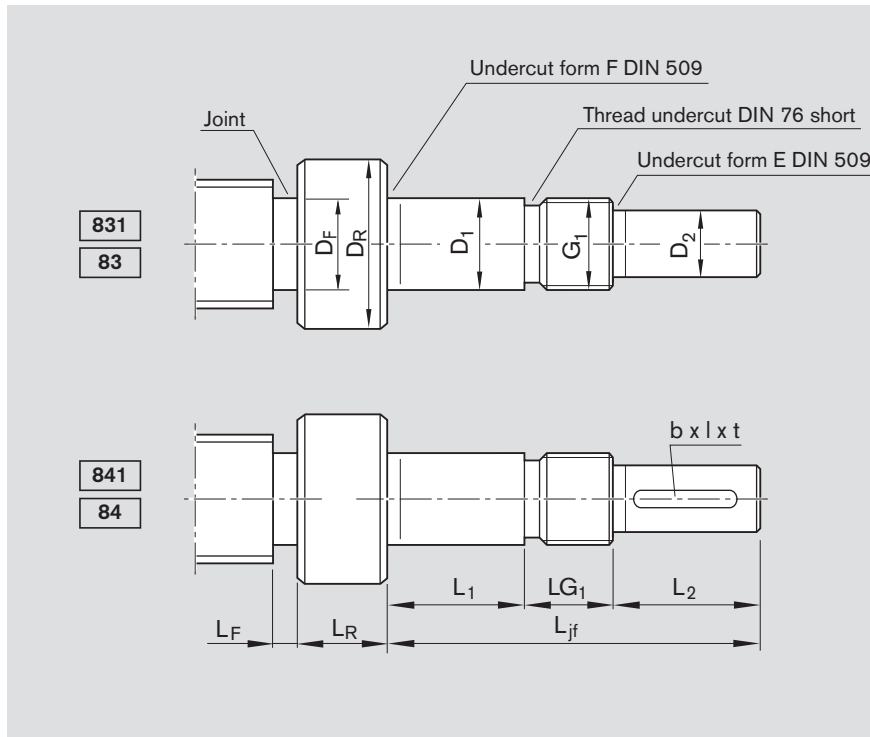
End bearings for screw ends form 81–82



Form	Ver- sion	Size		Pillow block unit for motor attachment			Bearing			
		d ₀	P	SEC-F Part number	SEB-F Part number	SES-F Part number	LAF Part number	LAN Part number	LAL Materialnummer	
81	060	12	2/5/10	–	R1591 106 20	–	–	R1590 106 00	–	
	061	12	2/5/10	–	–	–	–	–	R1590 406 00	
	100	16	5/10/16	–	R1591 110 20	–	–	R1590 110 00	–	
	120	20	5/10/20/40	R1594 012 00	R1591 112 20	R1595 012 20	R1590 012 00	R1590 112 00	–	
	122	20	5	–	–	–	–	–	R1590 412 00	
	151	25	5/10	–	–	–	–	–	R1590 415 00	
	170	25	5/10/25	–	R1591 117 30	R1595 017 20	R1590 017 30	R1590 117 30	–	
	200	32	5/10/20/32/64	–	R1591 120 30	–	R1590 020 30	R1590 120 30	–	
	203	32	5/10/20/32/64	R1594 020 00	–	R1595 020 20	R1590 020 00	R1590 120 00	–	
	204	32	5/10	–	–	–	–	–	R1590 420 00	
	250	40	10/12/16/20/40	–	R1591 225 30	–	R1590 325 30	R1590 225 30	–	
	300	40	5	–	R1591 130 30	–	R1590 030 30	R1590 130 30	–	
	301	40	5/10/12/16/20/40	R1594 030 00	–	R1595 030 20	–	–	–	
	302	40	10/12/16/20/40	–	–	R1595 330 20	–	–	–	
			50	10/12/16/20/40	–	R1591 230 30	–	R1590 330 30	R1590 230 30	–
			50	5	–	R1591 135 30	–	R1590 035 30	R1590 135 30	–
			63	10/20/40	–	R1591 140 30	–	R1590 040 30	R1590 140 30	–
			80	10/20	–	R1591 150 30	–	R1590 050 30	R1590 150 30	–
	82	120	20	5/10/20/40	R1594 012 00	R1591 112 20	R1595 012 20	R1590 012 00	R1590 112 00	–
		170	25	5/10/25	–	R1591 117 30	R1595 017 20	R1590 017 30	R1590 117 30	–
200		32	5/10/20/32/64	–	R1591 120 30	–	R1590 020 30	R1590 120 30	–	
203		32	5/10/20/32/64	R1594 020 00	–	R1595 020 20	R1590 020 00	R1590 120 00	–	
250		40	10/12/16/20/40	–	R1591 225 30	–	R1590 325 30	R1590 225 30	–	
300		40	5	–	R1591 130 30	–	R1590 030 30	R1590 130 30	–	
301		40	5/10/12/16/20/40	R1594 030 00	–	R1595 030 20	–	–	–	
302		40	10/12/16/20/40	–	–	R1595 330 20	–	–	–	
			50	10/12/16/20/40	–	R1591 230 30	–	R1590 330 30	R1590 230 30	–
			50	5	–	R1591 135 30	–	R1590 035 30	R1590 135 30	–
			63	10/20/40	–	R1591 140 30	–	R1590 040 30	R1590 140 30	–
			80	10/20	–	R1591 150 30	–	R1590 050 30	R1590 150 30	–

Screw Ends

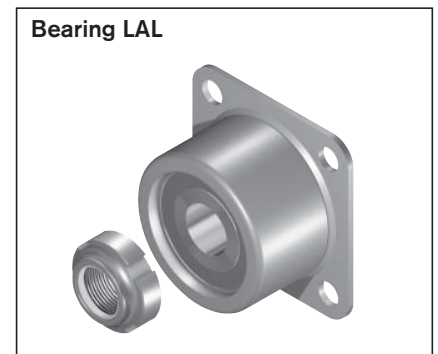
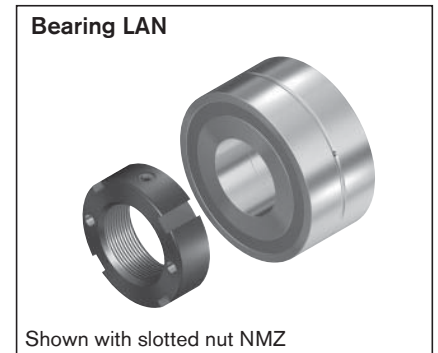
Form 831–83 and 841–84



Ordering code: SEM-E-S 20 x 5R x 3-4 1 2 T7 R 83Z200 51Z120 1250 1 0

Form	Version	Size		Dimensions (mm)							Keyway per DIN 6885			Centering hole		Hex socket	
		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	S	t _s
831	060	6	all	40	6	14	5	16	M6x0.5	10	-	-	-	-	-	-	-
	061	6	all	41	6	10	5	16	M6x0.5	15	-	-	-	-	-	-	-
	062	8	all	41	6	10	5	16	M6x0.5	15	-	-	-	-	-	-	-
	065	8	all	40	6	14	5	16	M6x0.5	10	-	-	-	-	-	-	-
	120	12	all	60	12	23	10	25	M12x1	12	-	-	-	-	-	4	4
	121	12	all	60	12	17	10	25	M12x1	18	-	-	-	-	-	4	4
	122	16	all	60	12	17	10	25	M12x1	18	-	-	-	-	-	4	4
83	170	16	all	75	17	23	15	30	M17x1	22	-	-	-	M5	12	4	4
	200	20	all	88	20	26	18	40	M20x1	22	6	28	3.5	M6	16	5	5
	250	25	all	102	25	26	22	50	M25x1.5	26	6	36	3.5	M8	19	6	6
	300	32	all	101	30	25	25	50	M30x1.5	26	8	36	4.0	M10	22	8	8
	400	40	all	132	40	44	36	60	M40x1.5	28	10	40	5.0	M12	28	12	12
	500	50	all	154	50	52	40	70	M50x1.5	32	12	50	5.0	M16	36	12	12
	600	63	all	155	60	43	55	80	M60x2	32	16	63	6.0	M20	42	17	17
841	120	12	all	60	12	23	10	25	M12x1	12	3	20	1.8	-	-	4	4
	170	16	all	75	17	23	15	30	M17x1	22	5	25	3.0	M5	12	4	4
84	200	20	all	88	20	26	18	40	M20x1	22	6	28	3.5	M6	16	5	5
	250	25	all	102	25	26	22	50	M25x1.5	26	6	36	3.5	M8	19	6	6
	300	32	all	101	30	25	25	50	M30x1.5	26	8	36	4.0	M10	22	8	8
	400	40	all	132	40	44	36	60	M40x1.5	28	10	40	5.0	M12	28	12	12
	500	50	all	154	50	52	40	70	M50x1.5	32	12	50	5.0	M16	36	12	12
	600	63	all	155	60	43	55	80	M60x2	32	16	63	6.0	M20	42	17	17

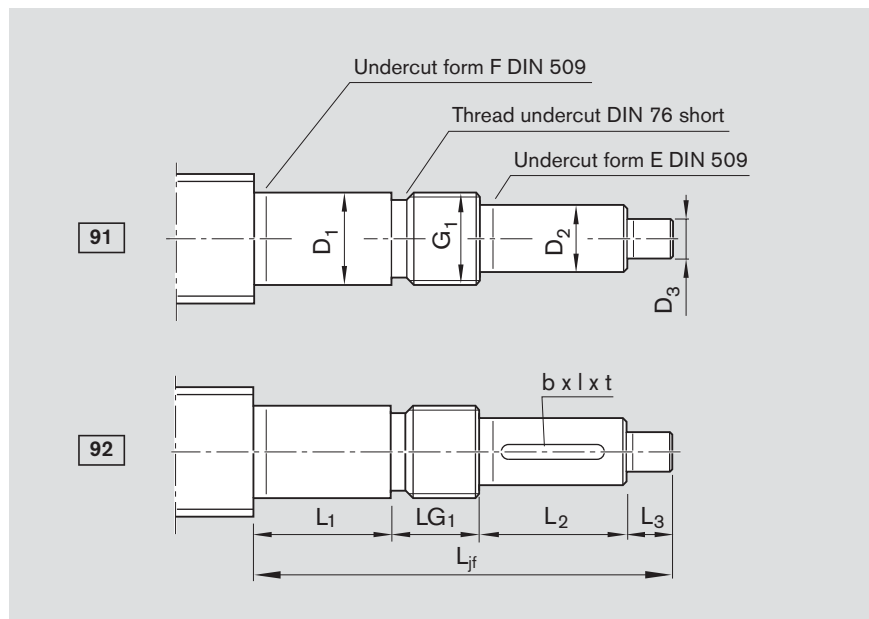
End bearings for screw ends form 831–83 and 841–84



Form	Version	Size		Dimensions (mm)				Bearing LAF Part number	Bearing LAN Part number	Bearing LAL Part number
		d ₀	P	D _R	L _R	D _F	L _{F max}			
831	060	6	all	12	15	5.0	1	–	R1590 106 00	–
	061	6	all	12	15	5.0	1	–	–	R1590 406 00
	062	8	all	12	15	6.0	1	–	–	R1590 406 00
	065	8	all	12	15	6.0	1	–	R1590 106 00	–
	120	12	all	16	15	8.0	1	–	R1590 112 00	–
	121	12	all	15	15	8.0	1	–	–	R1590 412 00
	122	16	all	18	17	12.0	1	–	–	R1590 412 00
83	170	16	all	23	17	12.0	1	R1590 017 30	R1590 117 30	–
	200	20	all	25	15	16.5	8	R1590 020 30	R1590 120 30	–
	250	25	all	32	15	21.0	8	R1590 325 30	R1590 225 30	–
	300	32	all	40	20	28.0	8	R1590 030 30	R1590 130 30	–
	400	40	all	50	20	33.5	8	R1590 040 30	R1590 140 30	–
	500	50	all	63	20	43.5	8	R1590 050 30	R1590 150 30	–
841	600	63	all	82	25	56.0	8	–	–	–
	120	12	all	16	15	8.0	1	–	R1590 112 00	–
84	170	16	all	23	17	12.0	1	R1590 017 30	R1590 117 30	–
	200	20	all	25	15	16.5	8	R1590 020 30	R1590 120 30	–
	250	25	all	32	15	21.0	8	R1590 325 30	R1590 225 30	–
	300	32	all	40	20	28.0	8	R1590 030 30	R1590 130 30	–
	400	40	all	50	20	33.5	8	R1590 040 30	R1590 140 30	–
	500	50	all	63	20	43.5	8	R1590 050 30	R1590 150 30	–
	600	63	all	82	25	56.0	8	–	–	–

Screw Ends

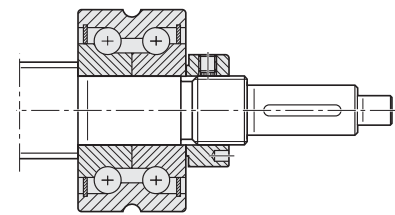
Form 91–92



Option (machining of end face)

K None

Application



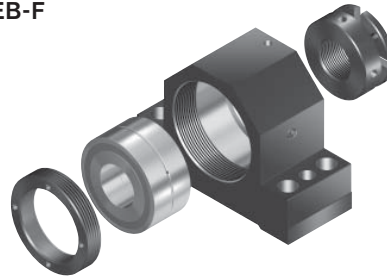
Ordering code: SEM-E-S 20 x 5R x 3-4 1 2 T7 R 92K120 41Z120 1250 1 0

Form	Version ¹⁾	Size		Dimensions (mm)										Keyway per DIN 6885		
		d ₀	P	L _{jf}	D ₁ h6	L ₁	D ₂ h7	L ₂	D ₃ h7	L ₃	G ₁	LG ₁	b P9	l	t	
91	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	10/12/16/20/40	145	25	54	22	50	6	15	M25x1.5	26	-	-	-	
	300	40	5	116	30	25	25	50	6	15	M30x1.5	26	-	-	-	
	301	50	10/12/16/20/40	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	120	20	5/10/20/40	75	12	23	10	25	6	15	M12x1	12	3	20	1.8	
	170	25	5/10/25	90	17	23	15	30	6	15	M17x1	22	5	25	3.0	
	200	32	5/10/20/32/64	103	20	26	18	40	6	15	M20x1	22	6	28	3.5	
	250	40	10/12/16/20/40	145	25	54	22	50	6	15	M25x1.5	26	6	36	3.5	
	300	40	5	116	30	25	25	50	6	15	M30x1.5	26	8	36	4.0	
	301	50	10/12/16/20/40	145	30	54	25	50	6	15	M30x1.5	26	8	36	4.0	
	350	50	5	125	35	32	30	50	6	15	M35x1.5	28	8	36	4.0	
	400	63	10/20/40	147	40	44	36	60	6	15	M40x1.5	28	10	40	5.0	
	500	80	10/20	169	50	52	40	70	6	15	M50x1.5	32	12	50	5.0	

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

End bearings for screw ends form 91–92

Pillow block unit SEB-F



Bearing LAF



Shown with slotted nut NMA

Bearing LAN

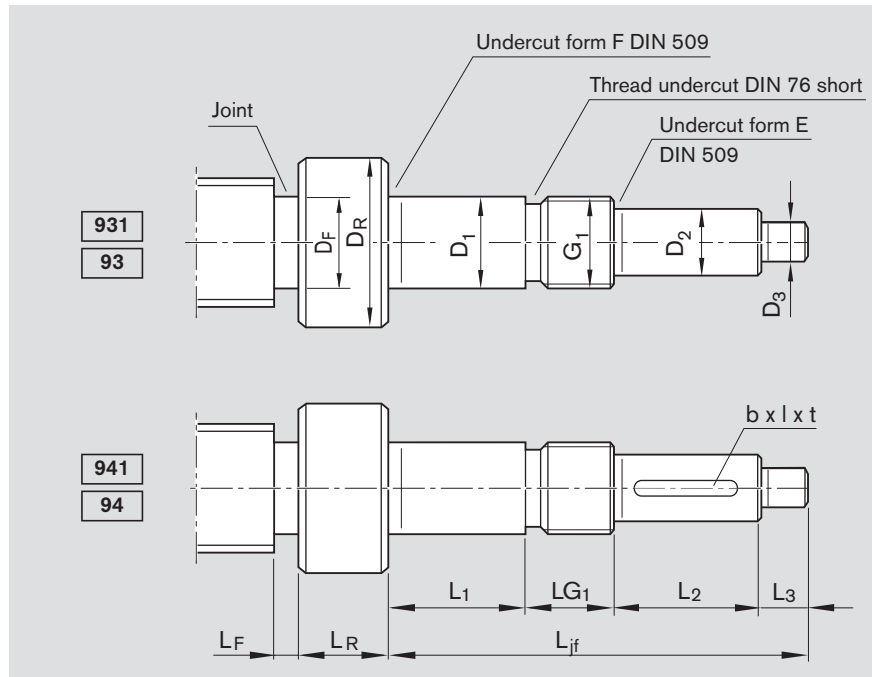


Shown with slotted nut NMZ

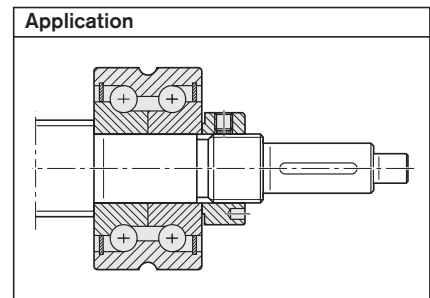
Form	Version ¹⁾	Size		Pillow block unit SEB-F	Bearing LAF	Bearing LAN
		d ₀	P	Part number	Part number	Part number
91	060	12	2/5/10	R1591 106 20	–	R1590 106 00
	100	16	5/10/16	R1591 110 20	–	R1590 110 00
	120	20	5/10/20/40	R1591 112 20	R1590 012 00	R1590 112 00
	170	25	5/10/25	R1591 117 30	R1590 017 30	R1590 117 30
	200	32	5/10/20/32/64	R1591 120 30	R1590 020 30	R1590 120 30
	250	40	10/12/16/20/40	R1591 225 30	R1590 325 30	R1590 225 30
	300	40	5	R1591 130 30	R1590 030 30	R1590 130 30
	301	50	10/12/16/20/40	R1591 230 30	R1590 330 30	R1590 230 30
	350	50	5	R1591 135 30	R1590 035 30	R1590 135 30
	400	63	10/20/40	R1591 140 30	R1590 040 30	R1590 140 30
92	500	80	10/20	R1591 150 30	R1590 050 30	R1590 150 30
	120	20	5/10/20/40	R1591 112 20	R1590 012 00	R1590 112 00
	170	25	5/10/25	R1591 117 30	R1590 017 30	R1590 117 30
	200	32	5/10/20/32/64	R1591 120 30	R1590 020 30	R1590 120 30
	250	40	10/12/16/20/40	R1591 225 30	R1590 325 30	R1590 225 30
	300	40	5	R1591 130 30	R1590 030 30	R1590 130 30
	301	50	10/12/16/20/40	R1591 230 30	R1590 330 30	R1590 230 30
	350	50	5	R1591 135 30	R1590 035 30	R1590 135 30
	400	63	10/20/40	R1591 140 30	R1590 040 30	R1590 140 30
	500	80	10/20	R1591 150 30	R1590 050 30	R1590 150 30

Screw Ends

Form 931-93 and 941-94



Option (machining of end face)	
K	None

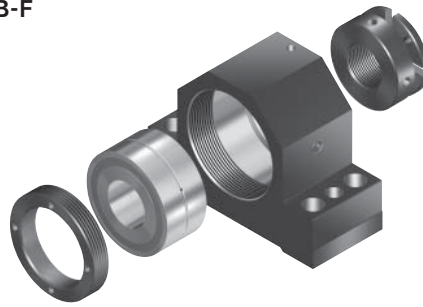


Ordering code: SEM-E-S 20 x 5R x 3-4 1 2 T7 R 93K200 41Z120 1250 1 0

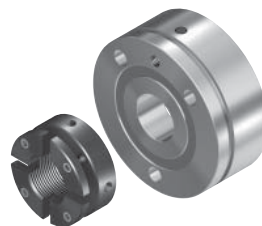
Form	Version	Size		Dimensions (mm)									Keyway per DIN 6885		
		d ₀	P	L _{jf}	D ₁ h6	L ₁	D ₂ h7	L ₂	D ₃ h7	L ₃	G ₁	LG ₁	b P9	l	t
931	060	8	all	50	6	14	5	16	4	10	M6x0.5	10	-	-	-
	120	12	all	75	12	23	10	25	6	15	M12x1	12	-	-	-
	170	16	all	90	17	23	15	30	6	15	M17x1	22	-	-	-
93	200	20	all	103	20	26	18	40	6	15	M20x1	22	-	-	-
	250	25	all	117	25	26	22	50	6	15	M25x1.5	26	-	-	-
	300	32	all	116	30	25	25	50	6	15	M30x1.5	26	-	-	-
	400	40	all	147	40	44	36	60	6	15	M40x1.5	28	-	-	-
	500	50	all	169	50	52	40	70	6	15	M50x1.5	32	-	-	-
	600	63	all	170	60	43	55	80	6	15	M60x2	32	-	-	-
941	120	12	all	75	12	23	10	25	6	15	M12x1	12	3	20	1.8
	170	16	all	90	17	23	15	30	6	15	M17x1	22	5	25	3.0
94	200	20	all	103	20	26	18	40	6	15	M20x1	22	6	28	4.0
	250	25	all	117	25	26	22	50	6	15	M25x1.5	26	6	36	4.0
	300	32	all	116	30	25	25	50	6	15	M30x1.5	26	8	36	4.0
	400	40	all	147	40	44	36	60	6	15	M40x1.5	28	10	40	5.0
	500	50	all	169	50	52	40	70	6	15	M50x1.5	32	12	50	5.0
	600	63	all	170	60	43	55	80	6	15	M60x2	32	16	63	6.0

End bearings for screw ends form 931–93 and 941–94

Pillow block unit SEB-F



Bearing LAF



Shown with slotted nut NMA

Bearing LAN



Shown with slotted nut NMZ

Form	Version	Size		Dimensions (mm)				Pillow block unit SEB-F	Bearing LAF	Bearing LAN
		d ₀	P	D _R	L _R	D _F	L _{F max}	Part number	Part number	Part number
931	060	8	all	12	15	6.0	1	R1591 106 20	–	R1590 106 00
	120	12	all	16	15	8.0	1	R1591 112 20	–	R1590 112 00
	170	16	all	23	17	12.0	1	R1591 117 30	R1590 017 30	R1590 117 30
93	200	20	all	25	15	16.5	8	R1591 120 30	R1590 020 30	R1590 120 30
	250	25	all	32	15	21.0	8	R1591 225 30	R1590 325 30	R1590 225 30
	300	32	all	40	20	28.0	8	R1591 113 30	R1590 030 30	R1590 130 30
	400	40	all	50	20	33.5	8	R1591 114 30	R1590 040 30	R1590 140 30
	500	50	all	63	20	43.5	8	R1591 115 30	R1590 050 30	R1590 150 30
	600	63	all	82	25	56.0	8	–	–	–
941	120	12	all	16	15	8.0	1	R1591 112 20	–	R1590 112 00
	170	16	all	23	17	12.0	1	R1591 117 30	R1590 017 30	R1590 117 30
94	200	20	all	25	15	16.5	8	R1591 120 30	R1590 020 30	R1590 120 30
	250	25	all	32	15	21.0	8	R1591 225 30	R1590 325 30	R1590 225 30
	300	32	all	40	20	28.0	8	R1591 113 30	R1590 030 30	R1590 130 30
	400	40	all	50	20	33.5	8	R1591 114 30	R1590 040 30	R1590 140 30
	500	50	all	63	20	43.5	8	R1591 115 30	R1590 050 30	R1590 150 30
	600	63	all	82	25	56.0	8	–	–	–

Bearings

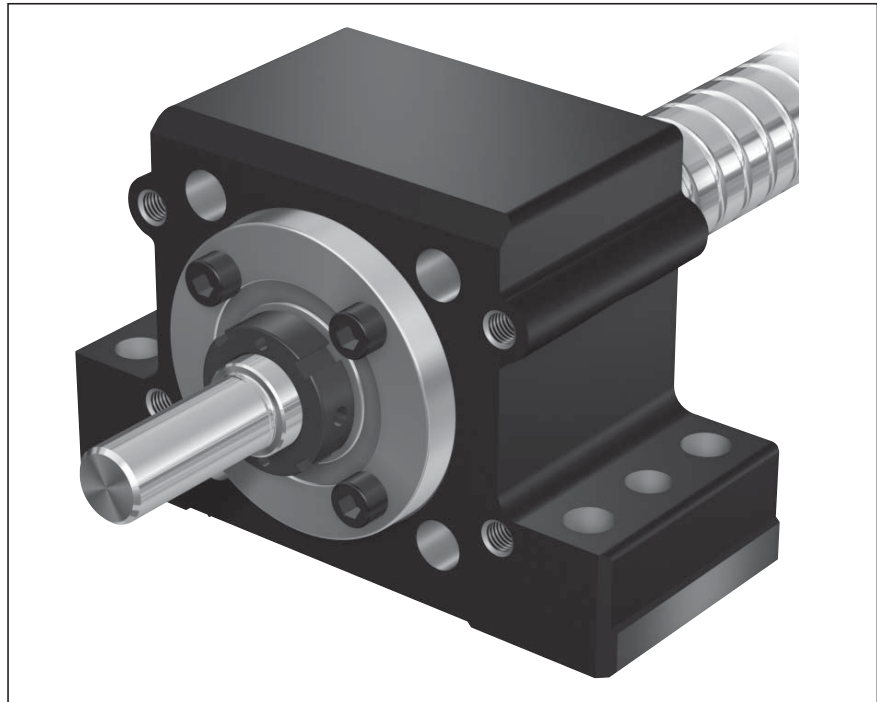
Pillow Block Unit SEC-F, Aluminum

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

The pillow block unit consists of:

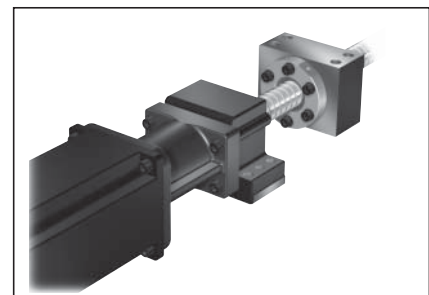
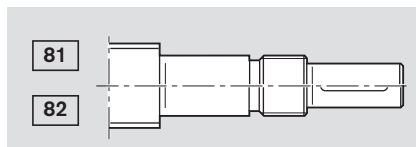
- precision pillow block housing made of aluminum with reference edges on two sides
- angular-contact thrust ball bearing LGF..
- slotted nut NMZ

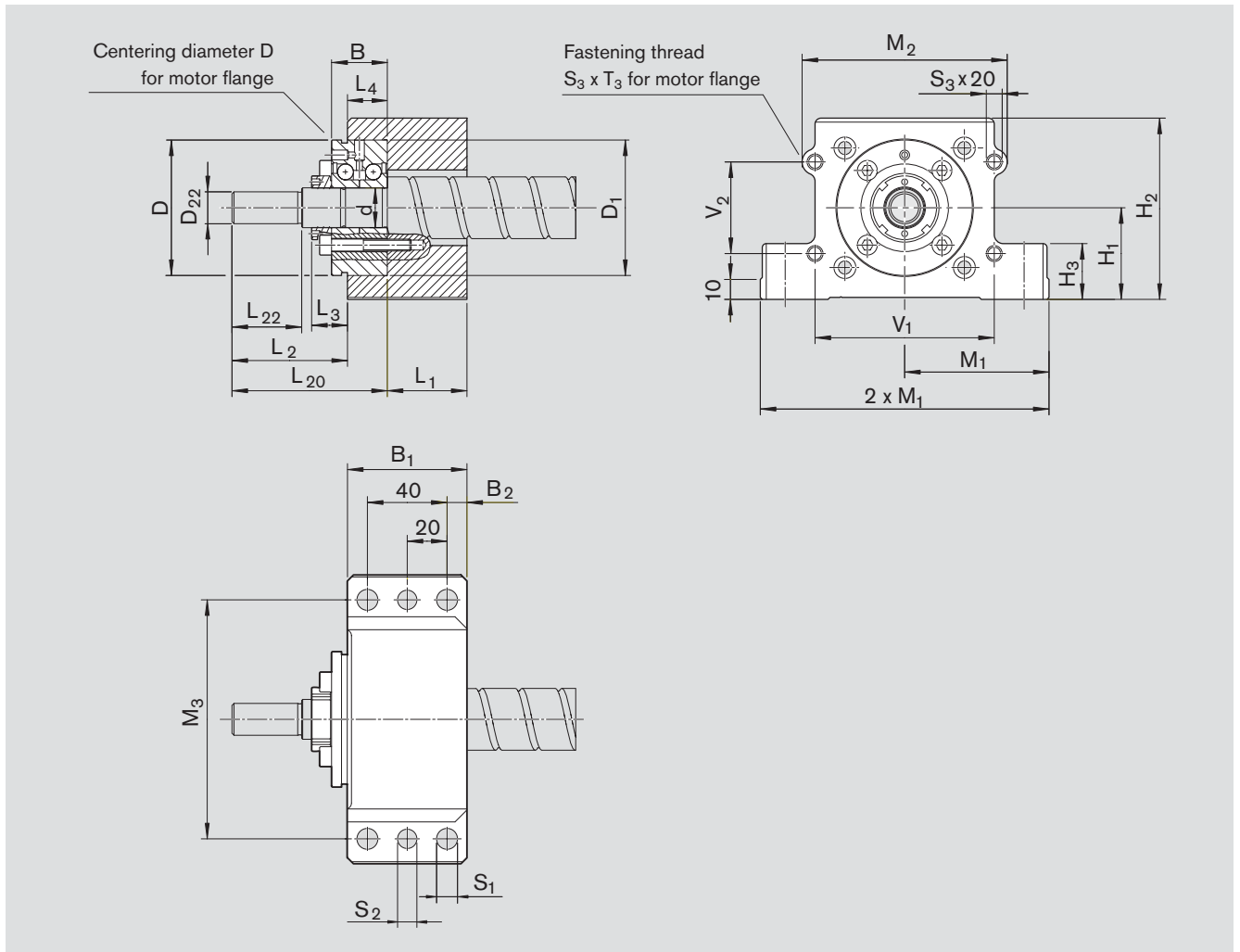
The nut is supplied unmounted.



Size	Pillow block unit complete	Angular-contact thrust ball bearing				Slotted nut		Weight complete	
		Load ratings (axial)		Dimensions		Designation	Designation		
$d_0 \times P$	Part number	dyn. C (N)	stat. C ₀ (N)	d (mm)	D (mm)			B (mm)	M _A (Nm)
20x5/10/20/40	R1594 012 00	17000	24700	12	55	25	8.0	NMZ 12x1	1.49
32x5/10/20/32/64	R1594 020 00	26000	47000	20	68	28	18.0	NMZ 20x1	1.88
40x5/10/12/16/20/40	R1594 030 00	29000	64000	30	80	28	32.0	NMZ 30x1.5	2.75

Screw end form 81–82 suitable for motor mounting, see section on Screw Ends.





