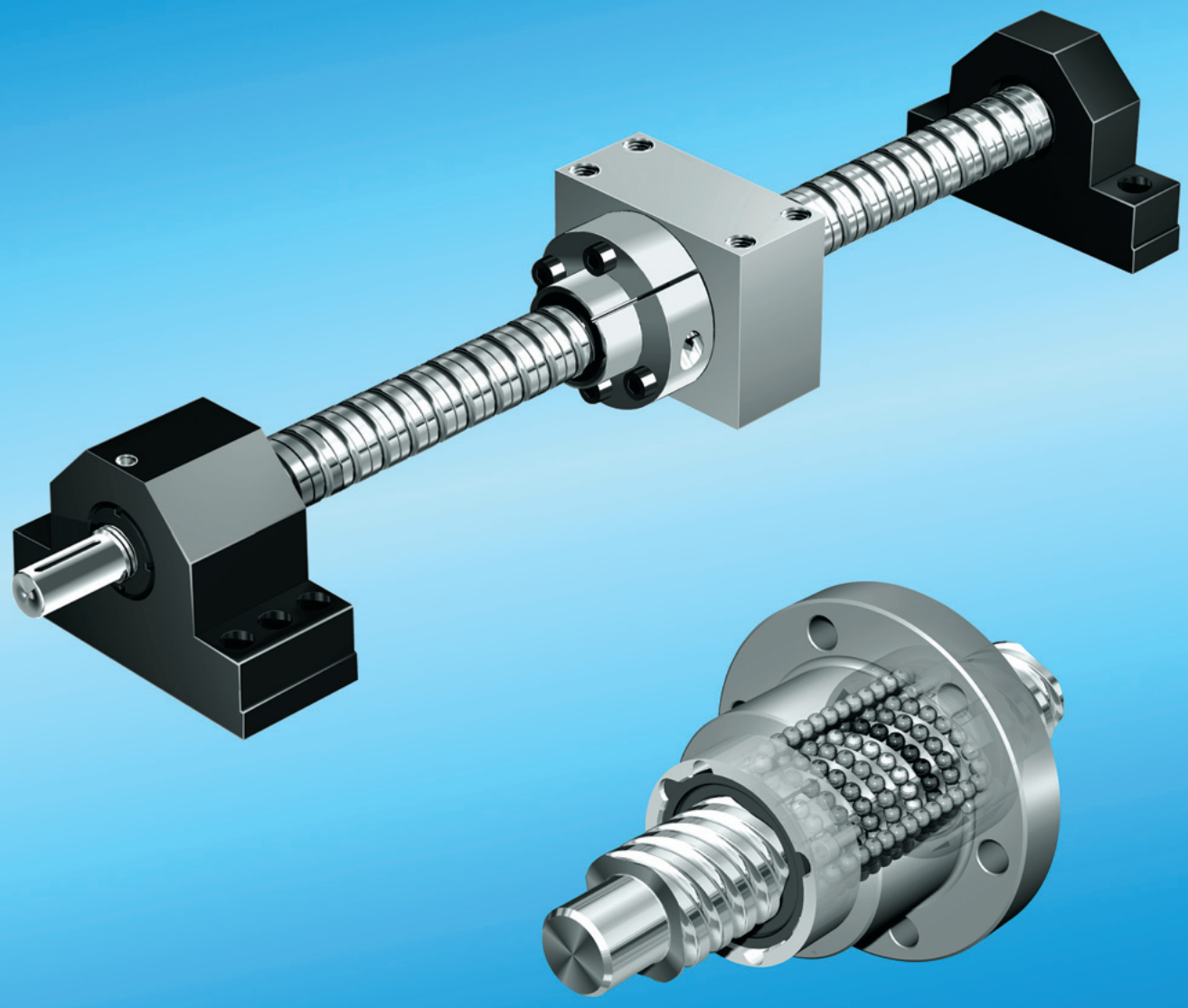
Electric Drives and Controls | Hydraulics | Linear Motion and Assembly Technologies | Pneumatics | Service

Rexroth
Bosch Group

Precision Ball Screw Assemblies
End Bearings and Nut Housings

The Drive & Control Company



Precision Ball Screw Assemblies

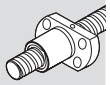
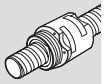
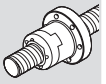
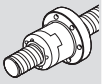
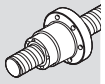
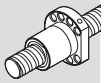
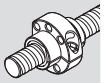
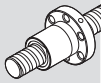
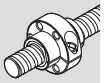
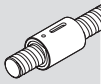
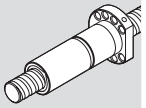
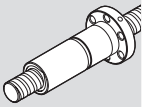
Linear Motion Technology

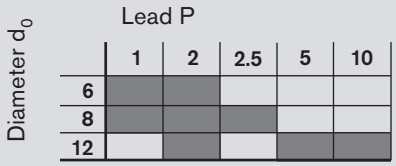
Ball Rail Systems	Standard Ball Rail Systems Super Ball Rail Systems Ball Rail Systems with Aluminum Runner Blocks High Speed Ball Rail Systems Corrosion Resistant Ball Rail Systems Wide Ball Rail Systems Ball Rail Systems with Integrated Measuring System Braking and Clamping Units for Ball Rail Systems Gear Racks for Ball Rail Systems Miniature Ball Rail Systems Cam Roller Guides	
Roller Rail Systems	Standard Roller Rail Systems Wide Roller Rail Systems Heavy Duty Roller Rail Systems Roller Rail Systems with Integrated Measuring System Braking and Clamping Units for Roller Rail Systems Gear Racks for Roller Rail Systems	
Linear Bushings and Shafts	Linear Bushings, Linear Sets, Shafts, Shaft Support Rails, Shaft Support Blocks Ball Transfer Units Traditional Engineering Components	
Screw Drives		
Linear Motion Systems	Linear Motion Slides	– Ball Screw Drive – Toothed Belt Drive
	Linear Modules	– Ball Screw Drive – Toothed Belt Drive – Rack and Pinion Drive – Pneumatic Drive – Linear Motor
	Compact Modules	– Ball Screw Drive – Toothed Belt Drive – Linear Motor
	Multi-Axis Motion Systems CMS	
	Precision Modules	– Ball Screw Drive
	Ball Rail Tables	– Ball Screw Drive – Linear Motor
	Controllers, Motors, Electrical Accessories	
	Linear Actuators	

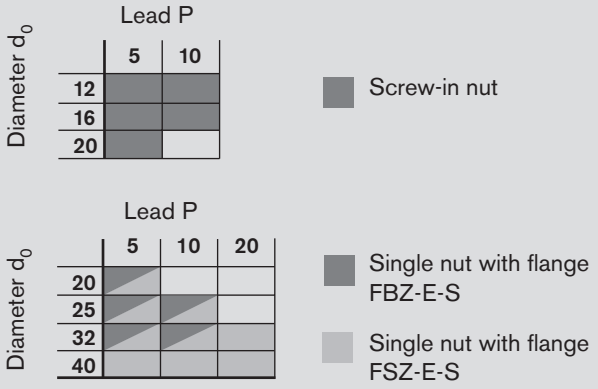
Contents

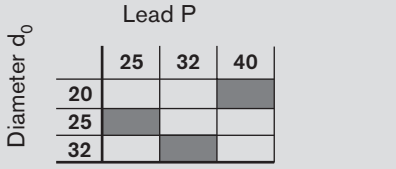
Precision Ball Screw Assemblies

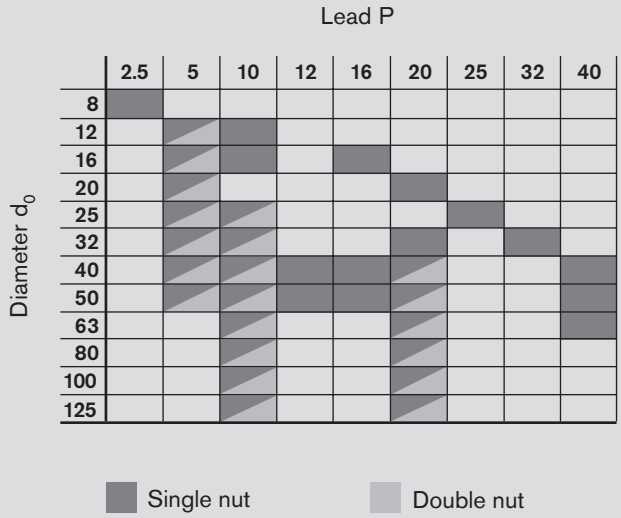
Product Overview Nuts and Nut Housings

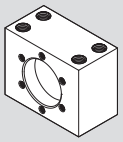
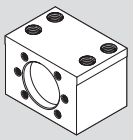
Nuts		Page
Miniature series		
Miniature Single nut with flange FEM-E-B		22
ECO series		
Screw-in nut ZEV-E-S		24
Single nut with flange and recirculation caps FBZ-E-S		26
Single nut with flange and recirculation caps FSZ-E-S		28
Speed series		
Single nut with flange and recirculation caps FEP-E-S		30
Standard series		
Single nut with flange DIN 69 051, Part 5 FEM-E-C		32
Adjustable-preload single nut DIN 69 051, Part 5 SEM-E-C		34
Single nut with flange FEM-E-S		36
Adjustable-preload single nut SEM-E-S		38
Cylindrical single nut ZEM-E-S		40
Double nut with flange DIN 69 051, Part 5 FDM-E-C		42
Double nut with flange FDM-E-S		44

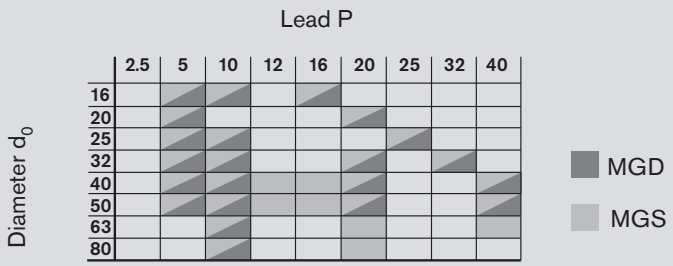








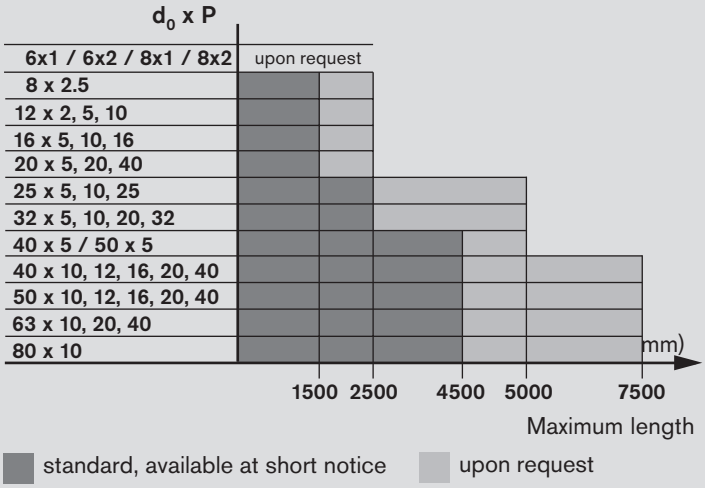
Nut housings	Page
MGS for Standard series FEM-E-S FDM-E-S SEM-E-S 	46
MGD for Standard series FEM-E-C FDM-E-C SEM-E-C 	48



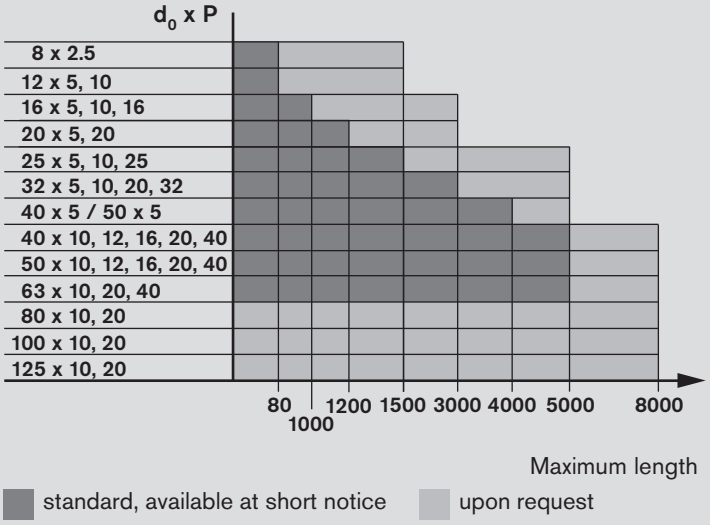
Precision Ball Screw Assemblies

Product Overview Screws and End Machining

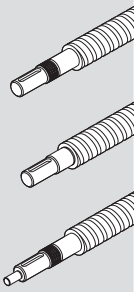
Screws	Page
Precision-rolled screw SN-R Tolerance grades T5, T7, T9 P5 available upon request	50
Acceptance conditions	100



Precision screw SN-F Tolerance grades P3, P5 P1 available upon request	52
Acceptance conditions	100



Screw end machining	
	54



Lead P

Diameter d_0	1	2	2.5	5	10	12	16	20	25	32	40
6											
8											
12											
16											
20											
25											
32											
40											
50											
63											
80											

Product Overview Bearings and Accessories

Lead P

Diameter d_0	1	2	2.5	5	10	12	16	20	25	32	40
6											
8			■								
12		■		■	■						
16				■	■		■				
20				◢				◢			◢
25				■	■				■		
32				◢	◢			◢		◢	
40				◢	◢	◢	◢	◢			◢

■ SEC-F, SEC-L ■ SEB-F, SEB-L

Lead P

Diameter d_0	1	2	2.5	5	10	12	16	20	25	32	40
6											
8			■								
12		■		■	■						
16				■	■		■				
20				◢				◢			◢
25				◢	◢				◢		
32				◢	◢			◢		◢	
40				◢	◢	◢	◢	◢			◢
50				◢	◢	◢	◢	◢			◢
63					◢			◢			◢
80					◢			◢			

■ LAF ■ LAN / LAD

Lead P

Diameter d_0	1	2	2.5	5	10
6	■	■			
8	■	■	■		
12		■		■	■
16				■	■
20				■	
25				■	■
32				■	■

■ LAL

Precision Ball Screw Assemblies

Product Overview

Definition of a 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.

New nut series have increased the size of the catalog. The catalog now features additional miniature sizes and double-square leads.

The range also includes an ECO series for simple applications requiring low-cost solutions.

The ECOplus versions offer the same performance data in all respects as the Standard nuts. The lower cost was achieved here by simplifying the nut body design.

The new series are tailor-made for specific applications or instances of use:

- Miniature series: extends the range to cover smaller sizes
- ECO 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 coupled with high load rating and short nut length

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 customarily ordered. 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.

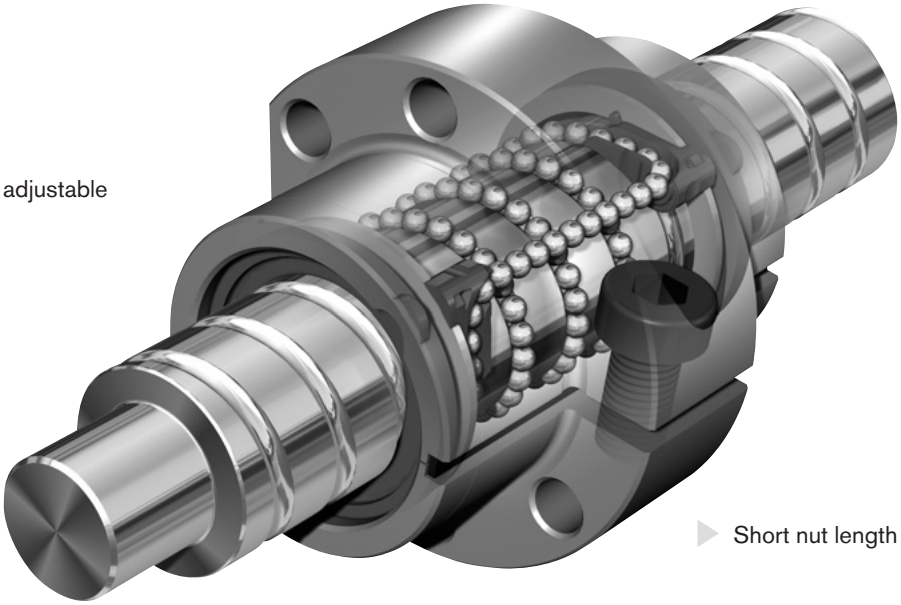
Matching nut housings for the Standard series and several types of end bearings are also stocked.

Precision-rolled screws in a variety of sizes and of unequaled 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. The only exceptions are nut sizes 80x20. For these applications and other specific instances of use we manufacture screws to individual customer requirements by means of grinding or whirling.

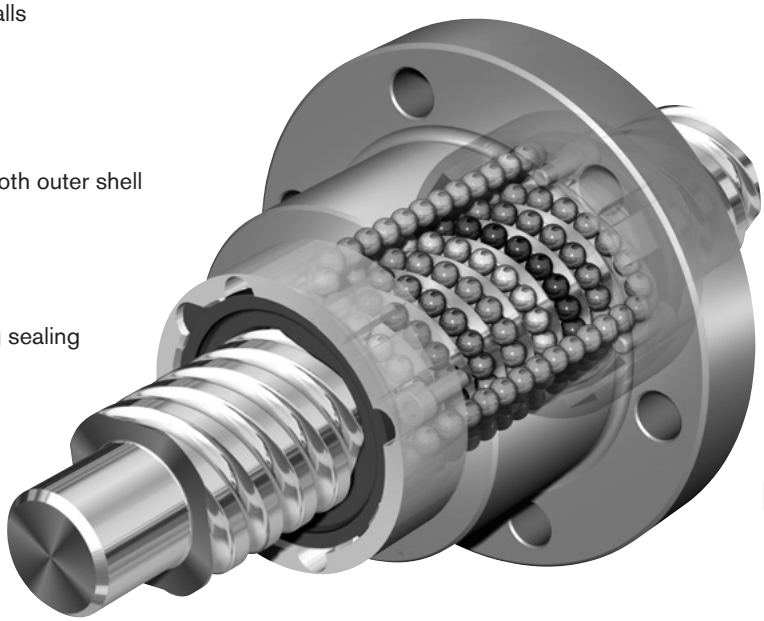
Precision-rolled screws can also be supplied without ball nuts to allow customers to machine the screw ends on their own facilities. Since hard machining has mean-time become an established method, we no longer anneal the screw ends, a process which was previously necessary but which lowers the quality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

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

- Smooth operation due to the design of the internal recirculation and optimal lift-off of balls from the raceway
- Preloaded or adjustable single nut



- Short nut length
- No protruding parts, nut is easily mounted
- High load rating due to large number of balls
- Smooth outer shell
- Effective, wiping sealing



- Large range of series available ex stock

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” on Page 126.

For the simplified creation of drawings of our precision ball screw assemblies as a CAD file, see the section headed “Inquiries and Orders” on Page 16 and the “Inquiry/Order” form on Page 127.

Precision Ball Screw Assemblies

Product Overview

Rexroth 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.