Size	Dimensions (mm)																					
	B_1	B_2	L_1	L_2	L_3	L_4	L_{20}	L_{22}	D_1	D_{22}	M_1	M_2	M_3	H_1	H_2	H_3	S_1	S_2	S_3	V_1	V_2	
$d_0 \times P$											± 0.015				± 0.015							
20x5/10/20/40	60	10.0	42	42	15	18	60	25	55	10	72.5	80	120	41	81	28	10.5	9.7	M8	66	50	
32x5/10/20/32/64	60	10.0	40	58	18	20	78	35	68	16	72.5	103	120	46	91	28	10.5	9.7	M8	90	46	
40x5/10/12/16/20/40	65	12.5	45	73	20	20	93	50	80	25	90.0	116	150	56	111	33	13.0	11.7	M10	100	65	

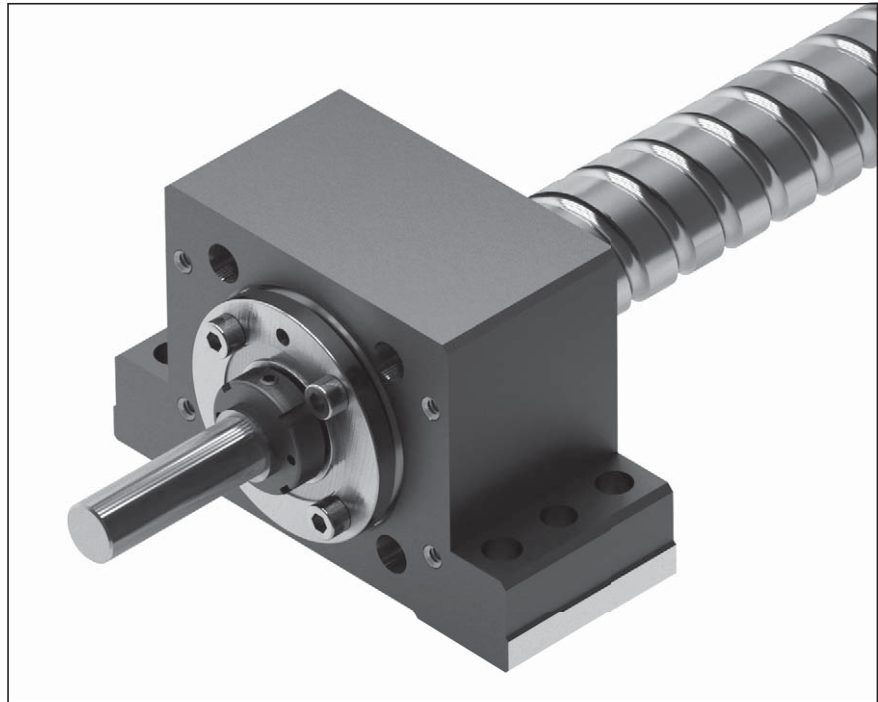
Pillow Block Unit SES-F, Steel

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

The pillow block unit consists of:

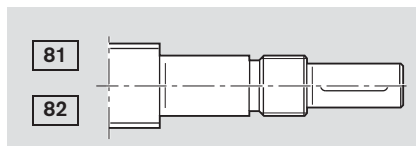
- precision pillow block housing made of aluminum with reference edges on two sides
- angular-contact thrust ball bearing LGF..
- slotted nut NMZ

The nut is supplied unmounted.

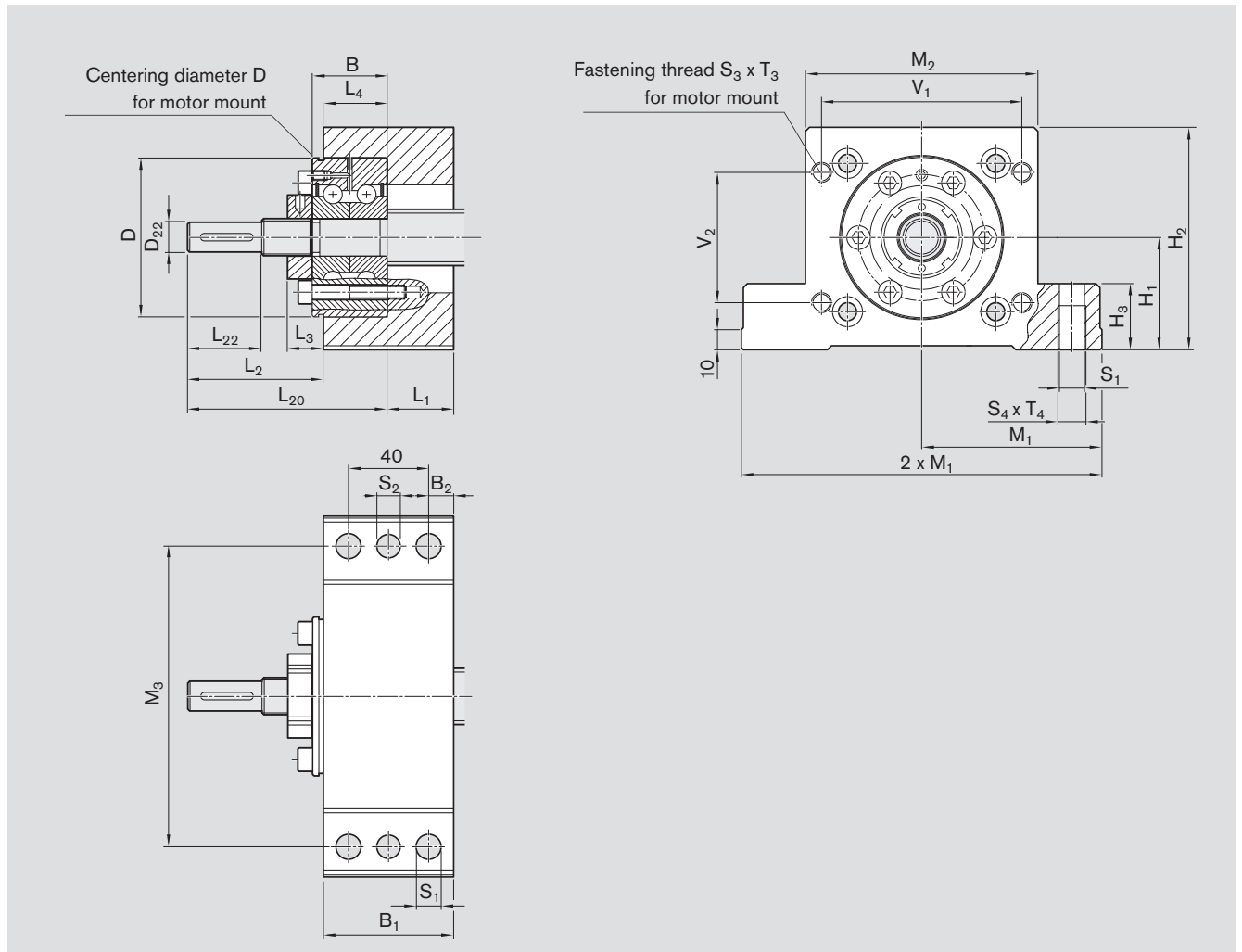


Size $d_0 \times P$	Pillow block unit complete Part number	Angular-contact thrust ball bearing					Designation	Slotted nut		Weight complete (kg)
		Load ratings (axial)		Dimensions (mm)				M_A (Nm)	Designation	
		dyn. C (N)	stat. C ₀ (N)	d	D	B				
20x5/10/20/40	R1595 012 20	17000	24700	12	55	25	LGF-B-1255	8	NMZ 12x1	3.37
25x5/10/25	R1595 017 20	18800	31000	17	62	25	LGF-B-1762	15	NMZ 17x1	3.38
32x5/10/20/32/64	R1595 020 20	26000	47000	20	68	28	LGF-B-2068	18	NMZ 20x1	4.31
40x5	R1595 030 20	29000	64000	30	80	28	LGF-B-3080	32	NMZ 30x1.5	6.31
40x10/12/16/20/40	R1595 330 20	47500	127000	30	80	56	LGF-C-3080	32	NMZ 30x1.5	7.53

Screw end form 81/82 suitable for motor attachment; see Screw Ends section.



For more information on LGF bearing pairs, please refer to page 104.



Size	Dimensions (mm)																														
	B ₁	B ₂	L ₁	L ₂	L ₃	L ₄	L ₂₀	L ₂₂	D ₁	D ₂₂	± 0,015		M ₁	M ₂	M ₃	± 0,015			H ₁	H ₂	H ₃	S ₁	S ₂	S ₃	S ₄	T ₃	T ₄	V ₁	V ₂		
d ₀ xP																															
20x5/10/20/40	60	10.0	42	42	15	18	60	25	55	10			72.5	80	120				41	81	28	10.5	9.7	M8	M12	20	20	66	50		
25x5/10/25	60	10.0	42	57	17	18	75	30	62	15			72.5	80	120				41	81	28	10.5	9.7	M8	M12	20	20	66	50		
32x5/10/20/32/64	60	10.0	40	58	18	20	78	35	68	16			72.5	103	120				46	91	28	10.5	9.7	M8	M12	20	20	90	46		
40x5	65	12.5	45	73	20	20	93	50	80	25			90.0	116	150				56	111	33	12.5	11.7	M10	M14	20	22	100	65		
40x10/12/16/20/40	85	12.5	37	82	20	48	130	50	80	25			90.0	116	150				56	111	33	12.5	11.7	M10	M14	20	22	100	65		

Bearings

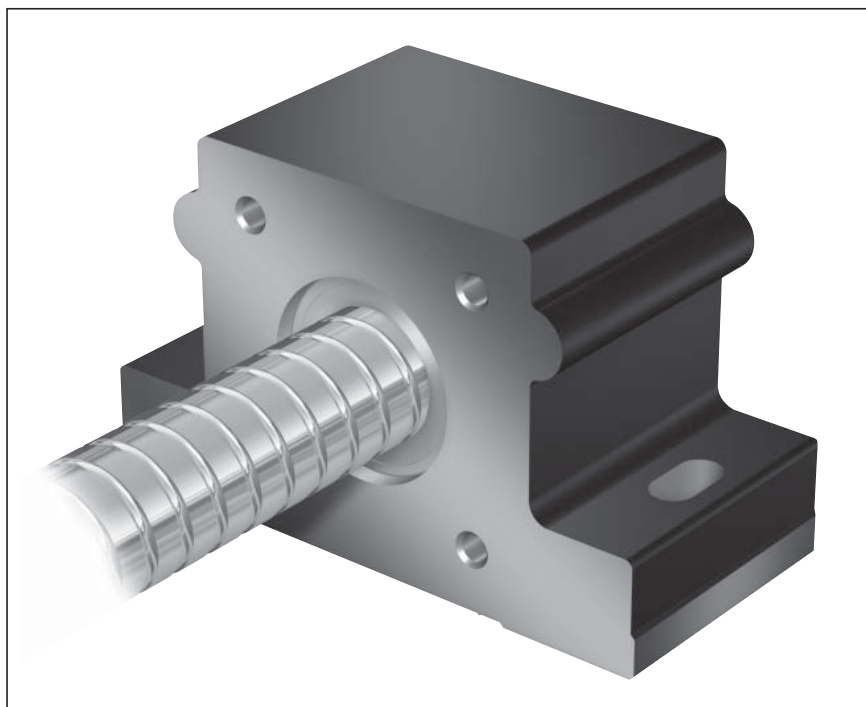
Pillow Block Unit SEC-L, Aluminium

Floating bearing with deep-groove ball bearing per DIN 625

The pillow block unit consists of:

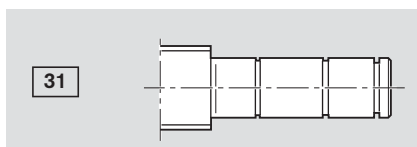
- precision pillow block housing made of aluminum with reference edges on two sides
- deep-groove ball bearing per DIN 625... .2RS
- retaining ring per DIN 471

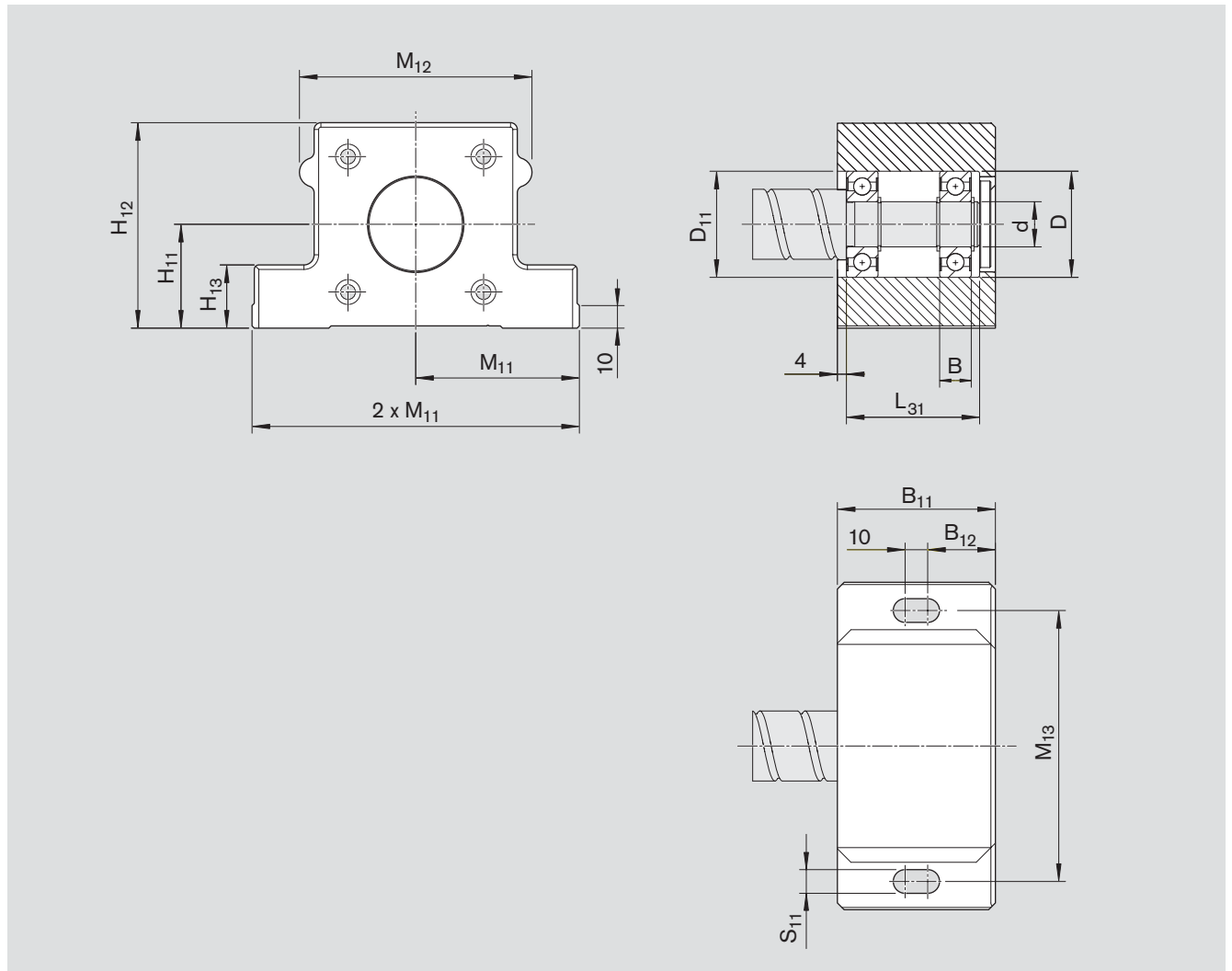
All parts are supplied unmounted.



Size	Pillow block unit complete	Deep-groove ball bearing per DIN 625			Dimensions (mm)			Designation DIN 625...	Retaining ring per DIN 471	Weight complete (kg)
		Load ratings (radial)								
$d_0 \times P$	Part number	dyn. C (N)	stat. C ₀ (N)	d	D	B				
20x5/10/20/40	R1594 615 00	7800	3250	15	35	11	6202.2RS	15x1	1.24	
32x5/10/20/32/64	R1594 620 00	12700	5700	20	47	14	6204.2RS	20x1.2	1.66	
40x5/10/12/16/20/40	R1594 630 00	19300	9800	30	62	16	6206.2RS	30x1.5	2.74	

Suitable for screw ends: Form





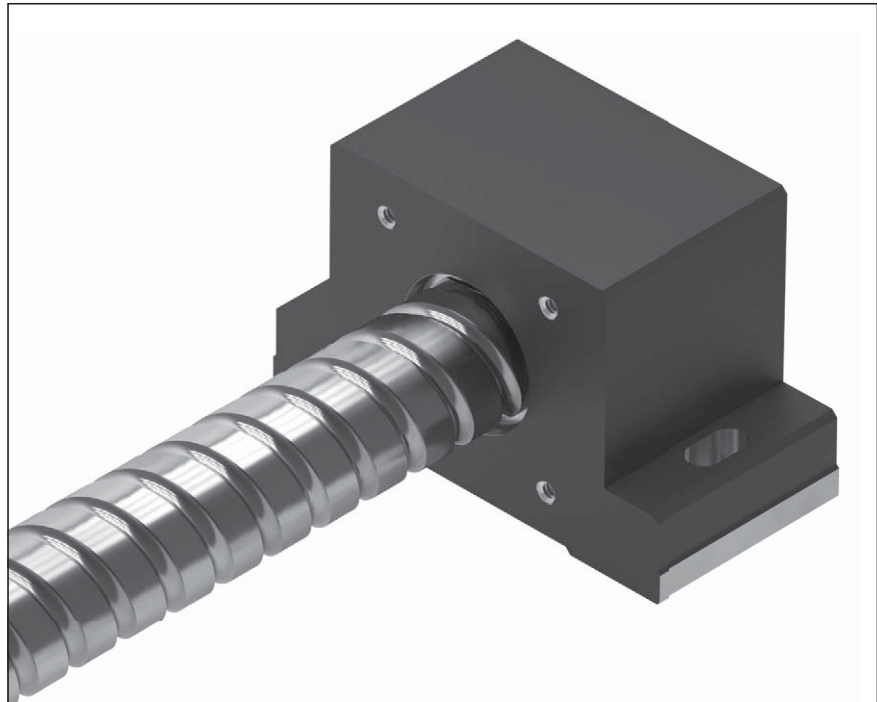
Size	Dimensions (mm)											
	B ₁₁	B ₁₂	L ₃₁	D ₁₁	M ₁₁ ±0.015	M ₁₂	M ₁₃	H ₁₁ ±0.015	H ₁₂	H ₁₃	S ₁₁	
d ₀ x P												
20x5/10/20/40	60	25	47	35	72.5	80	120	41	81	28	10.5	
32x5/10/20/32/64	70	30	60	47	72.5	103	120	46	91	28	10.5	
40x5/10/12/16/20/40	80	35	68	62	90.0	116	150	56	111	33	13.0	

Pillow Block Unit SES-L, Steel

Floating bearing with deep-groove ball bearing per DIN 625

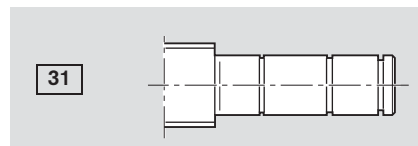
The pillow block unit consists of:

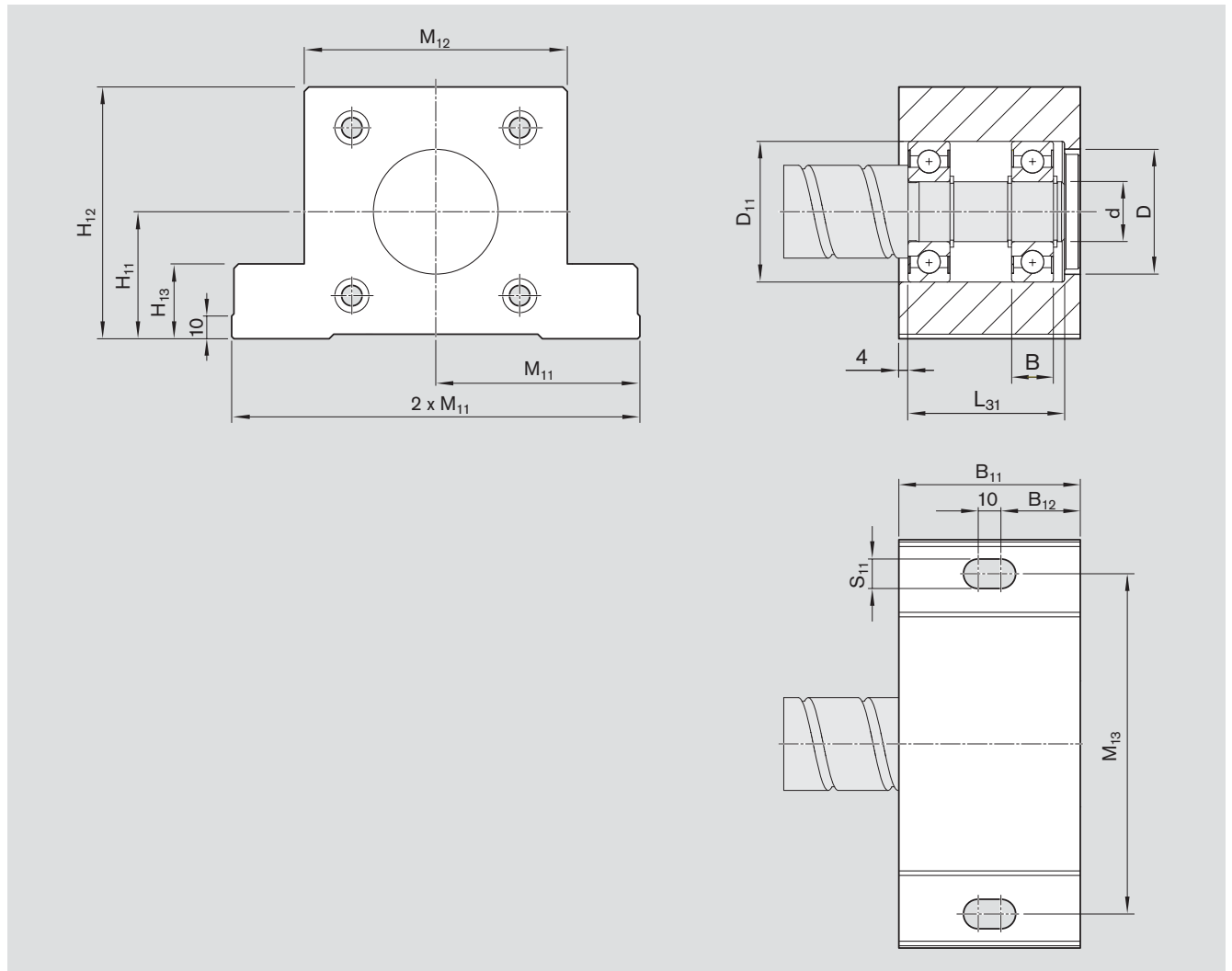
- precision pillow block housing made of steel with reference edge on both sides
 - deep-groove ball bearing per DIN 625... .2RS
 - retaining ring per DIN 471
- All parts are supplied unmounted.



Size $d_0 \times P$	Pillow block unit complete Part number	Deep-groove ball bearing per DIN 625		Dimensions (mm)			Designation DIN 625...	Retaining ring per DIN 471	Weight complete (kg)
		Load ratings (radial) dyn. C (N)	stat. C ₀ (N)	d	D	B			
20x5/10/20/40	R1595 615 00	7800	3250	15	35	11	6202.2RS	15x1	3.26
25x5/10/25	R1595 617 00	9500	4150	17	40	12	6203.2RS	17x1	3.39
32x5/10/20/32/64	R1595 620 00	12700	5700	20	47	14	6204.2RS	20x1.2	4.74
40x5/10/12/16/20/40	R1595 630 00	19300	9800	30	62	16	6206.2RS	30x1.5	7.30

Suitable for screw ends: Form





Size	Dimensions (mm)											
	B ₁₁	B ₁₂	L ₃₁	D ₁₁	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	35	72.5	80	120	41	81	28	10.5	
25x5/10/25	64	27.0	51	40	72.5	80	120	41	81	28	10.5	
32x5/10/20/32/64	70	30.0	60	47	72.5	103	120	46	91	28	10.5	
40x5/10/12/16/20/40	80	35.0	68	62	90.0	116	150	56	111	33	13.0	

Bearings

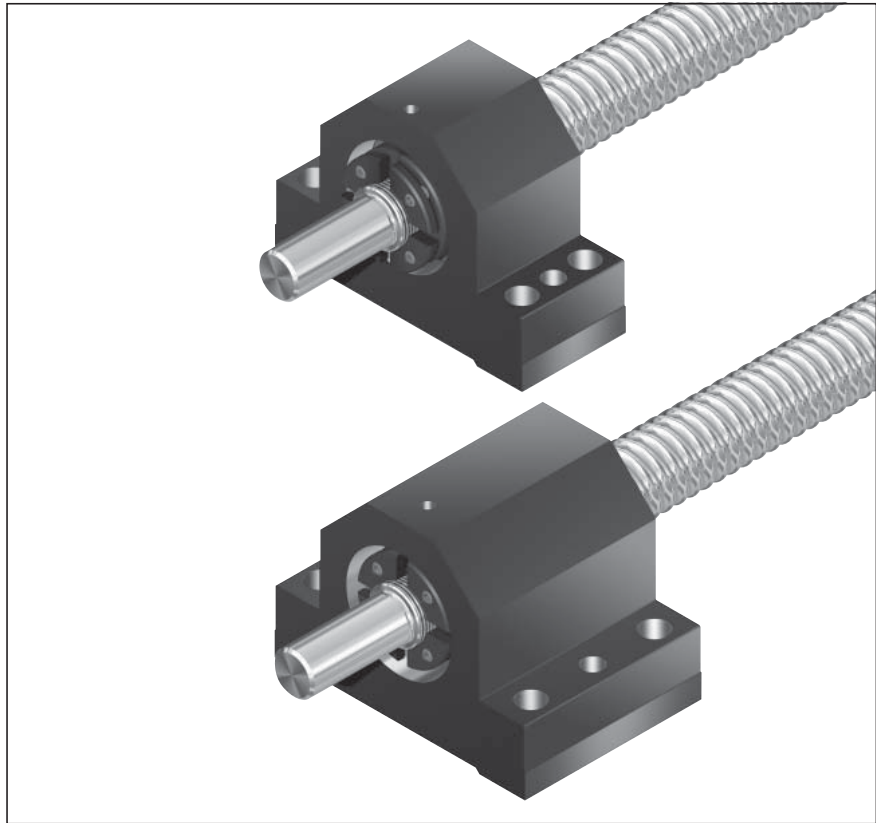
Pillow Block Unit SEB-F

**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 two sides
- angular-contact thrust ball bearing LGN...
- slotted nut NMA or NMZ
- housing nut GWR

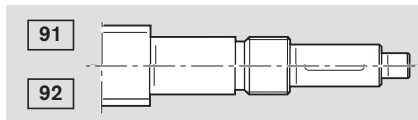
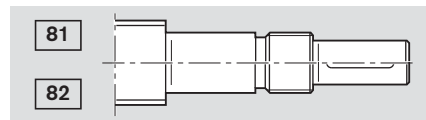
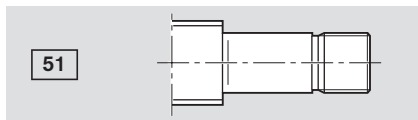
The nut is supplied unmounted.

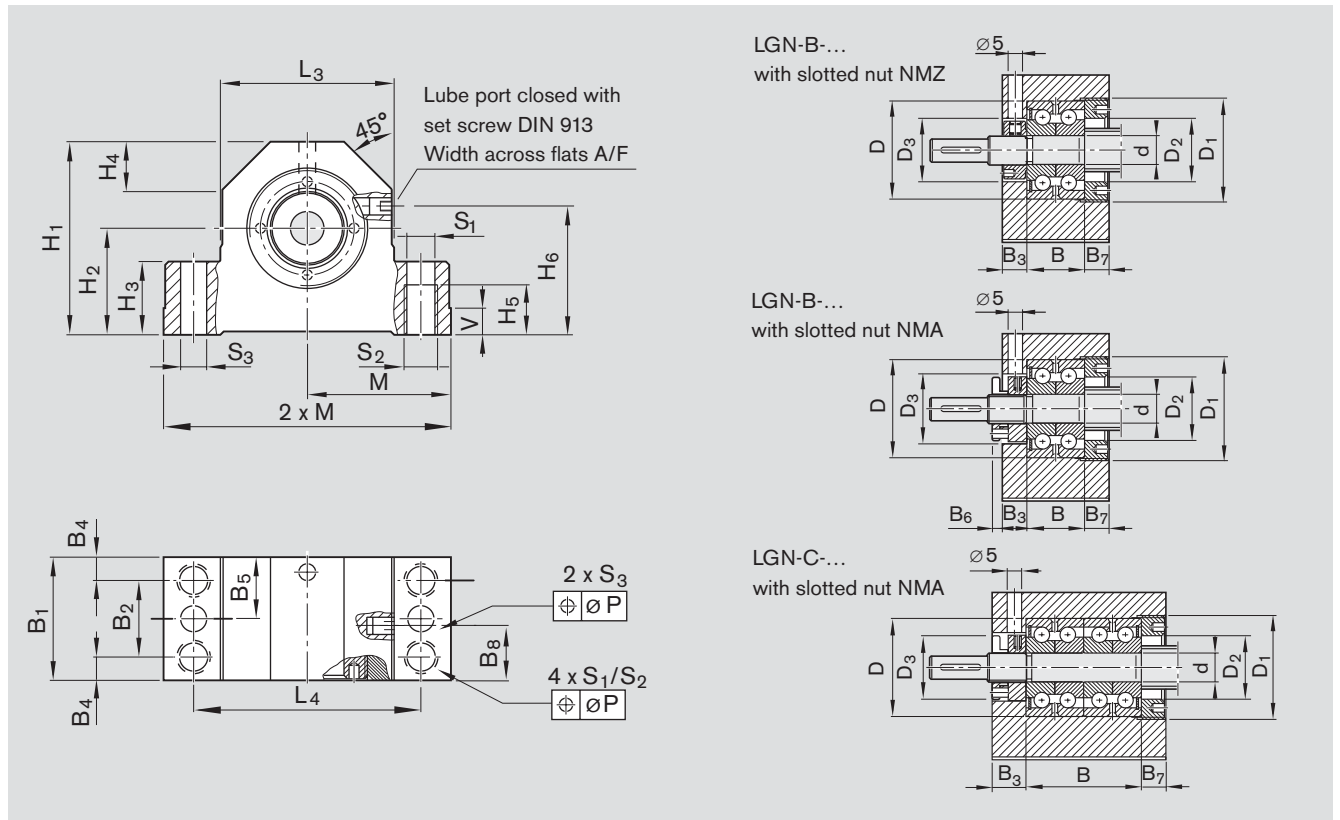


Size $d_0 \times P$	Pillow block unit complete Part number	Angular-contact thrust ball bearing			Designation	Slotted nut		Weight complete (kg)
		Load ratings (axial) dyn. C (N)	stat. C ₀ (N)	Dimensions (mm) d D B		M _A (Nm)	Designation	
6 x 1/2	R1591 106 00	6900	8500	6 24 15	LGN-B-0624	2.0	NMZ 6x0.5	0.38
8 x 1/2/2.5	R1591 106 00	6900	8500	6 24 15	LGN-B-0624	2.0	NMZ 6x0.5	0.38
12 x 2/5/10	R1591 106 20	6900	8500	6 24 15	LGN-B-0624	2.0	NMZ 6x0.5	0.38
16 x 5/10/16	R1591 110 20	13400	18800	10 34 20	LGN-B-1034	6.0	NMZ 10x1	0.87
20 x 5/10/20/40	R1591 112 20	17000	24700	12 42 25	LGN-B-1242	8.0	NMZ 12x1	1.12
25 x 5/10/25	R1591 117 20	18800	31000	17 47 25	LGN-B-1747	15.0	NMZ 17x1	1.65
25 x 5/10/25	R1591 117 30	18800	31000	17 47 25	LGN-B-1747	15.0	NMA 17x1	1.69
32 x 5/10/20/32/64	R1591 120 20	26000	47000	20 52 28	LGN-B-2052	18.0	NMZ 20x1	1.93
32 x 5/10/20/32/64	R1591 120 30	26000	47000	20 52 28	LGN-B-2052	18.0	NMA 20x1	2.03
40 x 10/12/16/20/40	R1591 225 30	44500	111000	25 57 56	LGN-C-2557	25.0	NMA 25x1.5	5.13
40 x 5	R1591 130 20	29000	64000	30 62 28	LGN-B-3062	32.0	NMZ 30x1.5	2.64
40 x 5	R1591 130 30	29000	64000	30 62 28	LGN-B-3062	32.0	NMA 30x1.5	2.77
50 x 5	R1591 135 30	41000	89000	35 72 34	LGN-B-3572	40.0	NMA 35x1.5	4.66
50 x 10/12/16/20/40	R1591 230 30	47500	127000	30 62 56	LGN-C-3062	32.0	NMA 30x1.5	7.04
63 x 10/20/40	R1591 140 30	72000	149000	40 90 46	LGN-A-4090	55.0	NMA 40x1.5	10.49
80 x 10/20	R1591 150 30	113000	250000	50 110 54	LGN-A-50110	85.0	NMA 50x1.5	15.61

Suitable for screw ends: Form

For screws 8 x 1/2/2.5:
Form 53, 83, 93





Size	Dimensions (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	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 10/12/16/20/40	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 10/12/16/20/40	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	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

Bearings

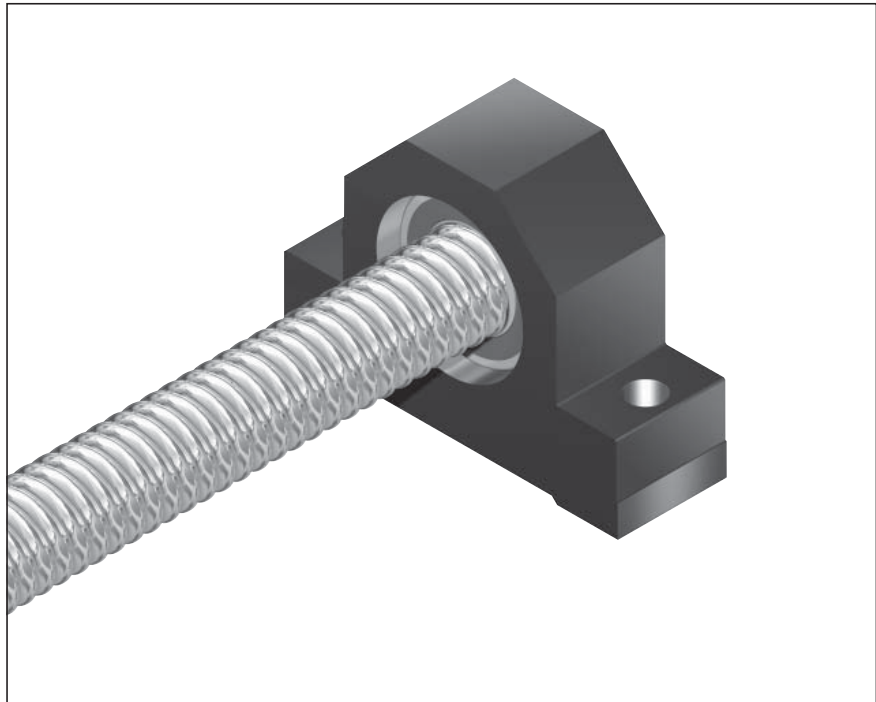
Pillow Block Unit SEB-L

**Floating bearing with
deep-groove ball bearing
per DIN 625**

The pillow block unit consists of:

- precision pillow block housing made of steel with reference edge on one side
- deep-groove ball bearing per DIN 625-... .2RS
- retaining ring per DIN 471
- cover

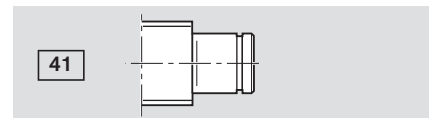
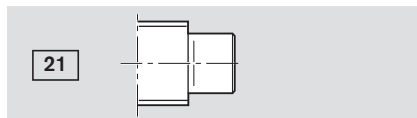
All parts are supplied unmounted.

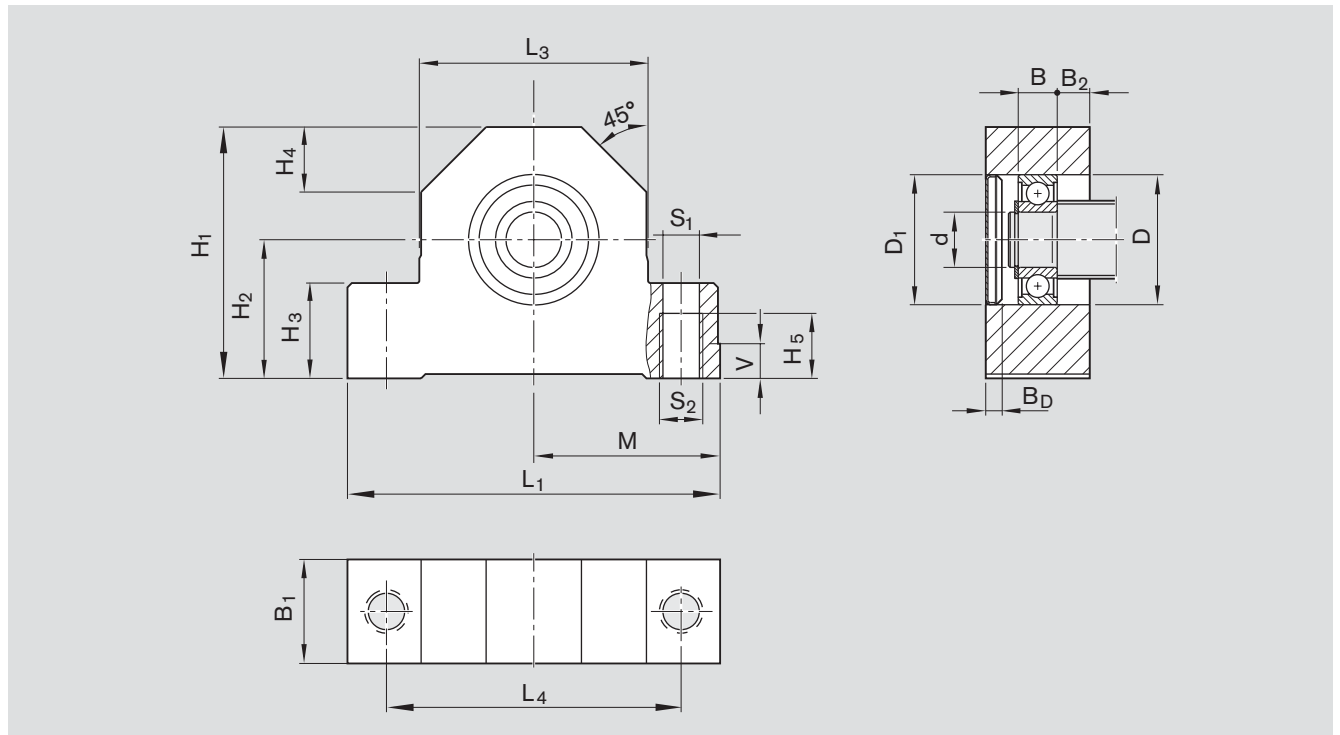


Size $d_0 \times P$	Pillow block unit complete Part number	Deep-groove ball bearing per DIN 625			Designation DIN 625...			Retaining ring per DIN 471	Weight complete (kg)
		Load ratings (radial)		Dimensions (mm)					
		dyn. C (N)	stat. C ₀ (N)	d	D	B			
8 x 1/2/2.5	R1591 605 00	1900	590	5	16	5	625.2RS	5x0.6	0.14
12 x 2/5/10	R1591 606 20	2450	900	6	19	6	626.2RS	6x0.7	0.18
16 x 5/10/16	R1591 610 20	6000	2240	10	30	9	6200.2RS	10x1	0.54
20 x 5/10/20/40	R1591 612 20	6950	2650	12	32	10	6201.2RS	12x1	0.73
25 x 5/10/25	R1591 617 20	9500	4150	17	40	12	6203.2RS	17x1	0.96
32 x 5/10/20/32/64	R1591 620 20	12700	5700	20	47	14	6204.2RS	20x1.2	1.24
40 x 5	R1591 630 20	19300	9800	30	62	16	6206.2RS	30x1.5	1.66
40 x 10/12/16/20/40	R1591 630 10	19300	9800	30	62	16	6206.2RS	30x1.5	1.82
50 x 5	R1591 635 10	25500	13200	35	72	17	6207.2RS	35x1.5	2.66
50 x 10/12/16/20/40	R1591 635 20	25500	13200	35	72	17	6207.2RS	35x1.5	2.87
63 x 10/20/40	R1591 650 20	36500	20800	50	90	20	6210.2RS	50x2	5.39
80 x 10/20	R1591 660 20	52000	31000	60	110	22	6212.2RS	60x2	7.09

Suitable for screw ends: Form

For screws 12 x 2: Form 41





Size	Dimensions (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	D ₁ J6	Cover B _D
8 x 1/2/2.5	62	38	50	34	18	13	11	9	13	4.0	31.0	6	5.3	M6	16	2.6
12 x 2/5/10	62	38	50	41	22	13	11	9	15	4.5	31.0	6	5.3	M6	19	2.6
16 x 5/10/16	86	52	68	58	32	22	15	15	24	7.5	43.0	8	8.4	M10	30	3.8
20 x 5/10/20/40	94	60	77	64	34	22	17	15	26	8.0	47.0	8	8.4	M10	32	3.8
25 x 5/10/25	108	66	88	72	39	27	19	18	28	8.0	54.0	10	10.5	M12	40	3.7
32 x 5/10/20/32/64	112	70	92	77	42	27	20	18	34	10.0	56.0	10	10.5	M12	47	4.8
40 x 5	126	80	105	90	50	32	23	21	38	11.0	63.0	12	12.6	M14	62	4.5
40 x 10/12/16/20/40	126	80	105	98	58	32	23	21	38	11.0	63.0	12	12.6	M14	62	4.5
50 x 5	144	92	118	105	58	38	25	22	41	12.0	72.0	12	12.5	M14	72	5.0
50 x 10/12/16/20/40	144	92	118	112	65	38	25	22	41	12.0	72.0	12	12.5	M14	72	5.0
63 x 10/20/40	190	130	160	138	73	50	35	22	46	13.0	95.0	16	12.5	M14	90	5.0
80 x 10/20	205	145	175	165	93	50	40	36	50	14.0	102.5	16	17.3	M20	110	6.0

Bearings

Bearing LAF

Fixed bearing with angular-contact thrust ball bearing LGF

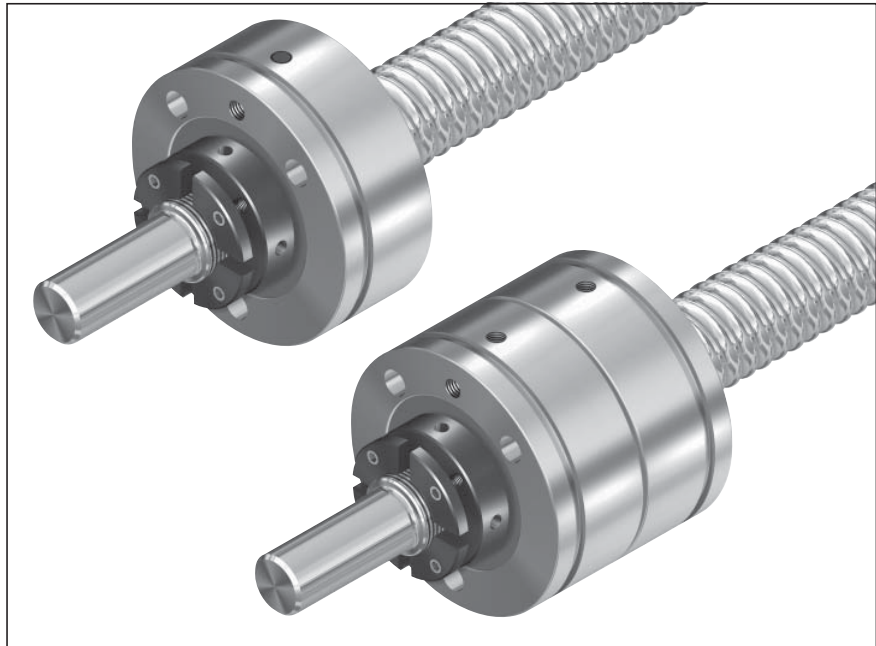
Double-thrust, screw-down,
Series LGF-B-...

LGF-A-...

Double-thrust, screw-down,
Series LGF-C-...

The fixed bearing consists of:

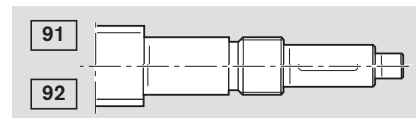
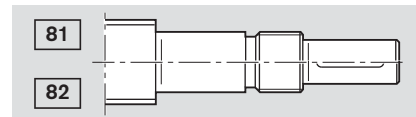
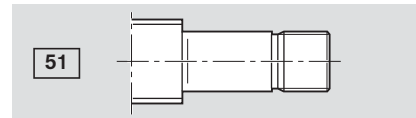
- angular-contact thrust ball bearing LGF
- slotted nut NMA..., NMZ...

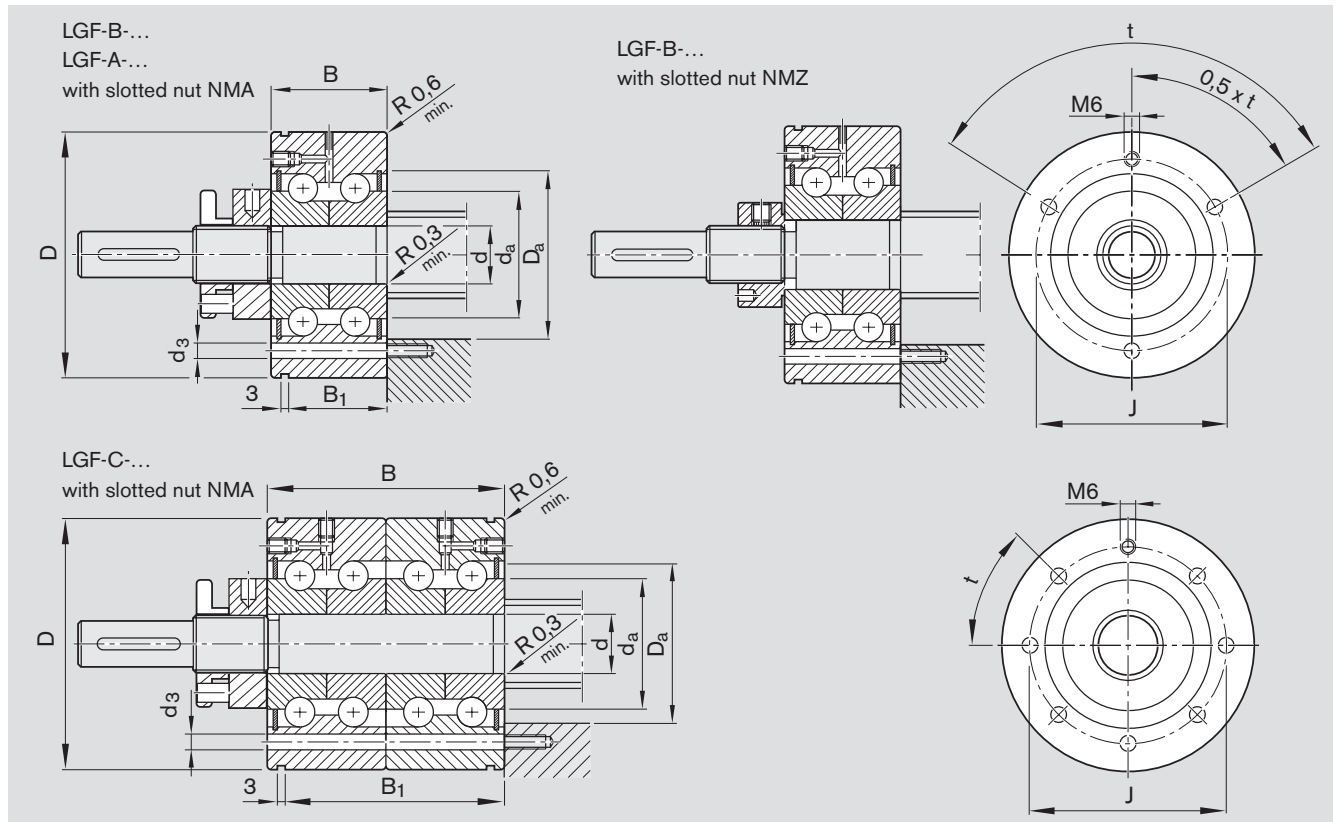


Size	Angular-contact thrust ball bearing with slotted nut	Single parts				Weight complete (kg)
		Angular-contact thrust ball bearing	Slotted nut	Designation	Part number	
$d_0 \times P$	Part number	Designation	Part number	Designation	Part number	
20 x 5/10/20/40	R1590 012 00	LGF-B-1255	R3414 009 06	NMZ 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 10/12/16/20/40	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 10/12/16/20/40	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	R1590 050 30	LGF-A-50140	R3414 029 06	NMA 50x1.5	R3446 019 04	5.130

Size	Load ratings		Bearing friction torque with seal M_{RL} (Nm)	Rigidity (axial) R_{fb} (N/ μ m)	Rigidity against tilting R_{kl} (Nm/mrad)	Limit speed (grease) n_G (min ⁻¹)
	dyn. C (N)	stat. C ₀ (N)				
$d_0 \times P$						
20x5/10/20/40	17000	24700	0.16	375	50	3800
25x5/10/25	18800	31000	0.24	450	80	3300
32x5/10/20/32/64	26000	47000	0.30	650	140	3000
40x5	29000	64000	0.50	850	300	2200
40x10/12/16/20/40	44500	111000	0.60	1300	450	2600
50x5	41000	89000	0.60	900	400	2000
50x10/12/16/20/40	47500	127000	0.75	1500	620	2200
63x10/20/40	72000	149000	1.30	1200	750	1600
80x10/20	113000	250000	2.60	1400	1500	1200

Suitable for screw ends: Form





Size $d_0 \times P$	Dimensions (mm)				Mounting dimensions (mm)						Mounting holes		
	d	D	B	B ₁	J	D _a min.	D _a max.	d _a min.	d _a max.	Number	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	
40x10/12/16/20/40	25 _{-0.005}	75 _{-0.010}	56 _{-0.50}	47	58	45	48	32	44	8	6.5	45	
50x5	35 _{-0.010}	90 _{-0.015}	34 _{-0.25}	25	75	59	62	45	58	4	8.8	90	
50x10/12/16/20/40	30 _{-0.005}	80 _{-0.010}	56 _{-0.50}	47	63	50	53	40	49	12	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	50 _{-0.005}	140 _{-0.010}	54 _{-0.25}	45	113	88	100	63	87	12	10.5	30	

Bearings

Bearing LAN

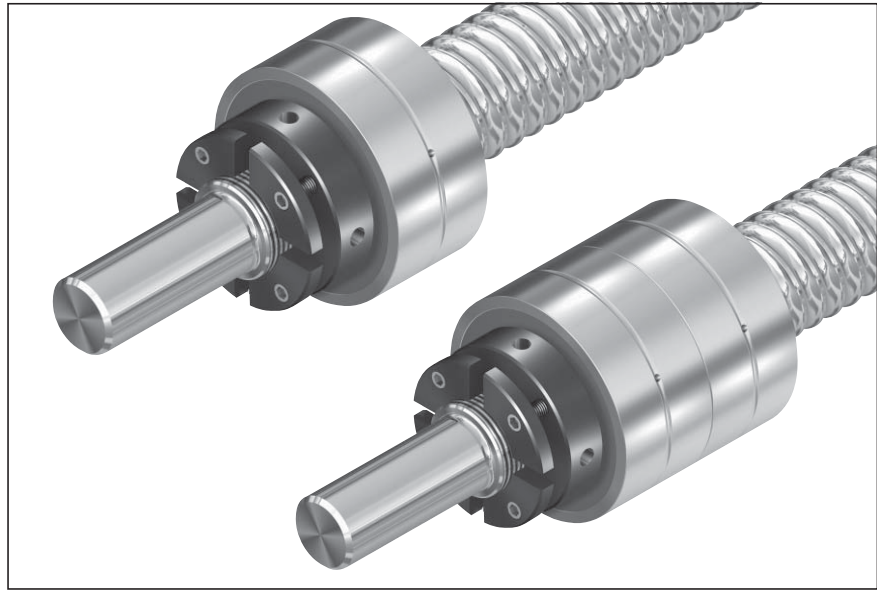
Fixed bearing with angular-contact thrust ball bearing LGN

Double-thrust,
Series LGN-B-...
LGN-A-...

Double-thrust, in pairs,
Series LGN-C-...

The fixed bearing consists of:

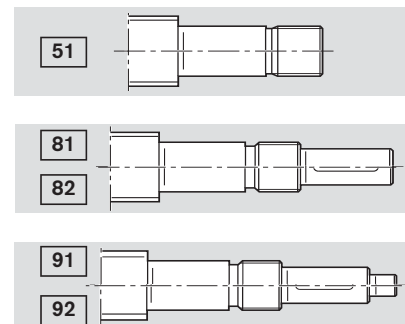
- angular-contact thrust ball bearing LGN
- slotted nut NMA..., NMZ...

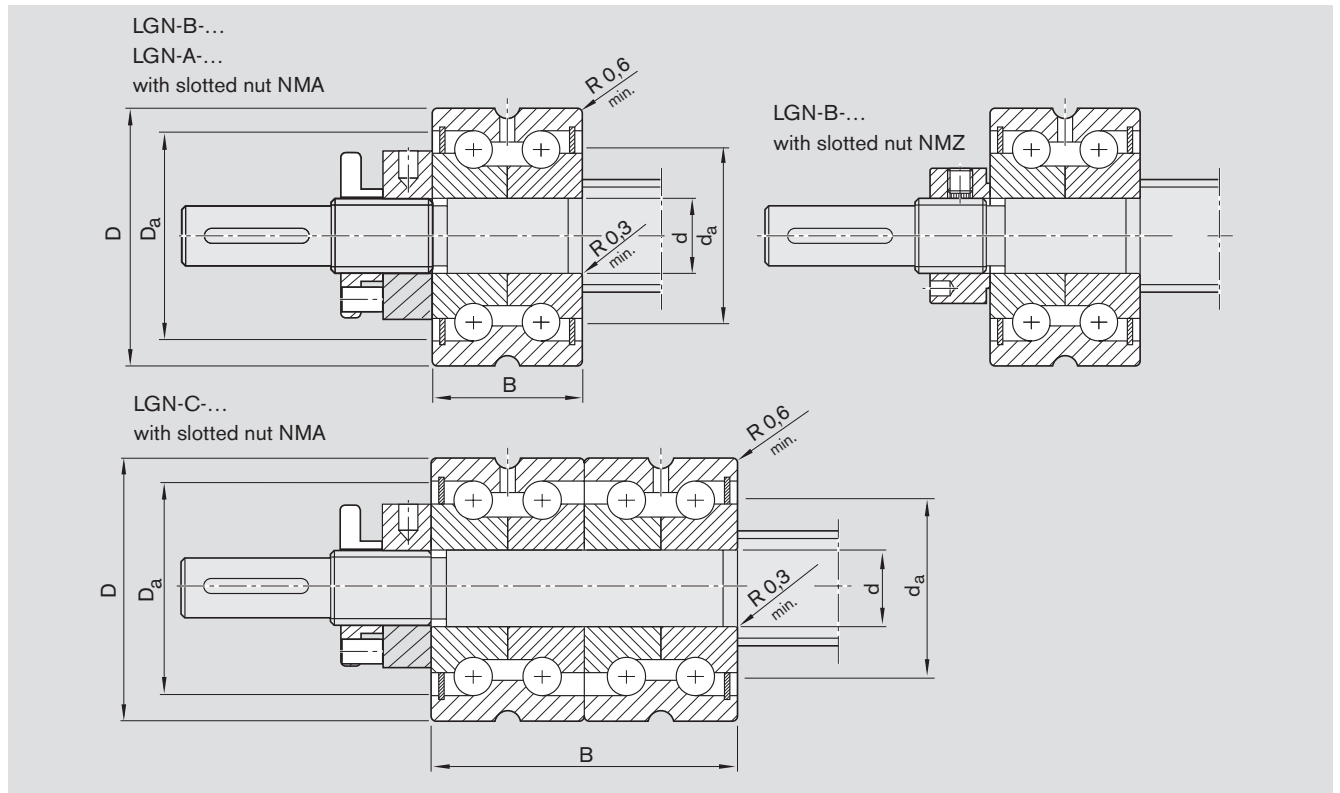


Size	Angular-contact thrust ball bearing with slotted nut	Single parts				Weight complete (kg)
		Angular-contact thrust ball bearing	Slotted nut	Designation	Part number	
d₀ x P	Part number	Designation	Part number	Designation	Part number	
6 x 1/2	R1590 106 00	LGN-B-0624	R3414 002 06	NMZ 6x0.5	R3446 001 04	0.040
8 x 1/2/2.5	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	R3446 004 04	0.248
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
32 x 5/10/20/32/64	R1590 120 30			NMA 20x1	R3446 015 04	0.440
	R1590 130 00	LGN-B-3062	R3414 007 06	NMZ 30x1.5	R3446 006 04	0.465
40 x 5	R1590 130 30			NMA 30x1.5	R3446 016 04	0.590
	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 10/12/16/20/40	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	R1590 150 30	LGN-A-50110	R3414 025 06	NMA 50x1.5	R3446 019 04	2.930

Size	Load ratings		Bearing friction torque with seal M _{RL} (Nm)	Rigidity (axial) R _{fb} (N/μm)	Rigidity against tilting R _{kt} (Nm/mrad)	Limit speed (grease) n _G (min ⁻¹)
	dyn. C (N)	stat. C ₀ (N)				
d₀ x P						
6x1/2	6900	8500	0.04	200	8	6800
8x1/2/2.5	6900	8500	0.04	200	8	6800
12x2/5/10	6900	8500	0.04	200	8	6800
16x5/10/16	13400	18800	0.12	325	25	4600
20x5/10/20/40	17000	24700	0.16	375	50	3800
25x5/10/25	18800	31000	0.24	450	80	3300
32x5/10/20/32/64	26000	47000	0.30	650	140	3000
40x5	29000	64000	0.50	850	300	2200
40x10/12/16/20/40	44500	111000	0.60	1300	450	2600
50x5	41000	89000	0.60	900	400	2000
50x10/12/16/20/40	47500	127000	0.75	1500	620	2200
63x10/20/40	72000	149000	1.30	1200	750	1600
80x10/20	113000	250000	2.60	1400	1500	1200

Suitable for screw ends: Form
 For screws 8 x 2.5: Form 53, 83, 93
 For screws 6 x 1; 6 x 2; 8 x 1; 8 x 2:
 Form 83





Size	Dimensions (mm)			Mounting dimensions (mm)			
	d	D	B	D_a	d_a	d_a	
$d_0 \times P$				min.	max.	min.	max.
6 x 1/2	6 _{-0.010}	24 _{-0.010}	15 _{-0.25}	16	19	9	15
8 x 1/2/2.5	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 10/12/16/20/40	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 10/12/16/20/40	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	50 _{-0.005}	110 _{-0.010}	54 _{-0.25}	88	100	63	87

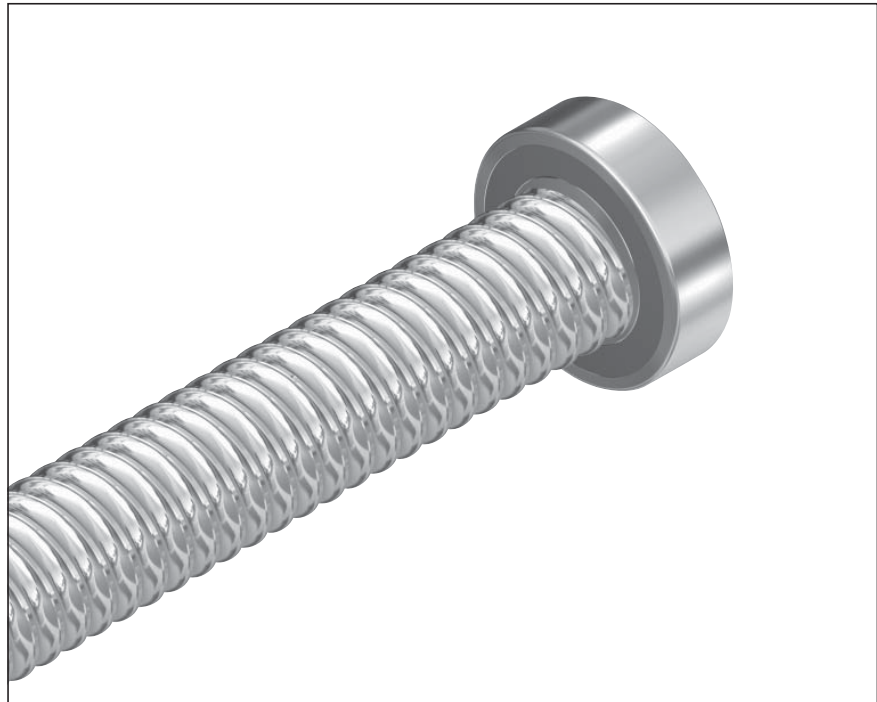
Bearings

Bearing LAD

Floating bearing with deep-groove ball bearing

The floating bearing consists of:

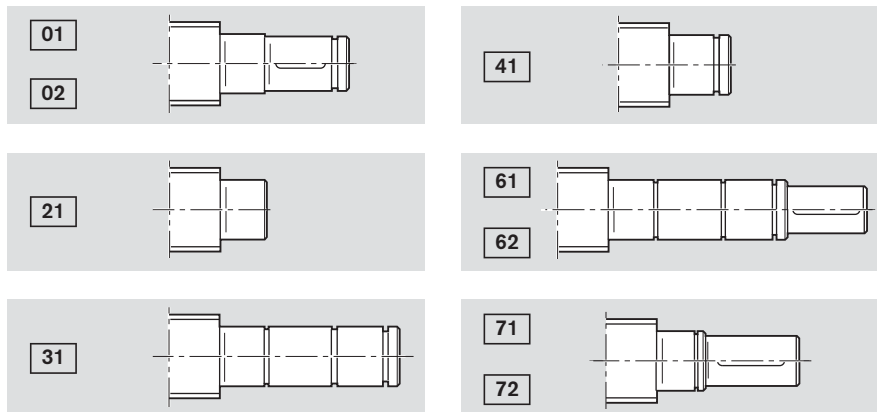
- deep-groove ball bearing per DIN 625... .2RS
- retaining ring DIN 471 (2 pcs)

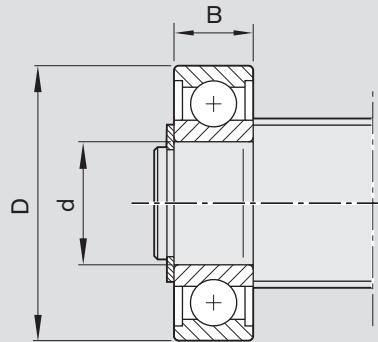


Size $d_0 \times P$	Deep-groove ball bearing with retaining ring Part number	Single parts				Load ratings	
		Deep-groove ball bearing DIN 625		Retaining ring DIN 471		dyn. C (N)	stat. C ₀ (N)
		Designation	Part number	Designation	Part number		
8 x 1/2/2.5	R1590 605 00	625.2RS	R3414 048 00	5x0.6	R3410 742 00	1900	590
12 x 2/5/10	R1590 606 00	626.2RS	R3414 043 00	6x0.7	R3410 736 00	2450	900
16 x 5/10/16	R1590 610 00	6200.2RS	R3414 049 00	10x1	R3410 745 00	6000	2240
20 x 5/10/20/40	R1590 612 00	6201.2RS	R3414 042 00	12x1	R3410 712 00	6950	2650
	R1590 615 00	6202.2RS	R3414 074 00	15x1	R3410 748 00	7800	3250
25 x 5/10/25	R1590 617 00	6203.2RS	R3414 050 00	17x1	R3410 749 00	9500	4150
32 x 5/10/20/32/64	R1590 620 00	6204.2RS	R3414 038 00	20x1.2	R3410 735 00	12700	5700
	R1590 625 00	6205.2RS	R3414 063 00	25x1.2	R3410 750 00	14300	6950
40 x 5/10/12/16/20/40	R1590 630 00	6206.2RS	R3414 051 00	30x1.5	R3410 724 00	19300	9800
50 x 5/10/12/16/20/40	R1590 635 00	6207.2RS	R3414 075 00	35x1.5	R3410 725 00	25500	13200
63 x 10/20/40	R1590 650 00	6210.2RS	R3414 077 00	50x2	R3410 727 00	36500	20800
80 x 10/20	R1590 660 00	6212.2RS	R3414 078 00	60x2	R3410 764 00	52000	31000

Suitable for screw ends: Form

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





Size	Dimensions (mm)			Weight complete (kg)	
	$d_0 \times P$	d	D		B
8 x 1/2/2.5		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 5/10/12/16/20/40		30	62	16	0.195
50 x 5/10/12/16/20/40		35	72	17	0.288
63 x 10/20/40		50	90	20	0.453
80 x 10/20		60	110	22	0.783

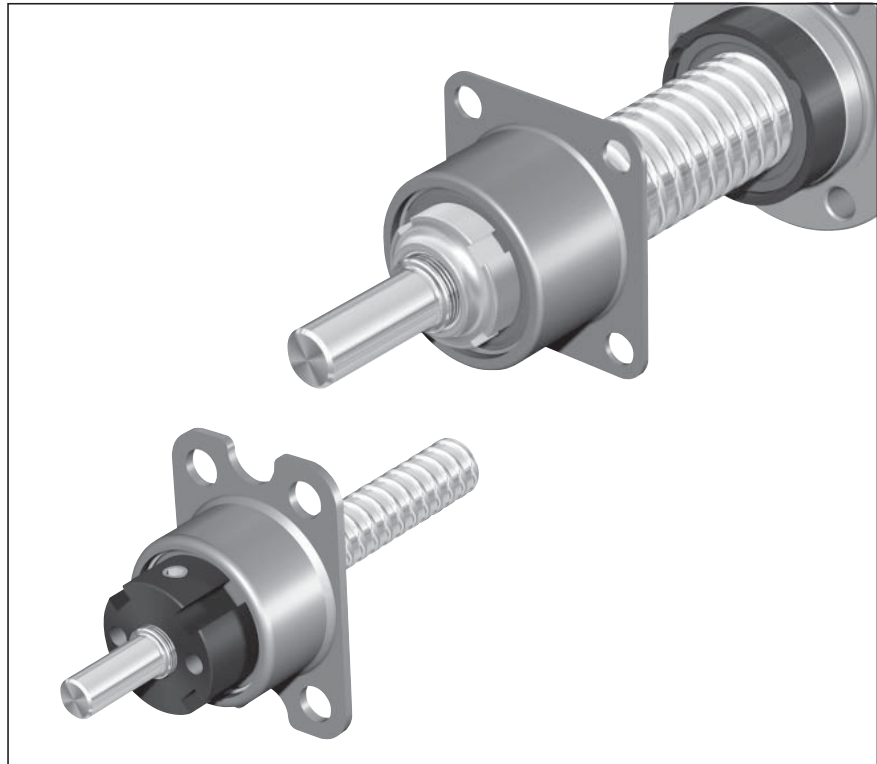
Bearings

Bearing LAL

Fixed bearing with angular-contact thrust ball bearing LGL
 Double-thrust, screw-down, for economical constructions

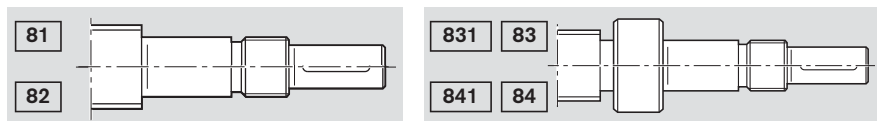
The fixed bearing consists of:

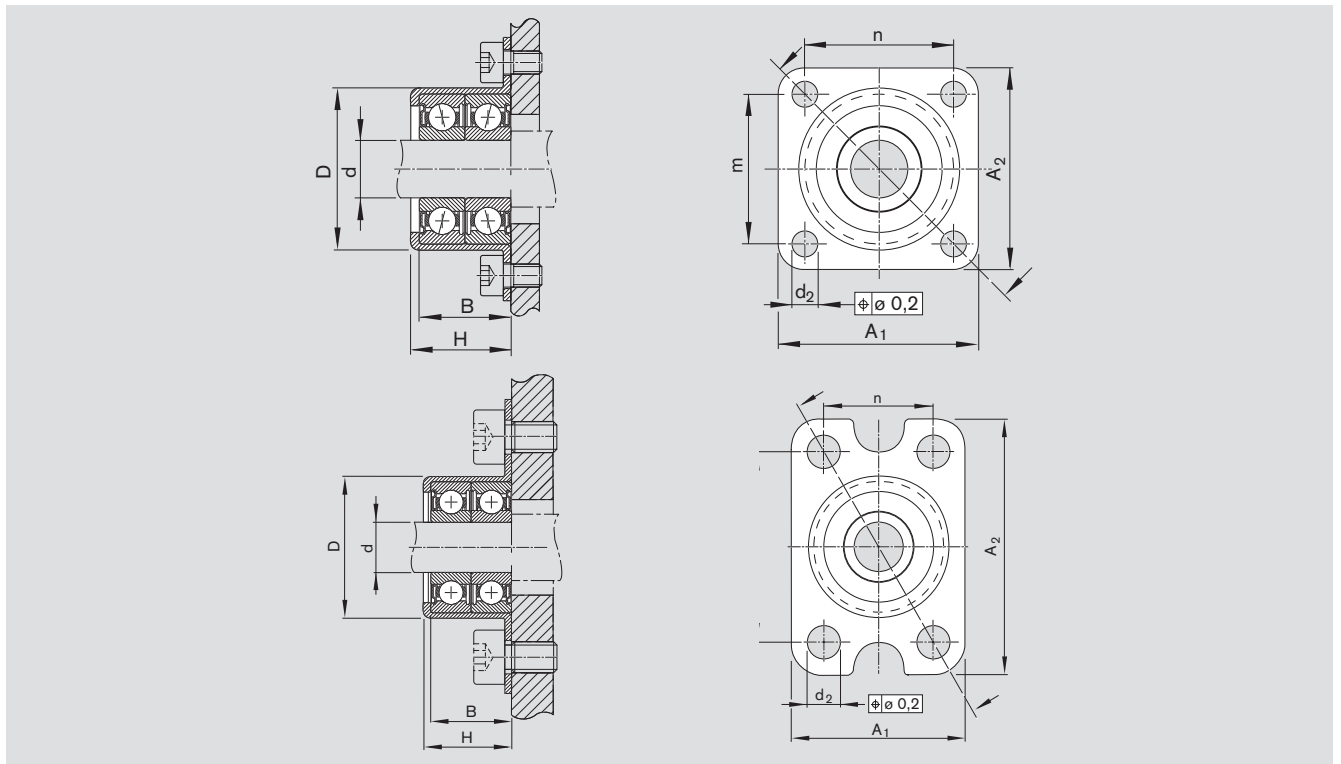
- angular-contact thrust ball bearing LGL
- slotted nut NMG..., NMZ...



Size	Angular-contact thrust ball bearing with slotted nut	Single parts				Slotted nut	
		Angular-contact thrust ball bearing		Load ratings		Designation	Part number
		Designation	Part number	dyn. C (N)	stat. C ₀ (N)		
d _o x P	Part number	Designation	Part number	dyn. C (N)	stat. C ₀ (N)	Designation	Part number
6x1/2	R1590 406 00	LGL-D-0624	R3414 038 06	1340	1250	NMZ 6x0.5	R3446 001 04
8x1/2/2.5	R1590 406 00	LGL-D-0624	R3414 038 06	1340	1250	NMZ 6x0.5	R3446 001 04
12x2/5/10	R1590 406 00	LGL-D-0624	R3414 038 06	1340	1250	NMZ 6x0.5	R3446 001 04
12x5/10	R1590 412 00	LGL-A-1244	R3414 040 06	13200	17900	NMG 12x1	R3446 002 02
16x5/10	R1590 412 00	LGL-A-1244	R3414 040 06	13200	17900	NMG 12x1	R3446 002 02
20x5	R1590 412 00	LGL-A-1244	R3414 040 06	13200	17900	NMG 12x1	R3446 002 02
25x5/10	R1590 415 00	LGL-A-1547	R3414 041 06	16400	22400	NMG 15x1	R3446 011 02
32x5/10	R1590 420 00	LGL-A-2060	R3414 042 06	27500	40000	NMG 20x1	R3446 005 02

Suitable for screw ends: Form





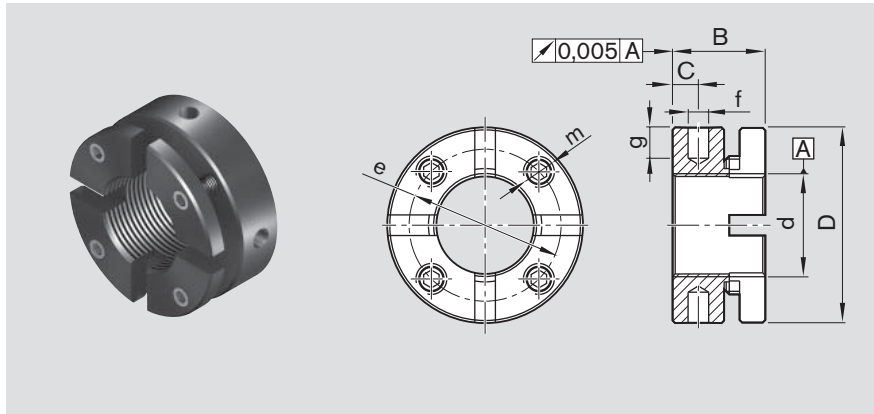
Size	Dimensions (mm)										Weight of bearing (kg)
	d	D +0.03 -0.01	A ₁	A ₂	n	m	H -0.25	B	d ₂		
d _o x P											
6x1/2	6	20.50	24	35	15	26	13	12	4.5	0.023	
8x1/2/2.5	6	20.50	24	35	15	26	13	12	4.5	0.023	
12x2/5/10	6	20.50	24	35	15	26	13	12	4.5	0.023	
12x5/10	12	35.45	44	50	32	38	22	20	6.6	0.120	
16x5/10	12	35.45	44	50	32	38	22	20	6.6	0.120	
20x5	12	35.45	44	50	32	38	22	20	6.6	0.120	
25x5/10	15	38.45	47	51	35	39	24	22	6.6	0.140	
32x5/10	20	50.45	60	60	47	47	30	28	6.6	0.300	

Slotted Nuts and Housing Nuts

Slotted Nuts NMA, NMZ and NMG for Fixed Bearings

Slotted nut NMA

- for maximum vibratory loads
- for new designs

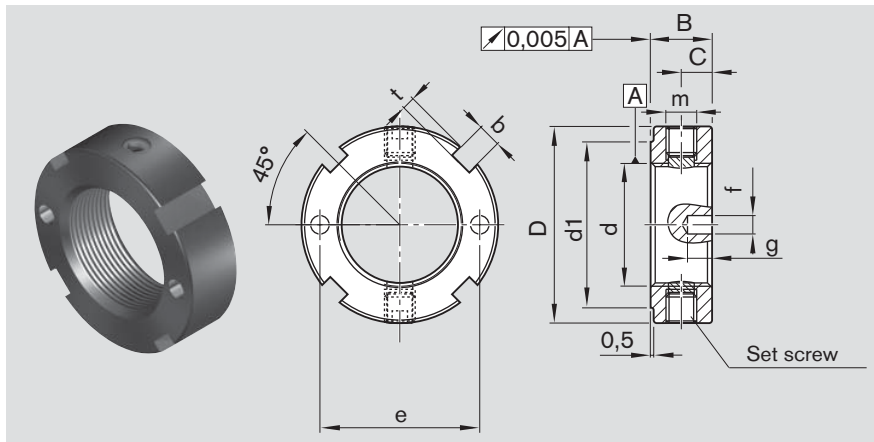


M_A = tightening torque for slotted nut
 F_{aB} = axial breaking load of slotted nut
 M_{AG} = tightening torque for set screw

Designation	Part number	Dimensions (mm)									M_A (Nm)	F_{aB} (kN)	M_{AG} (Nm)	Weight (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 50x1.5	R3446 019 04	M50x1.5	75	25	8	M6	68	6	8	85	450	5	430	

Slotted nut NMZ

- for existing designs
- for side drive with timing belt
- for driven nuts

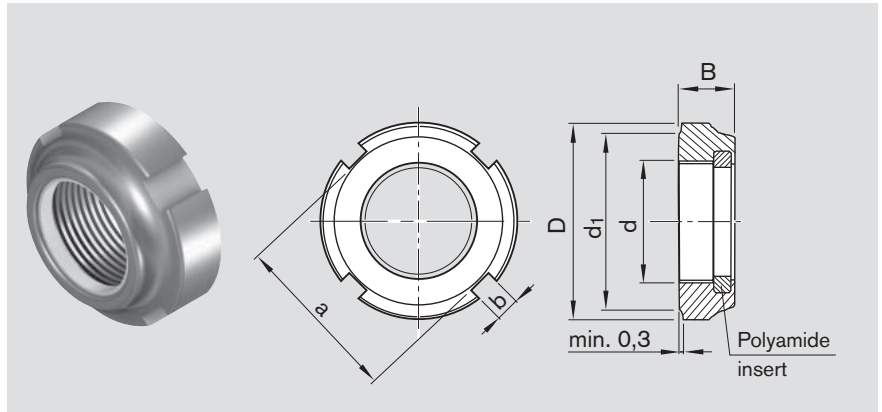


M_A = tightening torque for slotted nut
 F_{aB} = axial breaking load of slotted nut
 M_{AG} = tightening torque for set screw

Designation	Part number	Dimensions (mm)											M_A (Nm)	F_{aB} (kN)	M_{AG} (Nm)	Weight (g)
		d	D	B	d ₁	c	m	b	t	e	f	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
NMZ 20x1	R3446 005 04	M20x1	32	10	27	5	M5	4	2.0	26.0	3.0	4.0	18	69	3	35
NMZ 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

Slotted nut NMG

- for economical constructions



M_A = tightening torque of slotted nut

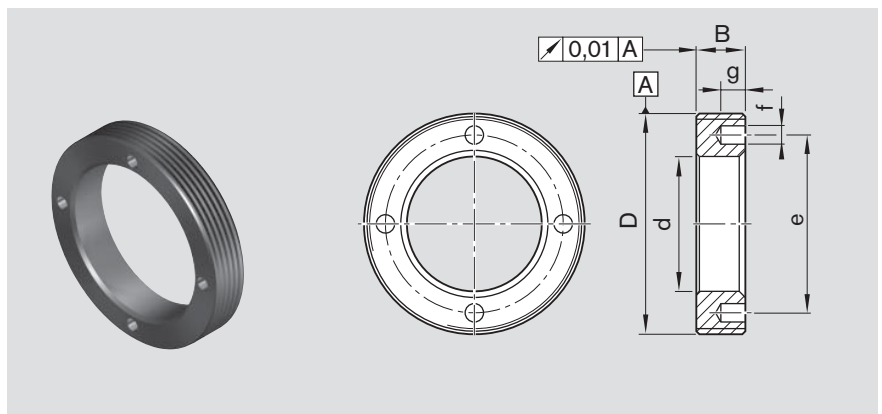
Designation	Part number	Dimensions (mm)						M_A (Nm)	Weight (g)
		d	D	B	d ₁	a	b		
NMG 12x1	R3446 002 02	M12x1	21	7.6	18	18	3	8	10
NMG 15x1	R3446 011 02	M15x1	24	8.6	21	21	4	10	13
NMG 20x1	R3446 005 02	M20x1	32	9.6	27	27	4	18	24

Housing nut GWR

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

Note:

Use a threadlocker (e.g. Loctite 638) to secure against loosening.



Designation	Part number	Dimensions (mm)						Weight (g)
		D	d	B	e	f	g	
GWR 18x1	R1507 040 33	M18x1	8.5	8	12.5	2.5	3	10.0
GWR 23x1	R1507 240 35	M23x1	13.0	8	18.0	2.5	3	15.0
GWR 26x1.5	R1507 240 22	M26x1.5	16.5	8	20.5	2.5	3	16.5
GWR 30x1.5	R1507 340 34	M30x1.5	17.0	8	23.0	3.0	4	29.0
GWR 36x1.5	R1507 040 23	M36x1.5	22.0	8	29.0	3.0	4	35.0
GWR 40x1.5	R1507 140 03	M40x1.5	25.0	8	33.0	3.0	4	39.5
GWR 45x1.5	R1507 240 04	M45x1.5	28.0	8	38.0	3.0	4	55.0
GWR 50x1.5	R1507 240 25	M50x1.5	31.0	10	40.0	4.0	5	86.0
GWR 55x1.5	R1507 340 05	M55x1.5	36.0	10	46.0	4.0	5	96.0
GWR 58x1.5	R1507 440 32	M58x1.5	43.0	10	50.0	4.0	5	84.0
GWR 60x1	R1507 440 28	M60x1	43.0	10	51.0	4.0	5	97.0
GWR 62x1.5	R1507 440 29	M62x1.5	43.0	12	53.0	5.0	6	127.0
GWR 65x1.5	R1507 440 26	M65x1.5	47.0	12	55.0	4.0	5	136.0
GWR 70x1.5	R1507 440 06	M70x1.5	42.0	12	58.0	4.0	5	216.0
GWR 78x2	R1507 540 07	M78x2	52.0	15	67.0	6.0	7	286.0
GWR 92x2	R1507 640 09	M92x2	65.0	16	82.0	6.0	7	385.0
GWR 112x2	R1507 740 11	M112x2	82.0	18	100.0	8.0	8	596.0

Technical Data

Technical Notes

DIN 69 051, Part 1 defines a ball screw as follows:

An assembly comprising a ball screw shaft and a ball nut and which is capable of converting rotary motion into linear motion and vice versa. The rolling elements of the assembly are balls.

Advantages over the Acme screw drive

- The mechanical efficiency of an Acme screw drive is a maximum 50%, whereas a ball screw can reach a mechanical efficiency of up to 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

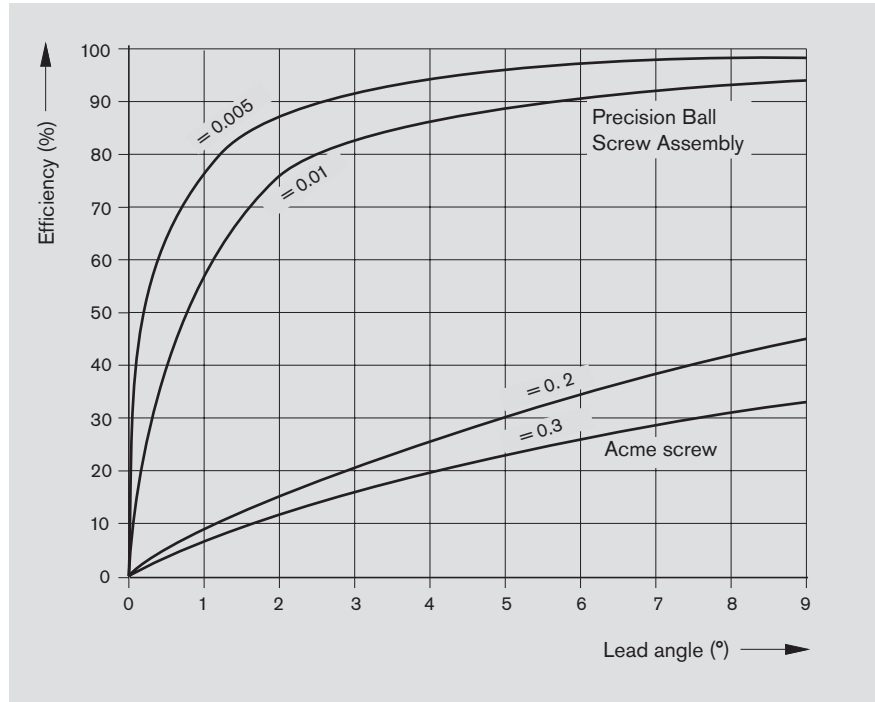
Due to their high mechanical efficiency, ball screws are in principle not self-locking.

Safety information

For vertically installed assemblies, customers should check whether separate protection against falling loads, e.g. a safety nut, is required.

We recommend that a safety nut be installed for particularly critical applications in vertical set-ups.

Please ask.



Selection criteria for ball screws

The following factors should be considered when selecting the ball screw for a given application:

- degree of accuracy required (lead deviation)
- in-service load conditions
- 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 ball screw assembly that is to be both cost-efficient and optimally designed:

- The lead is a decisive factor for the load-carrying capacity (depending on the maximum possible ball diameter) and the drive moment.
- 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 ball nut environment should be enclosed with your inquiry.

Note

Radial and eccentric forces relative to the screw must be avoided as they have a negative effect on the life and proper function of the ball screw.

Where special conditions of use are involved, please ask.

Load-carrying capacities and service life

We calculate load-carrying capacities and service life in accordance with DIN 69 051, Part 4 and ISO 3408-4 (P5).

Basic 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 ball diameter between the ball and the ball raceway.

Basic 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 amount of identical ball screws can achieve a nominal service life of one million revolutions.

Service life

The nominal 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 ball screws before the first signs of material fatigue become evident. The nominal life is designated as L or L_h , depending on whether it is specified in revolutions or hours.

Short stroke

During a short stroke, the ball does not make a real turn. It is therefore impossible for an adequate lubricating film to form. This may result in premature wear. In the chart, the minimum required stroke (travel) for a 10% lower load rating is shown as a function of the number of turns and lead of the nut. Hence the most favorable range lies above each curve. It may help to have occasional longer strokes, which are performed with simultaneous relubrication as "lubricating strokes". If in doubt, please ask.

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 "Design Calculations"

Characteristic speed $d_0 \cdot n$

Rexroth ball screws can be operated at very high speeds due to their internal ball recirculation system. Characteristic speeds of up to 150,000 are possible depending on the nut type.

$d_0 \cdot n \leq 150,000$

$d_0 \cdot n \leq 80,000$ (for eLINE and ECOplus series)

$d_0 =$ nominal diameter (mm)
 $n =$ speed (min⁻¹)

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

Our standard ball screw assemblies 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 60. Ball screw assemblies made of corrosion-resistant steel (DIN EN ISO 683-17) are also available upon request. Unless otherwise specified, the screw ends are not hardened.

Sealing

Ball screws are precision assemblies that require protection against contamination. Flat protective covers and bellows type dust boots or the drive

unit AGK are particularly suitable for this purpose. As 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. Our ball screws are therefore supplied with seals in their standard versions. At the customer's request, these seals can be omitted or special seals used in their place. A reinforced version of the standard seal has been developed for those applications where heavy contamination of the screw appears inevitable. The sealing effect has been improved further by increasing the preload. What must be borne in mind is the significantly higher friction torque in comparison with the standard friction torque (see Technical Data) and the associated increased heat build-up. The reinforced seal can be easily recognized externally by its dark green color.

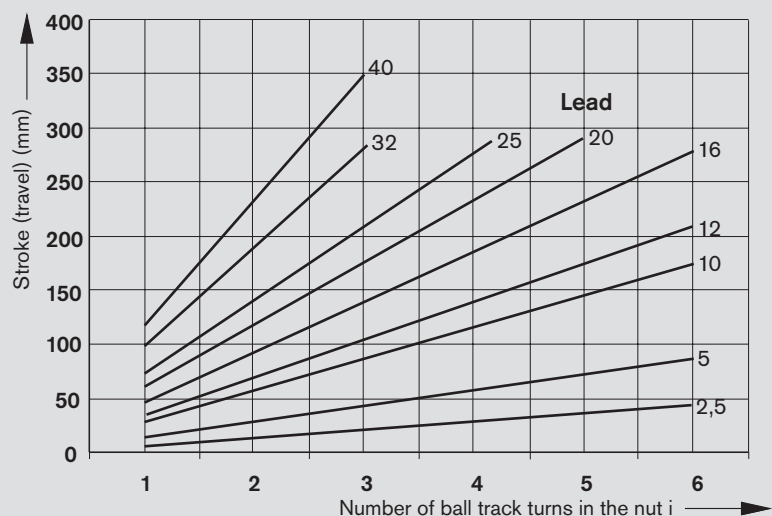
Permissible operating temperatures

Ball screws are suitable for continuous operation at temperatures up to 80°C with temporary peaks of 100°C (measurements taken on the outer shell of the nut).

Permissible operating temperatures:
 $-10^\circ\text{C} \leq T_{operating} \leq 80^\circ\text{C}$

Permissible bearing temperature:
 $-15^\circ\text{C} \leq T_{bearing} \leq 80^\circ\text{C}$

Short stroke limit (load rating reduced by less than 10%)



Technical Data

Acceptance Conditions and Tolerance Grades

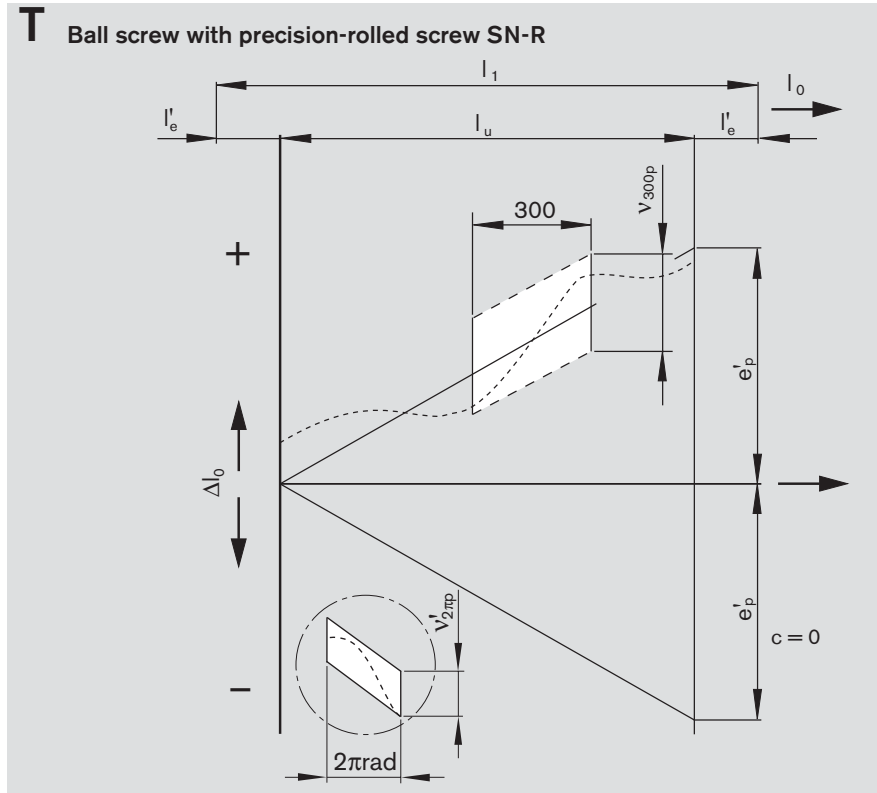
Note: For eLINE Ball Screws, please refer to the data given in the "eLINE Ball Screw Assemblies" section.