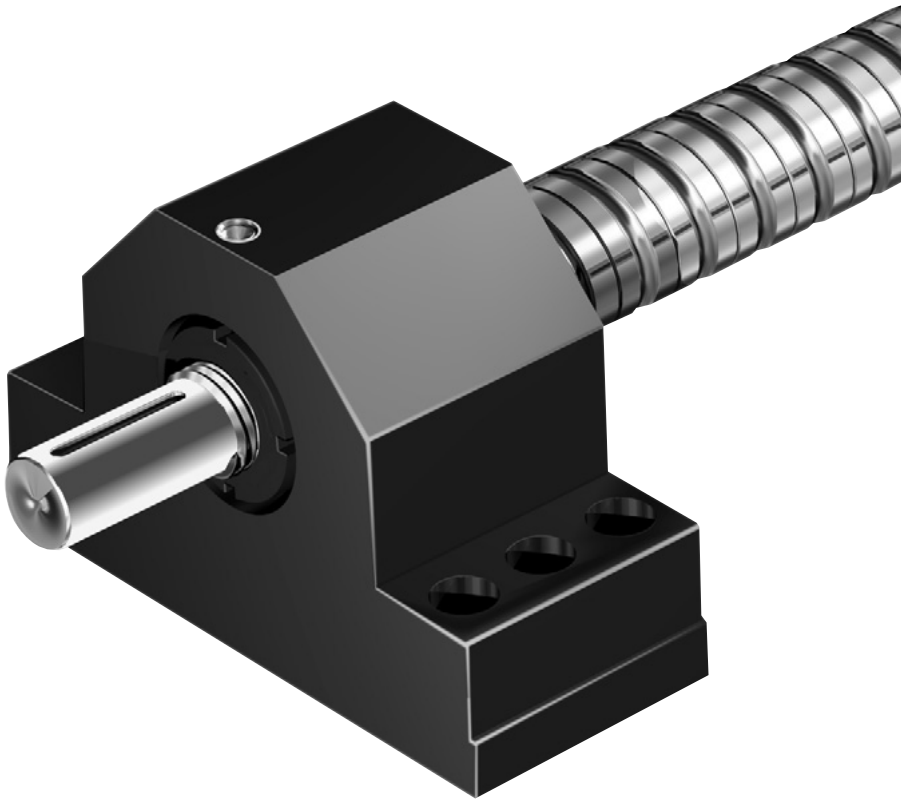
Rexroth precision pillow block units enable:

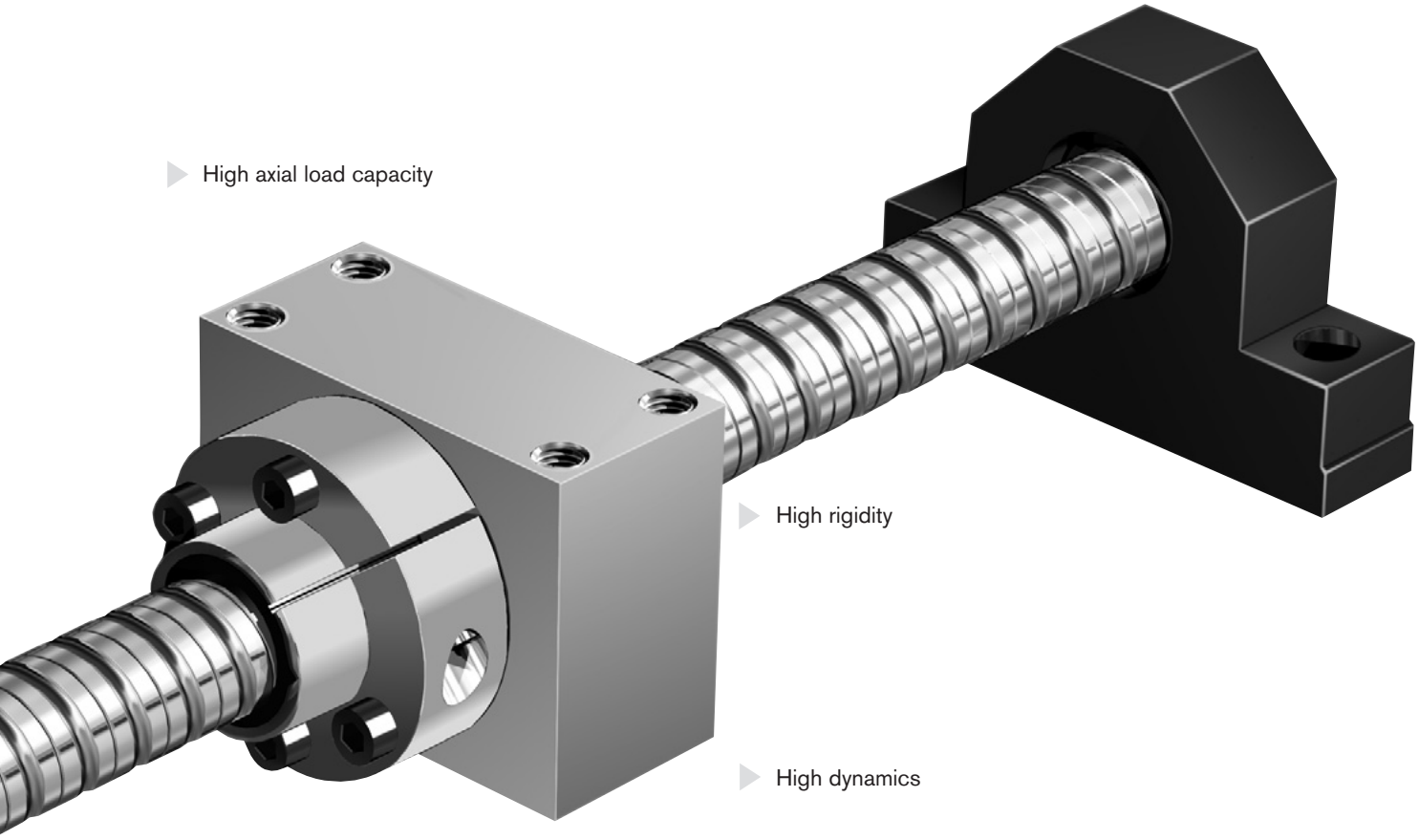
- Easy installation due to the variable fixture options and reference edges
- Use of premachined pin holes provides increased mounting accuracy

Nut housings

Rexroth nut housings for various flanged nuts complete the ready-to-install Rexroth product range.

▶ Available from stock in many versions and sizes



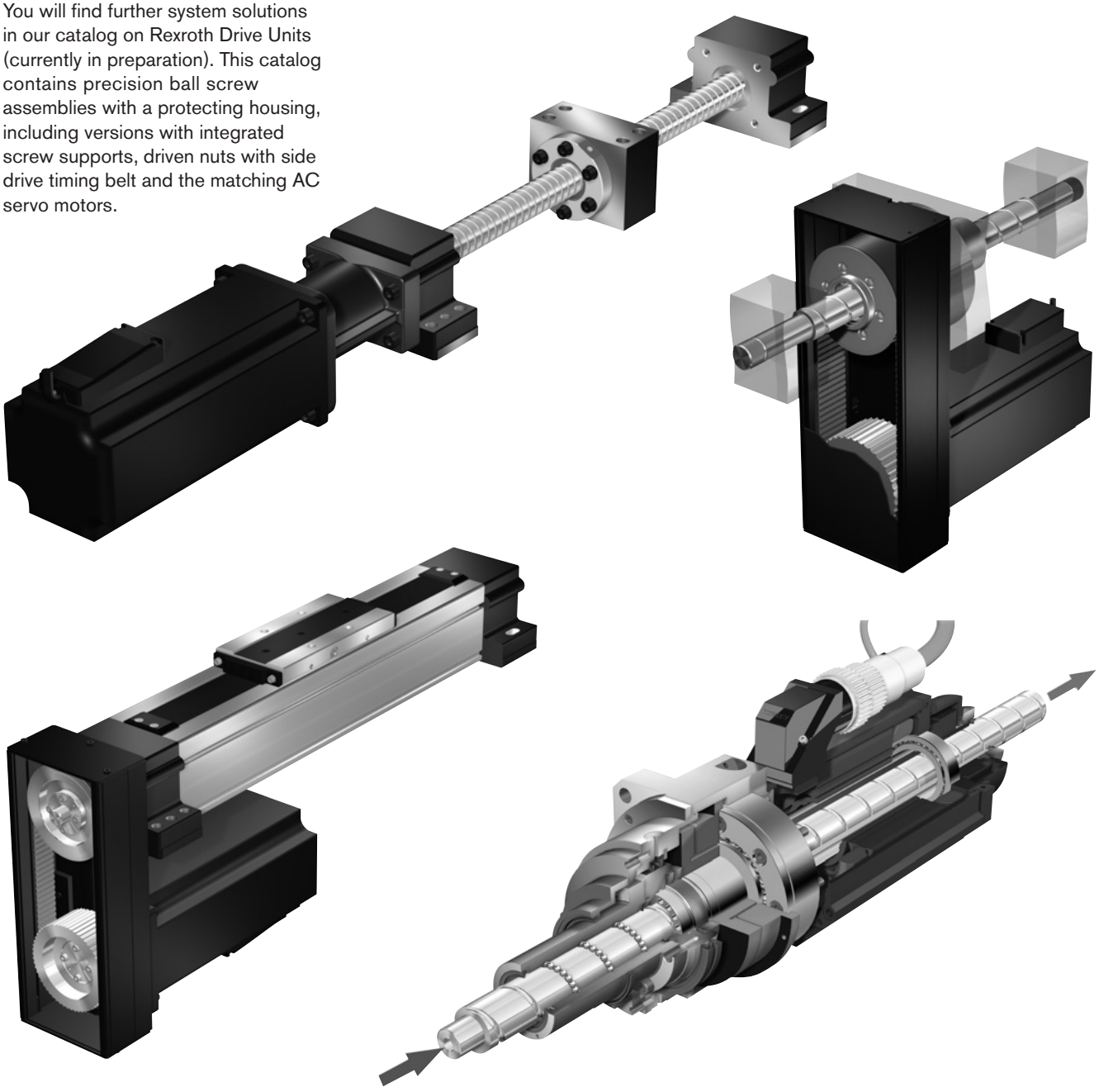


- High axial load capacity
- High rigidity
- High dynamics
- Low friction

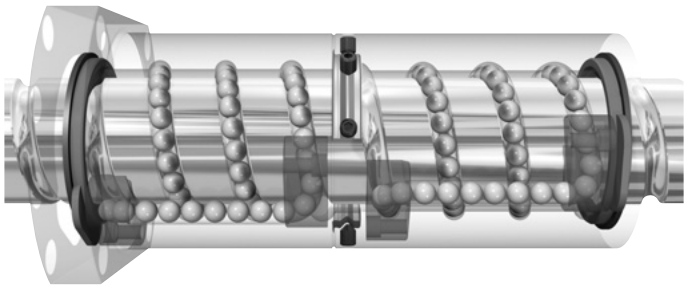
Precision Ball Screw Assemblies

Product Overview

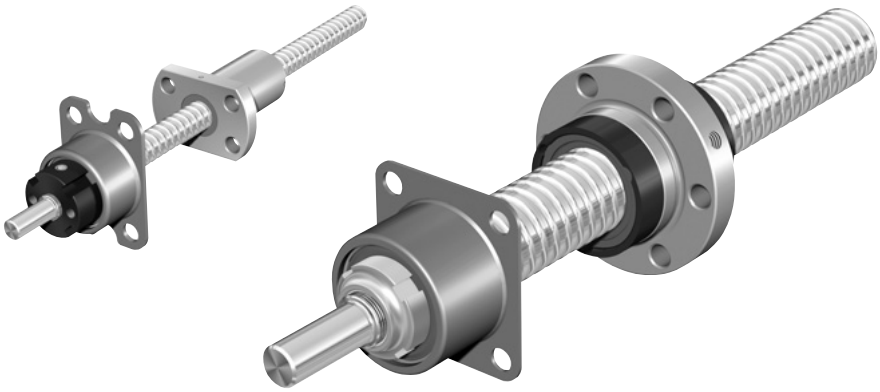
You will find further system solutions in our catalog on Rexroth Drive Units (currently in preparation). This catalog contains precision ball screw assemblies with a protecting housing, including versions with integrated screw supports, driven nuts with side drive timing belt and the matching AC servo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

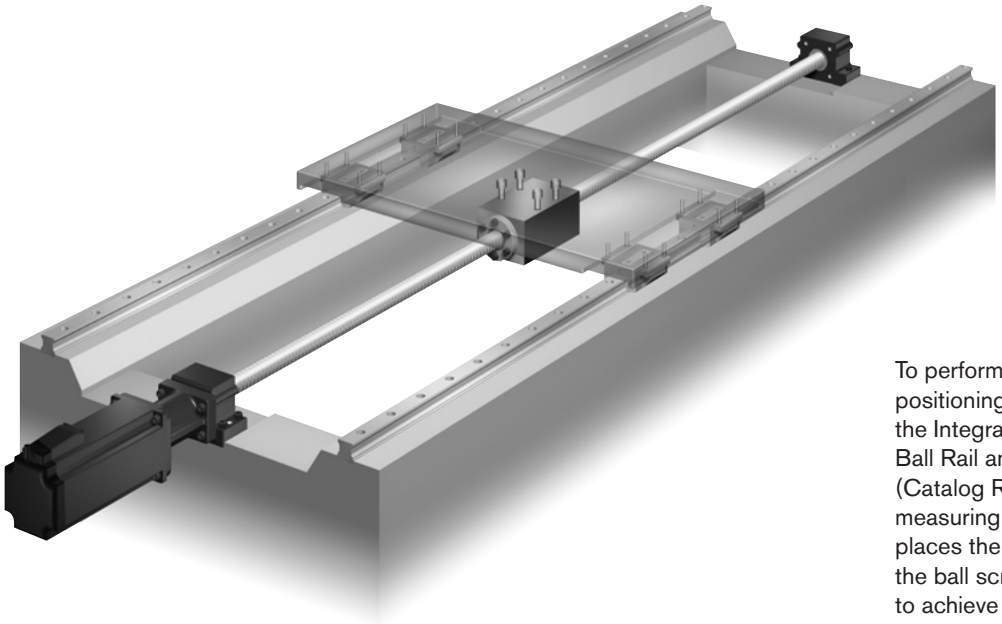


For machine tool and heavy duty applications with precision ball screw assemblies, please inquire with Rexroth Engineering.



For miniature and ECO applications, catalogs containing plug-and-play ball screw assemblies are available.





To perform particularly demanding positioning tasks we have developed the Integrated Measuring System for Ball Rail and Roller Rail Systems (Catalog RA 82 350). 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 by the customer.

Precision Ball Screw Assemblies

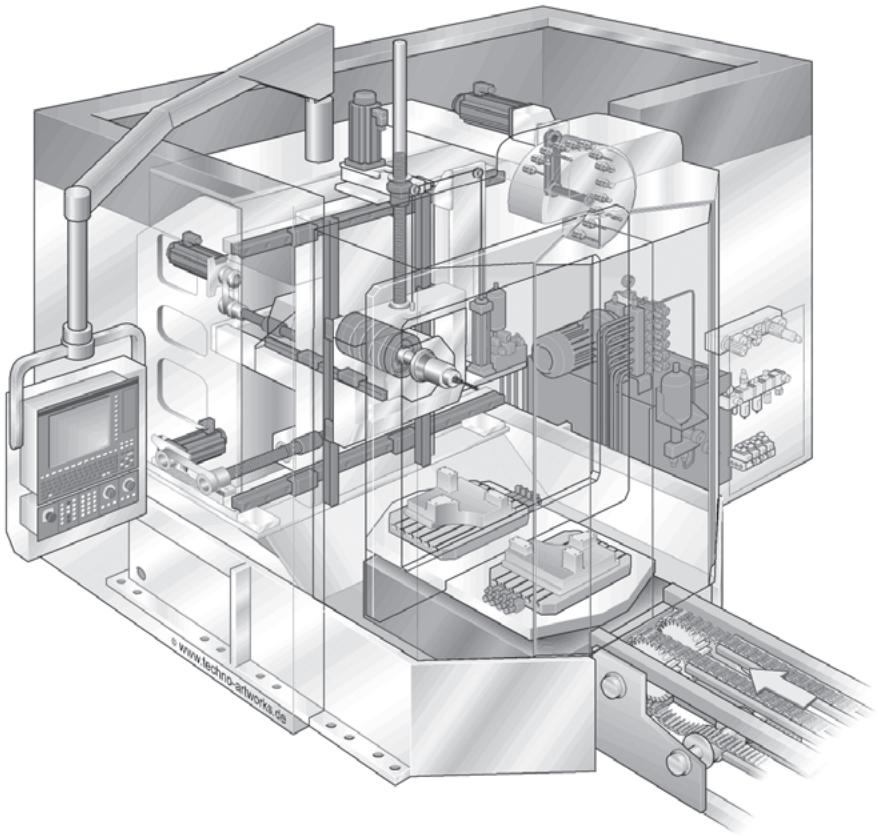
Application Examples

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

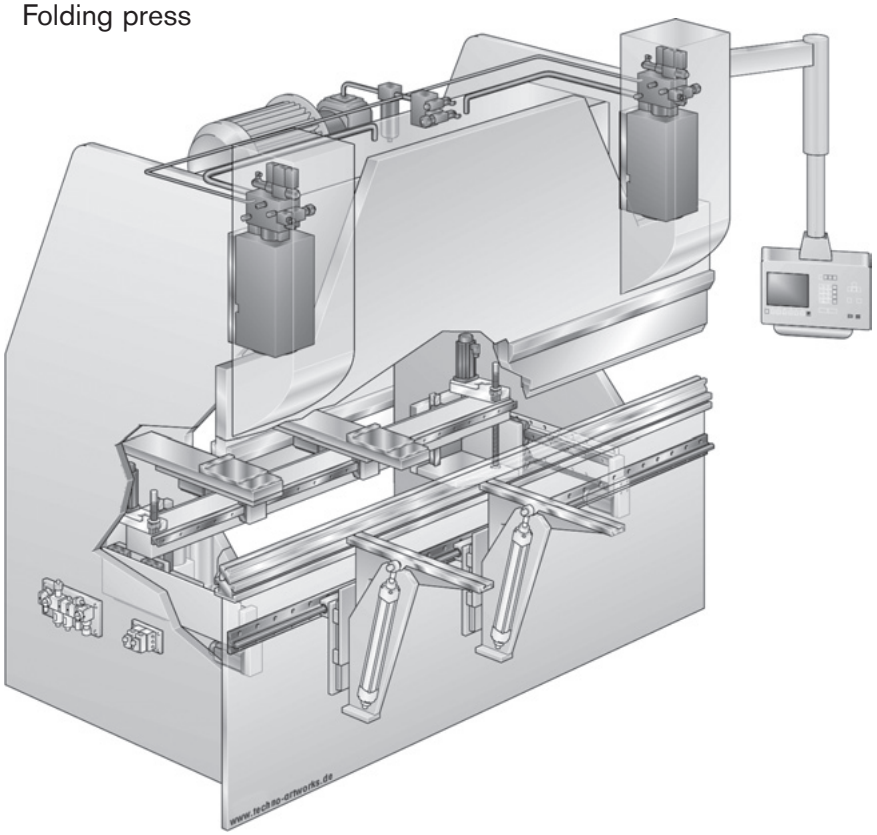
- Cutting machine tools
- Forming machine tools
- Automation and handling
- Woodworking
- Electrical and electronics
- Printing and paper
- Injection molding machines
- Food and packaging industry
- Medical equipment
- Textile industry

Machining center

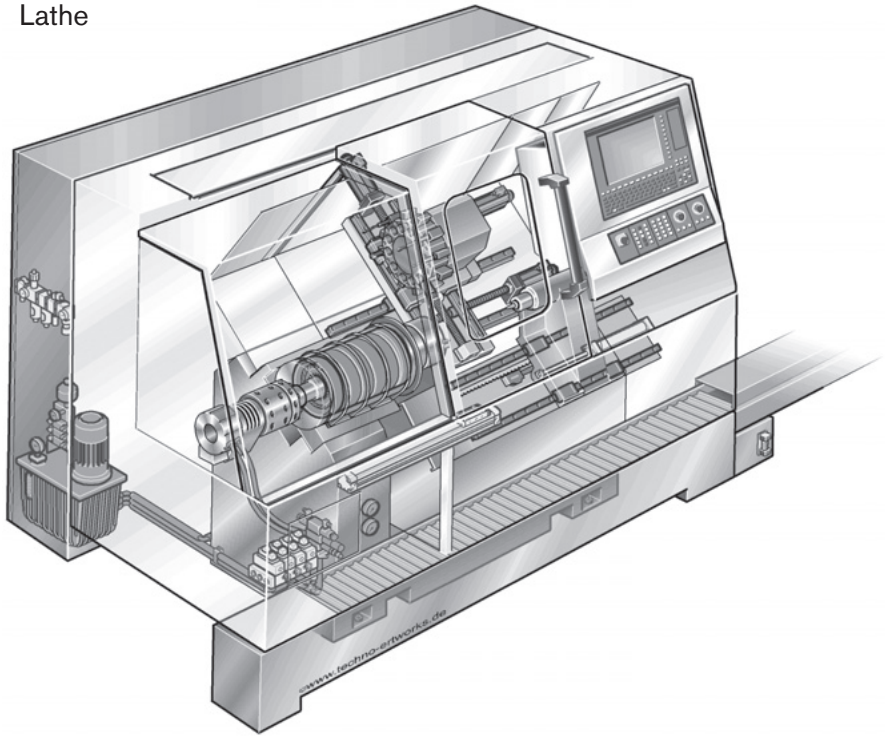
Vertical axis with driven nut



Folding press



Lathe



Inquiries and Orders

All nuts, screws and end machining details 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 on Page 127 of this catalog.

If no drawing is available, please specify your wishes using the variable ordering code. You will find a summary of the options on Page 19.