Permissible travel deviation

in accordance with DIN 69 051, Part 3 and ISO 3408-3
 Many values are significantly more accurate than those defined in DIN 69 051, Part 3 and 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 actual travel deviation
- v_{300p} = permissible travel deviation within 300 mm travel
- $v'_{2\pi p}$ = permissible travel deviation within one revolution



Improved values compared with DIN 69 051, Part 3 and ISO 3408-3 (tolerance reduced by half)

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	130
200	315	23	52	150
315		$e'_p = \frac{l_u}{300} \cdot v_{300p}$		

For precision screws SN-R the following values apply in all cases:

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

$v'_{2\pi p}$ (μm)	Tolerance grade		
	5	7	9
	8	10	10

Non-usable length l'_e

(Excess travel)

Modified with respect to DIN 69051.

d_0 (mm)	l'_e (mm)
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

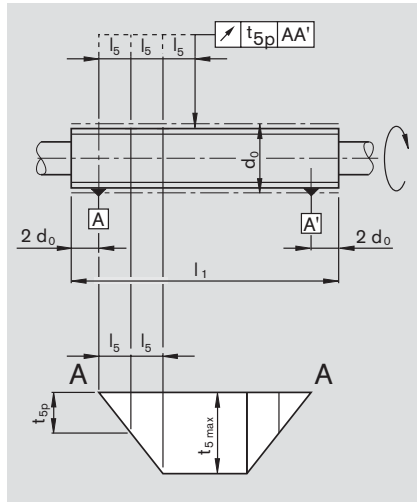
Lead P (mm)	Minimum number of measurements for tolerance grade		
	5	7	9
2.5	10	5	5
5	6	3	3
10	3	1	1
16	3	1	1
20	3	1	1
25	3	1	1
32	2	1	1
40	1	1	1

Technical Data

Acceptance Conditions and Tolerance Grades

Run-outs and location deviations based on DIN 69 051, Part 3 and ISO 3408-3

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

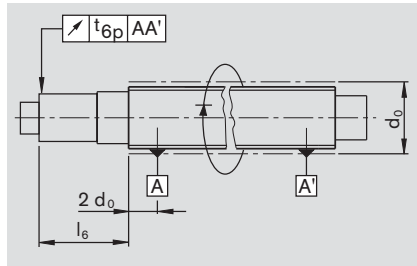


d_0		l_5	t_{5p} in μm for l_5 for tolerance grade	
above	up to		5	7; 9
= 6	12	80	32	40
12	25	160		
25	50	315		
50	100	630		
100	200	1250		

l_1/d_0		$t_{5\text{max}}$ in μm for $l_1 \geq 4l_5$ for tolerance grade	
above	up to	5	7; 9
	40	64	80
40	60	96	120
60	80	160	200
80	100	256	320

Radial run-out t_6 of the bearing diameter in relation to AA' for $l_6 \leq l$. Table value t_{6p} applies when $l_6 \leq$ reference length l .

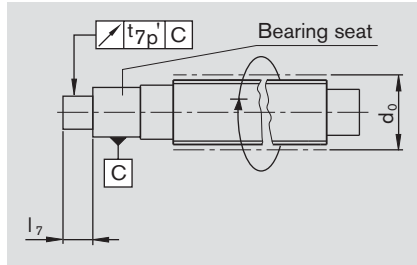
Where $l_6 > l$ then $t_{6a} \leq t_{6p} \cdot \frac{l_{6a}}{l}$



Nominal diameter d_0		Reference length l	t_{6p} in μm for $l_6 \leq l$ for tolerance grade	
above	up to		5; 7; 9	
= 6	20	80	20	
20	50	125	25	
50	125	200	25	
125	200	315	25	

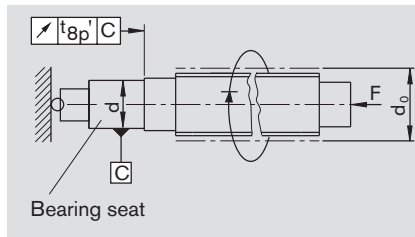
Coaxial deviation t_7' of the journal diameter of the ball screw shaft in relation to the bearing diameter for $l_7 \leq l$. Table value t_{7p} applies when $l_7 \leq$ reference length l .

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



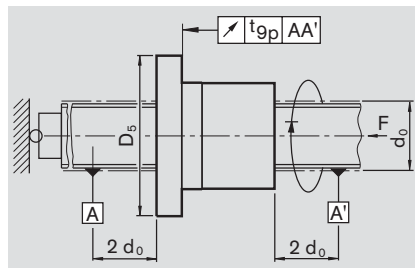
Nominal diameter d_0		Reference length l	t_{7p}' in μm for $l_7 \leq l$ for tolerance grade	
above	up to		5; 7; 9	
= 6	20	80	6	
20	50	125	6	
50	125	200	7	
125	200	315	12	

Axial run-out t_{8p}' of the shaft (bearing) face of the ball screw shaft in relation to the bearing diameter.



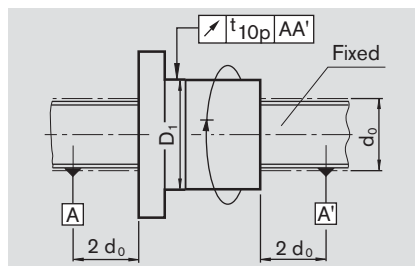
Nominal diameter d_0		t_{8p}' in μm for tolerance grade
above	up to	5; 7; 9
= 6	63	5
63	125	6
125	200	8

Axial run-out t_{9p} of the ball 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
above	up to	5; 7; 9
16	32	16
32	63	20
63	125	25
125	250	32
250	500	40

Radial run-out t_{10p} of the outer diameter D_1 of the ball nut in relation to **A** and **A'** (for preloaded and rotating ball nuts only). Fix screw against rotation before carrying out the measurement.



Outer diameter D_1		t_{10p} in μm for tolerance grade
above	up to	5; 7; 9
16	32	16
32	63	20
63	125	25
125	250	32
250	500	40

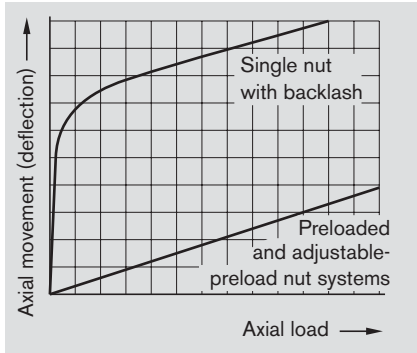
Please ask for details of permissible axial and radial run-out for driven nuts.

Technical Data

Preload and Rigidity

Nut system preload

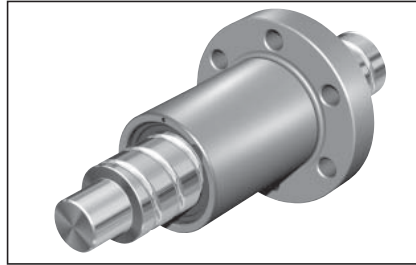
In addition to single nuts with reduced backlash, Rexroth supplies preloaded or adjustable-preload nut systems.



The rigidity of these types of Rexroth nut systems is approximately the same at the same preload. This is because the adjustable-preload single nut and the preloaded single nut have a much more compact design. The screw is typically far less rigid than the nut unit (for details see "Overall axial rigidity...").

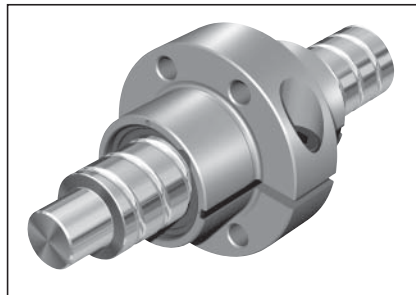
Preloaded single nut

Single nuts can be preloaded to 2%, 3% or 5% of the basic dynamic load rating by means of optimized ball size selection.



Adjustable-preload single nut

The adjustable-preload single nut allows cost-efficient design techniques to be implemented in a large number of applications. The radial clearance and preload are adjusted radially via a slot approx. 0.1 mm wide, see section "Mounting". Depending on the application, we will preload the nut system to 2%, 3% or 5% of the basic dynamic load rating. The maximum preload equals approx. 5% of the basic dynamic load rating.



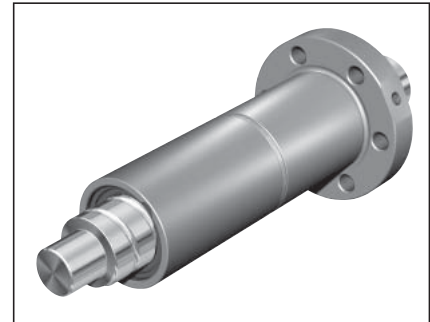
2-start single nut with flange

The 2-start single nut with flange is optimally preloaded to 2% or 3% of the dynamic load rating by means of ball size selection.



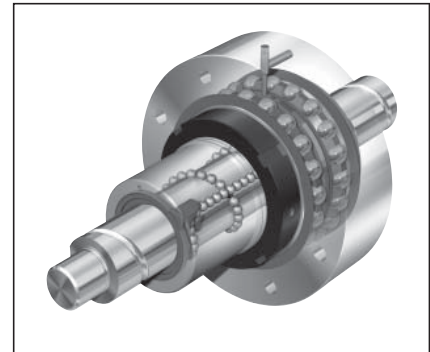
Double nut

Tensioning two single nuts against each other eliminates the inherent backlash of the ball screw, increases rigidity and thus improves positioning accuracy. As excessive preload can cause a reduction in service life, we recommend that it not be more than $\frac{1}{3}$ of the average operating load. Depending on the application, we will preload the nut system to 7% or 10% of the basic dynamic load rating.



Driven nut

Like the single nut, the driven nut from the "Drive Units" catalog R310EN 3304 can be preloaded to 2%, 3% or 5% of the basic dynamic load rating by means of ball size selection.



Overall rigidity

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

Overall axial rigidity R_{bs} of the ball screw

The overall axial rigidity R_{bs} is comprised 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. In an assembly with a diameter of 40 x 10, for example, the rigidity R_{nu} of the nut unit is 2 to 3 times higher than the rigidity R_S of a screw with a length of 500 mm.

Rigidity of the bearing R_{fb}

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

See the corresponding tables in this catalog for rigidity values of the bearings offered by Rexroth.

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

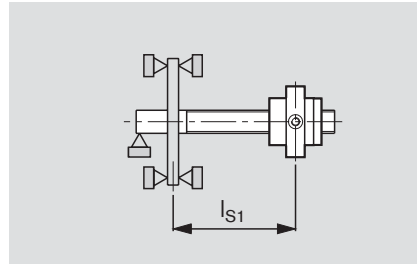
The rigidity in the area of the nut unit is calculated according per DIN 69 051 (P5).

See the corresponding tables for rigidity values.

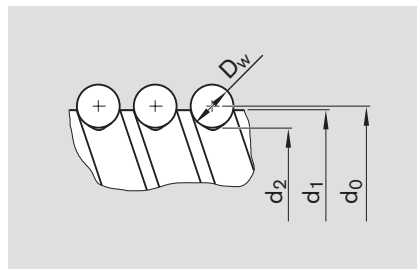
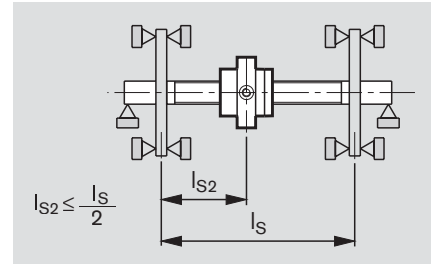
Rigidity of the screw R_S

The rigidity of the screw R_S depends on the type of bearing used. See the corresponding tables for rigidity values.

1 Ball screw shaft is fixed at one end.



2 Ball screw shaft is fixed at both ends.



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

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

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

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

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

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)

Technical Data

Preload and Overall Rigidity of Single Nuts

Dynamic drag torque, preload and rigidity for screws of tolerance grade 5-7 with single nuts from diameter 16 mm (smaller diameters without backlash only) FSZ-E-S, FEP-E-S (2% only), FEM-E-S, FEM-E-C, ZEM-E-S; SEM-E-S and SEM-E-C (consider centering diameter D_1 to be set) (ZEV-E-S and FBZ-E-S with backlash only)

- T_0 = overall dynamic drag torque
- $T_0 = T_{pr0} + T_{RD}$
- C = basic dynamic load rating
- C_0 = basic static load rating
- T_{RD} = dynamic drag torque of 2 seals
- R_S = rigidity of the screw
- R_{nu} = rigidity of the nut
- T_{pr0} = dynamic drag torque without a seal
- d_0 = nominal diameter
- P = lead
- D_w = ball diameter
- i = number of ball track turns

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

Note:
Measurement of the dynamic load torque, see "Mounting."

Size	Load ratings		Backlash of single nut		Overall rigidity of the screw R_S ($\frac{N \cdot m}{\mu m}$)
	dyn. C (N)	stat. C_0 (N)	Standard	Reduced	
$D_0 \times P \times D_w - i$					
6 x 1R x 0.8 - 4	900	1290	0.01	0.005	5
6 x 2R x 0.8 - 4	890	1280	0.01	0.005	5
8 x 1R x 0.8 - 4	1020	1740	0.01	0.005	9
8 x 2R x 1.2 - 4	1870	2760	0.01	0.005	9
8 x 2.5R x 1.588 - 3	2200	2800	0.02	0.010	8
12 x 2R x 1.2 - 4	2240	4160	0.01	0.005	21
12 x 5R x 2 - 3	3800	5800	0.02	0.010	18
12 x 10R x 2 - 2	2500	3600	0.02	0.010	18
16 x 5R/L x 3 - 4	12300	16100	0.04	0.020	32
16 x 10R x 3 - 3	9600	12300	0.04	0.020	32
16 x 16R x 3 - 2	6300	7600	0.04	0.020	32
16 x 16R x 3 - 3	9300	12000	0.04	0.020	32
20 x 5R/L x 3 - 4	14300	21500	0.04	0.020	53
20 x 5R x 3 - 5	17500	27300	0.04	0.020	53
20 x 10R x 3 - 4	14100	21300	0.04	0.020	53
20 x 20R/L x 3.5 - 2	9100	12100	0.04	0.020	52
20 x 20R x 3.5 - 3	13300	18800	0.04	0.020	52
20 x 40R x 3.5 - 1 x 4	14000	26200	0.04	0.020	52
25 x 5R/L x 3 - 4	15900	27200	0.04	0.020	86
25 x 10R x 3 - 4	15700	27000	0.04	0.020	86
25 x 25R/L 3.5 - 2	10100	15100	0.04	0.020	84
25 x 25R x 3.5 - 3	14700	23300	0.04	0.020	84
25 x 25R x 3.5 - 1.2 x 4	19700	39400	0.04	0.020	84
32 x 5R/L x 3.5 - 4	21600	40000	0.04	0.020	144
32 x 10R x 3.969 - 5	31700	58300	0.04	0.020	141
32 x 20R x 3.969 - 2	13500	21800	0.04	0.020	141
32 x 20R x 3.969 - 3	19700	33700	0.04	0.020	141
32 x 32R x 3.969 - 2	13400	22000	0.04	0.020	141
32 x 32R x 3.969 - 3	19500	34000	0.04	0.020	141
32 x 32R x 3.969 - 1.2 x 4	26300	57600	0.04	0.020	141
32 x 64R x 3.969 - 1 x 4	21100	49000	0.04	0.020	141
40 x 5R/L x 3.5 - 5	29100	64100	0.04	0.020	232
40 x 10R/L x 6 - 4	50000	86400	0.07	0.035	211
40 x 10R x 6 - 6	72100	132200	0.07	0.035	211
40 x 12R x 6 - 4	49900	86200	0.07	0.035	211
40 x 16R x 6 - 4	49700	85900	0.07	0.035	211
40 x 20R x 6 - 3	37900	62800	0.07	0.035	211
40 x 20R x 6 - 4 x 2	76400	171100	0.07	0.035	211
40 x 40R x 6 - 2	25500	40300	0.07	0.035	211
40 x 40R x 6 - 3	37000	62300	0.07	0.035	211
40 x 40R x 6 - 3 x 2	57200	124500	0.07	0.035	211
50 x 5R x 3.5 - 5	32000	81300	0.04	0.020	373
50 x 10R x 6 - 4	55400	109000	0.07	0.035	345
50 x 10R x 6 - 6	79700	166500	0.07	0.035	345
50 x 12R x 6 - 6	79600	166400	0.07	0.035	345
50 x 16R x 6 - 6	79400	166000	0.07	0.035	345
50 x 20R x 6.5 - 3	47900	87900	0.07	0.035	340
50 x 20R x 6.5 - 5	75700	149700	0.07	0.035	340
50 x 20R x 6.5 - 4 x 2	93200	228000	0.07	0.035	340
50 x 25R x 6.5 - 3 x 2	74100	175100	0.07	0.035	340
50 x 40R x 6.5 - 2	32100	55800	0.07	0.035	340
50 x 40R x 6.5 - 3 x 2	71400	171500	0.07	0.035	340
50 x 40R x 6.5 - 3	46500	85900	0.07	0.035	340
63 x 10R x 6 - 4	61800	140500	0.07	0.035	569
63 x 10R x 6 - 6	88800	214300	0.07	0.035	569
63 x 20R x 6.5 - 3	53200	112100	0.07	0.035	563
63 x 20R x 6.5 - 5	83900	190300	0.07	0.035	563
63 x 20R x 6.5 - 4 x 2	104600	292000	0.07	0.035	563
63 x 40R x 6.5 - 2	36900	74300	0.07	0.035	563
63 x 40R x 6.5 - 3	53400	114100	0.07	0.035	563
63 x 40R x 6.5 - 3 x 2	80000	217000	0.07	0.035	563
80 x 10R x 6.5 - 6	108400	291700	0.07	0.035	938
80 x 20R x 12.7 - 6	262700	534200	0.11	0.055	832

Size	Screws with single nuts									
	2% preload		3% preload			5% preload				
	R_{nu} (N/ μ m)	T_{pro} (Nm)	R_{nu} (N/ μ m)	Tolerance grade 5; 7		R_{nu} (N/ μ m)	T_{pro} (Nm)	Tolerance grade 5		T_{pro} (Nm)
$D_0 \times P \times D_W - i$	max.	max.	min.	max.	min.	max.	min.	max.	min.	max.
6 x 1R x 0.8 - 4	-	-	-	-	-	-	-	-	-	-
6 x 2R x 0.8 - 4	-	-	-	-	-	-	-	-	-	-
8 x 1R x 0.8 - 4	-	-	-	-	-	-	-	-	-	-
8 x 2R x 1.2 - 4	-	-	-	-	-	-	-	-	-	-
8 x 2.5R x 1.588 - 3	70	0.004	-	-	-	-	-	-	-	-
12 x 2R x 1.2 - 4	110	0.005	-	-	-	-	-	-	-	-
12 x 5R x 2 - 3	100	0.009	-	-	-	-	-	-	-	-
12 x 10R x 2 - 2	60	0.006	-	-	-	-	-	-	-	-
16 x 5R x 3 - 4	210	0.040	240	0.020	0.10	280	0.05	0.15	0.04	0.16
16 x 10R x 3 - 3	160	0.030	190	0.010	0.08	220	0.04	0.12	0.03	0.12
16 x 16R x 3 - 2	100	0.020	120	0.005	0.06	140	0.03	0.08	0.02	0.08
16 x 16R x 3 - 3	160	0.030	180	0.010	0.08	210	0.04	0.11	0.03	0.12
20 x 5R/L x 3 - 4	260	0.060	300	0.030	0.14	350	0.07	0.21	0.06	0.23
20 x 5R x 3 - 5	330	0.070	375	0.040	0.17	440	0.09	0.26	0.07	0.28
20 x 10R x 3 - 4	260	0.060	300	0.030	0.14	350	0.07	0.21	0.06	0.23
20 x 20R/L x 3.5 - 2	130	0.040	150	0.020	0.09	180	0.05	0.14	0.04	0.15
20 x 20R x 3.5 - 3	200	0.050	220	0.030	0.13	270	0.07	0.20	0.05	0.21
20 x 40R x 3.5 - 1 x 4	215	0.060	-	-	-	-	-	-	-	-
25 x 5R/L x 3 - 4	310	0.080	350	0.040	0.20	410	0.10	0.30	0.08	0.32
25 x 10R x 3 - 4	320	0.080	360	0.040	0.19	430	0.10	0.29	0.08	0.31
25 x 25R/L x 3.5 - 2	160	0.050	180	0.030	0.12	210	0.06	0.19	0.05	0.20
25 x 25R x 3.5 - 3	240	0.070	270	0.040	0.18	320	0.09	0.28	0.07	0.29
25 x 25R x 3.5 - 1.2 x 4	350	0.100	-	-	-	-	-	-	-	-
32 x 5R/L x 3.5 - 4	380	0.140	420	0.100	0.31	500	0.24	0.45	0.21	0.48
32 x 10R x 3.969 - 5	500	0.200	570	0.150	0.46	670	0.36	0.66	0.30	0.71
32 x 20R x 3.969 - 2	200	0.090	230	0.050	0.21	270	0.15	0.28	0.13	0.30
32 x 20R x 3.969 - 3	300	0.130	340	0.070	0.31	410	0.22	0.41	0.19	0.44
32 x 32R x 3.969 - 2	200	0.090	220	0.050	0.21	260	0.15	0.28	0.13	0.30
32 x 32R x 3.969 - 3	300	0.120	340	0.070	0.31	400	0.22	0.41	0.19	0.44
32 x 32R x 3.969 - 1.2 x 4	440	0.170	-	-	-	-	-	-	-	-
32 x 64R x 3.969 - 1 x 4	330	0.140	-	-	-	-	-	-	-	-
40 x 5R/L x 3.5 - 5	550	0.230	620	0.170	0.52	720	0.41	0.76	0.35	0.81
40 x 10R/L x 6 - 4	500	0.400	570	0.360	0.84	670	0.75	1.25	0.70	1.30
40 x 10R x 6 - 6	760	0.580	860	0.520	1.21	1010	1.08	1.80	1.01	1.87
40 x 12R x 6 - 4	510	0.400	580	0.300	0.90	680	0.75	1.25	0.70	1.30
40 x 16R x 6 - 4	510	0.400	580	0.300	0.89	680	0.75	1.24	0.70	1.29
40 x 20R x 6 - 3	380	0.300	430	0.230	0.68	510	0.57	0.95	0.53	0.99
40 x 20R x 6 - 4 x 2	881	0.610	1005	0.550	1.28	-	-	-	-	-
40 x 40R x 6 - 2	240	0.200	280	0.150	0.46	330	0.36	0.66	0.31	0.71
40 x 40R x 6 - 3	370	0.300	420	0.220	0.67	490	0.56	0.93	0.52	0.96
40 x 40R x 6 - 3 x 2	632	0.460	723	0.410	0.96	-	-	-	-	-
50 x 5R x 3.5 - 5	640	0.320	720	0.240	0.72	830	0.60	1.00	0.56	1.04
50 x 10R x 6 - 4	590	0.550	670	0.500	1.16	780	1.04	1.73	0.97	1.80
50 x 10R x 6 - 6	890	0.800	1000	0.720	1.67	1180	1.49	2.49	1.39	2.59
50 x 12R x 6 - 6	900	0.800	1020	0.720	1.67	1190	1.49	2.49	1.39	2.59
50 x 16R x 6 - 6	910	0.790	1030	0.710	1.67	1210	1.49	2.48	1.39	2.58
50 x 20R x 6.5 - 3	470	0.480	540	0.430	1.01	630	0.90	1.50	0.84	1.56
50 x 20R x 6.5 - 5	780	0.760	880	0.680	1.59	1050	1.42	2.37	1.32	2.46
50 x 20R x 6.5 - 4 x 2	1046	0.930	1192	0.840	1.96	-	-	-	-	-
50 x 25R x 6.5 - 3 x 2	813	0.740	928	0.67	1.56	-	-	-	-	-
50 x 40R x 6.5 - 2	300	0.320	340	0.240	0.72	410	0.60	1.00	0.56	1.04
50 x 40R x 6.5 - 3	450	0.470	520	0.420	0.98	610	0.87	1.45	0.81	1.51
50 x 40R x 6.5 - 3 x 2	788	0.710	900	0.640	1.50	-	-	-	-	-
63 x 10R x 6 - 4	700	0.780	790	0.700	1.64	920	1.46	2.43	1.36	2.53
63 x 10R x 6 - 6	1050	1.120	1190	1.010	2.35	1380	2.24	3.36	2.10	3.50
63 x 20R x 6.5 - 3	560	0.670	640	0.600	1.41	750	1.26	2.09	1.17	2.18
63 x 20R x 6.5 - 5	930	1.060	1060	0.950	2.22	1250	2.11	3.17	1.98	3.30
63 x 20R x 6.5 - 4 x 2	1271	1.320	1448	1.190	2.77	-	-	-	-	-
63 x 40R x 6.5 - 2	380	0.460	440	0.420	0.98	510	0.87	1.45	0.81	1.51
63 x 40R x 6.5 - 3	570	0.670	660	0.610	1.41	770	1.26	2.10	1.18	2.19
63 x 40R x 6.5 - 3 x 2	959	1.000	1095	0.901	2.12	-	-	-	-	-
80 x 10R x 6.5 - 6	1240	1.730	1390	1.820	3.38	1610	3.47	5.20	3.25	5.42
80 x 20R x 12.7 - 6	1400	4.200	1590	4.410	8.20	1870	8.41	12.61	7.88	13.14

Preload and Rigidity of Double Nuts

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

- T_0 = overall dynamic drag torque
 $T_0 = T_{pr0} + T_{RD}$
 C = basic dynamic load rating
 C_0 = basic static load rating
 T_{RD} = dynamic drag torque of 2 seals
 R_S = rigidity of the screw
 R_{nu} = rigidity of the nut
 T_{pr0} = dynamic drag torque without a seal
 d_0 = nominal diameter
 P = lead
 D_w = ball diameter
 i = number of ball track turns

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

Note:

Measurement of the dynamic load torque, see "Mounting."

Size $D_0 \times P \times D_w - i$	Load ratings		Rigidity of the screw R_S $\left(\frac{N \cdot m}{\mu m}\right)$
	dyn. C (N)	stat. C_0 (N)	
16 x 5R x 3 - 4	12300	16100	32
20 x 5R x 3 - 4	14300	21500	53
25 x 5R x 3 - 4	15900	27200	86
25 x 10R x 3 - 4	15700	27000	86
32 x 5R x 3.5 - 4	21600	40000	144
32 x 10R x 3.969 - 5	31700	58300	141
40 x 5R x 3.5 - 5	29100	64100	232
40 x 10R x 6 - 4	50000	86400	211
40 x 10R x 6 - 6	72100	132200	211
40 x 20R x 6 - 3	37900	62800	211
50 x 5R x 3.5 - 5	32000	81300	373
50 x 10R x 6 - 4	55400	109000	345
50 x 10R x 6 - 6	79700	166500	345
50 x 20R x 6.5 - 5	75700	149700	340
63 x 10R x 6 - 4	61800	140500	569
63 x 10R x 6 - 6	88800	214300	569
63 x 20R x 6.5 - 5	83900	190300	563
80 x 10R x 6.5 - 6	108400	291700	938
80 x 20R x 12.7 - 6	262700	534200	832

Size $D_0 \times P \times D_W - i$	Screws with double nuts FDM-E-S, FDM-E-C										
	R_{nu} (N/ μ m)	7% preload				T_{pr0} (Nm)	R_{nu} (N/ μ m)	10% preload			
		Tolerance grade 5		Tolerance grade 7				Tolerance grade 5		Tolerance grade 7	
		min.	max.	min.	max.		min.	max.	min.	max.	
16 x 5R x 3 - 4	310	0.03	0.08	0.02	0.09	350	0.04	0.12	0.03	0.13	
20 x 5R x 3 - 4	390	0.04	0.12	0.03	0.13	430	0.06	0.17	0.05	0.18	
25 x 5R x 3 - 4	460	0.06	0.17	0.04	0.18	510	0.08	0.24	0.06	0.25	
25 x 10R x 3 - 4	470	0.05	0.16	0.04	0.18	530	0.08	0.24	0.06	0.25	
32 x 5R x 3.5 - 4	550	0.10	0.29	0.08	0.31	610	0.19	0.36	0.17	0.39	
32 x 10R x 3.969 - 5	750	0.20	0.37	0.17	0.40	830	0.28	0.53	0.24	0.57	
40 x 5R x 3.5 - 5	790	0.23	0.42	0.20	0.46	870	0.33	0.61	0.28	0.65	
40 x 10R x 6 - 4	740	0.39	0.73	0.34	0.78	830	0.60	1.00	0.56	1.04	
40 x 10R x 6 - 6	1120	0.61	1.01	0.57	1.05	1250	0.87	1.44	0.81	1.50	
40 x 20R x 6 - 3	570	0.30	0.55	0.25	0.59	630	0.45	0.76	0.42	0.79	
50 x 5R x 3.5 - 5	920	0.31	0.58	0.27	0.63	1010	0.48	0.80	0.45	0.83	
50 x 10R x 6 - 4	870	0.58	0.97	0.54	1.01	960	0.83	1.39	0.78	1.44	
50 x 10R x 6 - 6	1300	0.84	1.39	0.78	1.45	1450	1.20	1.99	1.12	2.07	
50 x 20R x 6.5 - 5	1170	0.79	1.32	0.74	1.38	1310	1.14	1.89	1.06	1.97	
63 x 10R x 6 - 4	1020	0.82	1.36	0.76	1.42	1120	1.17	1.95	1.09	2.02	
63 x 10R x 6 - 6	1520	1.17	1.96	1.10	2.04	1690	1.68	2.80	1.57	2.91	
63 x 20R x 6.5 - 5	1390	1.11	1.85	1.04	1.92	1560	1.59	2.64	1.48	2.75	
80 x 10R x 6.5 - 6	1770	1.82	3.04	1.70	3.16	1950	2.78	4.16	2.60	4.34	
80 x 20R x 12.7 - 6	2070	4.71	7.06	4.41	7.36	2320	6.73	10.09	6.30	10.51	

Technical Data

Friction Torques of Seals

Seal torque for single and double nuts

(ZEV-E-S is supplied without a seal)

 T_0 = overall dynamic drag torque $T_0 = T_{pr0} + T_{RD}$ T_{RD} = dynamic drag torque of 2 seals T_{pr0} = dynamic drag torque without a seal d_0 = nominal diameter P = lead D_w = ball diameter

Note:

Measurement of the dynamic load torque, see "Mounting."