Should you already have a drawing available as a CAD file (in Pro/E20, AutoCAD/Genius14, AutoCAD 2000 or DXF formats), you can send us the data by e-mail. Mail to: techdesk.chr@boschrexroth-us.com

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

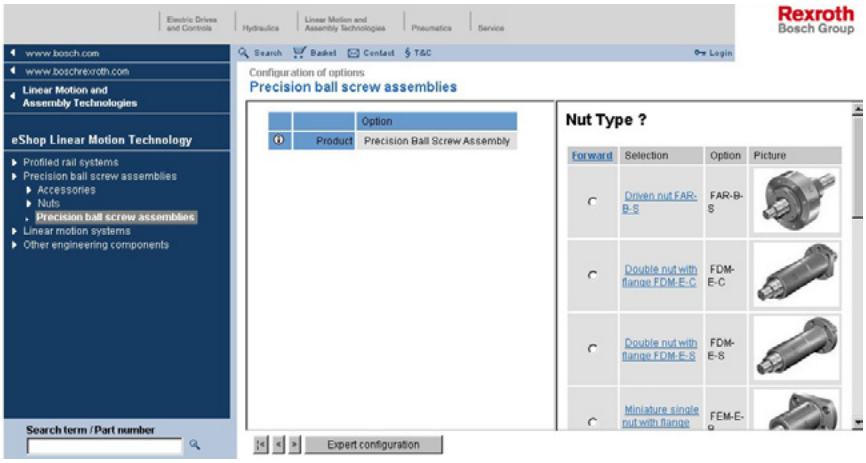
Each customer-specific precision ball screw assembly is issued with an ID number when an order is placed. If you have any subsequent queries, you need only quote this ID number.

Using the ordering data from the catalog, you can also easily generate a drawing in AutoCAD14 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/linearshop".

Once inside the program, select "Precision Ball Screw Assemblies", then "Ball Screw Assemblies Configurations", and a window will appear with boxes for input of the ordering data you have chosen from the catalog.

Data can be input via the default mode, "Configuration of options", as the dialog is supported by meaningful default settings to minimize input errors. 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 transmis-sion of the drawing to the user.



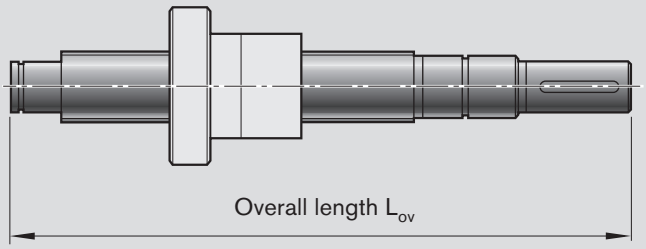
The ordering data given on Page 20 cover all the parameters of a precision ball screw assembly. Once you have defined the nominal diameter and lead and entered the overall length, the functionality guides you through a succession of dialog boxes allowing you to select the desired options.

Nominal diameter, leads

Nominal 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			■			■			■

Screws > ø 80 mm available upon request

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

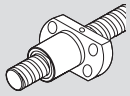


Precision Ball Screw Assemblies

Nut type

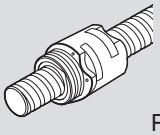
The various series versions and forms are shown below.

FEM-E-B Single nut with flange Miniature series



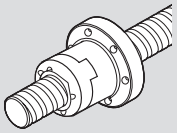
Page 22

ZEV-E-S Screw-in nut ECO series



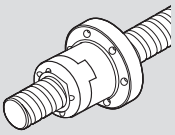
Page 24

FBZ-E-S Single nut with flange, ECO series



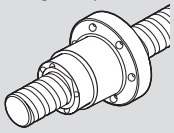
Page 26

FSZ-E-S Single nut with flange, ECOplus series



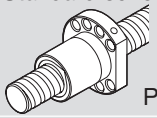
Page 28

FEP-E-S Single nut with flange, Speed series



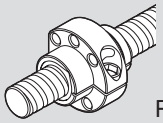
Page 30

FEM-E-C Single nut with flange DIN 69 051, Part 5 Standard series



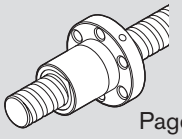
Page 32

SEM-E-C Adjustable-preload single nut, DIN 69 051, Part 5 Standard series



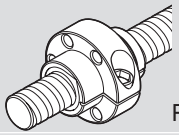
Page 34

FEM-E-S Single nut with flange Standard series



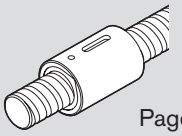
Page 36

SEM-E-S Adjustable-preload single nut Standard series



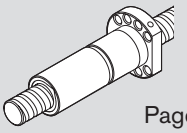
Page 38

ZEM-E-S Cylindrical single nut Standard series



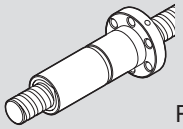
Page 40

FDM-E-C Double nut with flange, DIN 69 051, Part 5 Standard series



Page 42

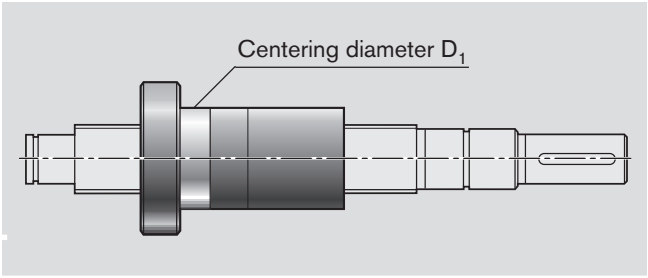
FDM-E-S Double nut with flange Standard series

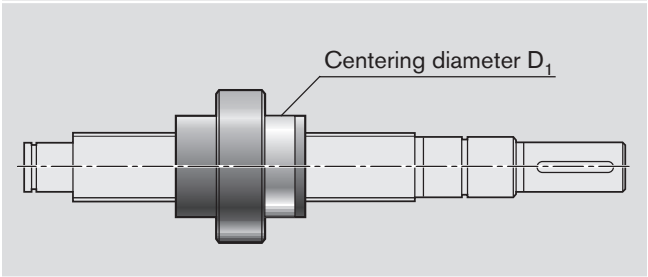


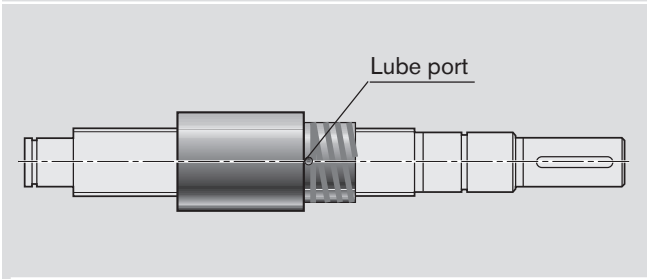
Page 44

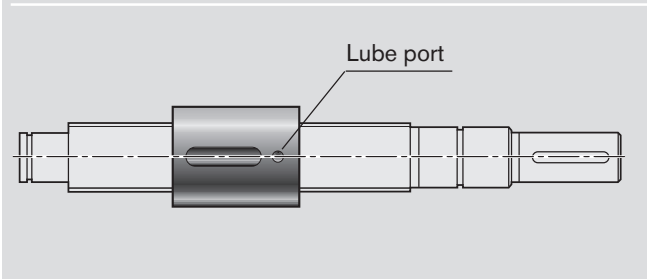
Mounting direction of nut types

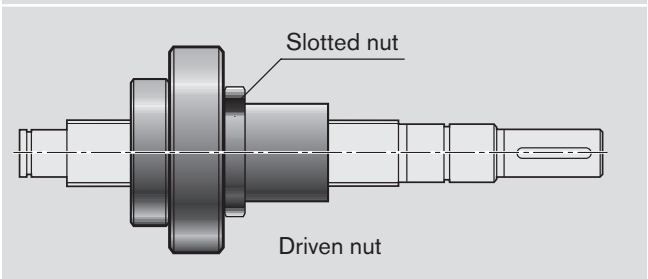
Definition: The centering diameter on a nut with flange, the slotted nut on a driven nut and the lube bore on a cylindrical nut points to the right end of the screw.





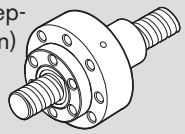




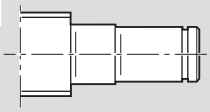
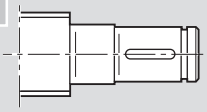
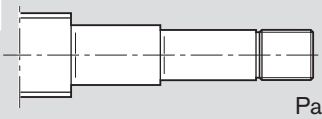
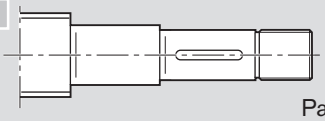
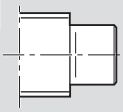
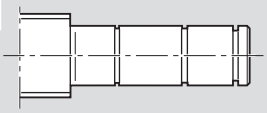
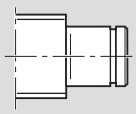
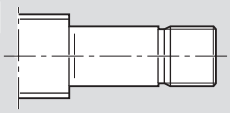
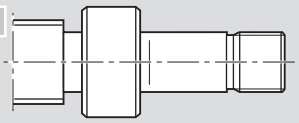
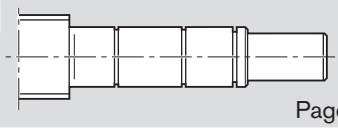
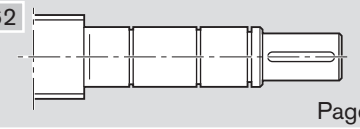
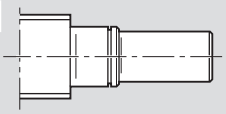
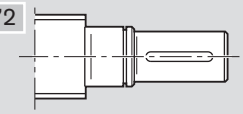
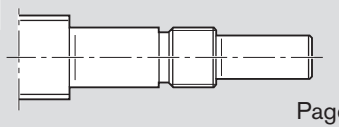
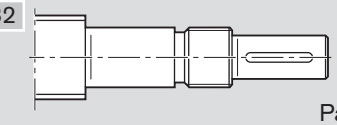
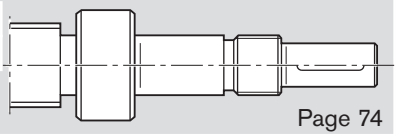
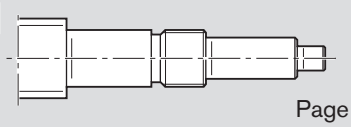
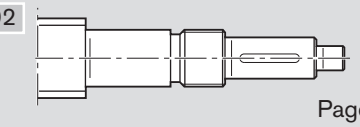
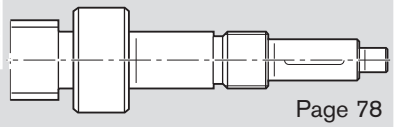


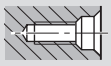
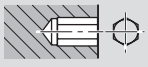
FAR-B-S

For driven nuts, please refer to catalog R310EN 3304 (in prep-aration)



Screw ends, forms for a left or right screw end

Basic version	With keyway	Cut to size only “T”
00  Page 54		00  Page 55
01  Page 56	02  Page 56	
11  Page 58	12  Page 58	
21  Page 60		
31  Page 62		
41  Page 64		
		End friction-welded with/without keyway
51  Page 66		53  Page 66
61  Page 68	62  Page 68	
71  Page 70	72  Page 70	
81  Page 72	82  Page 72	83 84  Page 74
91  Page 76	92  Page 76	93 94  Page 78

Machining of end face	Z Centering hole DIN 332-D	S Hex socket
		

Precision Ball Screw Assemblies

Ordering Code

Precision Ball Screw Assembly	SEM-E-S	20 x	5R x	3-4	1	2	T7	R	81Z120	41Z120	1250	1	1

Nut type

FEM-E-B	Single nut with flange Miniature series
ZEV-E-S	Screw-in nut ECO series
FBZ-E-S	Single nut with flange ECO series
FSZ-E-S	Single nut with flange ECOplus series
FEP-E-S	Single nut with flange Speed series
FEM-E-C	Single nut with flange to DIN 69 051, Part 5
FEM-E-S	Single nut with flange, Rexroth mounting dimensions
SEM-E-C	Adjustable-preload single nut to DIN 69 051, Part 5
SEM-E-S	Adjustable-preload single nut, Rexroth mounting dimensions
ZEM-E-S	Cylindrical single nut, Rexroth mounting dimensions
FDM-E-C	Double nut with flange to DIN 69 051, Part 5
FDM-E-S	Double nut with flange, Rexroth mount. dim.

Size

- Nominal diameter (mm)
- Lead (mm)
- Direction of lead R … right, L … left
- Ball diameter (mm)
- Number of ball track turns in the nut

Seal

0 … none	2*… reinforced seal
1 … standard seal	X … not possible

Preload

0 … standard backlash	4 … 10% (double nut)
1 … reduced backlash	5 … 7% (double nut)
2**… 5% (single nut)	6 … 3% (single nut)
3 … 2% (single nut) standard	

Precision

(P5) T5 T7 T9 … precision-rolled screw
P1 P3 P5 … precision screw

Screw

R … precision-rolled F … precision

Left screw end

- Form
  - Z … centering to DIN 332-D
- Option
  - S … hex socket
  - K … none
- Version

Right screw end

see left screw end

Overall length L_{ov} (mm)

Documentation

0 … standard (acceptance test report) – is always supplied	2 … torque test report
	3 … lead and torque test report
1 … lead test report	

Lubrication

0 … preserved	1 … preserved and nut with basic greasing

* only for d_0 25 to 40 of the precision-rolled version; note higher frictional torque!
** only for d_0 16 to 63

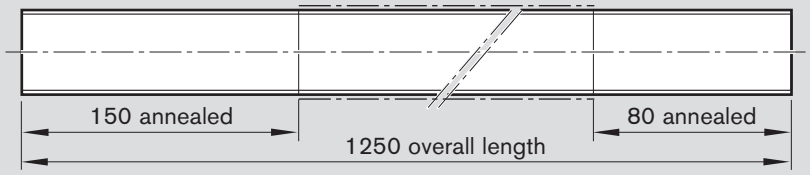
Note: It is also possible to process inquiries based on a customer's drawings.

For screws supplied separately; cut to size only “T”

Screw	SN	20 x 5 R x 3	X	X	T7	R	00 T 200	00 T 200	1250	0	0
Screw											
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 … precision-rolled screw										
Screw	R … precision-rolled screw										
Left screw end	Form										
	Option – –T … cut to size only										
	Version (corresponds to screw nominal diameter)										
Right screw end	see left screw end										
Overall length L_{ov}(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 involving precision-rolled screws SN-R with annealed ends, please consult us.



Precision Ball Screw Assemblies

Miniature Single Nut with Flange FEM-E-B

Miniature series

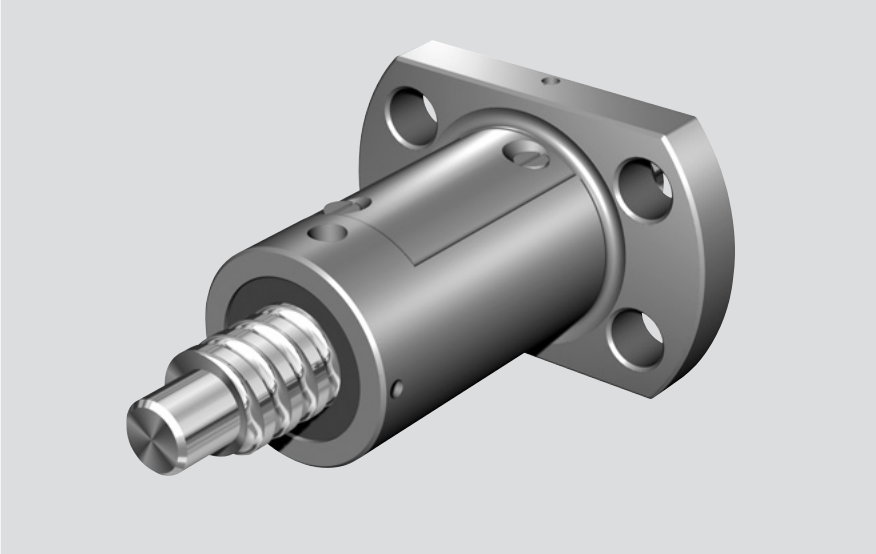
Rexroth mounting dimensions

Flange type B

With seals

With backlash or reduced backlash

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



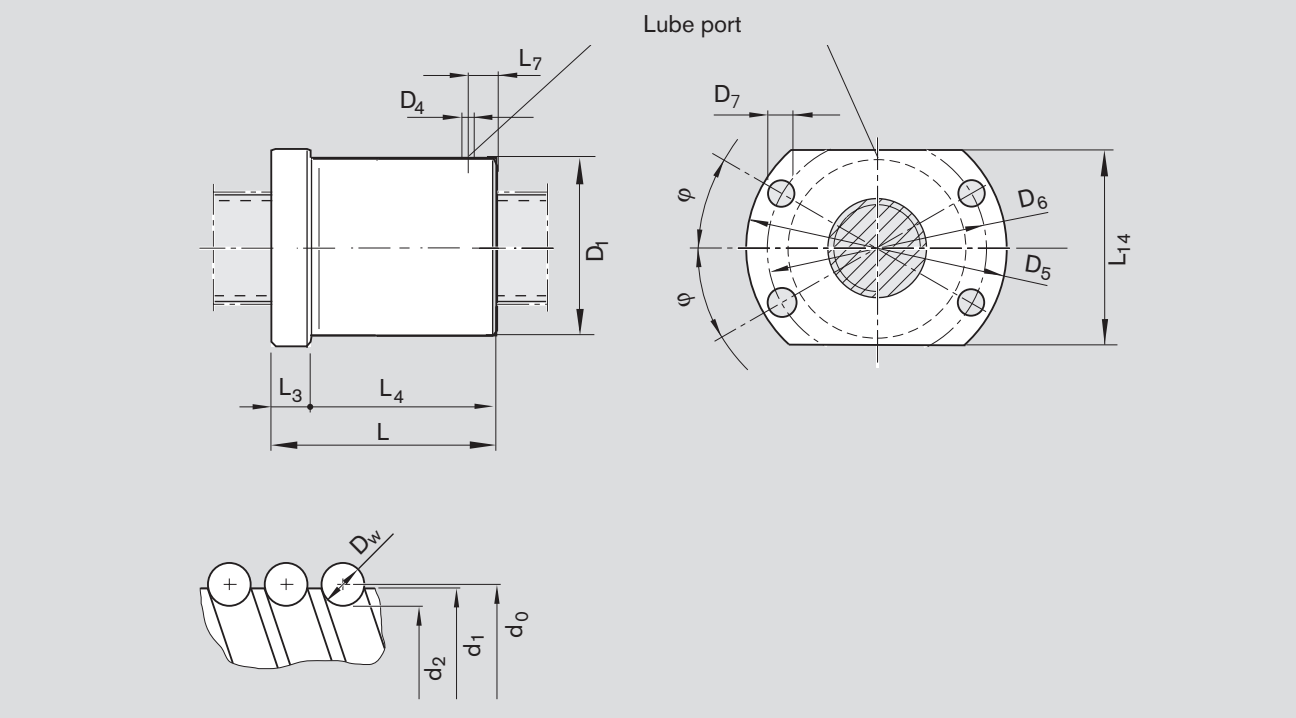
d_0 = nominal diameter
P = lead
(R = right-hand, L = left-hand)
D_w = ball diameter
i = number of ball track turns

Ordering code:

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

Category	Size d_0 x P x D_w - i	Part number	Load ratings dyn. C (N)	stat. C_0 (N)	Speed* $v_{max.}$ [m/min]
A	6 x 1 R x 0.8 - 4	R1532 100 06	900	1290	3
A	6 x 2 R x 0.8 - 4	R1532 120 06	890	1280	6
A	8 x 1 R x 0.8 - 4	R1532 200 06	1020	1740	3
A	8 x 2 R x 1.2 - 4	R1532 220 06	1870	2760	6
A	8 x 2.5R x 1.588 - 3	R1532 230 06	2200	2800	15
A	12 x 2 R x 1.2 - 4	R1532 420 06	2240	4160	12
A	12 x 5 R x 2 - 3	R1532 460 06	3800	5800	30
A	12 x 10 R x 2 - 2	R1532 490 06	2500	3600	60

* See P. 99 Characteristic speed $d_0 \cdot n$ and P. 120 Critical speed n_k



Dimensions (mm)													Weight
d_1	d_2	D_1 g6	D_4	D_5	D_6	D_7	L	L_3	L_4	L_7	L_{14}	φ (°)	m (kg)
6.0	5.3	12	2	24	18	3.4	19.5	3.5	16	3.5	16	30	0.02
6.0	5.3	12	2	24	18	3.4	22.5	3.5	19	3	16	30	0.02
8.0	7.3	16	2	28	22	3.4	22	6	16	3.5	19	30	0.035
8.0	7.0	16	2	28	22	3.4	25	6	19	3	19	30	0.05
7.5	6.3	16	2	28	22	3.4	16	6	10	3	19	30	0.03
11.7	10.8	20	2	37	29	4.5	19	8	11	2.5	24	30	0.055
11.4	9.9	22	2	37	29	4.5	28	8	20	6	24	30	0.075
11.4	9.9	22	2	37	29	4.5	33	8	25	8	24	30	0.085