Size $d_0 \times P \times D_w$	Dynamic drag torque		Low-friction seal	Standard seal for 2-start single nuts with flange T_{RD} approx. (Nm)
	Standard seal T_{RD} approx. (Nm)	Reinforced seal T_{RD} approx. (Nm)		
6 x 1R x 0.8	0.010	-	-	
6 x 2R x 0.8	0.010	-	-	
8 x 1R x 0.8	0.010	-	-	
8 x 2R x 1.2	0.020	-	-	
8 x 2.5R 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 10R x 3	0.080	-	✓	
16 x 16R x 3	0.080	-	x	
20 x 5R x 3	0.100	-	x	
20 x 5L x 3	0.100	-	x	
20 x 10R x 3	0.120	-	-	
20 x 20R x 3.5	0.120	-	✓	
20 x 20L 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	✓	
25 x 25L x 3.5	0.200	-	✓	
32 x 5R x 3.5	0.250	0.51	x	
32 x 5L x 3.5	0.250	-	x	
32 x 10R x 3.969	0.250	0.46	x	
32 x 20R x 3.969	0.250	0.49	x	
32 x 32R x 3.969	0.250	0.45	x	
40 x 5R x 3.5	0.400	0.85	x	
40 x 5L x 3.5	0.400	-	-	
40 x 10R x 6	0.400	0.91	x	
40 x 10L x 6	0.400	-	x	
40 x 12R x 6	0.400	-	-	
40 x 16R x 6	0.400	-	-	
40 x 20R x 6	0.400	0.54	x	0.40
40 x 40R x 6	0.400	0.54	x	0.40
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	-	0.60
50 x 25R x 6.5	0.600	-	-	0.70
50 x 40R x 6.5	0.700	-	-	0.70
63 x 10R x 6	1.200	-	-	
63 x 20R x 6.5	1.200	1.00	-	1.20
63 x 40R x 6.5	1.200	1.40	-	1.20
80 x 10R x 6.5	1.400	-	-	
80 x 20R x 12.7	2.200	-	-	

Gap seal (0 Nm)

✓ Seal available

x Seal in preparation

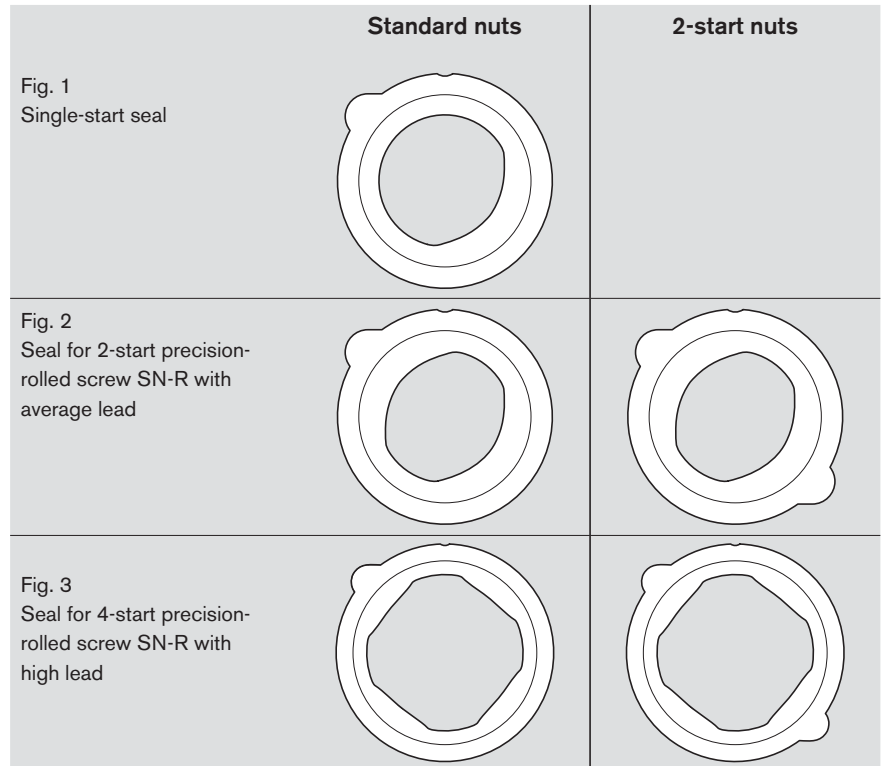
Please bear in mind the following when changing or retrofitting the seals:

All precision-rolled screws SN-R with small leads are designed as single-start screws (Fig. 1). There is therefore only one ball track on the screw.

However precision-rolled screws SN-R with higher leads are designed as 2-start or 4-start screws (Figs. 2 and 3).

“Reinforced seals” for precision-rolled screws SN-R are available as an option. These are identified by their opal-green color and their part number.

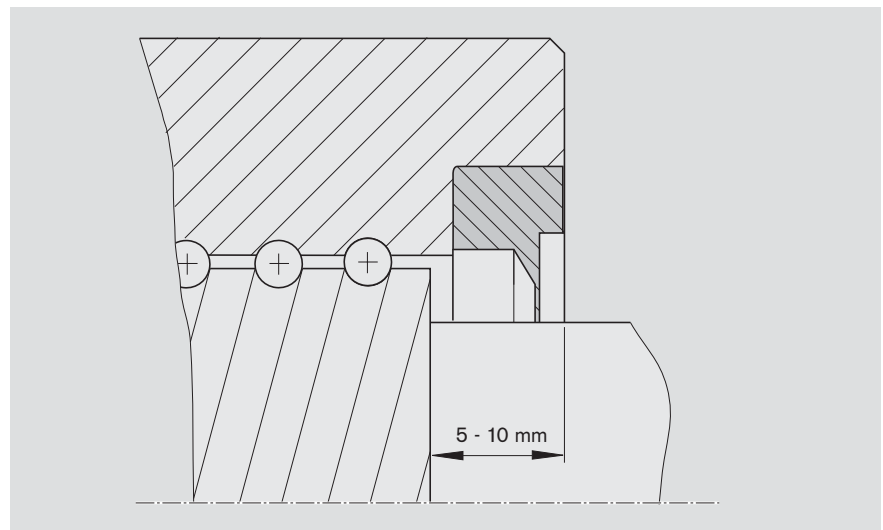
Low-friction seals for precision-rolled screws SN-R are available upon request. This version is currently in preparation. The seals are identified by their red-brown color and their part number.



Inserting the seal

Position the nut on the screw as illustrated in the diagram. Insert the seal so that its projection is in the recess and press it in until it snaps into the groove. While turning the nut on the screw, watch the sealing lip carefully and straighten it if necessary by applying pressure to the end surface. Ensure that the lip is not damaged.

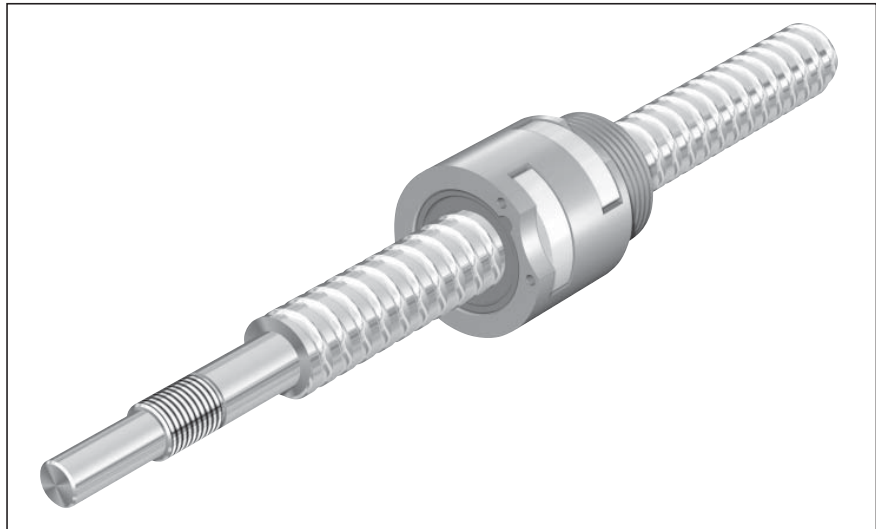
Detailed mounting instructions are delivered along with the parts.



eLINE Ball Screw Assemblies

eLINE Ball Screw with Screw-In Nut ZEV-E-S, Fixed Length

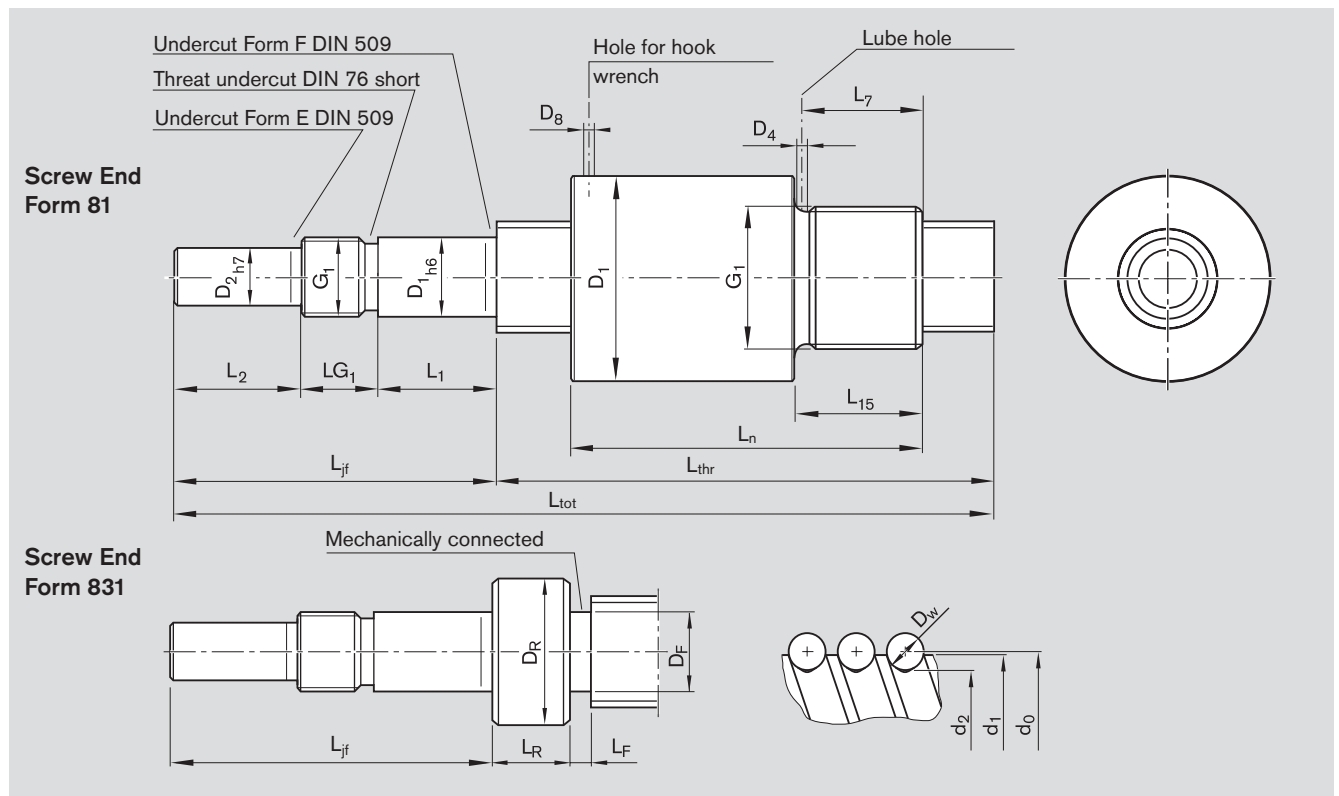
- Rexroth mounting dimensions
- Single fixed bearing
- With seals
- With backlash 0.1 mm
- Screw tolerance class T9 or T10



Ordering code:

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

Size $d_0 \times P \times D_w - i$	Tolerance class	Length (mm)		Part Numbers
		L_{tot}	L_{thr}	
12 x 5R x 2-3	T9	400	317	R2540 002 01
	T10	400	317	R2540 000 01
12 x 10R x 2-2	T9	400	317	R2540 002 02
	T10	400	317	R2540 000 02
16 x 5R x 3-3	T9	550	467	R2540 002 03
	T10	550	467	R2540 000 03
16 x 10R x 3-3	T9	550	467	R2540 002 04
	T10	550	467	R2540 000 04
20 x 5R x 3-4	T9	550	490	R2540 002 05
	T10	550	490	R2540 000 05



L_{tot} = overall length
 L_{thr} = thread length

Ball nut

Size		Dimensions (mm)								
d_0	P	D_1	D_4 h10	D_8	G_1	L_n $\pm 0,3$	L_7	L_{15}		
12	5	25.5	2.7	3.2	M20 x 1	36	8.5	10		
12	10	25.5	2.7	3.2	M20 x 1	40	8.5	10		
16	5	32.5	2.7	4.2	M26 x 1.5	40	10.5	12		
16	10	32.5	2.7	4.2	M26 x 1.5	54	10.5	12		
20	5	38.0	2.7	8.0	M35 x 1.5	50	12.5	14		

Screw

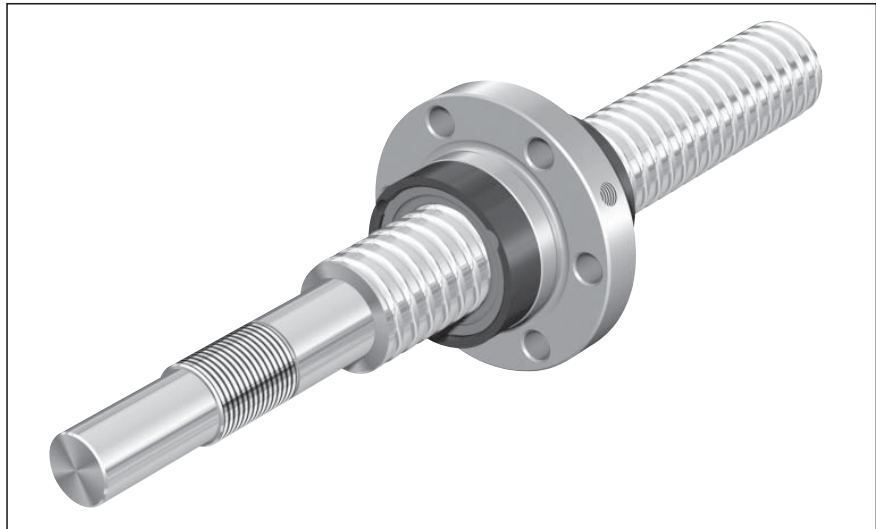
Size		Form	Dimensions (mm)												
d_0	P		d_1	d_2	L_{ZF}	D_R	L_R	D_F	L_F	D_1	L_1	D_2	L_2	G_1	LG_1
12	5	831	11.4	9.9	60	15	15	8.0	1	12	17	10	25	M12x1	18
12	10		11.4	9.9	60	15	15	8.0	1	12	17	10	25	M12x1	18
16	5		15.0	12.9	60	18	17	12.0	1	12	17	10	25	M12x1	18
16	10		15.0	12.9	60	18	17	12.0	1	12	17	10	25	M12x1	18
20	5	81	19.0	16.9	60	-	-	-	-	12	17	10	25	M12x1	18

Size		Load ratings		Linear speed v_{max} (m/min)
d_0	P	dyn. C (N)	stat. C ₀ (N)	
12	5	2300	3500	30
12	10	1500	2200	60
16	5	5600	7100	25
16	10	5800	7400	50
20	5	8600	12900	20

eLINE Ball Screw Assemblies

eLINE Ball Screw with Flanged Single Nut FBZ-E-S, Fixed Length

- Rexroth mounting dimensions
- Single fixed bearing
- With seals
- With backlash 0.1 mm
- Screw tolerance class T9 or T10

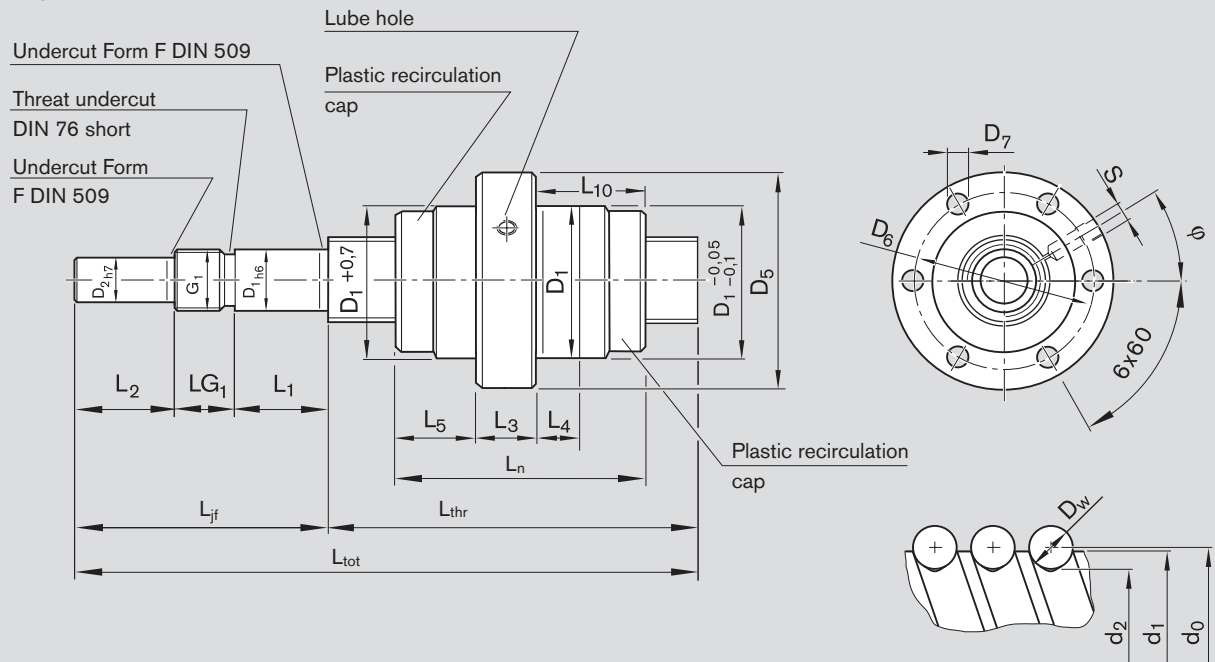


Ordering code:

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

Size $d_0 \times P \times D_w - i$	Tolerance class	Length (mm)		Part Numbers
		L_{tot}	L_{thr}	
20 x 5R x 3-4	T9	550	490	R2540 002 06
	T10	550	490	R2540 000 06
25 x 5R x 3-4	T9	700	640	R2540 002 07
	T10	700	640	R2540 000 07
25 x 10R x 3-4	T9	700	640	R2540 002 08
	T10	700	640	R2540 000 08
32 x 5R x 3.5-4	T9	1200	1120	R2540 002 09
	T10	1200	1120	R2540 000 09
32 x 10R x 3.969-5	T9	1200	1120	R2540 002 10
	T10	1200	1120	R2540 000 10

**Screw End
Form 81**



Ball nut

Size		Dimensions (mm)											ϕ (°)
d_0	P	D_1	D_5	D_6	D_7	L_n $\pm 0,5$	L_3	L_4	L_5	L_{10}	S		
20	5	33	58	45	6.6	40	10	6	15.0	15	M6	30	
25	5	38	63	50	6.6	43	10	6	16.5	16.5	M6	30	
25	10	38	63	50	6.6	62	10	16	16.0	36.0	M6	30	
32	5	48	73	60	6.6	46	12	6	17.0	17.0	M6	30	
32	10	48	73	60	6.6	77	12	16	20.0	45.0	M6	30	

Screw

Size		Form	Dimensions (mm)									
d_0	P		d_1	d_2	L_{ZF}	D_1	L_1	D_2	L_2	G_1	LG_1	
20	5	81	19.0	16.9	60	12	17	10	25	M12x1	18	
25	5		24.0	21.9	60	15	19	12	25	M15x1	16	
25	10		24.0	21.9	60	15	19	12	25	M15x1	16	
32	5		31.0	28.4	80	20	25	18	40	M20x1	15	
32	10		31.0	27.9	80	20	25	18	40	M20x1	15	

Size		Load ratings		Linear speed v_{max} (m/min)
d_0	P	dyn. C (N)	stat. C ₀ (N)	
20	5	8600	12900	20
25	5	9500	16300	16
25	10	9400	16200	32
32	5	13000	24000	13
32	10	19000	35000	25

eLINE Ball Screw Assemblies

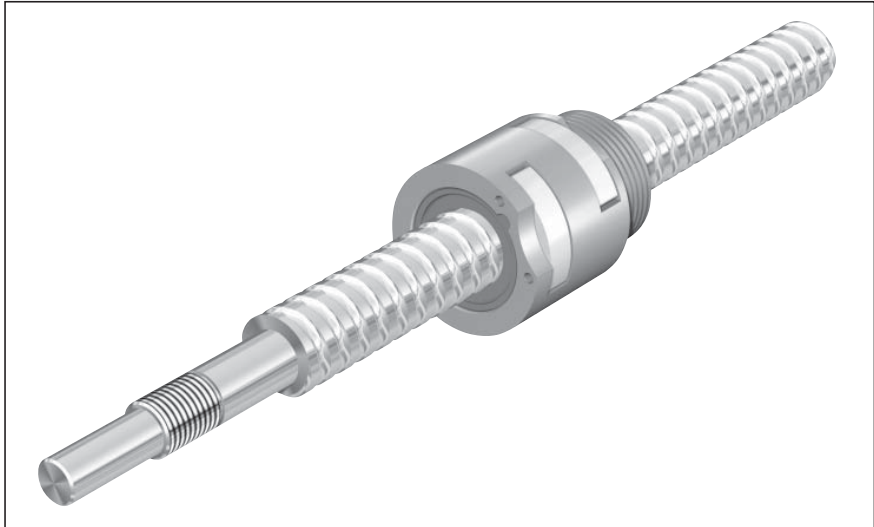
eLINE Ball Screw with Screw-In Nut ZEV-E-S, Custom Length

- Rexroth mounting dimensions
- Single fixed bearing
- With seals
- With backlash 0.1 mm
- Screw tolerance class T9 or T10

$$L_{thr} = L_{tot} - L_{if} - L_{ij}$$

L_{if} = journal length, fixed bearing end
 L_{ij} = journal length, floating bearing end
 L_{tot} = overall length of screw
 L_{thr} = thread length

Note:
 Consider excess travel ($2 \cdot d_0$)



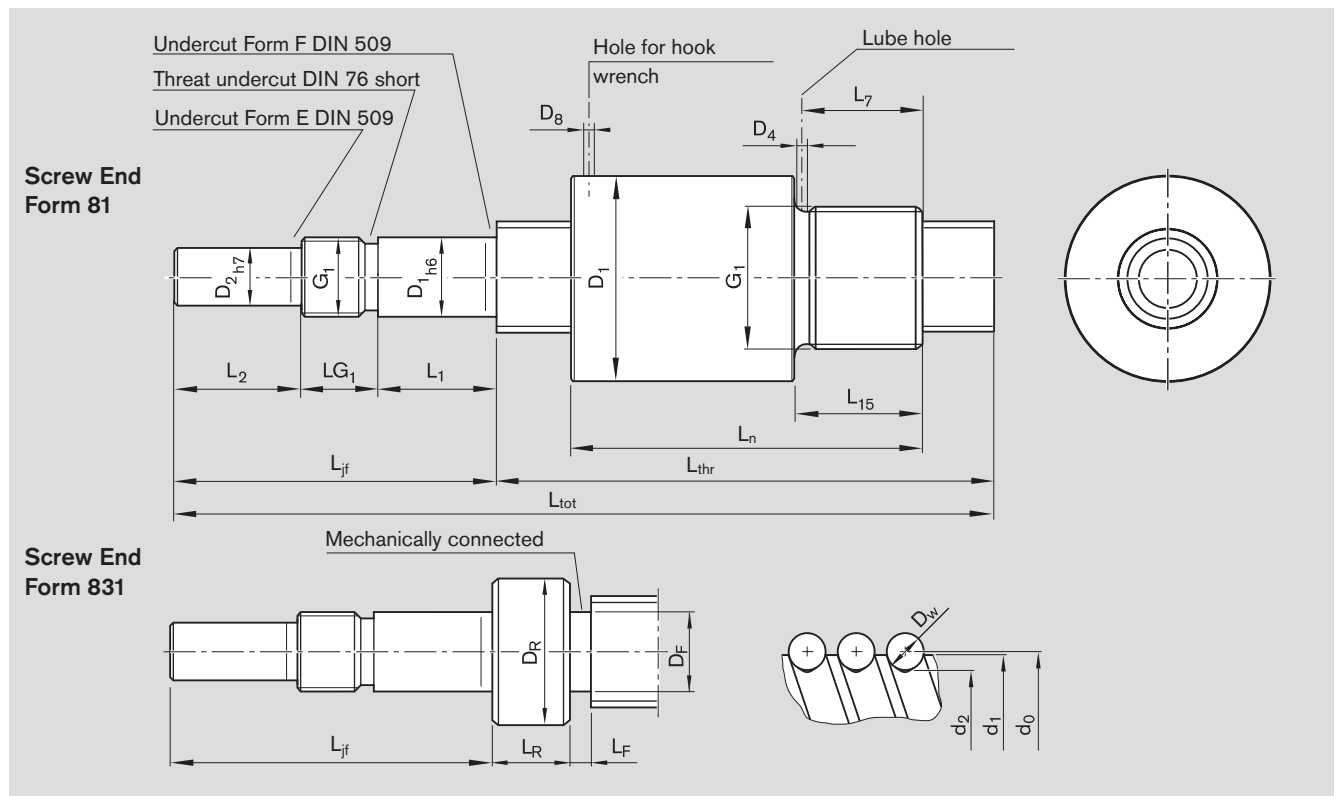
Ordering code:

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

Size $d_0 \times P \times D_w - i$	Tolerance class	Length (mm)		Part Numbers
		$L_{tot \max}$	$L_{thr \max}$	
12 x 5R x 2-3	T9	1250	1182	R2540 002 11
	T10	1250	1182	R2540 002 21
12 x 10R x 2-2	T9	1250	1182	R2540 002 12
	T10	1250	1182	R2540 002 22
16 x 5R x 3-3	T9	1700	1624	R2540 002 13
	T10	1700	1624	R2540 002 23
16 x 10R x 3-3	T9	1700	1621	R2540 002 14
	T10	1700	1621	R2540 002 24
20 x 5R x 3-4	T9	2500	2427	R2540 002 15
	T10	2500	2427	R2540 002 25

When ordering, please ensure that part numbers and desired total length L_{tot} are given.
 (R2540 xx2 xx, xxxx mm).





L_{tot} = overall length
 L_{thr} = thread length

Ball nut

Size		Dimensions (mm)								
d_0	P	D_1	D_4 h10	D_8	G_1	L_n	L_7 $\pm 0,3$	L_{15}		
12	5	25.5	2.7	3.2	M20 x 1	36	8.5	10		
12	10	25.5	2.7	3.2	M20 x 1	40	8.5	10		
16	5	32.5	2.7	4.2	M26 x 1.5	40	10.5	12		
16	10	32.5	2.7	4.2	M26 x 1.5	54	10.5	12		
20	5	38.0	2.7	8	M35 x 1.5	50	12.5	14		

Screw

Size		Form	Dimensions (mm)												
d_0	P		d_1	d_2	L_{ZF}	D_R	L_R	D_F	L_F	D_1	L_1	D_2	L_2	G_1	LG_1
12	5	831	11.4	9.9	60	15	15	8.0	1	12	17	10	25	M12x1	18
12	10		11.4	9.9	60	15	15	8.0	1	12	17	10	25	M12x1	18
16	5		15.0	12.9	60	18	17	12.0	1	12	17	10	25	M12x1	18
16	10		15.0	12.9	60	18	17	12.0	1	12	17	10	25	M12x1	18
20	5	81	19.0	16.9	60	-	-	-	-	12	17	10	25	M12x1	18

Size		Load ratings		Linear speed v_{max} (m/min)
d_0	P	dyn. C (N)	stat. C ₀ (N)	
12	5	2300	3500	30
12	10	1500	2200	60
16	5	5600	7100	25
16	10	5800	7400	50
20	5	8600	12900	20

eLINE Ball Screw Assemblies

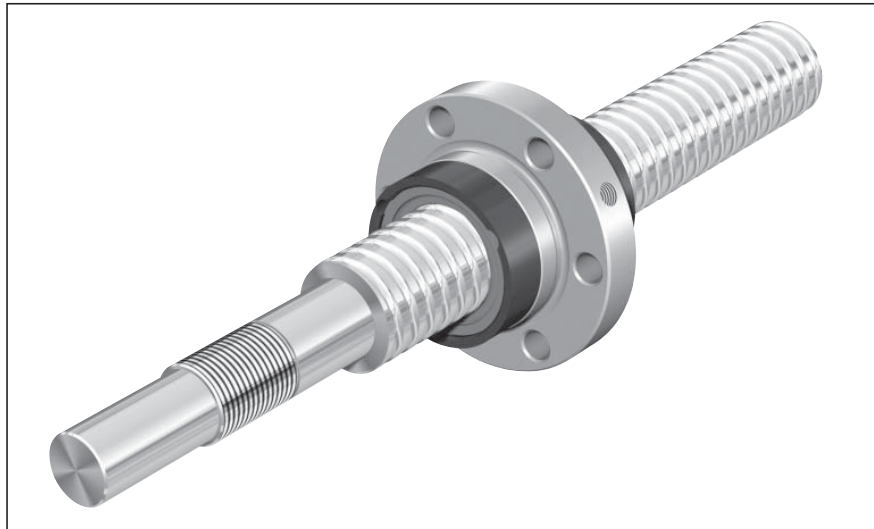
eLINE Ball Screw with Flanged Single Nut FBZ-E-S, Custom Length

- Rexroth mounting dimensions
- Single fixed bearing
- With seals
- With backlash 0.1 mm
- Screw tolerance class T9 or T10

$$L_{thr} = L_{tot} - L_{jf} - L_{jl}$$

L_{jf} = journal length, fixed bearing end
 L_{jl} = journal length, floating bearing end
 L_{tot} = overall length of screw
 L_{thr} = thread length

Note:
 Consider excess travel ($2 \cdot d_0$)



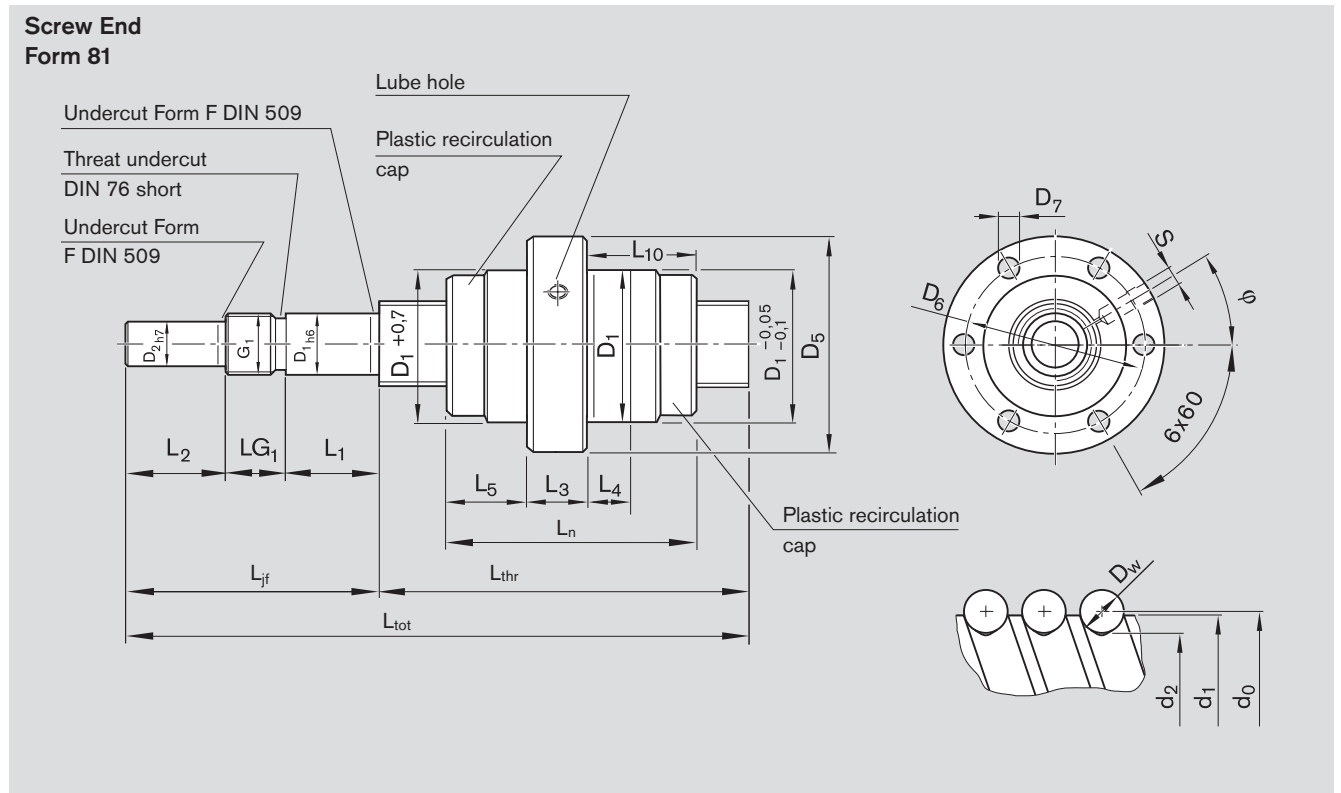
Ordering code:

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

Size $d_0 \times P \times D_w - i$	Tolerance class	Length (mm)		Part Numbers
		$L_{tot \max}$	$L_{thr \max}$	
12 x 5R x 3-4	T9	2500	2427	R2540 002 16
	T10	2500	2427	R2540 002 26
25 x 5R x 3-4	T9	5000	4925	R2540 002 17
	T10	5000	4925	R2540 002 27
25 x 10R x 3-4	T9	5000	4925	R2540 002 18
	T10	5000	4925	R2540 002 28
32 x 5R x 3.5-4	T9	5000	4902	R2540 002 19
	T10	5000	4902	R2540 002 29
32 x 10R x 3.969-5	T9	5000	4902	R2540 002 20
	T10	5000	4902	R2540 002 30

When ordering, please ensure that part numbers and desired total length L_{tot} are given.
 (R2540 xx2 xx, xxxx mm).