Precision Ball Screw Assemblies

Screw-in Nut ZEV-E-S

ECO series

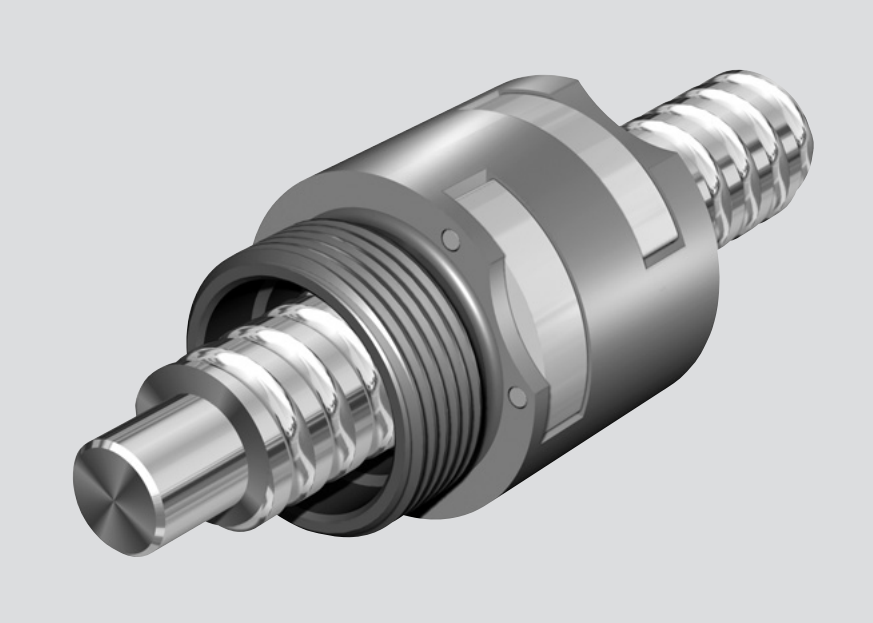
Rexroth mounting dimensions

Without seals (no initial greasing)

Seals available on request - please specify on the order

With backlash only

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



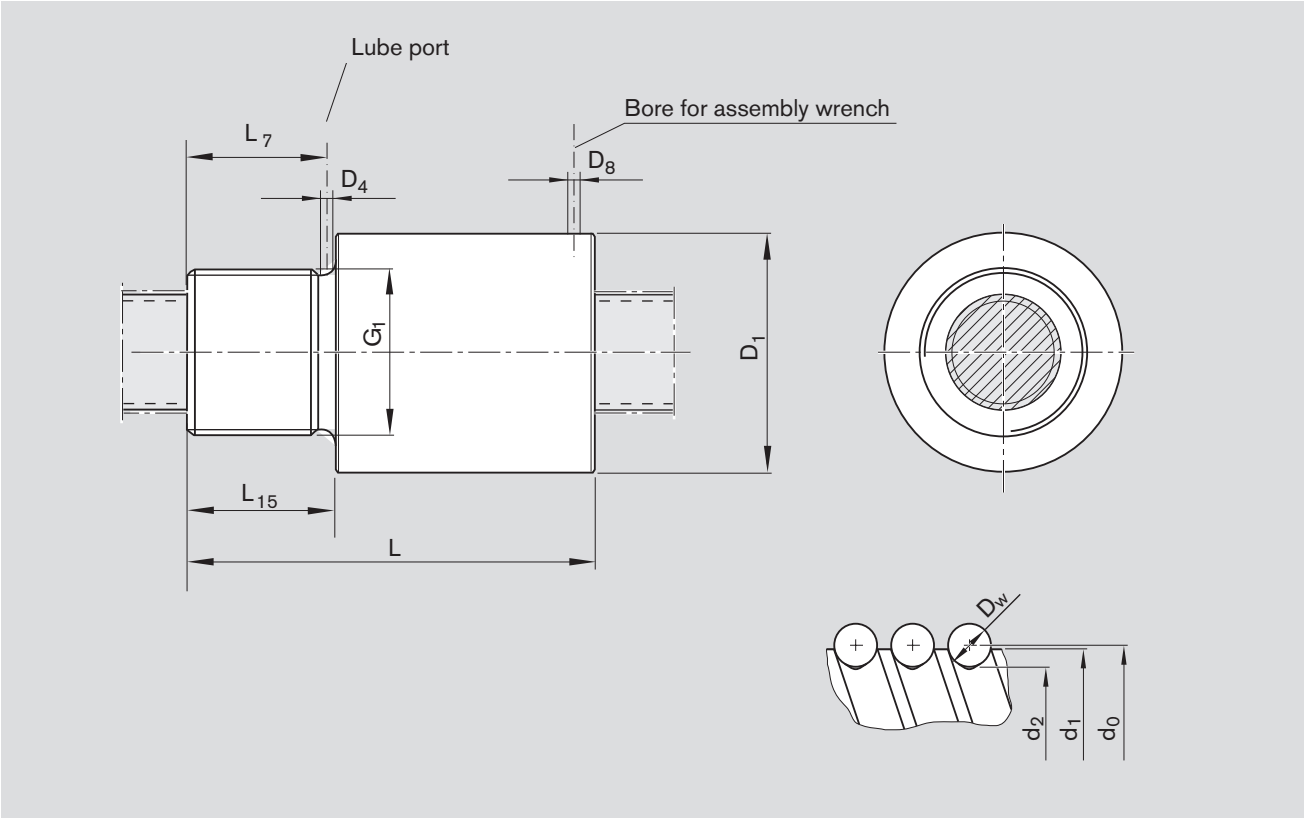
d_0 = nominal diameter
P = lead
(R = right-hand, L = left-hand)
D_w = ball diameter
i = number of ball track turns

Ordering code:

ZEV-E-S	20 x 5R x 3-4	0	0	T7	R	81K120	41K120	550	0	1

Category	Size d_0 x P x D_w - i	Part number	Load ratings dyn. C (N)	stat. C_0 (N)	Speed* $v_{max.}$ [m/min]
A	12 x 5R x 2 - 3	R2542 430 01	2300	3500	30
A	12 x 10R x 2 - 2	R2542 430 11	1500	2200	60
A	16 x 5R x 3 - 3	R2542 000 01	5600	7100	25
A	16 x 10R x 3 - 3	R2542 000 11	5800	7400	50
A	20 x 5R x 3 - 4	R2542 100 01	8600	12900	20

* See P. 99 Characteristic speed $d_0 \cdot n$ and P. 120 Critical speed n_k



Dimensions (mm)									Backlash	Weight
d_1	d_2	D_1 h10	D_4	D_8	G_1	L ±0.3	L_7	L_{15}	max. (mm)	m (kg)
11.4	9.9	25.5	2.7	3.2	M20 x 1	36	8.5	10	0.1	0.09
11.4	9.9	25.5	2.7	3.2	M20 x 1	40	8.5	10	0.1	0.10
15.0	12.9	32.5	2.7	4.2	M26 x 1.5	40	10.5	12	0.1	0.14
15.0	12.9	32.5	2.7	4.2	M26 x 1.5	54	10.5	12	0.1	0.21
19.0	16.9	38	2.7	8	M35 x 1.5	50	12.5	14	0.1	0.25

Precision Ball Screw Assemblies

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

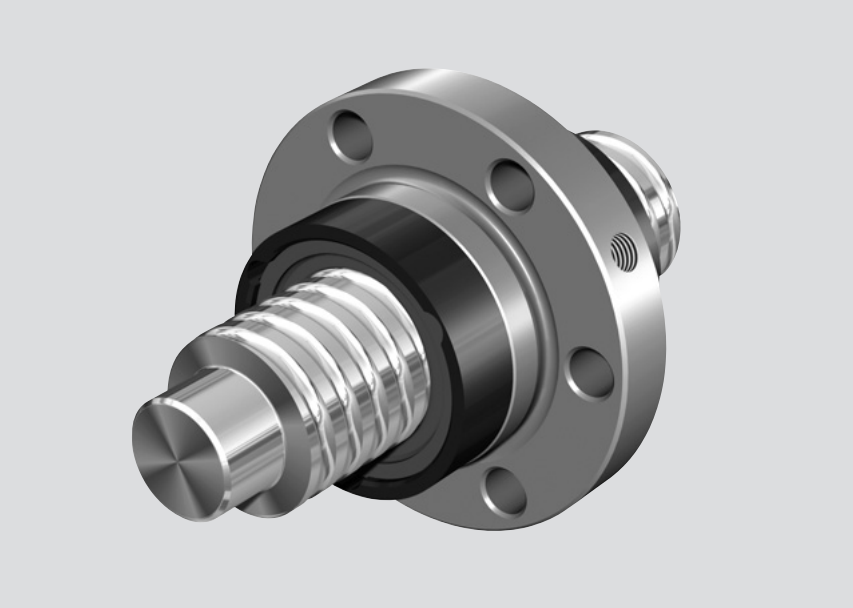
ECO series

Rexroth mounting dimensions

With seals

With backlash only

For precision-rolled screws SN-R, with 4 starts, of tolerance grade T7, T9



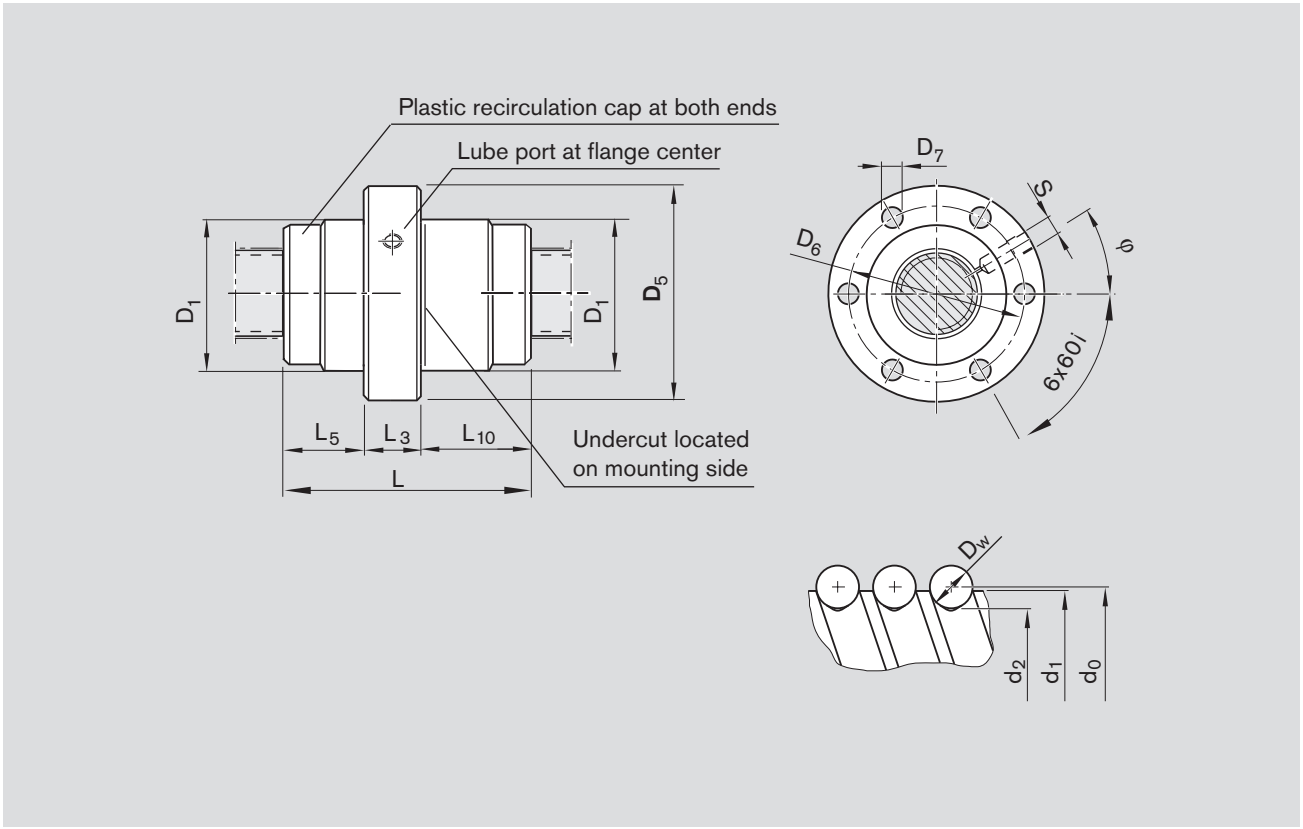
d_0 = nominal diameter
P = lead
(R = right-hand, L = left-hand)
D_w = ball diameter
i = number of ball track turns

Ordering code:

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

Category	Size d_0 x P x D_w - i	Part number	Load ratings dyn. C (N)	stat. C_0 (N)	Speed* $v_{max.}$ [m/min]
B	20 x 5R x 3 - 4	R2542 100 02	8600	12900	20
B	25 x 5R x 3 - 4	R2542 200 02	9500	16300	16
B	25 x 10R x 3 - 4	R2542 200 12	9400	16200	32
B	32 x 5R x 3.5 - 4	R2542 300 02	13000	24000	13
B	32 x 10R x 3.969 - 5	R2542 300 12	19000	35000	25

* See P. 99 Characteristic speed $d_0 \cdot n$ and P. 120 Critical speed n_k



Dimensions (mm)												Backlash	Weight
d_1	d_2	D_1 -0.2	D_5	D_6	D_7	L	L_3	L_5 ±0.5	L_{10}	S	φ (°)	max. (mm)	m (kg)
19.0	16.9	33	58	45	6.6	40	10	15	15	M6	30	0.1	0.22
24.0	21.9	38	63	50	6.6	43	10	16.5	16.5	M6	30	0.1	0.25
24.0	21.9	38	63	50	6.6	62	10	16	36	M6	30	0.1	0.34
31.0	28.4	48	73	60	6.6	46	12	17	17	M6	30	0.1	0.41
31.0	27.9	48	73	60	6.6	77	12	20	45	M6	30	0.1	0.63

Precision Ball Screw Assemblies

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

ECOplus series

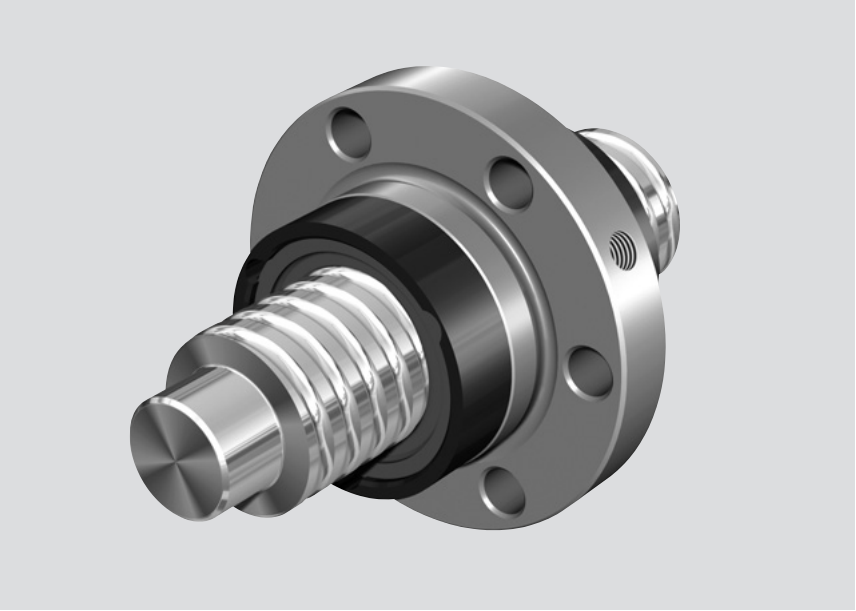
Rexroth mounting dimensions

ECOplus load ratings in accordance with Standard series (see P. 36)

With seals

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

For precision-rolled screws SN-R of tolerance grade T5, T7, T9 and precision screws SN-F of tolerance grade P3, P5



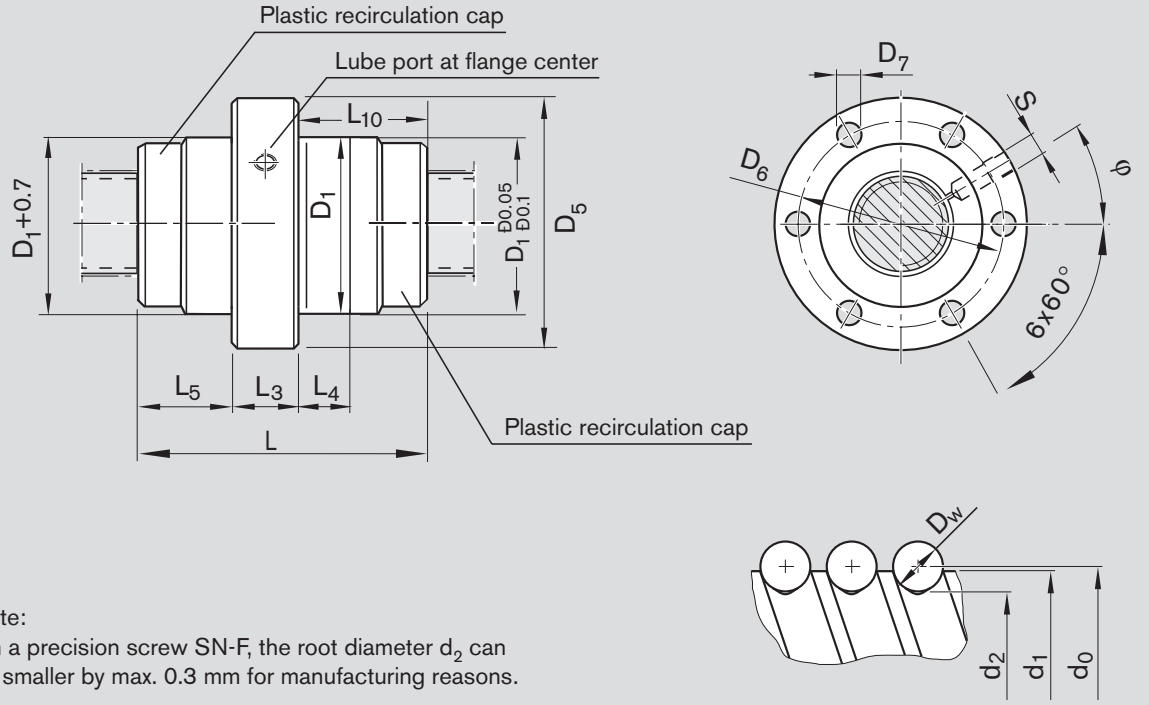
d_0 = nominal diameter
P = lead
(R = right-hand, L = left-hand)
D_w = ball diameter
i = number of ball track turns

Ordering code:

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

Category	Size d_0 x P x D_w - i	Part number	Load ratings dyn. C (N)	stat. C_0 (N)	Speed* $v_{max.}$ [m/min]
A	20 x 5R x 3 - 4	R1502 110 41	14300	21500	30
A	25 x 5R x 3 - 4	R1502 210 41	15900	27200	30
A	25 x 10R x 3 - 4	R1502 240 41	15700	27000	60
A	32 x 5R x 3.5 - 4	R1502 310 41	21600	40000	23
A	32 x 10R x 3.969 - 5	R1502 340 41	31700	58300	47
A	32 x 20R x 3.969 - 2	R1502 370 41	13500	21800	94
A	40 x 5R x 3.5 - 5	R1502 410 41	29100	64100	19
A	40 x 10R x 6 - 4	R1502 440 41	50000	86400	38
A	40 x 20R x 6 - 3	R1502 470 41	37900	62800	75

* See P. 99 Characteristic speed $d_0 \cdot n$ and P. 120 Critical speed n_k



Note:
On a precision screw SN-F, the root diameter d_2 can be smaller by max. 0.3 mm for manufacturing reasons.

Dimensions (mm)													Weight
d_1	d_2	D_1 g6	D_5	D_6	D_7	L ±0.5	L_3	L_4	L_5	L_{10}	S	φ (°)	m (kg)
19.0	16.9	33	58	45	6.6	40	10	6	15	15	M6	30	0.22
24.0	21.9	38	63	50	6.6	43	10	6	16.5	16.5	M6	30	0.25
24.0	21.9	38	63	50	6.6	62	10	16	16	36	M6	30	0.34
31.0	28.4	48	73	60	6.6	46	12	6	17	17	M6	30	0.41
31.0	27.9	48	73	60	6.6	77	12	16	20	45	M6	30	0.63
31.0	27.9	56	80	68	6.6	65	12	10	19	34	M6	30	0.69
39.0	36.4	56	80	68	6.6	52	14	8	18.5	19.5	M8x1	30	0.54
38.0	33.8	63	95	78	9	71	14	16	22	35	M8x1	30	1.06
38.0	33.8	63	95	78	9	89	14	25	22	53	M8x1	30	1.30

Precision Ball Screw Assemblies

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

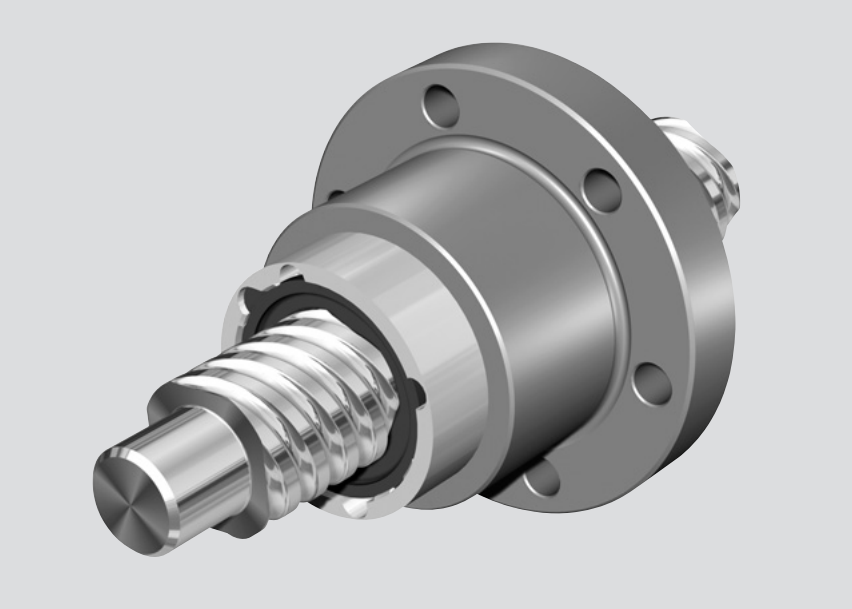
Speed series

Rexroth mounting dimensions

With seals

With backlash, reduced backlash or preload 2%

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



d_0 = nominal diameter
P = lead
(R = right-hand, L = left-hand)
D_w = ball diameter

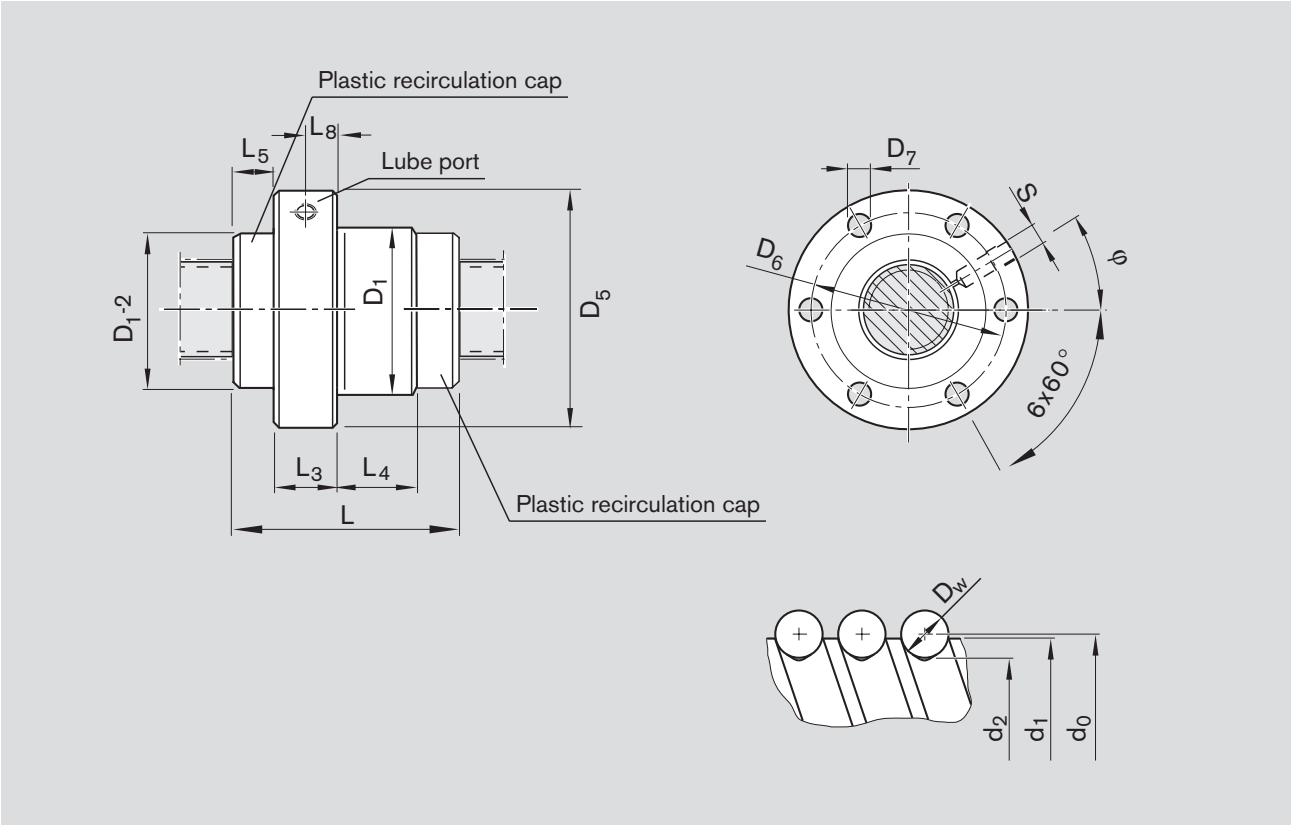
i = a x b
"a" Bearing turns per thread
"b" Number of bearing threads on the screw

Ordering code:

FEP-E-S	25 x 25R x 3.5-1.2x4	1	0	T5	R	81K170	41K120	1000	0	1

Category	Size d_0 x P x D_w - i	Part number	Load ratings dyn. C (N)	 stat. C_0 (N)	Speed* $v_{max.}$ [m/min]
A	20 x 40R x 3.5 - 1 x 4	R2522 100 11	8000	14900	150
A	25 x 25R x 3.5 - 1.2 x 4	R2522 200 01	19700	39400	120
A	32 x 32R x 3.969 - 1.2 x 4	R2522 300 01	26300	57600	120

* See P. 99 Characteristic speed $d_0 \cdot n$ and P. 120 Critical speed n_k



Dimensions (mm)													Weight
d_1	d_2	D_1	D_5 g6	D_6	D_7	L	L_3 ±0.3	L_4	L_5	L_8	S	φ	m (°) (kg)
19	16.4	38	63	50	6.6	57	12	23	11	8.0	M6	30	0.51
24	21.4	48	73	60	6.6	52	12	14	13	5.0	M6	30	0.51
31	28.4	56	80	68	6.6	68	15	21	16	7.7	M6	30	0.78

Precision Ball Screw Assemblies

Single Nut with Flange FEM-E-C

Standard series

Mounting dimensions to DIN 69 051, Part 5

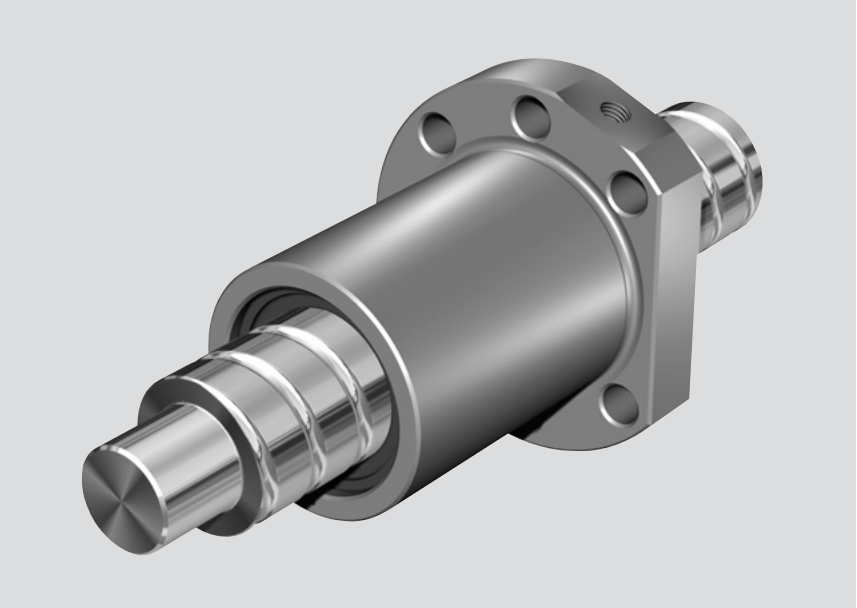
Flange type C

With standard seals

Reinforced seals, see Page 110 (some sizes not available)

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

For precision-rolled screws SN-R of tolerance grade T5, T7, T9 and precision screws SN-F of tolerance grade P3, P5; P1 upon request



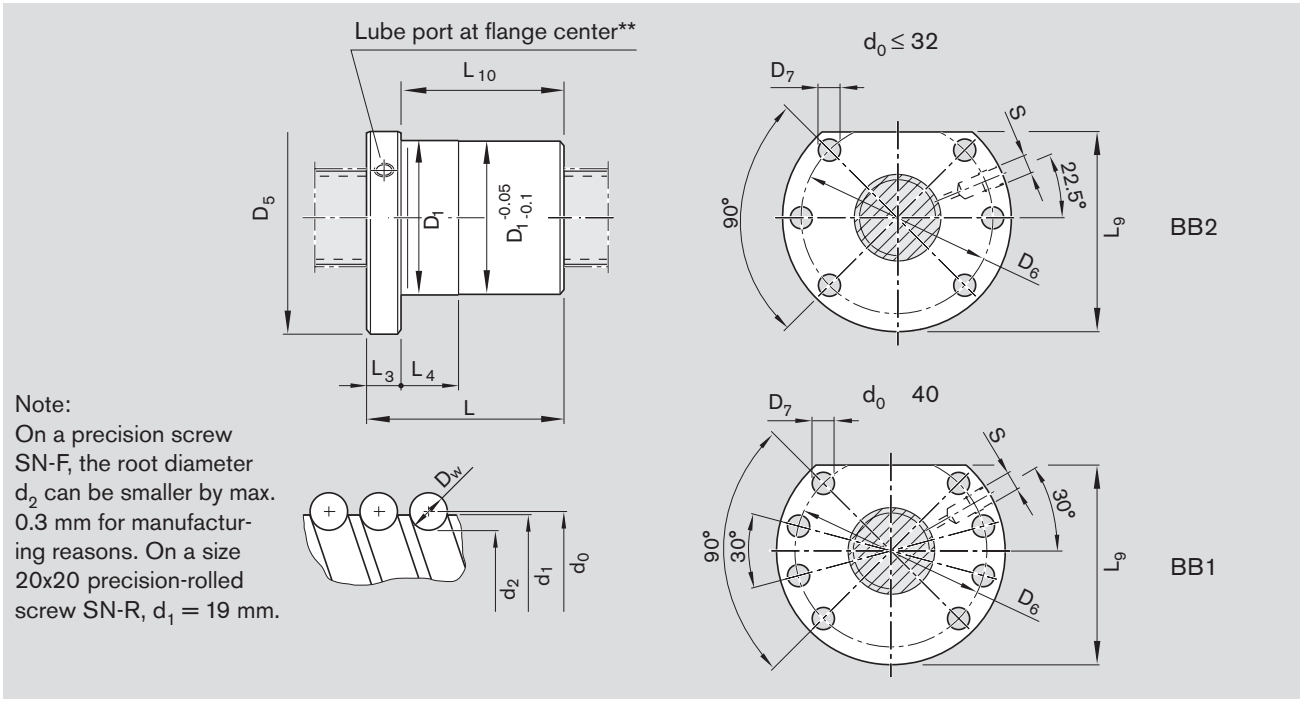
d_0 = nominal diameter
P = lead
(R = right-hand, L = left-hand)
D_w = ball diameter
i = number of ball track turns

Ordering code:

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

Category	Size d_0 x P x D_w - i	Part number	Load ratings dyn. C (N)	stat. C_0 (N)	Speed* $v_{max.}$ [m/min]
A	16 x 5R x 3 - 4	R1502 010 65	12300	16100	30
A	16 x 10R x 3 - 3	R1502 040 85	9600	12300	60
A	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
A	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
A	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
C	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	R1502 770 96	262700	534200	30
C	100 x 10R x 6.5 - 6	R1502 840 66	119500	371900	10
C	100 x 20R x 12.7 - 6	R1502 870 66	295100	686400	20
C	125 x 10R x 6.5 - 6	R1502 940 66	130600	468700	8
C	125 x 20R x 12.7 - 6	R1502 970 66	326500	870400	16

* See P. 99 Characteristic speed $d_0 \cdot n$ and P. 120 Critical speed n_k



Note:
On a precision screw SN-F, the root diameter d_2 can be smaller by max. 0.3 mm for manufacturing reasons. On a size 20x20 precision-rolled screw SN-R, $d_1 = 19$ mm.

Dimensions (mm)													Weight
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**	m (kg)
15.0	12.9	28	48	BB2	38	5.5	38	12	10	44.0	26	M6	0.19
15.0	12.9	28	48	BB2	38	5.5	45	12	16	44.0	33	M6	0.21
15.0	12.9	28	48	BB2	38	5.5	61	12	20	44.0	49	M6	0.26
19.0	16.9	36	58	BB2	47	6.6	40	12	10	51.0	28	M6	0.31
19.3	16.7	36	58	BB2	47	6.6	77	12	25	51.0	65	M6	0.49
24.0	21.9	40	62	BB2	51	6.6	45	12	10	55.0	33	M6	0.36
24.0	21.9	40	62	BB2	51	6.6	64	12	16	55.0	52	M6	0.47
24.0	21.4	40	62	BB2	51	6.6	95	12	30	55.0	83	M6	0.63
31.0	28.4	50	80	BB2	65	9.0	48	13	10	71.0	35	M6	0.62
31.0	27.9	50	80	BB2	65	9.0	77	13	16	71.0	64	M6	0.84
31.0	27.9	50	80	BB2	65	9.0	84	13	25	71.0	71	M6	0.90
31.0	27.9	50	80	BB2	65	9.0	120	13	40	71.0	107	M6	1.21
39.0	36.4	63	93	BB1	78	9.0	54	15	10	81.5	39	M8x1	1.03
38.0	33.8	63	93	BB1	78	9.0	70	15	16	81.5	55	M8x1	1.19
38.0	33.8	63	93	BB1	78	9.0	75	15	25	81.5	60	M8x1	1.27
38.0	33.8	63	93	BB1	78	9.0	90	15	25	81.5	75	M8x1	1.51
38.0	33.8	63	93	BB1	78	9.0	88	15	25	81.5	73	M8x1	1.44
38.0	33.8	63	93	BB1	78	9.0	142	15	45	81.5	127	M8x1	2.16
49.0	46.4	75	110	BB1	93	11.0	54	15	10	97.5	39	M8x1	1.39
48.0	43.8	75	110	BB1	93	11.0	90	18	16	97.5	72	M8x1	2.14
48.0	43.8	75	110	BB1	93	11.0	105	18	25	97.5	87	M8x1	2.38
48.0	43.8	75	110	BB1	93	11.0	128	18	25	97.5	110	M8x1	2.75
48.0	43.4	75	110	BB1	93	11.0	132	18	25	97.5	114	M8x1	2.73
48.0	43.4	75	110	BB1	93	11.0	149	18	45	97.5	131	M8x1	3.04
61.0	56.8	90	125	BB1	108	11.0	90	22	16	110.0	68	M8x1	2.56
61.0	56.4	95	135	BB1	115	13.5	132	22	25	117.5	110	M8x1	4.51
61.0	56.4	95	135	BB1	115	13.5	149	22	45	117.5	127	M8x1	5.04
78.0	73.3	105	145	BB1	125	13.5	95	22	16	127.5	73	M8x1	3.40
76.0	67.0	125	165	BB1	145	13.5	170	25	25	147.5	145	M8x1	10.20
98.0	93.4	125	165	BB1	145	13.5	95	25	16	147.5	70	M8x1	4.40
96.0	87.1	150	202	BB1	176	17.5	170	30	25	178.5	140	M8x1	14.30
123.0	118.0	150	202	BB1	176	17.5	95	25	16	178.5	70	M8x1	5.65
121.0	112.0	170	222	BB1	196	17.5	170	40	25	198.5	130	M8x1	16.10

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

Precision Ball Screw Assemblies

Adjustable-Preload Single Nut SEM-E-C

Standard series

Mounting dimensions to DIN 69 051, Part 5

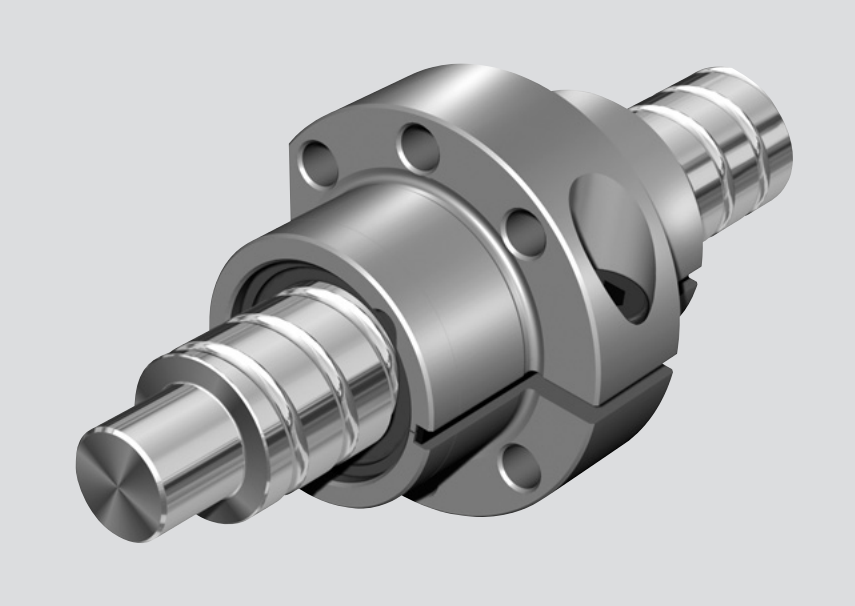
Flange type C

With standard seals

Reinforced seals, see Page 110 (some sizes not available)

Adjustable preload

For precision-rolled screws SN-R of tolerance grade T5, T7, T9 and precision screws SN-F of tolerance grade P3, P5; P1 upon request



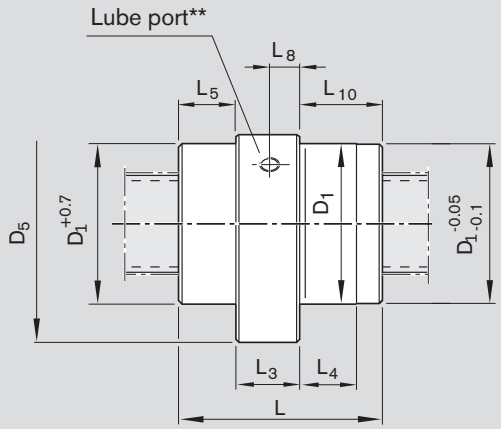
d_0 = nominal diameter
P = lead
(R = right-hand, L = left-hand)
D_w = ball diameter
i = number of ball track turns

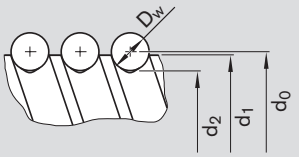
Ordering code:

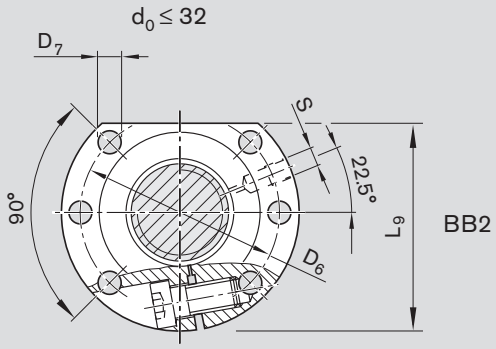
SEM-E-C	20 x 5R x 3-4	1	2	T7	R	82Z120	41Z120	1250	1	0

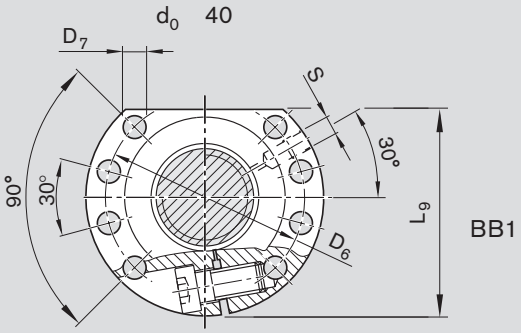
Category	Size d_0 x P x D_w - i	Part number	Load ratings dyn. C (N)	stat. C_0 (N)	Speed* $v_{max.}$ [m/min]	Centering diameter D_1 after adjustment (mm) min.	max.
B	16 x 5R x 3 - 4	R1512 010 55	12300	16100	30	27.940	27.975
C	16 x 10R x 3 - 3	R1512 040 75	9600	12300	60	27.940	27.975
C	16 x 16R x 3 - 3	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
B	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
B	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
B	40 x 20R x 6 - 3	R1512 470 75	37900	62800	75	62.941	62.969
B	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
B	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	R1512 770 56	262700	534200	30	124.931	124.959

* See P. 99 Characteristic speed $d_0 \cdot n$ and P. 120 Critical speed n_k









Note: On a precision screw SN-F, the root diameter d_2 can be smaller by max. 0.3 mm for manufacturing reasons. On a size 20x20 precision-rolled screw SN-R, d_1 = 19 mm.