Ball nut

Size		Dimensions (mm)											
d_0	P	D_1	D_5	D_6	D_7	L_n $\pm 0,5$	L_3	L_4	L_5	L_{10}	S	ϕ (°)	
20	5	33	58	45	6.6	40	10	6	15	15.0	M6	30	
25	5	38	63	50	6.6	43	10	6	16.5	16.5	M6	30	
25	10	38	63	50	6.6	62	10	16	16	36.0	M6	30	
32	5	48	73	60	6.6	46	12	6	17	17.0	M6	30	
32	10	48	73	60	6.6	77	12	16	20	45.0	M6	30	

Screw

Size		Form	Dimensions (mm)								
d_0	P		d_1	d_2	L_{ZF}	D_1	L_1	D_2	L_2	G_1	LG_1
20	5	81	19.0	16.9	60	12	17	10	25	M12x1	18
25	5		24.0	21.9	60	15	19	12	25	M15x1	16
25	10		24.0	21.9	60	15	19	12	25	M15x1	16
32	5		31.0	28.4	80	20	25	18	40	M20x1	15
32	10		31.0	27.9	80	20	25	18	40	M20x1	15

Size		Load ratings		Linear speed v_{max} (m/min)
d_0	P	dyn. C (N)	stat. C ₀ (N)	
20	5	8600	12900	20
25	5	9500	16300	16
25	10	9400	16200	32
32	5	13000	24000	13
32	10	19000	35000	25

eLINE Ball Screw Assemblies

Technical Data

Speed

$$v_{\max} = 1 \text{ m/s}$$

Dependant of size and lead

Acceleration

$$a_{\max} = 20 \text{ m/s}^2$$

Dependant of size and lead

Temperature Stability

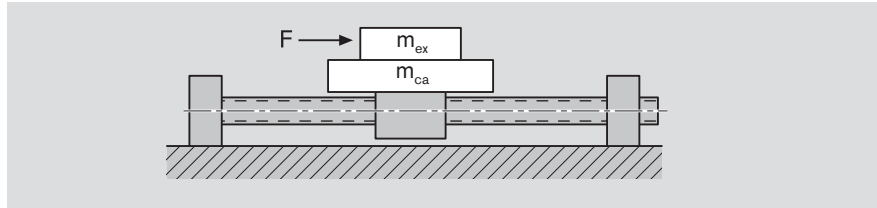
$$t = -10 \text{ bis } 80 \text{ }^\circ\text{C}$$

Temperature of surrounding environment

Seal

eLINE Ball Screw Assemblies come with seals, if required.

Information for calculation of horizontally installed assemblies (in combination with suitable linear guides)



The load on bearing and life expectancy of eLINE Ball Screws is generally calculated as illustrated above. The following formula allows a simpler and more rapid estimation of the life expectancy.

Equivalent dynamic load on bearing for eLINE Ball Screws

Calculation of load on bearing

$$F_m = k_f \cdot ((m_{ca} + m_{ex}) \cdot a + |F_L|)$$

- a = acceleration (m/s²)
- F_L = thrust (N)
- F_m = equivalent dynamic axial load (N)
- k_f = operating factor –
- m_{ca} = moved system mass (kg)
- m_{ex} = moved external load (kg)

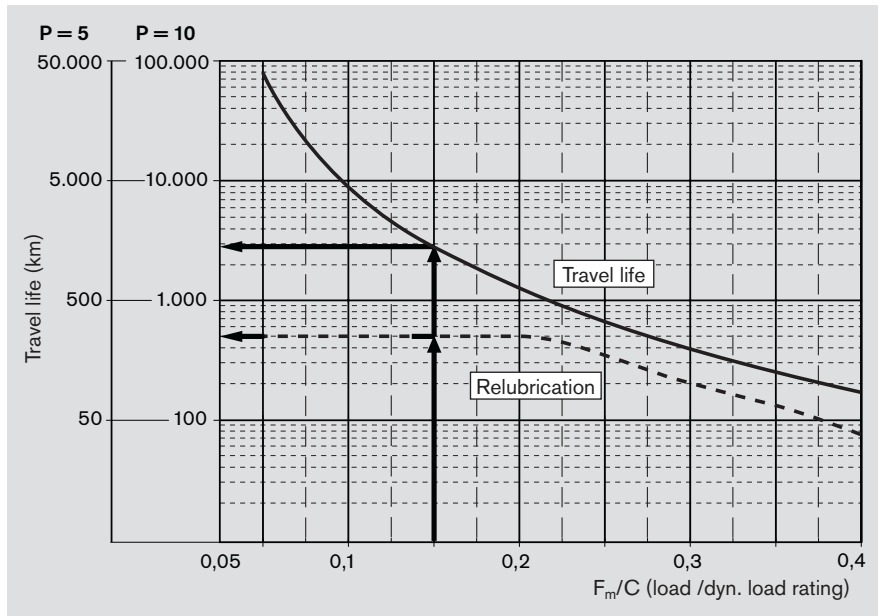
Recommended operating factors k_f

Operating factor	Application
0.8	Manually operated ball screw
1.0	Applications in clean environments
2.0	Auxiliary axes in machine tools
4.0	Use in heavily contaminated environments

Travel life of eLINE Ball Screws

The travel life is determined by calculating the ratio F_m/C .

This value can be used to read off the travel life and relubrication intervals from the chart.



Example:

If an eLINE Ball Screw with a 10 mm lead is loaded to 15% of the dynamic load rating, the travel life will be approx. 1500 km. Relubrication is required every 500 km.

Relubrication every 50×10^6 rev.

P = 10 every 500 km

P = 5 every 250 km

eLINE Ball Screw Assemblies

Technical Data

Acceptance Conditions and Tolerance Grades

Permissible travel deviation

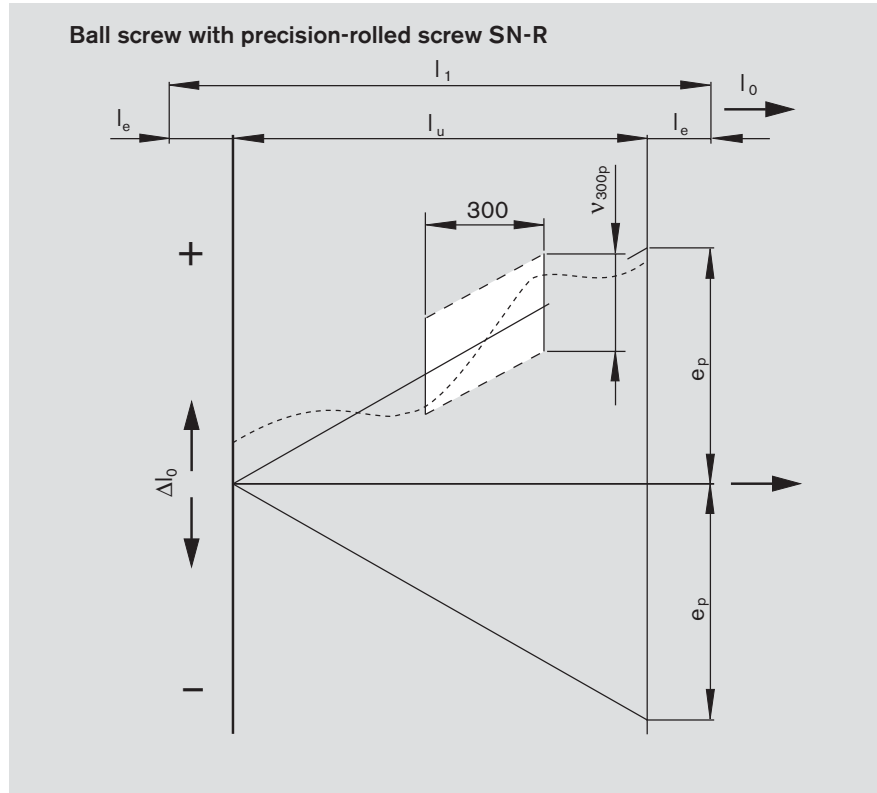
in accordance with DIN 69 051, Part 3 and ISO 3408-3

Symbol definitions (excerpt):

- l_0 = nominal travel
- l_1 = thread length
- Δl_0 = travel deviation
- l_u = useful travel
- l_e = excess travel
- e_p = tolerance for mean actual travel deviation
- v_{300p} = permissible travel deviation within 300 mm travel
- $v'_{2\pi p}$ = permissible travel deviation within one revolution

Subindices:

p = Permissible



Maximum permissible travel deviation e_p as per DIN 69051 or ISO 3408-3

Useful Travel (mm)	Tolerance e_p (μm)	
	T9	T10
0	0	0
100	43.5	70.0
250	108.5	175.0
500	216.5	350.0
750	325.0	525.0
1000	433.5	700.0
1250	541.5	875.0
1500	650.0	1050.0
1750	758.5	1225.0
2000	866.5	1400.0
2250	975.0	1575.0
2500	1083.5	1750.0

$$e_p = \frac{l_u}{300} \cdot v_{300p}$$

v_{300p} for T9 = 130 μm
 v_{300p} for T10 = 210 μm

Non-usable length l'_e

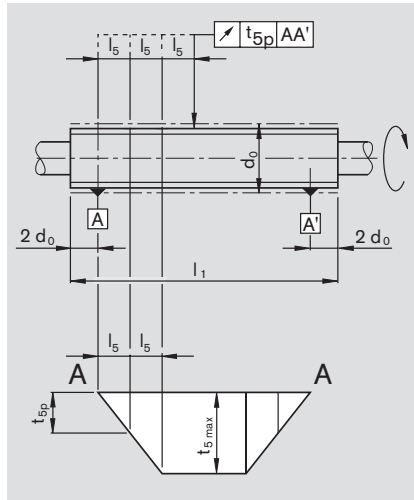
(Excess travel)

Modified with respect to DIN 69051.

d_0 (mm)	l'_e (mm)
12, 16	20
20, 25, 32	40

Run-outs and location deviations based on DIN 69 051, Part 3 and ISO 3408-3

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

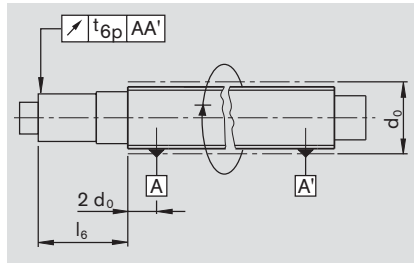


Nominal diameter d_0 (mm)		l_5 (mm)	t_{5p} in μm for l_5 for tolerance grade	
above	up to		9	10
6	12	80	40	80
12	25	160		
25	50	315		

l_1/d_0		t_{5max} in μm for $l_1 \geq 4l_5$ for tolerance grade	
above	up to	9	10
	40	80	160
40	60	120	240
60	80	200	400
80	100	320	640

Radial run-out t_6 of the bearing diameter in relation to AA' for $l_6 \leq l$.

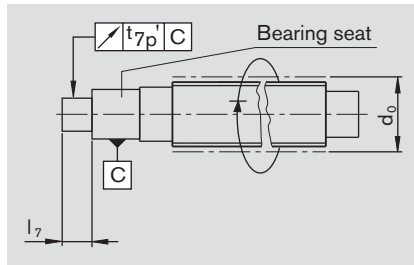
Where $l_6 > l$ then $t_{6a} \leq t_{6p} \cdot \frac{l_{6a}}{l}$



Nominal diameter d_0 (mm)		Reference length l (mm)	t_{6p} in μm for $l_6 \leq l$ for tolerance grade	
above	up to		9	10
6	20	80	20	40
20	50	125	25	50

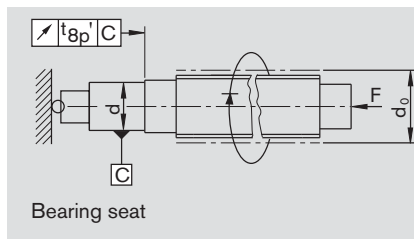
Coaxial deviation t_7' of the journal diameter of the ball screw shaft in relation to the bearing diameter for $l_7 \leq l$.

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



Nominal diameter d_0 (mm)		Reference length l (mm)	t_{7p}' in μm for $l_7 \leq l$ for tolerance grade	
above	up to		9	10
6	20	80	6	12
20	50	125		

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



Nominal diameter d_0 (mm)		up to	t_{8p}' in μm for tolerance grade	
above			9	10
6		63	5	12

Mounting

Mounting

Condition as delivered

Rexroth Ball Screws are normally delivered with an initial supply of grease type Rexroth Dynalub. Relubrication with grease or oil is thus 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 supply.

For special cases, the ball screws can also be supplied with only a preservative coating. This can be indicated by choosing the appropriate option number in the ordering code.

⚠ Important

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:

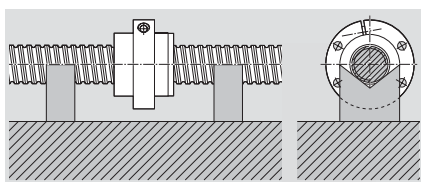
- aqueous cleaning agents
- organic cleaning agents

⚠ Important

Immediately after cleaning, thoroughly dry all parts, then 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 models are always supplied with premounted nut units.

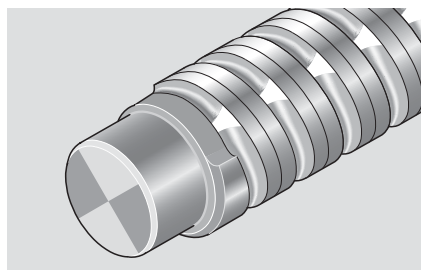
The nut unit and screw must not be disassembled. Should this become necessary for any reason, please ask.

Note: For Ball Screws with Front Lube Units, do not remove the nut and front lube unit from the screw.

Single nut with standard backlash

Single nut with reduced backlash Adjustable-preload single nut

The nut unit may only be mounted on a screw with machined ends using a mounting arbor. In this case, the screw spigot serves to center the mounting arbor. On a screw end form "00", a centering hole "Z" can be used to fit an auxiliary spigot as a mounting aid. The outer diameter of the arbor should be approx. 0.1 mm smaller than the root diameter of the screw. In most cases, the transport arbor on which the nuts are delivered is used to mount the nut. The end of the screw thread must be carefully chamfered in order to prevent damage to the seal and the internal components of the nut unit.

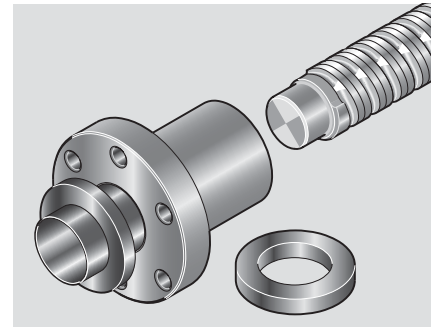


The various mounting steps are described below.

Proceed in reverse order when removing the nut from the screw. Take particular care not to damage the nut, screw or internal components, as this could result in the premature failure of the ball screw assembly.

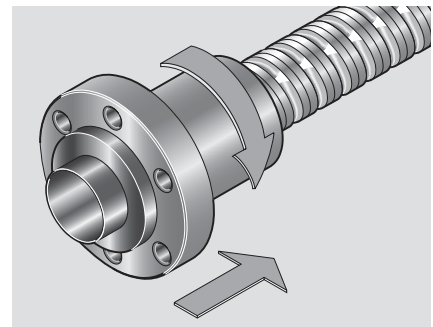
Mounting steps

The nut is to be mounted as follows: Remove the rubber ring from one end of the mounting arbor.

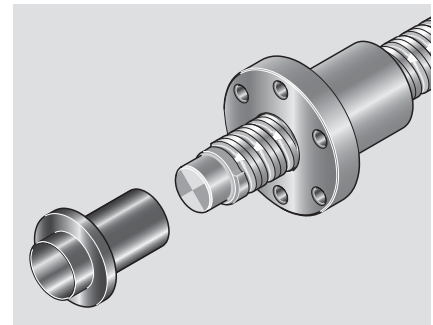


Push the mounting arbor with nut until it bears against the end of the thread. The arbor must make contact with no axial clearance.

Carefully turn the nut unit onto the thread, applying only slight thrust.



Remove the arbor only when the nut unit is fully located on the screw thread.



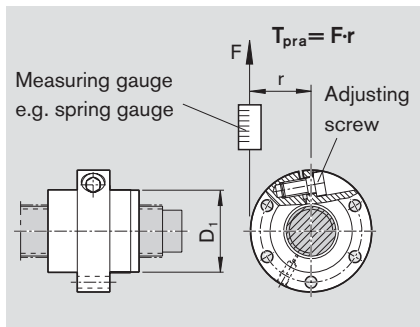
Preload of adjustable-preload single nuts

Measurement of the dynamic drag torque for SEM-E-C and SEM-E-S.

Using the adjusting screw, reduce the clearance of the nut mounted on the screw until the corresponding dynamic drag torque T_{pra} specified in the table ➔ page 123, has been attained (ball screw lightly oiled).

Check this torque along the entire length of the thread; if the torque deviates from the value specified in the table at any point along the thread, adjust accordingly.

Once the torque has been properly adjusted, the centering diameter D_1 must correspond to the values specified in the table ➔ pages 44 and 48. Cover the head of the screw with a protective cap.



T_{pra} = currently measured dynamic drag torque

Mounting instructions are supplied as standard along with every unit. Please ask for extra copies if needed.

Installation in the machine

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

- If the ball screw 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.

Screw diameter (mm)	Tightening torque (Nm) Strength class 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

- 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.

Screw diameter (mm)	Tightening torque (Nm) Strength class 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

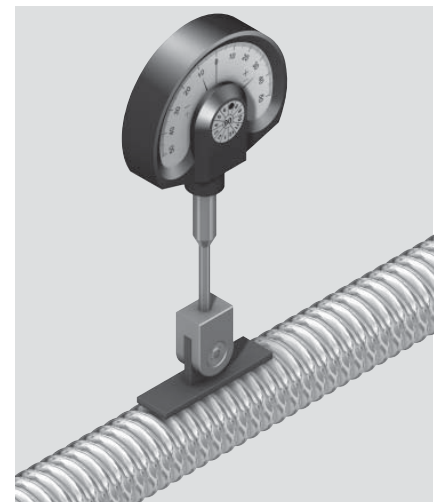
Tightening torques for fastening screws according to VDI 2230 for $\mu_G = \mu_K = 0.125$

Alignment of the precision 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



Lubrication

Lubrication

When lubricating, please refer to the product and material safety data sheets for Dynalub which can be found online at www.boschrexroth.de/brl

Standard lubrication practices for ball bearings also apply to ball screws. Lubricant loss is, however, greater than that from conventional ball bearings, for instance, due to the axial motion between the screw and the nut.

Lifelong lubrication



If the Ball Screw is supplied completely pre-assembled with Front Lube Unit, it will require no relubrication for up to 300 million revolutions or five years in service. Afterwards, the Ball Screw can be relubricated as specified in the tables below.

Oil lubrication

The influence of the temperature on the performance of the ball screw is very significant, as the thermal expansion of the ball screw interferes with the positioning accuracy of the assembly.

One of the advantages of oil lubrication over grease lubrication is therefore the minimized heat build-up of the ball screw, particularly

at high speeds.

As a rule, commercially available mineral base oils used for ball bearings are suitable. The necessary viscosity depends on the speed, temperature and load conditions of the respective application (see DIN 51517, 51519 and GfT Work-sheet 3).

Oils ranging from ISO VG 68 to approx. ISO VG 460 are used in practice. The high viscosity grades (e.g. ISO VG 460) should be preferred in general and particularly for slow running screws. A maximum relubrication interval of up to 10 operating hours can be attained with small quantities from the adjacent table.

Please ask for details for driven nuts.

Relubrication quantity and intervals for oil

d ₀	Lubricating quantity		Lubricating interval ¹⁾												
	Initial lubrication V _e (ml)	Relubrication V _n (ml/10 h)	Time (h)	Revolutions (mill.)	Travel (km) with lead P =										
					1	2	2.5	5	10	12	16	20	25	32	40
6	0.300	0.030	10	1.3	1.3	2.6									
8	0.300	0.030	10	1.3	1.3	2.6	3.3								
12	0.300	0.030	10	1.3		2.6		6.5	13.0						
16	0.300	0.030	10	1.3				6.5	13.0		20.8				
20	0.600	0.060	10	1.0				5.0				20.0			40.0
25	0.600	0.060	10	1.0				5.0	10.0				25.0		
32	0.600	0.060	10	1.0				5.0	10.0			20.0		32.0	
40	2.000 ²⁾	0.400 ²⁾	10	1.0				5.0	10.0	12.0	16.0	20.0			40.0
50	4.000 ²⁾	0.800 ²⁾	10	1.0				5.0	10.0	12.0	16.0	20.0	25.0		40.0
63	4.000 ²⁾	0.800 ²⁾	10	1.0					10.0	12.0	16.0	20.0	25.0		40.0
80	8.000	1.600	10	1.0					10.0			20.0			40.0

d₀ = nominal diameter

1) The value first reached defines the lubricating interval.

2) For 2-start single nut FED-E-B: use double the quantity of lubricant

Limit conditions:

Load	=	≤ 0.2 C
n _{min}	=	100 min ⁻¹
Temp _{max. nut}	=	80 °C
Temp _{continuous nut}	=	60 °C

Orientation:

– any

Operating mode:

- driven screw
- no short stroking or hypercritical operation

Sealing:

– standard

Grease lubrication

The advantage of grease lubrication is that the ball screw can run long distances on one supply of grease.

As a result, a lubricating system is not required in many cases. The amount of grease used should fill the nuts to approximately half of their capacity. All commercially available high-quality ball bearing lubricating greases may be used.

Read the lubricant manufacturer's specifications carefully! Never use greases with solid lubricant components (e.g. graphite or MoS₂).

For relubrication, grease cartridges containing Dynalub 510 and 520 are available from Rexroth.

Greases in accordance with DIN 51825-K2K and, for higher loads, KP2K of NLGI grade 2 in accordance with DIN 51818 are recommended for the longest possible lubrication intervals. Tests have shown that greases of NLGI grade 00 achieve only about 50% of the running performance of Class 2 at higher loads. The relubrication interval depends on many factors such as the degree of contamination, operating temperature, load, etc. The following values can thus serve only as a guideline.

Relubrication intervals for NLGI-2 greases

d ₀	Lubricating quantity Relubrication V _e (ml)	Lubricating interval										
		Revolutions (mill.)	Travel (km) with lead P =									
		1	2	2.5	5	10	16	20	25	32	40	
≤ 40	see table for	50	100	125	250	500	800	1000	1250	1600	2000	
> 40	NLGI-2 greases	10			50	100	160	200			400	

d₀ = nominal diameter

Relubrication quantities for Standard series

For NLGI grade 2 and NLGI grade 00 greases:

The nut has to be lubricated with lubricant via the lube port before the ball screw is started.

Twice the relubrication quantity of grease is to be used when lubricating for the first time.

Size $d_0 \times P \times D_W - i$	Relubrication quantity of grease (g)		
	Single nut FEM-E-C / FEM-E-S / SEM-E-C SEM-E-S / ZEM-E-A / ZEM-E-S FED-E-B Precision screw SN-R	Double nut FDM-E-C / FDM-E-S Precision screw SN-R	
8 x 2.5R x 1.588 - 3	0.10	–	NLGI grade 00 Dynalub 520 or alternatively Castrol Longtime PD00
12 x 2R x 1.2 - 4	0.15	–	
12 x 5R x 2 - 3	0.30	–	
12 x 10R x 2 - 2	0.30	–	
16 x 5R x 3 - 4	0.60	1.7	
16 x 10R x 3 - 3	0.80	–	
16 x 16R x 3 - 2	0.90	–	
16 x 16R x 3 - 3	1.10	–	
20 x 5R/L x 3 - 4	0.90	2.7	
20 x 5R x 3 - 5	1.00	–	
20 x 10R x 3 - 4	1.40	–	
20 x 20R/L x 3.5 - 2	1.70	–	
20 x 20R x 3.5 - 3	2.20	–	
25 x 5R/L x 3 - 4	1.40	3.2	
25 x 10R x 3 - 4	1.70	3.8	
25 x 25R/L x 3.5 - 2	2.40	–	
25 x 25R x 3.5 - 3	3.10	–	
32 x 5L x 3.5 - 4	2.30	–	
32 x 5R x 3.5 - 4	2.00	4.5	
32 x 10R x 3.969 - 5	2.80	6.0	
32 x 20R x 3.969 - 2	2.50	–	
32 x 20R x 3.969 - 3	3.20	–	
32 x 32R x 3.969 - 2	3.70	–	
32 x 32R x 3.969 - 3	4.90	–	
40 x 5L x 3.5 - 5	3.10	–	
40 x 5R x 3.5 - 5	2.70	6.9	
40 x 10L x 6 - 4	6.00	–	
40 x 10R x 6 - 4	6.00	15.1	
40 x 10R x 6 - 6	7.30	17.7	
40 x 12R x 6 - 4	6.10	–	
40 x 16R x 6 - 4	8.30	19.3	
40 x 20R x 6 - 3	7.80	18.5	
40 x 20R x 6 - 4 x 2	8.60	–	
40 x 40R x 6 - 2	9.40	–	
40 x 40R x 6 - 3	12.90	–	
40 x 40R x 6 - 3 x 2	13.80	–	
50 x 5R x 3.5 - 5	3.90	7.1	
50 x 10R x 6 - 4	8.00	19.7	
50 x 10R x 6 - 6	9.70	23.0	
50 x 12R x 6 - 6	10.40	–	
50 x 16R x 6 - 6	14.60	–	
50 x 20R x 6.5 - 3	11.40	–	
50 x 20R x 6.5 - 5	15.60	31.3	
50 x 20R x 6.5 - 4 x 2	9.10	–	
50 x 25R x 6.5 - 3 x 2	9.60	–	
50 x 40R x 6.5 - 2	13.90	–	
50 x 40R x 6.5 - 3	18.60	–	
50 x 40R x 6.5 - 3 x 2	17.60	–	
63 x 10R x 6 - 4	9.00	23.0	
63 x 10R x 6 - 6	11.00	27.0	
63 x 20R x 6.5 - 3	13.90	–	
63 x 20R x 6.5 - 5	19.20	39.4	
63 x 20R x 6.5 - 4 x 2	13.20	–	
63 x 40R x 6.5 - 2	17.00	–	
63 x 40R x 6.5 - 3	22.90	–	
63 x 40R x 6.5 - 3 x 2	24.80	–	
80 x 10R x 6.5 - 6	16.30	39.0	
80 x 20R x 12.7 - 6	59.00	119.5	

NLGI grade 2
Dynalub 510 or alternatively
Castrol Longtime PD2

Lubrication

Lubrication

Relubrication quantities for Miniature, ECOplus and eLINE series.

For NLGI grade 2 and NLGI grade 00 greases:

The nut has to be lubricated with lubricant via the lube port before the ball screw is started.

Twice the relubrication quantity of grease is to be used when lubricating for the first time.