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**	m (kg)
15.0	12.9	28	48	BB2	38	5.5	38	15	10	11.5	7.1	44	11.5	M6	0.20
15.0	12.9	28	48	BB2	38	5.5	45	15	15	15	11	44	15	M6	0.22
15.0	12.9	28	48	BB2	38	5.5	61	15	20	23	10	44	23	M6	0.29
19.0	16.9	36	58	BB2	47	6.6	40	15	10	12.5	7.1	51	12.5	M6	0.33
19.3	16.7	36	58	BB2	47	6.6	77	20	25	28.5	12.5	51	28.5	M6	0.56
24.0	21.9	40	62	BB2	51	6.6	45	20	10	12.5	9.5	55	12.5	M6	0.43
24.0	21.9	40	62	BB2	51	6.6	64	20	16	22	10	55	22	M6	0.54
24.0	21.4	40	62	BB2	51	6.6	95	25	30	35	14	55	35	M6	0.77
31.0	28.4	50	80	BB2	65	9	48	20	10	14	9.7	71	14	M6	0.74
31.0	27.9	50	80	BB2	65	9	77	20	16	28.5	12.5	71	28.5	M6	0.97
31.0	27.9	50	80	BB2	65	9	84	20	25	32	12.5	71	32	M6	1.04
31.0	27.9	50	80	BB2	65	9	120	20	40	50	12.5	71	50	M6	1.34
39.0	36.4	63	93	BB1	78	9	54	25	10	14.5	12	81.5	14.5	M8x1	1.25
38.0	33.8	63	93	BB1	78	9	70	25	16	22.5	11.8	81.5	22.5	M8x1	1.39
38.0	33.8	63	93	BB1	78	9	75	25	25	25	12.5	81.5	25	M8x1	1.47
38.0	33.8	63	93	BB1	78	9	88	25	25	31.5	16.5	81.5	31.5	M8x1	1.55
38.0	33.8	63	93	BB1	78	9	142	40	45	51	25	81.5	51	M8x1	2.69
49.0	46.4	75	110	BB1	93	11	54	25	10	14.5	12	97.5	14.5	M8x1	1.67
48.0	43.8	75	110	BB1	93	11	90	30	16	30	14.1	97.5	30	M8x1	2.46
48.0	43.8	75	110	BB1	93	11	105	30	25	37.5	15	97.5	37.5	M8x1	2.69
48.0	43.4	75	110	BB1	93	11	132	30	25	51	20	97.5	51	M8x1	3.08
48.0	43.4	75	110	BB1	93	11	149	30	45	59.5	18	97.5	59.5	M8x1	3.39
61.0	56.8	90	125	BB1	108	11	90	30	16	30	14	110	30	M8x1	2.83
61.0	56.4	95	135	BB1	115	13.5	132	30	25	51	20	117.5	51	M8x1	4.86
61.0	56.4	95	135	BB1	115	13.5	149	30	45	59.5	18	117.5	59.5	M8x1	5.36
78.0	73.3	105	145	BB1	125	13.5	95	30	16	32.5	14	127.5	32.5	M8x1	3.73
76.0	67.0	125	165	BB1	145	13.5	170	50	25	60	24	147.5	60	M8x1	13.50

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

Precision Ball Screw Assemblies

Single Nut with Flange FEM-E-S

Standard series

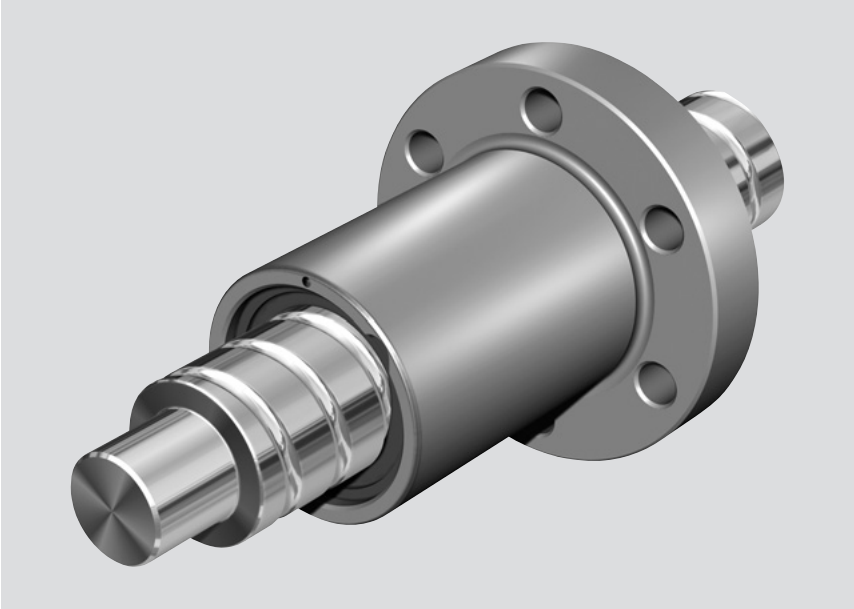
Rexroth mounting dimensions

With standard seals

Reinforced seals, see Page 110 (some sizes not available)

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

For precision-rolled screws SN-R of tolerance grade T5, T7, T9 and precision screws SN-F of tolerance grade P3, P5; P1 upon request



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

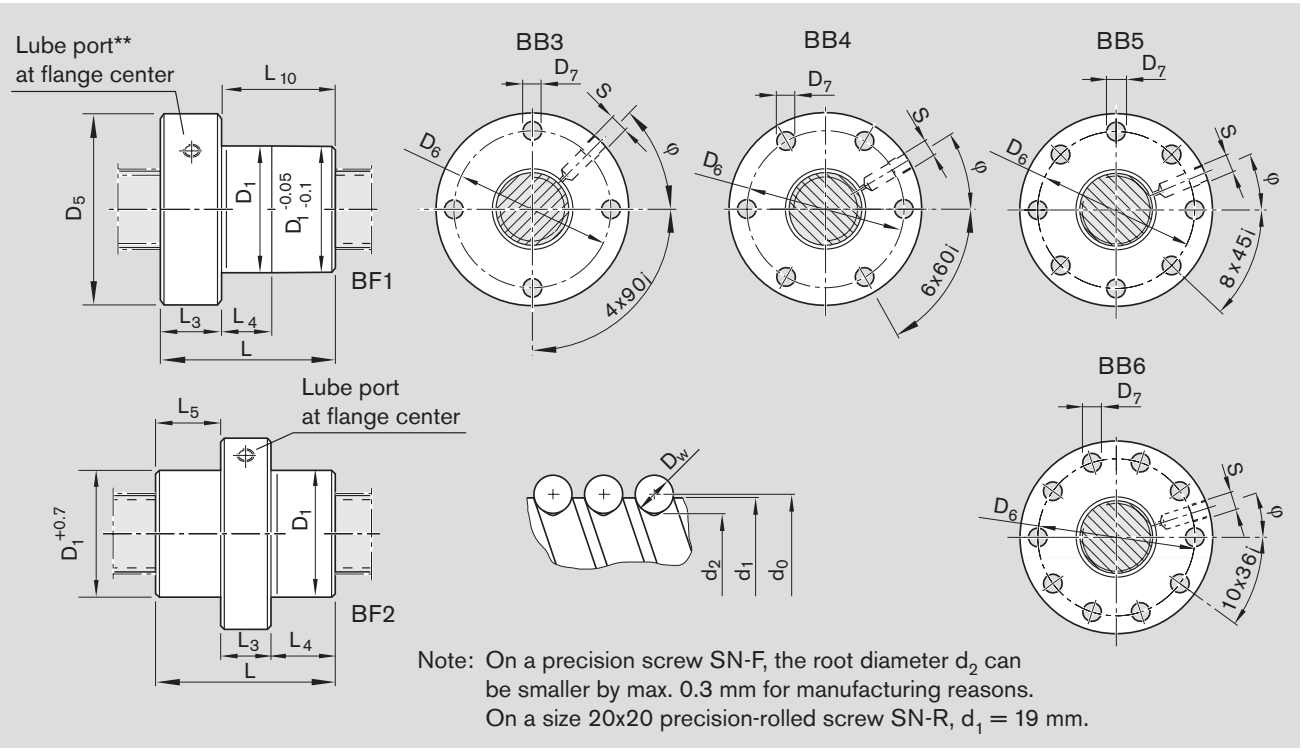
Ordering code:

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

Category	Size d_0 x P x D_w - i	Part number	Load ratings dyn. C (N)	stat. C_0 (N)	Speed* $v_{max.}$ [m/min]
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
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***	20 x 5R x 3 - 4	R1512 110 13	14300	21500	30
A	20 x 20R x 3.5 - 2	R1512 170 13	9100	12100	120
A***	25 x 5R x 3 - 4	R1512 210 13	15900	27200	30
A***	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
A***	32 x 5R x 3.5 - 4	R1512 310 13	21600	40000	23
A***	32 x 10R x 3.969 - 5	R1512 340 13	31700	58300	47
A***	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***	40 x 10R x 6 - 4	R1512 440 13	50000	86400	38
A***	40 x 20R x 6 - 3	R1512 470 13	37900	62800	75
A	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	R1512 770 23	262700	534200	30
C	100 x 10R x 6.5 - 6	R1502 840 02	119500	371900	10
C	100 x 20R x 12.7 - 6	R1502 870 02	295100	686400	20
C	125 x 10R x 6.5 - 6	R1502 940 02	130600	468700	8
C	125 x 20R x 12.7 - 6	R1502 970 02	326500	870400	16

* See P. 99 Characteristic speed $d_0 \cdot n$ and P. 120 Critical speed n_k

*** Can be replaced in these sizes by FSZ-E-S



Dimensions (mm)															Weight
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**	φ (°)	m (kg)
7.5	6.3	16	30	BB4	23	3.4	BF1	16	8	8	–	8	4	30	0.05
11.4	9.9	24	40	BB4	32	4.5	BF1	28	12	10	–	16	M6	330	0.12
11.4	9.9	24	40	BB4	32	4.5	BF1	33	12	16	–	21	M6	330	0.14
15.0	12.9	28	53	BB3	40	6.6	BF1	38	12	10	–	26	M6	315	0.24
15.0	12.9	28	53	BB3	40	6.6	BF1	45	12	16	–	33	M6	315	0.25
15.0	12.9	33	58	BB4	45	6.6	BF2	45	15	15	15	–	M6	30	0.39
19.0	16.9	33	58	BB4	45	6.6	BF1	40	12	10	–	28	M6	30	0.28
19.3	16.7	38	63	BB4	50	6.6	BF2	57	20	18.5	18.5	–	M6	30	0.60
24.0	21.9	38	63	BB4	50	6.6	BF1	45	12	10	–	33	M6	30	0.35
24.0	21.9	38	63	BB4	50	6.6	BF1	64	12	16	–	52	M6	30	0.44
24.0	21.4	48	73	BB4	60	6.6	BF2	70	25	22.5	22.5	–	M6	18	1.09
31.0	28.4	48	73	BB4	60	6.6	BF1	48	13	10	–	35	M6	30	0.54
31.0	27.9	48	73	BB4	60	6.6	BF1	77	13	16	–	64	M6	30	0.72
31.0	27.9	56	80	BB4	68	6.6	BF1	64	15	25	–	49	M6	30	1.02
31.0	27.9	56	80	BB4	68	6.6	BF2	88	20	34	34	–	M6	30	1.40
39.0	36.4	56	80	BB4	68	6.6	BF1	54	15	10	–	39	M8x1	30	0.71
38.0	33.8	63	95	BB4	78	9	BF1	70	15	16	–	55	M8x1	30	1.29
38.0	33.8	63	95	BB4	78	9	BF1	88	15	25	–	73	M8x1	30	1.54
38.0	33.8	72	110	BB4	90	11	BF2	102	40	31	31	–	M8x1	19	3.59
49.0	46.4	68	98	BB4	82	9	BF1	54	15	10	–	39	M8x1	30	1.02
48.0	43.8	72	110	BB4	90	11	BF1	90	18	16	–	72	M8x1	30	2.02
48.0	43.8	72	110	BB4	90	11	BF1	128	18	25	–	110	M8x1	30	2.58
48.0	43.4	85	125	BB4	105	11	BF1	92	22	25	–	70	M8x1	30	3.40
48.0	43.4	85	125	BB4	105	11	BF1	109	22	45	–	87	M8x1	30	3.87
61.0	56.8	85	125	BB4	105	11	BF1	90	22	16	–	68	M8x1	30	2.62
61.0	56.4	95	140	BB4	118	14	BF1	92	22	25	–	70	M8x1	30	3.71
61.0	56.4	95	140	BB4	118	14	BF1	109	22	45	–	87	M8x1	30	4.21
78.0	73.3	105	150	BB4	125	14	BF1	95	22	16	–	73	M8x1	30	3.78
76.0	67.0	125	180	BB5	152	18	BF1	170	25	25	–	145	M8x1	22.5	11.00
98.0	93.4	125	180	BB5	152	18	BF1	95	25	16	–	70	M8x1	22.5	5.46
96.0	87.1	145	200	BB5	172	18	BF1	170	30	25	–	140	M8x1	22.5	14.50
123.0	118.0	150	210	BB5	180	18	BF1	95	30	16	–	65	M8x1	22.5	7.49
121.0	112.0	170	230	BB6	200	18	BF1	170	40	25	–	130	M8x1	18	19.00

** 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.

Precision Ball Screw Assemblies

Adjustable-Preload Single Nut SEM-E-S

Standard series

Rexroth mounting dimensions

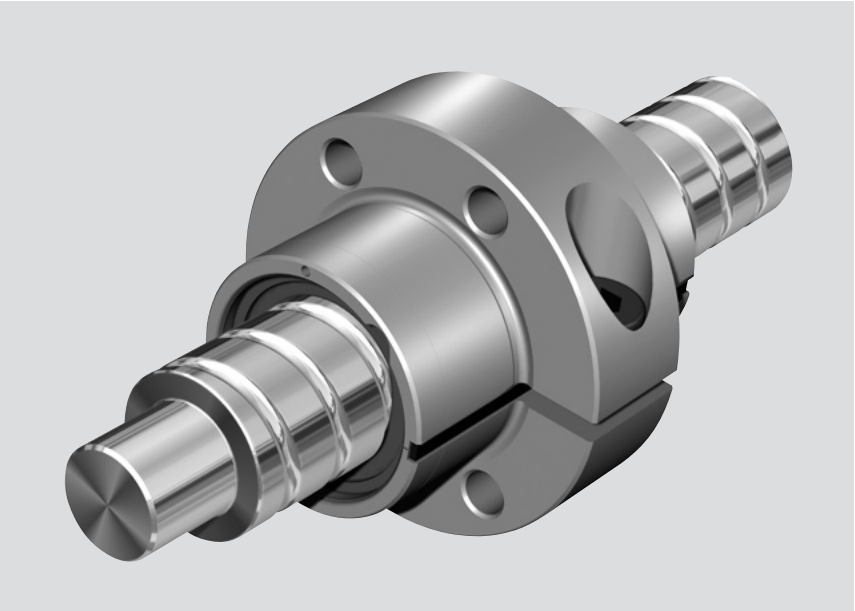
With standard seals

Reinforced seals, see Page 110 (some sizes not available)

Adjustable preload

For precision-rolled screws SN-R of tolerance grade T5, T7, T9 and precision screws SN-F of tolerance grade P3, P5; P1 upon request

With left-hand thread in some versions



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

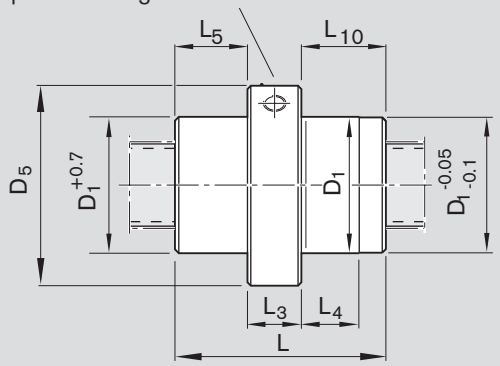
Ordering code:

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

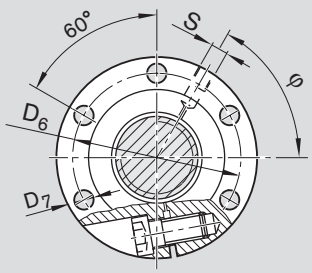
Category	Size d_0 x P x D_w - i	Part number	Load ratings dyn. C (N)	stat. C_0 (N)	Speed* $v_{max.}$ [m/min]	Centering diameter D_1 after adjustment (mm) min.	max.
B	8 x 2.5R x 1.588 - 3	R1532 230 04	2200	2800	15	15.953	15.987
B	12 x 5R x 2 - 3	R1532 460 24	3800	5800	30	23.940	23.975
C	12 x 10R x 2 - 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
B	16 x 16R x 3 - 2	R1512 060 14	6300	7600	96	32.945	32.973
A	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
A	25 x 5R x 3 - 4	R1512 210 14	15900	27200	30	37.935	37.970
A	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
A	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
A	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
A	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
A	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
A	40 x 20R x 6 - 3	R1512 470 14	37900	62800	75	62.941	62.969
A	40 x 40R x 6 - 2	R1512 490 14	25500	40300	150	71.941	71.969
B	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
B	80 x 20R x 12.7 - 6	R1512 770 24	262700	534200	30	124.931	124.959

* See P. 99 Characteristic speed $d_0 \cdot n$ and P. 120 Critical speed n_k

Lube port** at flange center

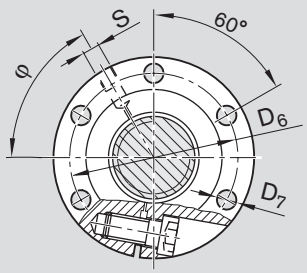


Right



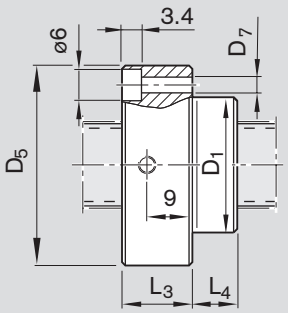
BB7

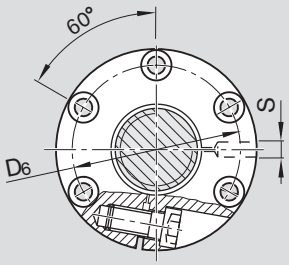
Left



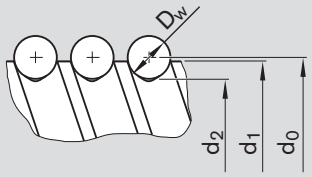
BB7

Version for 8
x 2.5
R x 1.588–3





BB7



Note:
On a precision screw SN-F, the root diameter d_2 can be smaller by max. 0.3 mm for manufacturing reasons. On a size 20x20 precision-rolled screw SN-R, d_1 = 19 mm.

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_{10}	S**	φ (°)	m (kg)
7.5	6.3	16	30	BB7	23	3.4	16	13	3	0	3	4	0	0.06
11.4	9.9	24	40	BB7	32	4.5	28	12	8	8	8	M6	55	0.12
11.4	9.9	24	40	BB7	32	4.5	33	12	10.5	10.5	10.5	M6	55	0.13
15.0	12.9	28	53	BB7	40	6.6	38	15	10	11.5	11.5	M6	53	0.24
15.0	12.9	28	53	BB7	40	6.6	45	15	15	15	15	M6	180	0.25
15.0	12.9	33	58	BB7	45	6.6	45	15	15	15	15	M6	50	0.42
19.0	16.9	33	58	BB7	45	6.6	40	15	10	12.5	12.5	M6	56	0.31
19.3	16.7	38	63	BB7	50	6.6	57	20	18.5	18.5	18.5	M6	60	0.63
24.0	21.9	38	63	BB7	50	6.6	45	20	10	12.5	12.5	M6	60	0.44
24.0	21.9	38	63	BB7	50	6.6	64	20	16	22	22	M6	60	0.53
24.0	21.4	48	73	BB7	60	6.6	70	25	22.5	22.5	22.5	M6	48	1.13
31.0	28.4	48	73	BB7	60	6.6	48	20	10	14	14	M6	60	0.64
31.0	28.4	48	73	BB7	60	6.6	48	20	10	14	14	M6	59	0.64
31.0	27.9	48	73	BB7	60	6.6	77	20	16	28.5	28.5	M6	168	0.87
31.0	27.9	56	80	BB7	68	6.6	64	20	22	22	22	M6	60	1.14
31.0	27.9	56	80	BB7	68	6.6	88	20	34	34	34	M6	60	1.44
39.0	36.4	56	80	BB7	68	6.6	54	20	10	17	17	M8x1	65	0.87
39.0	36.4	56	80	BB7	68	6.6	54	20	10	17	17	M8x1	65	0.87
38.0	33.8	63	95	BB7	78	9	70	25	16	22.5	22.5	M8x1	57	1.53
38.0	33.8	63	95	BB7	78	9	70	25	16	22.5	22.5	M8x1	57	1.53
38.0	33.8	63	95	BB7	78	9	88	25	25	31.5	31.5	M8x1	180	1.77
38.0	33.8	72	110	BB7	90	11	102	40	31	31	31	M8x1	49	3.77
49.0	46.4	68	98	BB7	82	9	54	25	10	14.5	14.5	M8x1	67	1.23
48.0	43.8	72	110	BB7	90	11	90	30	16	30	30	M8x1	61	2.44
48.0	43.4	85	125	BB7	105	11	92	30	25	31	31	M8x1	180	3.94
48.0	43.4	85	125	BB7	105	11	109	30	39.5	39.5	39.5	M8x1	60	4.42
61.0	56.8	85	125	BB7	105	11	90	30	16	30	30	M8x1	65	2.94
61.0	56.4	95	140	BB7	118	14	92	30	25	31	31	M8x1	190	4.45
61.0	56.4	95	140	BB7	118	14	109	30	39.5	39.5	39.5	M8x1	70	4.95
78.0	73.3	105	150	BB7	125	14	95	30	16	32.5	32.5	M8x1	67	4.2
76.0	67.0	125	180	BB7	152	18	170	50	25	60	60	M8x1	60	13.3

** 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.

Precision Ball Screw Assemblies

Cylindrical Single Nut ZEM-E-S

Standard series

Rexroth mounting dimensions

With standard seals

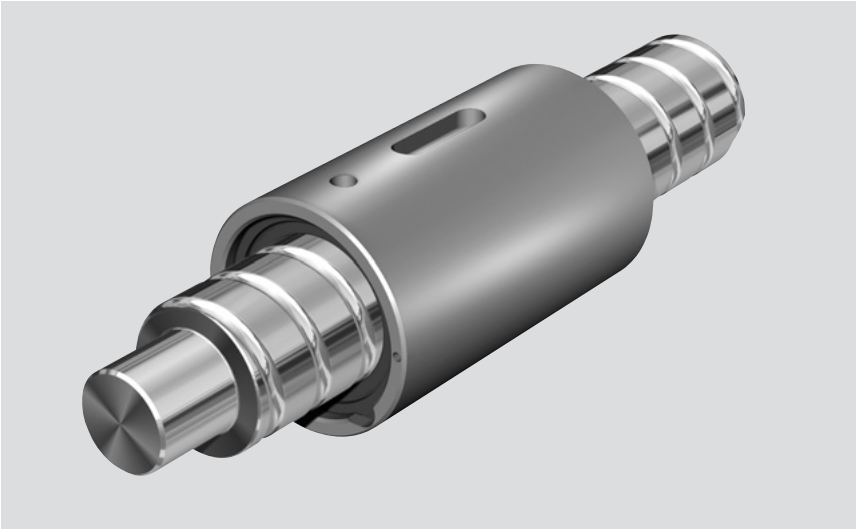
Reinforced seals, see Page 110 (some sizes not available)

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

For precision-rolled screws SN-R of tolerance grade T5, T7, T9 and precision screws SN-F of tolerance grade P3, P5; P1 upon request

With left-hand thread in some versions

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



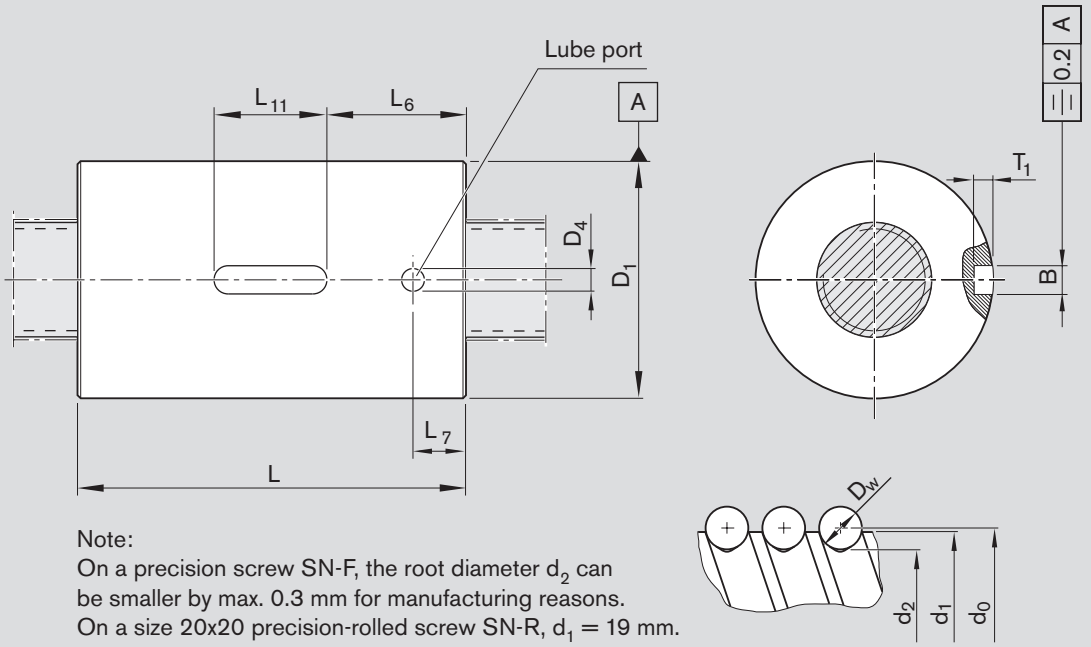
Ordering code:

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

Category	Size d_0 x P x D_w - i	Part number	Load ratings C (N)	dyn. C_0 (N)	Speed* stat. $v_{max.}$ [m/min]
A	8 x 2.5R x 1.588 - 3	R1532 230 02	2200	2800	15
B**	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
B**	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**	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
C	16 x 5L x 3 - 4	R1552 010 02	12300	16100	30
B**	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**	16 x 10R x 3 - 3	R1512 042 08	9600	12300	60
B**	16 x 10R x 3 - 3	R1512 042 09	9600	12300	60
A	16 x 16R x 3 - 2	R1512 060 12	6300	7600	96
B**	16 x 16R x 3 - 2	R1512 062 10	6300	7600	96
B**	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**	20 x 5R x 3 - 4	R1512 112 43	14300	21500	30
A	20 x 20R x 3.5 - 2	R1512 170 12	9100	12100	120
B**	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
A	32 x 10R x 3.969 - 5	R1512 340 12	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
B	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**	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
B	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
B	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

* See P. 99 Characteristic speed $d_0 \cdot n$ and P. 120 Critical speed n_k

** Special nuts for Rexroth modules and drive units



Note:
On a precision screw SN-F, the root diameter d_2 can be smaller by max. 0.3 mm for manufacturing reasons.
On a size 20x20 precision-rolled screw SN-R, d_1 = 19 mm.

Dimensions (mm)										Weight
d_1	d_2	D_1 g6	D_4	L ±0.1	L_6	L_7	L_{11} +0.2	B P9	T_1 +0.1	m (kg)
7.5	6.3	16	2	16	5	3.5	6	3	1.8	0.02
11.7	10.8	21	2	19	5.5	3.5	8	3	1.8	0.03
11.4	9.9	24	2	28	8	3.5	12	5	3	0.06
11.4	9.9	21	2	28	8	3.5	12	3	1.8	0.04
11.4	9.9	24	2	33	10.5	3.5	12	5	3	0.07
11.4	9.9	21	2	33	10.5	3.5	12	3	1.8	0.05
15.0	12.9	28	4	35	14.5	9.5	12	5	3	0.09
15.0	12.9	28	4	35	14.5	9.5	12	5	3	0.09
15.0	12.9	33	4	45	14.5	9.5	16	5	3	0.17
15.0	12.9	28	4	45	14.5	9.5	16	5	3	0.12
15.0	12.9	38	4	54	19	9.5	16	5	3	0.35
15.0	12.9	33	4	45	14.5	9.5	16	5	3	0.20
15.0	12.9	33	4	45	14.5	9.5	16	5	3	0.20
15.0	12.9	28	4	45	14.5	9.5	16	5	3	0.12
15.0	12.9	38	4	61	22.5	9.5	16	5	3	0.42
19.0	16.9	33	4	45	14.5	9.5	16	5	3	0.16
19.0	16.9	38	4	40	21	9.5	12	5	3	0.21
19.3	16.7	38	4	64	22	9.5	20	5	3	0.34
19.3	16.7	38	4	77	28.5	9.5	20	5	3	0.44
24.0	21.9	38	4	45	14.5	9.5	16	5	3	0.19
24.0	21.9	38	4	64	22	9.5	20	5	3	0.28
24.0	21.4	48	4	80	30	10.5	20	5	3	0.73
24.0	21.4	40	4	95	37.5	10.5	20	5	3	0.50
31.0	28.4	48	4	48	14	9.5	20	5	3	0.32
31.0	27.9	48	4	77	28.5	9.5	20	5	3	0.50
31.0	27.9	56	4	64	22	9.5	20	5	3	0.74
31.0	27.9	50	4	84	32	9.5	20	5	3	0.66
31.0	27.9	56	4	88	34	9.5	20	5	3	1.03
31.0	27.9	50	4	120	50	9.5	20	5	3	0.97
39.0	36.4	56	4	54	17	9.5	20	5	3	0.44
39.0	36.4	63	4	70	25	14	20	5	3	0.82
38.0	33.8	63	4	70	25	14	20	5	3	0.88
38.0	33.8	63	4	88	34	14	20	5	3	1.13
38.0	33.8	72	4	113	46.5	14	20	5	3	2.23
38.0	33.8	63	4	142	61	14	20	5	3	1.85
49.0	46.4	68	4	54	17	9.5	20	5	3	0.62
48.0	43.8	72	5	90	35	14	20	5	3	1.34
48.0	43.4	85	5	92	30	14	32	6	3.5	2.39
61.0	56.8	85	5	90	29	14	32	6	3.5	1.59

Precision Ball Screw Assemblies

Double Nut with Flange FDM-E-C

Standard series

Mounting dimensions to DIN 69 051, Part 5

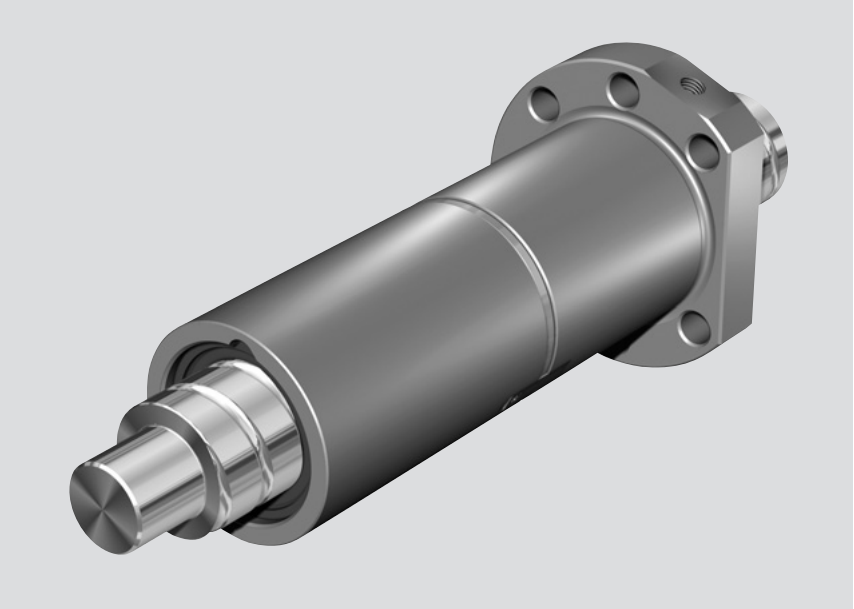
Flange type C

With standard seals

Reinforced seals, see Page 110 (some sizes not available)

With preload 7% or 10%

For precision-rolled screws SN-R of tolerance grade T5, T7 and precision screws SN-F of tolerance grade P3, P5; P1 upon request



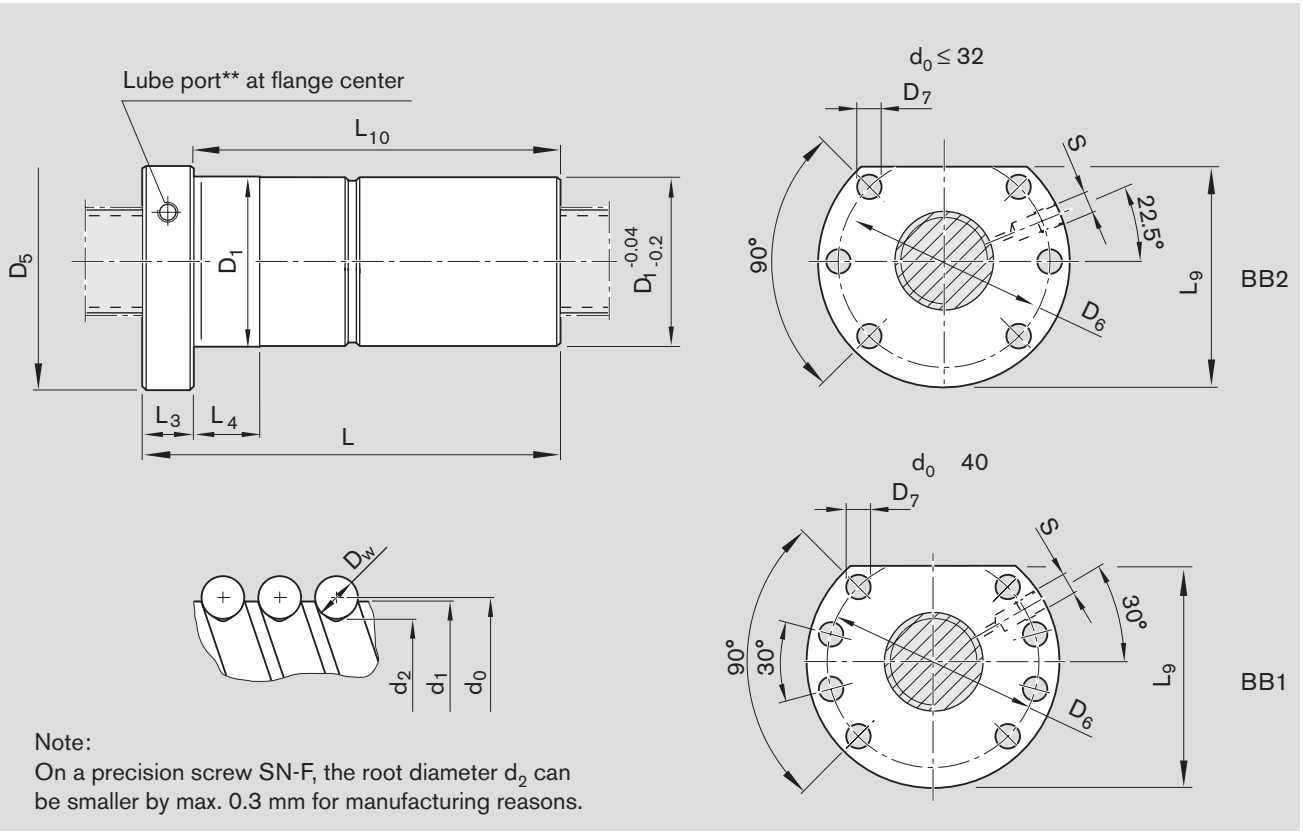
d_0 = nominal diameter
P = lead
(R = right-hand, L = left-hand)
D_w = ball diameter
i = number of ball track turns

Ordering code:

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

Category	Size d_0 x P x D_w - i	Part number	Load ratings C (N)	dyn. C_0 (N)	Speed* stat. $v_{max.}$ [m/min]
C	16 x 5R x 3 - 4	R1502 010 55	12300	16100	30
B	20 x 5R x 3 - 4	R1502 110 75	14300	21500	30
B	25 x 5R x 3 - 4	R1502 210 75	15900	27200	30
A	25 x 10R x 3 - 4	R1502 240 75	15700	27000	60
A	32 x 5R x 3.5 - 4	R1502 310 75	21600	40000	23
A	32 x 10R x 3.969 - 5	R1502 340 76	31700	58300	47
B	40 x 5R x 3.5 - 5	R1502 410 76	29100	64100	19
A	40 x 10R x 6 - 4	R1502 440 75	50000	86400	38
B	40 x 10R x 6 - 6	R1502 440 76	72100	132200	38
B	40 x 20R x 6 - 3	R1502 470 75	37900	62800	75
B	50 x 5R x 3.5 - 5	R1502 510 76	32000	81300	15
B	50 x 10R x 6 - 4	R1502 540 75	55400	109000	30
A	50 x 10R x 6 - 6	R1502 540 76	79700	166500	30
B	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
B	63 x 10R x 6 - 6	R1502 640 76	88800	214300	24
B	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
B	80 x 20R x 12.7 - 6	R1502 770 46	262700	534200	30
C	100 x 10R x 6.5 - 6	R1502 840 56	119500	371900	10
C	100 x 20R x 12.7 - 6	R1502 870 56	295100	686400	20
C	125 x 10R x 6.5 - 6	R1502 940 56	130600	468700	8
C	125 x 20R x 12.7 - 6	R1502 970 56	326500	870400	16

* See P. 99 Characteristic speed $d_0 \cdot n$ and P. 120 Critical speed n_k



Note:
On a precision screw SN-F, the root diameter d_2 can be smaller by max. 0.3 mm for manufacturing reasons.