Size $d_0 \times P \times D_w - i$	Relubrication quantity of grease (g) Single nut, precision-rolled screw SN-R				
	FEM-E-B -Miniature	FBZ-E-S	FSZ-E-S	FEP-E-S	ZEV-E-S
6 x 1R x 0.8- 4	0.06	–	–	–	– NLGI grade 00
6 x 2R x 0.8- 4	0.12	–	–	–	– Dynalub 520
8 x 1R x 0.8- 4	0.12	–	–	–	– or alternatively
8 x 2R x 1.2- 4	0.24	–	–	–	– Castrol Long-time PD00
8 x 2.5R x 1.588 - 3	0.10	–	–	–	–
12 x 2R x 1.2- 4	0.15	–	–	–	–
12 x 5R x 2- 3	0.30	–	–	–	0.30
12 x 10R x 2- 2	0.30	–	–	–	0.30
16 x 5L x 3- 3	–	–	–	–	0.85 NLGI grade 2
16 x 5R x 3- 3	–	–	–	–	0.85 Dynalub 510
16 x 10R x 3- 3	–	–	–	–	1.00 or alternatively
20 x 5R x 3- 4	–	0.7	0.7	–	1.20 Castrol Long-time PD2
20 x 5R x 3- 5	–	–	–	–	–
20 x 40R x 3.5 - 1 x 4	–	–	–	1.6	–
25 x 5R x 3- 4	–	1.1	1.1	–	–
25 x 10R x 3- 4	–	1.3	1.3	–	–
25 x 25R x 3.5 - 1.2 x 4	–	–	–	1.5	–
32 x 5R x 3.5- 4	–	1.6	1.6	–	–
32 x 10R x 3.969 - 5	–	2.3	2.3	–	–
32 x 20R x 3.969 - 2	–	–	2.0	–	–
32 x 32R x 3.969 - 1.2 x 4	–	–	–	2.6	–
32 x 64R x 3.969 - 1 x 4	–	–	–	3.1	–
40 x 5R x 3.5- 5	–	–	2.2	–	–
40 x 10R x 6- 4	–	–	5.2	–	–
40 x 20R x 6- 3	–	–	6.7	–	–

High-performance lubricant for Linear Motion Systems

(not released for the USA)

Product description Dynalub 510

Materialnummer	Packing unit
R3416 037 00	1 x 400 g

Dynalub 510 is an NLGI grade 2 lithium-based high-performance grease specially developed for linear motion systems. It is notable for offering excellent water resistance and protection against corrosion, and is suited for use at temperatures of between $-20\text{ }^{\circ}\text{C}$ and $80\text{ }^{\circ}\text{C}$.

Applications

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

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

Technical data

For further details, see
"Safety Data Sheet Dynalub 510"
R310EN 2052 (2004.04)

Chemical composition	Mineral oil, special lithium soap, agents	
Designation	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 P1
Melting point in $^{\circ}\text{C}$	> 165	
Flash point in $^{\circ}\text{C}$	> 200 – base oil	
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 $-20\text{ }^{\circ}\text{C}$	$< 1400\text{ hPa}$	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/ $120\text{ }^{\circ}\text{C}$)	DIN 51 811
Four ball tester welding load	$> 2000\text{ N}$	DIN 51 350 P4
Four ball tester impression diameter	0.93 (400 N, 1 h)	DIN 51 350 P5
Shelf life in original container	2 years	

Product description Dynalub 520

Materialnummer	Packing unit
R3416 043 00	1 x 400 g

Dynalub 520 is an NLGI grade 00 lithium-based high-performance grease specially developed for linear motion systems. It is notable for offering excellent water resistance and protection against corrosion, and is suited for use at temperatures of between $-20\text{ }^{\circ}\text{C}$ and $+80\text{ }^{\circ}\text{C}$.

Applications

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

Technical data

For further details, see
"Safety Data Sheet Dynalub 520"
R310EN 2053 (2004.04)

Chemical composition	Mineral oil, special lithium soap, agents	
Designation	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 P1
Melting point in $^{\circ}\text{C}$	> 160	
Flash point in $^{\circ}\text{C}$	> 200 – base oil	
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 $-20\text{ }^{\circ}\text{C}$	$< 700\text{ hPa}$	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/ $100\text{ }^{\circ}\text{C}$)	DIN 51 811
Four ball tester welding load	1800 N	DIN 51 350 P4
Four ball tester impression diameter	0.80 (400 N, 1 h)	DIN 51 350 P5
Shelf life in original container	2 years	

Design Calculations

Design Calculations

Upon 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 "Design Calculation Service Form", page 156.

Where the speed and load fluctuate, the service life must be calculated using the averages F_m and n_m .

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

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

The following applies for the effective equivalent bearing load:

Preload	Preload class factor X_{pr}
2% C	0.02
3% C	0.03
5% C	0.05
7% C	0.07
10% C	0.10

$$F > 2,8 X_{pr} \cdot C \quad F_{eff\ n} = |F_n|$$

$$F \leq 2,8 X_{pr} \cdot C \quad F_{eff\ n} = \left[\frac{|F_n|}{2,8 \cdot X_{pr} \cdot C} + 1 \right]^{\frac{3}{2}} \cdot X_{pr} \cdot C$$

C = dynamic load rating (N)
 $F_{eff\ n}$ = effective equivalent axial load during phase n (N)
 F_n = axial load during phase n (N)
 X_{pr} = preload factor (-)

- where the load fluctuates and the speed is constant, the average 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 average load F_m is calculated as follows:

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

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

Nominal life

Service life in revolutions L

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

C	= dynamic load rating	(N)
F_m	= equivalent dynamic axial load	(N)
L	= service life in revolutions	(-)

Service life in hours L_h

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

L_h	= service life	(h)
L	= service life in revolutions	(-)
n_m	= average speed	(min ⁻¹)

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

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

Drive torque and drive power

Drive torque M_{ta}

for conversion of rotary motion into 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 (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 (η' approx. 0.8)	(-)

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

Drive power P_a

$$P_a = \frac{M_{ta} \cdot n}{9550} \quad 11$$

M_{ta}	= drive torque	(Nm)
n	= speed	(min ⁻¹)
P_a	= drive power	(kW)

Design Calculations

Design Calculations

Calculation example
Service life

Operating conditions

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

Proposed ball screw: 63 x 10

$$\begin{aligned} F_1 &= 50\,000 \text{ N at } n_1 = 10 \text{ min}^{-1} \text{ for } q_1 = 6\% \text{ of the duty cycle} \\ F_2 &= 25\,000 \text{ N at } n_2 = 30 \text{ min}^{-1} \text{ for } q_2 = 22\% \text{ of the duty cycle} \\ F_3 &= 8\,000 \text{ N at } n_3 = 100 \text{ min}^{-1} \text{ for } q_3 = 47\% \text{ of the duty cycle} \\ F_4 &= 2\,000 \text{ N at } n_4 = 1\,000 \text{ min}^{-1} \text{ for } q_4 = \frac{25\%}{100\%} \text{ of the duty cycle} \end{aligned}$$

Calculation procedure

Average speed n_m

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

$$n_m = 304 \text{ min}^{-1}$$

Average load F_m for variable load and variable speed

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

$$F_m = 8757 \text{ N}$$

Required service life L
(revolutions)

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

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

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

$$L_h = 40000 \cdot \frac{60}{100} = 24000 \text{ h}$$

$$L = 24000 \cdot 304 \cdot 60$$

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

Basic dynamic load rating C

$$C = 8757 \cdot \sqrt[3]{\frac{437\,760\,000}{10^6}} \quad 5 \quad C \approx 66492 \text{ N}$$

Result and selection

The ball screw can now be selected from the Dimension Tables:

e.g. ball screw,
size 63 x 10R x 6 - 6, with preloaded
single nut with flange FEM-E-S,
dynamic load rating $C = 88\,800 \text{ N}$,
part number R1512 640 13.

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

Cross check

Service life of the selected ball screw
in revolutions

$$L = \left(\frac{88\,800}{8757} \right)^3 \cdot 10^6 \quad 4 \quad L \approx 1042 \cdot 10^6 \text{ revolutions}$$

Service life in hours L_h

$$L_h = \frac{1042 \cdot 10^6}{304 \cdot 60} \quad 7$$

$$L_h \approx 57\,167 \text{ hours}$$

The life of the selected ball screw
assembly is thus greater than the
required service life of 24,000 hours
(including operating hours). A smaller
ball screw could therefore be selected.

Design Calculations

Design Calculations

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 allow-

ance must be made for guidance by a nut without preload. The operating speed should not reach more than 80% of the critical speed.

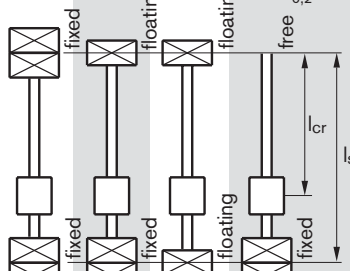
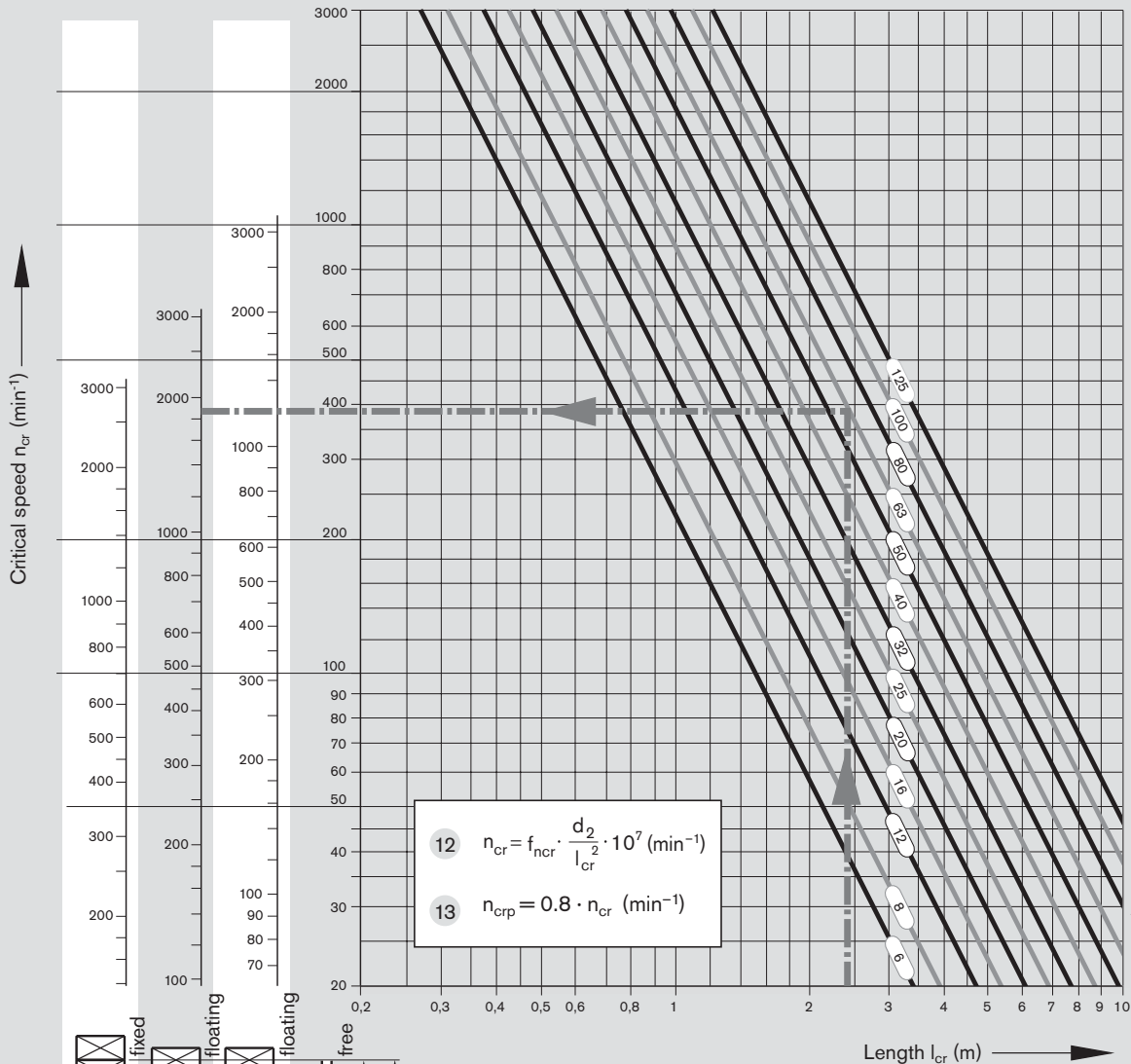
The characteristic speed and the max. permissible linear speed must be taken into account, see "Technical Notes".

Example

Screw diameter = 63 mm
 Length l_{cr} = 2.4 m
 End fixity II (fixed – supported)

According to the graph, the critical speed is 1850 min^{-1} .
 The permissible operating speed is thus $1850 \text{ min}^{-1} \times 0.8 = 1480 \text{ min}^{-1}$.

The maximum operating speed in our calculation example of $n_4 = 1000 \text{ min}^{-1}$ is therefore below the permissible operating speed.



End fixity	I	II	III	IV
f_{ncr} value	27.4	18.9	12.1	4.3

- n_{cr} = critical speed (min⁻¹)
- n_{crp} = permissible operating speed (min⁻¹)
- f_{ncr} = corrector value determined by bearing
- d_2 = root diameter (see Dimension Tables) (mm)
- l_{cr} = critical length for preloaded nut systems (mm)
- l_s = distance between bearing and bearing (mm)
- $l_{cr} = l_s$ for non-preloaded nut systems

For screw ends form 31 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 free (unsupported) length l_c .

A safety factor of $s \geq 2$ should be taken into consideration when determining the permissible axial load.

Example

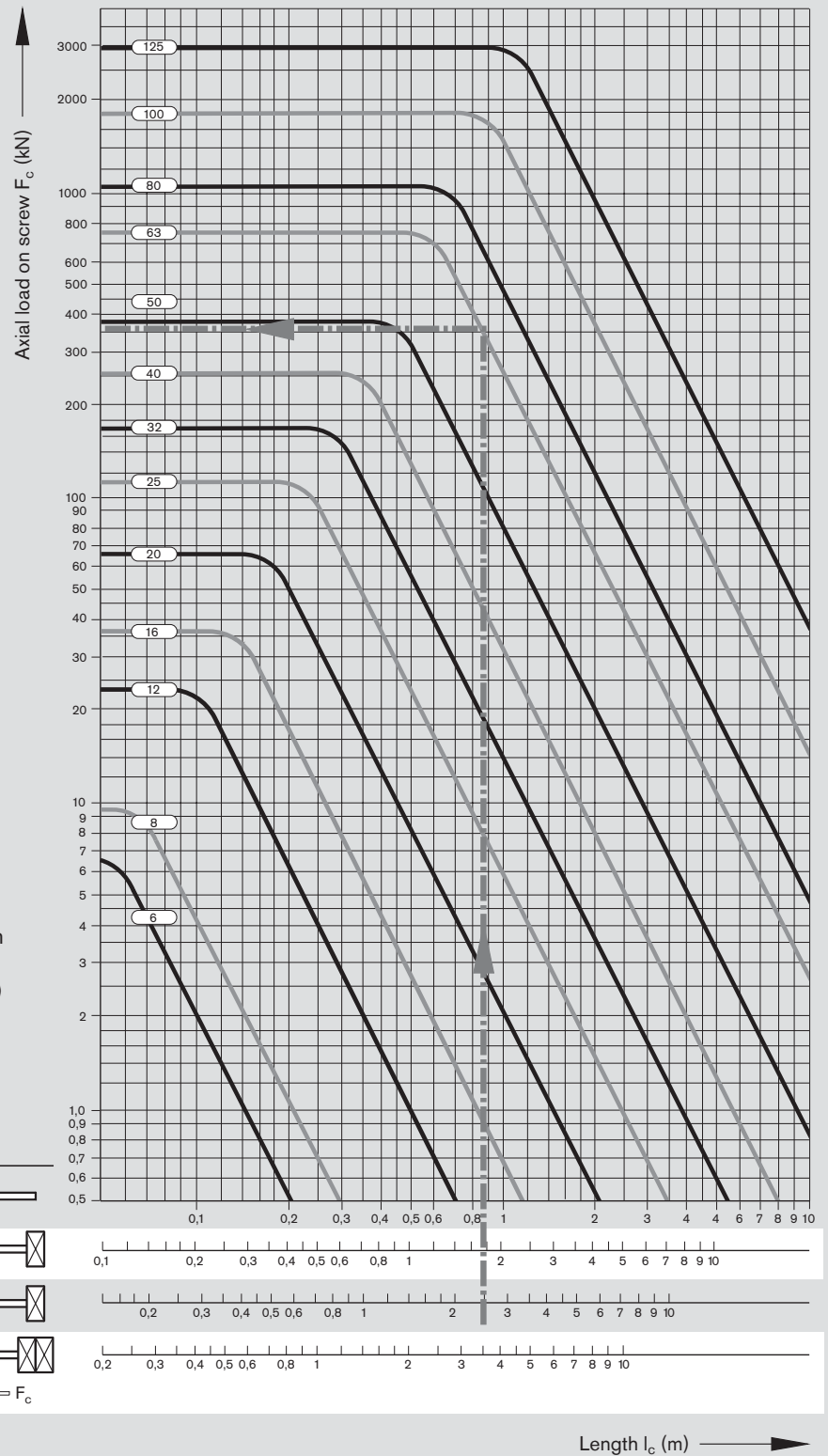
Screw diameter = 63 mm
 Lead = 10 mm
 Length l_c = 2.4 m
 End fixity II (fixed – supported)
 According to the graph, the theoretically permissible axial load is 360 kN.
 A permissible axial load on the screw of $360 \text{ kN} : 2 = 180 \text{ kN}$ is achieved when applying the safety factor 2. This therefore lies above the maximum operating load of $F_1 = 50 \text{ kN}$ used in our calculation example.

14 $F_c = f_{Fc} \cdot \frac{d_2^4}{l_c^2} \cdot 10^4 \text{ (N)}$

15 $F_{cp} = \frac{F_c}{2} \text{ (N)}$

- F_c = theoretically permissible axial load on screw
- F_{cp} = permissible axial load during operation
- f_{Fc} = corrector value determined by bearing
- d_2 = root diameter (mm), see Dimension Tables
- l_c = unsupported threaded length (mm)

f_{Fc} value	End fixity
2.6	IV
10.2	III
20.4	II
40.6	I



Length l_c (m)

End Bearings

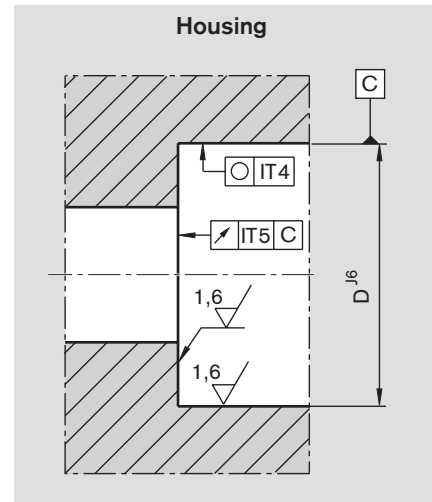
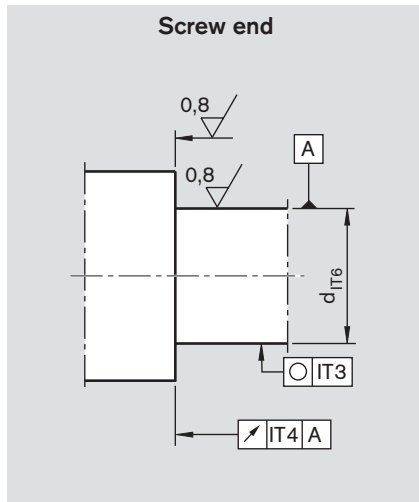
Design Notes, Mounting Instructions

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.



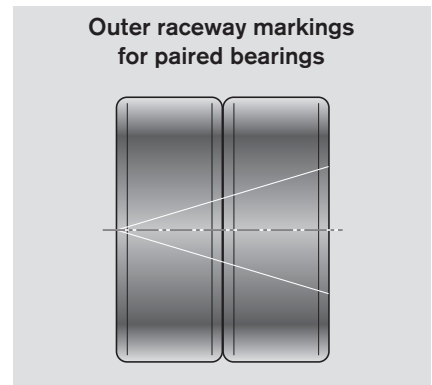
Mounting

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 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 outward after proper mounting.

Outer raceway markings for paired bearings



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 are 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).

Lubrication, Mounting the Housing

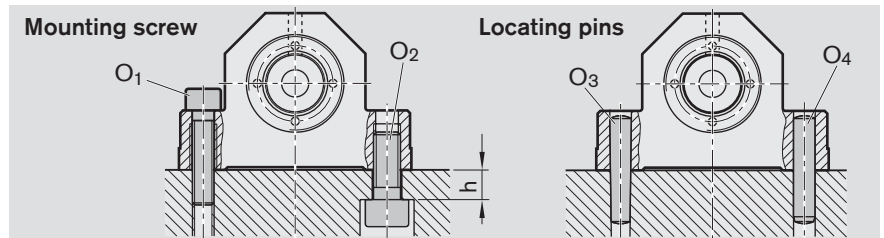
Mounting the housing SEB

Tighten the pillow block mounting screws in crosswise sequence. See table for max. tightening torque. The housing nut fixes the entire bearing unit in the housing. Use a threadlocking adhesive to secure the housing nut in place.

Note:



Take care to align the screw and nut assembly, the bearings and the guideway precisely with one another. The Rexroth gauge is a useful aid here.

Size	h	O ₁	O ₂	O ₃ – Tapered pin (hardened)	O ₄ – Straight pin (DIN 6325)
d ₀ x P	(mm)	DIN 912	DIN 912		
8 x 2,5	8	M5 x 20	M6 x 16		4 x 20
12 x 5	8	M5 x 20	M6 x 16		4 x 20
16 x 5	11	M8 x 35	M10 x 25		8 x 40
16 x 10	11	M8 x 35	M10 x 25		8 x 40
16 x 16	11	M8 x 35	M10 x 25		8 x 40
20 x 5	11	M8 x 35	M10 x 25		8 x 40
20 x 20	11	M8 x 35	M10 x 25		8 x 40
25 x 5	14	M10 x 40	M12 x 30		10 x 50
25 x 10	14	M10 x 40	M12 x 30		10 x 50
25 x 25	14	M10 x 40	M12 x 30		10 x 50
32 x 5	14	M10 x 40	M12 x 30		10 x 50
32 x 10	14	M10 x 40	M12 x 30		10 x 50
32 x 20	14	M10 x 40	M12 x 30		10 x 50
32 x 32	14	M10 x 40	M12 x 30		10 x 50
40 x 5	16	M12 x 50	M14 x 35		10 x 50
40 x 10	16	M12 x 50	M14 x 35		10 x 50
40 x 20	16	M12 x 50	M14 x 35		10 x 50
40 x 40	16	M12 x 50	M14 x 35		10 x 50





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

Steel/steel material pairing

	Strength class for O ₁ ; O ₂	M5	M6	M8	M10	M12	M14
 (Nm)	8.8	5.5	9.5	23	46	80	125
	12.9	9.5	16.0	39	77	135	215

Steel/aluminum and aluminum/aluminum material pairings

	Strength class for O ₁ ; O ₂	M5	M6	M8	M10	M12	M14
 (Nm)	8.8	4.8	8.5	20	41	70	110
	12.9	4.8	8.5	20	41	70	110

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. Angular-contact thrust ball bearings of the series LGF, LGN are lubricated for life with grease KE2P-35 per DIN 51825. For regreasing, the quantities stated in the table below can be applied via the lube ports provided on the bearings.

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						
Designation	Quantity (g)	Designation	Quantity (g)	Designation	Quantity (g)	
LGN-B-0624	0.3 / 0.2					
LGN-B-1034	0.3 / 0.2					
LGN-B-1242	LGF-B-1255					
LGN-B-1747	LGF-B-1762					
LGN-B-2052	LGF-B-2068					
LGN-B-2557	LGF-B-2575	LGN-C-2557	LGF-C-2575		2.0 / 1.2	
LGN-B-3062	LGF-B-3080	LGN-C-3062	LGF-C-3080		2.0 / 1.2	
LGN-B-3572	LGF-B-3590					
LGN-A-4075				LGN-A-4090	LGF-B-40115	6.0 / 3.5
LGN-A-5090				LGN-A-50110	LGF-A-50140	9.0 / 5.5

End Bearings

Design Calculations

Resulting and equivalent bearing loads

For angular-contact thrust ball bearings LGN and LFG

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 able to accommodate tilting moments. As a rule, the moments that usually occur due to the weight and drive motion of the screw do not need to be incorporated in the calculation of the equivalent bearing load.

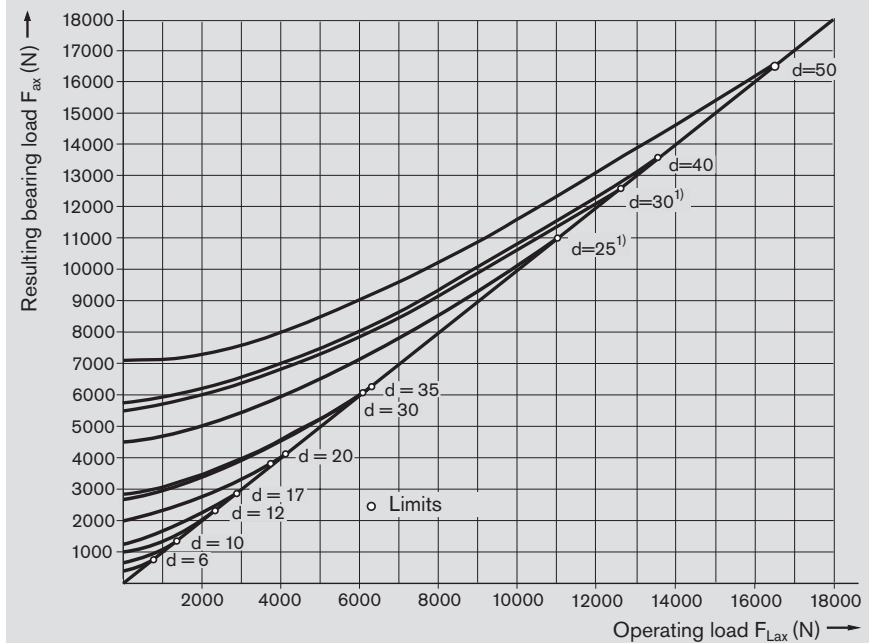
Permissible static axial load for bearing series LGF

The permissible static axial load of LGF-series bearings in screw-down direction is:

$$F_{comb} = X \cdot F_{rad} + Y \cdot F_{ax} \quad 20$$

- 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

$$F_{0ax p} \leq \frac{C_0}{2}$$

- $F_{0ax p}$ = permissible static axial bearing load (N)

The static axial load rating C_0 is stated in the Dimension Tables.

Resulting and equivalent bearing loads

For angular-contact thrust ball bearings LGL

Before determining the combined equivalent load F_{comb} , the bearing size must be checked against the chart for static load limits.

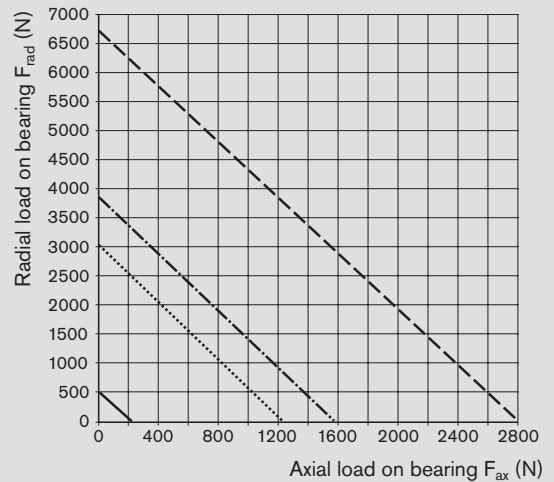
A bearing will only be suitable for a particular application when the intersection point between the axial and radial bearing loads lies below the load limit curve.

$$F_{comb} = X \cdot F_{rad}^A + Y \cdot F_{ax}^B + Z \quad 21$$

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 load limit



- LGL-D-0624
- LGL-A-1244
- - - LGL-A-1547
- - - LGL-A-2060

Average speed and average bearing load

When the bearing load varies in steps over a specific period of time, calculate the dynamic equivalent bearing load using formula 22.

When the speed varies, use formula 23. In these formulas q_t denotes the discrete time steps for the individual phases in %.

$$F_m = \sqrt[3]{F_{comb1}^3 \cdot \frac{|n_1|}{n_m} \cdot \frac{q_{t1}}{100} + F_{comb2}^3 \cdot \frac{|n_2|}{n_m} \cdot \frac{q_{t2}}{100} + \dots + F_{combn}^3 \cdot \frac{|n_n|}{n_m} \cdot \frac{q_{tn}}{100}} \quad 22$$

$$n_m = \frac{q_{t1}}{100} \cdot |n_1| + \frac{q_{t2}}{100} \cdot |n_2| + \dots + \frac{q_{tn}}{100} \cdot |n_n| \quad 23$$

- $F_{comb1} \dots F_{combn}$ = combined equivalent axial load in phases 1 ... n (N)
- F_m = dynamic equivalent bearing load (N)
- $n_1 \dots n_n$ = speeds in phases 1 ... n (min^{-1})
- n_m = average speed (min^{-1})
- $q_{t1} \dots q_{tn}$ = discrete time steps in phases 1 ... n (%)

Service life and load safety factor

Nominal life

The nominal life is calculated as follows:

Note:

Take into account the dynamic load rating of the nut!

$$L = \left[\frac{C}{F_{comb}} \right]^3 \cdot 10^6 \quad 24$$

- C = dynamic bearing load rating (N)
- F_{comb} = combined equivalent bearing load (N)
- L = nominal service life in revolutions (-)
- L_h = nominal service life in operating hours (h)
- n_m = average speed (min^{-1})

$$L_h = \frac{16666}{n_m} \left[\frac{C}{F_{comb}} \right]^3 \quad 25$$

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 rating (N)
- S_0 = static load safety factor (-)

Design Calculation Service Form

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To: Precision Ball Screw
 Assemblies Department

Alternatively, technical design calculation
 can be performed by the customer with
 our WINKGT software.

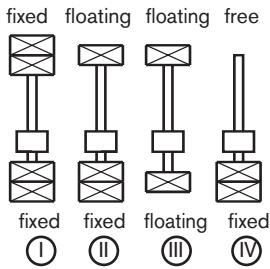
Application: New design Revised design

Operating conditions

Loads (N)	Speeds (1/min)	Discrete time steps (%)
$F_1 =$	at $n_1 =$	for $q_1 =$
$F_2 =$	at $n_2 =$	for $q_2 =$
$F_3 =$	at $n_3 =$	for $q_3 =$
$F_4 =$	at $n_4 =$	for $q_4 =$
$F_5 =$	at $n_5 =$	for $q_5 =$
$F_6 =$	at $n_6 =$	for $q_6 =$
Average load (see p. 146)	Average speed (see p. 146)	Sum of time steps
$F_m =$	$n_m =$	$Q = 100\%$
Maximum static load:	N	
Required service life	Operating hours or	$\times 10^6$ ball screw revolutions

Screw end fixity: horizontal vertical

Screw end fixity



(see pages 150/151)

Selected:

Installation conditions (enclose
 drawings/sketches if possible!)

Drawing enclosed

Type of lubrication: _____

Operating temperature: _____ °C - _____ min/max. / _____ °C

Exceptional operating conditions: _____

Sender

OEM User Distributor

Company _____

Address _____

Name _____

Department _____

Telephone _____

Fax _____

e-mail _____

Notes

Notes

Notes

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