Dimensions (mm)													Weight
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**	m (kg)
15.0	12.9	28	48	BB2	38	5.5	72	12	10	44	60	M6	0.29
19.0	16.9	36	58	BB2	47	6.6	82	12	10	51	70	M6	0.53
24.0	21.9	40	62	BB2	51	6.6	82	12	10	55	70	M6	0.57
24.0	21.9	40	62	BB2	51	6.6	120	12	16	55	108	M6	0.77
31.0	28.4	50	80	BB2	65	9	88	13	10	71	75	M6	0.96
31.0	27.9	50	80	BB2	65	9	146	13	16	71	133	M6	1.34
39.0	36.4	63	93	BB1	78	9	100	15	10	81.5	85	M8x1	1.68
38.0	33.8	63	93	BB1	78	9	140	15	16	81.5	125	M8x1	2.15
38.0	33.8	63	93	BB1	78	9	180	15	16	81.5	165	M8x1	2.73
38.0	33.8	63	93	BB1	78	9	175	15	25	81.5	160	M8x1	2.56
49.0	46.4	75	110	BB1	93	11	100	15	10	97.5	85	M8x1	2.25
48.0	43.8	75	110	BB1	93	11	140	18	16	97.5	122	M8x1	2.97
48.0	43.8	75	110	BB1	93	11	180	18	16	97.5	162	M8x1	3.73
48.0	43.4	75	110	BB1	93	11	255	18	25	97.5	237	M8x1	4.93
61.0	56.8	90	125	BB1	108	11	140	22	16	110	118	M8x1	4
61.0	56.8	90	125	BB1	108	11	180	22	16	110	158	M8x1	4.45
61.0	56.4	95	135	BB1	115	13.5	255	22	25	117.5	233	M8x1	8.21
78.0	73.3	105	145	BB1	125	13.5	190	22	16	127.5	168	M8x1	5.93
76.0	67.0	125	165	BB1	145	13.5	340	25	25	147.5	315	M8x1	19.4
98.0	93.4	125	165	BB1	145	13.5	190	25	16	147.5	165	M8x1	7.35
96.0	87.1	150	202	BB1	176	17.5	340	30	25	178.5	310	M8x1	24.6
123.0	118.0	150	202	BB1	176	17.5	190	25	16	178.5	165	M8x1	9.38
121.0	112.0	170	222	BB1	196	17.5	340	40	25	198.5	300	M8x1	29.7

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

Precision Ball Screw Assemblies

Double Nut with Flange FDM-E-S

Standard series

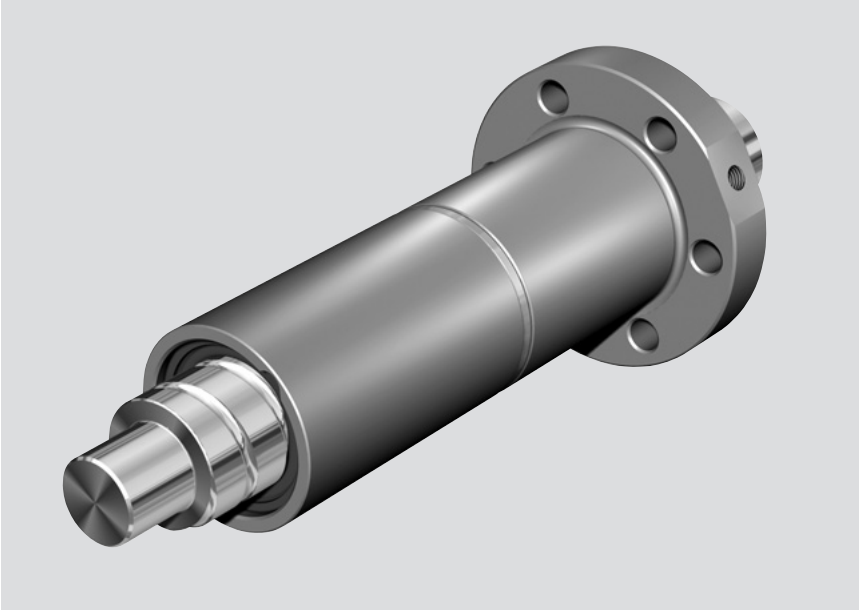
Rexroth mounting dimensions

With standard seals

Reinforced seals, see Page 110 (some sizes not available)

With preload 7% or 10%

For precision-rolled screws SN-R of tolerance grade T5, T7 and precision screws SN-F of tolerance grade P3, P5; P1 upon request



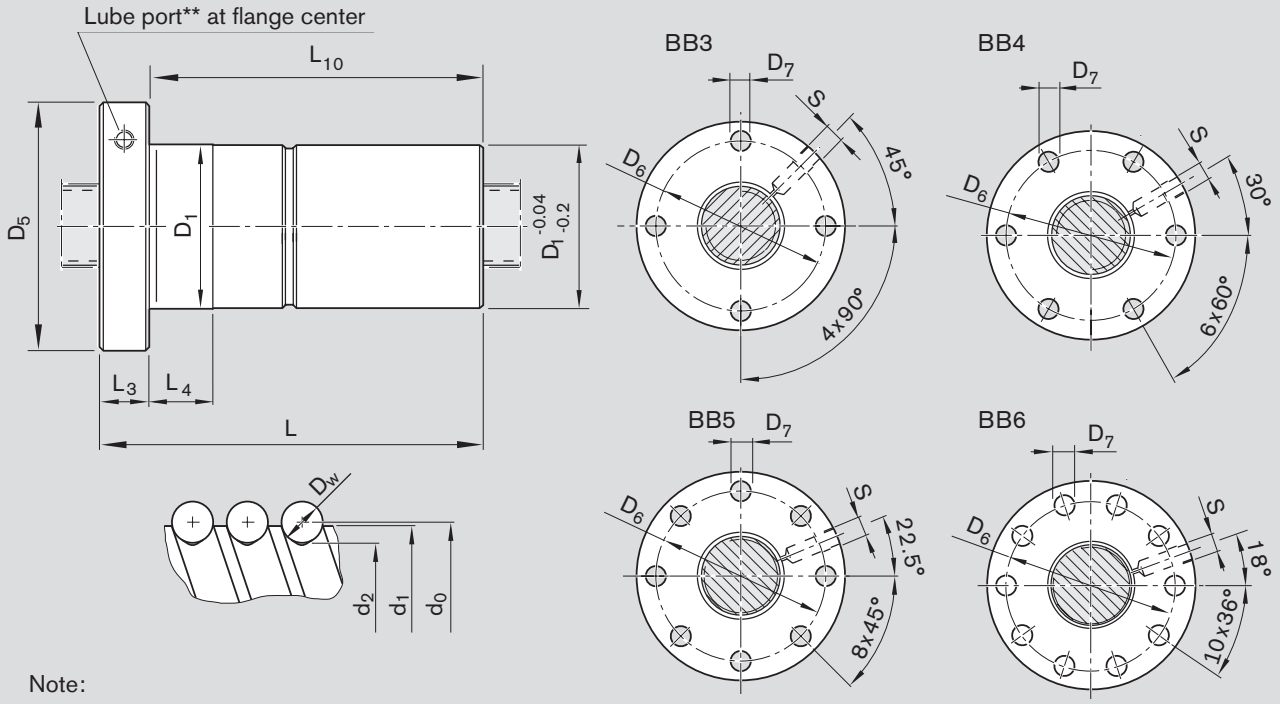
d_0 = nominal diameter
P = lead
(R = right-hand, L = left-hand)
D_w = ball diameter
i = number of ball track turns

Ordering code:

FDM-E-S	20 x 5R x 3-4	1	2	T7	R	82Z120	41Z120	1250	1	0

Category	Size d_0 x P x D_w - i	Part number	Load ratings C (N)	dyn. C_0 (N)	Speed* stat. [m/min] $v_{max.}$
C	16 x 5R x 3 - 4	R1502 010 23	12300	16100	30
B	20 x 5R x 3 - 4	R1502 110 33	14300	21500	30
B	25 x 5R x 3 - 4	R1502 210 33	15900	27200	30
A	25 x 10R x 3 - 4	R1502 240 33	15700	27000	60
A	32 x 5R x 3.5 - 4	R1502 310 33	21600	40000	23
A	32 x 10R x 3.969 - 5	R1502 340 33	31700	58300	47
B	40 x 5R x 3.5 - 5	R1502 410 33	29100	64100	19
A	40 x 10R x 6 - 4	R1502 440 33	50000	86400	38
B	40 x 10R x 6 - 6	R1502 440 34	72100	132200	38
B	40 x 20R x 6 - 3	R1502 470 33	37900	62800	75
B	50 x 5R x 3.5 - 5	R1502 510 33	32000	81300	15
B	50 x 10R x 6 - 4	R1502 540 33	55400	109000	30
A	50 x 10R x 6 - 6	R1502 540 34	79700	166500	30
B	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
B	63 x 10R x 6 - 6	R1502 640 34	88800	214300	24
B	63 x 20R x 6.5 - 5	R1502 670 34	83900	190300	48
B	80 x 10R x 6.5 - 6	R1502 740 34	108400	291700	19
B	80 x 20R x 12.7 - 6	R1502 770 04	262700	534200	30
C	100 x 10R x 6.5 - 6	R1502 840 24	119500	371900	10
C	100 x 20R x 12.7 - 6	R1502 870 24	295100	686400	20
C	125 x 10R x 6.5 - 6	R1502 940 24	130600	468700	8
C	125 x 20R x 12.7 - 6	R1502 970 24	326500	870400	16

* See P. 99 Characteristic speed $d_0 \cdot n$ and P. 120 Critical speed n_k



Note:
On a precision screw SN-F, the root diameter d_2 can be smaller by max. 0.3 mm for manufacturing reasons.

d_1	d_2	D_1 g6	D_5	Hole pattern	Dimensions (mm) D_6	D_7	L	L_3	L_4	L_{10}	S**	Weight m (kg)
15.0	12.9	28	53	BB3	40	6.6	72	12	10	60	M6	0.33
19.0	16.9	33	58	BB4	45	6.6	82	12	10	70	M6	0.45
24.0	21.9	38	63	BB4	50	6.6	82	12	10	70	M6	0.53
24.0	21.9	38	63	BB4	50	6.6	120	12	16	108	M6	0.70
31.0	28.4	48	73	BB4	60	6.6	88	13	10	75	M6	0.84
31.0	27.9	48	73	BB4	60	6.6	146	13	16	133	M6	1.22
39.0	36.4	56	80	BB4	68	6.6	100	15	10	85	M8x1	1.13
38.0	33.8	63	95	BB4	78	9	140	15	16	125	M8x1	2.25
38.0	33.8	63	95	BB4	78	9	180	15	16	165	M8x1	2.83
38.0	33.8	63	95	BB4	78	9	175	15	25	160	M8x1	2.66
49.0	46.4	68	98	BB4	82	9	100	15	10	85	M8x1	1.60
48.0	43.8	72	110	BB4	90	11	140	18	16	122	M8x1	2.74
48.0	43.8	72	110	BB4	90	11	180	18	16	162	M8x1	3.39
48.0	43.4	85	125	BB4	105	11	255	22	25	233	M8x1	6.71
61.0	56.8	85	125	BB4	105	11	140	22	16	118	M8x1	3.53
61.0	56.8	85	125	BB4	105	11	180	22	16	158	M8x1	4.32
61.0	56.4	95	140	BB4	118	14	255	22	25	233	M8x1	8.65
78.0	73.3	105	150	BB4	125	14	190	22	16	168	M8x1	6.35
76.0	67.0	125	180	BB5	152	18	340	25	25	315	M8x1	20.20
98.0	93.4	125	180	BB5	152	18	190	25	16	165	M8x1	8.19
96.0	87.1	145	200	BB5	172	18	340	30	25	310	M8x1	24.50
123.0	118.0	150	210	BB5	180	18	190	30	16	160	M8x1	10.80
121.0	112.0	170	230	BB6	200	18	340	40	25	300	M8x1	31.00

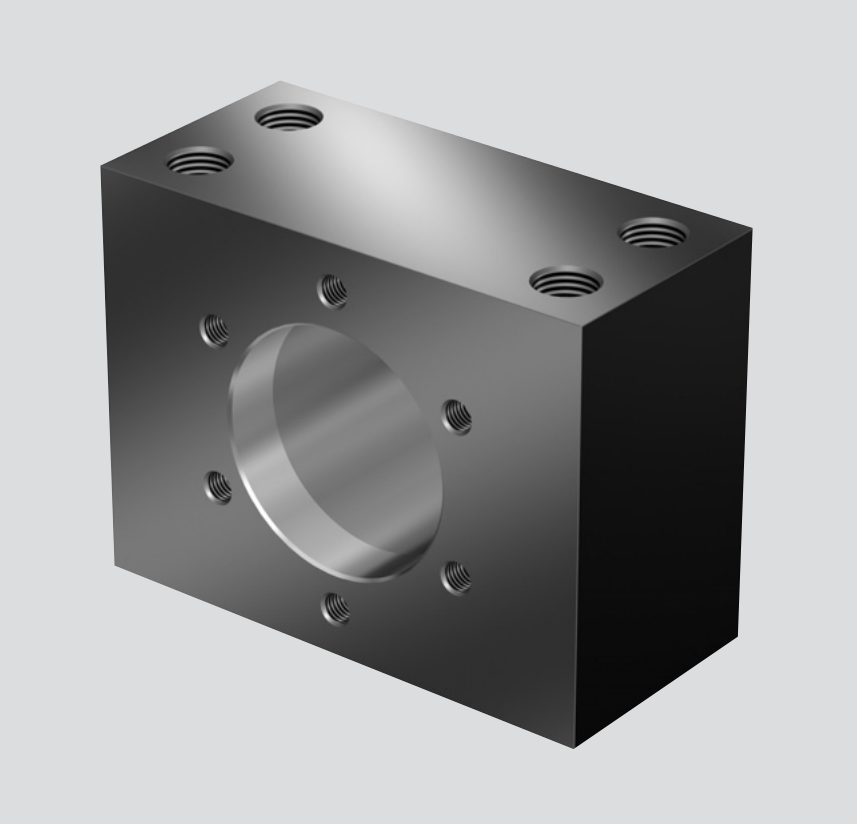
** Lube port machining: flat surface $L_3 \leq 13$ mm, countersink $L_3 > 14$ mm

Precision Ball Screw Assemblies

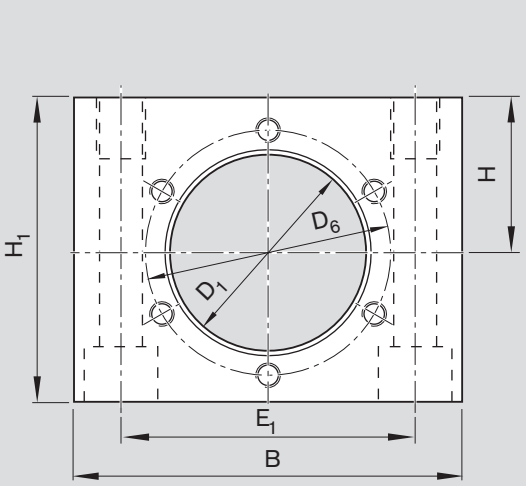
Nut Housing MGS

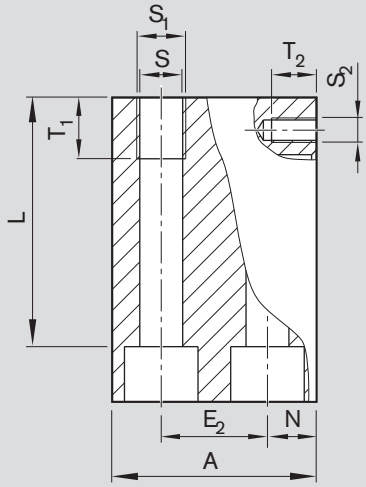
Nut housings MGS are designed for FEM-E-S, FDM-E-S and SEM-E-S ball nuts

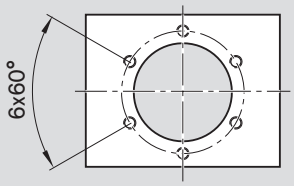
In addition to bolting, the housings should be locked in place by positive means (e.g. two dowel pins with a diameter equal to that of the screws). We recommend using screws with a strength class of 8.8.
Tightening torque
➠ see “Mounting” on Page 112.



Size d_0 x P	Part number
16x5	R1506 000 10
16x10	R1506 000 10
16x16	R1506 100 10
20x5	R1506 100 10
20x20	R1506 200 10
25x5	R1506 200 10
25x10	R1506 200 10
25x25	R1506 300 10
32x5	R1506 300 10
32x10	R1506 300 10
32x20	R1506 400 10
32x32	R1506 400 10
40x5	R1506 400 10
40x10	R1506 400 11
40x20	R1506 400 11
40x40	R1506 500 11
50x5	R1506 500 10
50x10	R1506 500 11
50x20	R1506 600 10
50x40	R1506 600 10
63x10	R1506 600 10
80x10	R1506 700 10

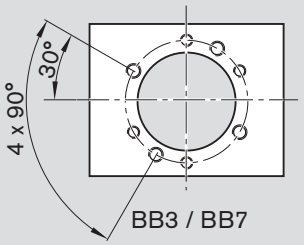






BB4/BB7

for size 16x5/16x10



BB3 / BB7

Dimensions (mm)														Hole pattern FEM-E-S FDM-E-S	Hole pattern SEM-E-S	Hex socket cap screw ISO 4762	Clamping length L	Weight (kg)
D_1 H8	D_6	$A^{1)}$	$B^{1)}$	H js7	$H_1{}^{1)}$	E_1	E_2	N	S	S_1	T_1	S_2	T_2					
28	40	40	70	28	55	52±0.1	20±0.1	10	8.4	M10	15	M6	10	BB3	BB7	M8	44	0.85
28	40	40	70	28	55	52±0.1	20±0.1	10	8.4	M10	15	M6	10	BB3	BB7	M8	44	0.85
33	45	40	75	32	62	56±0.1	20±0.1	10	8.4	M10	15	M6	10	BB4	BB7	M8	51	1.05
33	45	40	75	32	62	56±0.1	20±0.1	10	8.4	M10	15	M6	10	BB4	BB7	M8	51	1.05
38	50	40	85	34	65	63±0.1	20±0.1	10	8.4	M10	15	M6	10	BB4	BB7	M8	54	1.25
38	50	40	85	34	65	63±0.1	20±0.1	10	8.4	M10	15	M6	10	BB4	BB7	M8	54	1.25
38	50	40	85	34	65	63±0.1	20±0.1	10	8.4	M10	15	M6	10	BB4	BB7	M8	54	1.25
48	60	50	95	38	75	72±0.1	26±0.1	12	10.5	M12	15	M6	10	BB4	BB7	M10	61	1.8
48	60	50	95	38	75	72±0.1	26±0.1	12	10.5	M12	15	M6	10	BB4	BB7	M10	61	1.8
48	60	50	95	38	75	72±0.1	26±0.1	12	10.5	M12	15	M6	10	BB4	BB7	M10	61	1.8
56	68	60	105	42	82	82±0.1	30±0.1	15	13	M16	20	M6	12	BB4	BB7	M12	64	2.5
56	68	60	105	42	82	82±0.1	30±0.1	15	13	M16	20	M6	12	BB4	BB7	M12	64	2.5
56	68	60	105	42	82	82±0.1	30±0.1	15	13	M16	20	M6	12	BB4	BB7	M12	64	2.5
63	78	65	120	50	98	93±0.1	35±0.1	15	15	M18	25	M8	14	BB4	BB7	M14	79.5	3.7
63	78	65	120	50	98	93±0.1	35±0.1	15	15	M18	25	M8	14	BB4	BB7	M14	79.5	3.7
72	90	80	140	58	113	108±0.15	46±0.15	17	17	M20	30	M10	18	BB4	BB7	M16	92	6.3
68	82	65	130	52	101	100±0.15	35±0.15	15	15	M18	30	M8	14	BB4	BB7	M14	82.5	4.1
72	90	80	140	58	113	108±0.15	46±0.15	17	17	M20	30	M10	18	BB4	BB7	M16	92	6.3
85	105	80	150	65	128	121±0.15	46±0.15	17	17	M20	30	M10	18	BB4	BB7	M16	107	7.3
85	105	80	150	65	128	121±0.15	46±0.15	17	17	M20	30	M10	18	BB4	BB7	M16	107	7.3
85	105	80	150	65	128	121±0.15	46±0.15	17	17	M20	30	M10	18	BB4	BB7	M16	107	7.3
105	125	80	170	78	153	140±0.2	46±0.15	17	17	M20	30	M12	20	BB4	BB7	M16	132	9.4

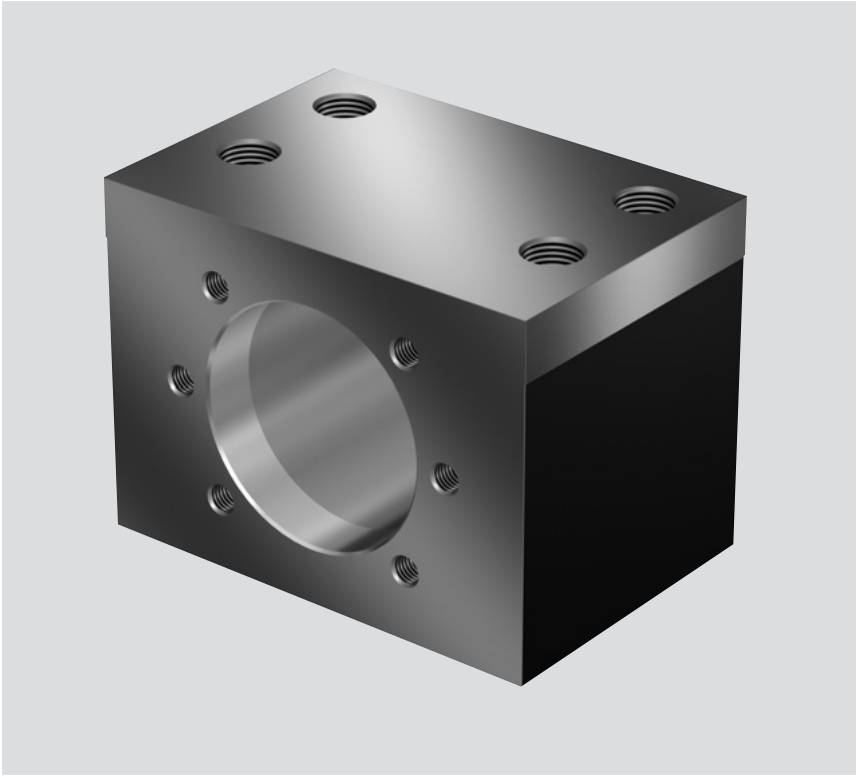
[1)] Tolerance grades to DIN 1685-GTB 16

Precision Ball Screw Assemblies

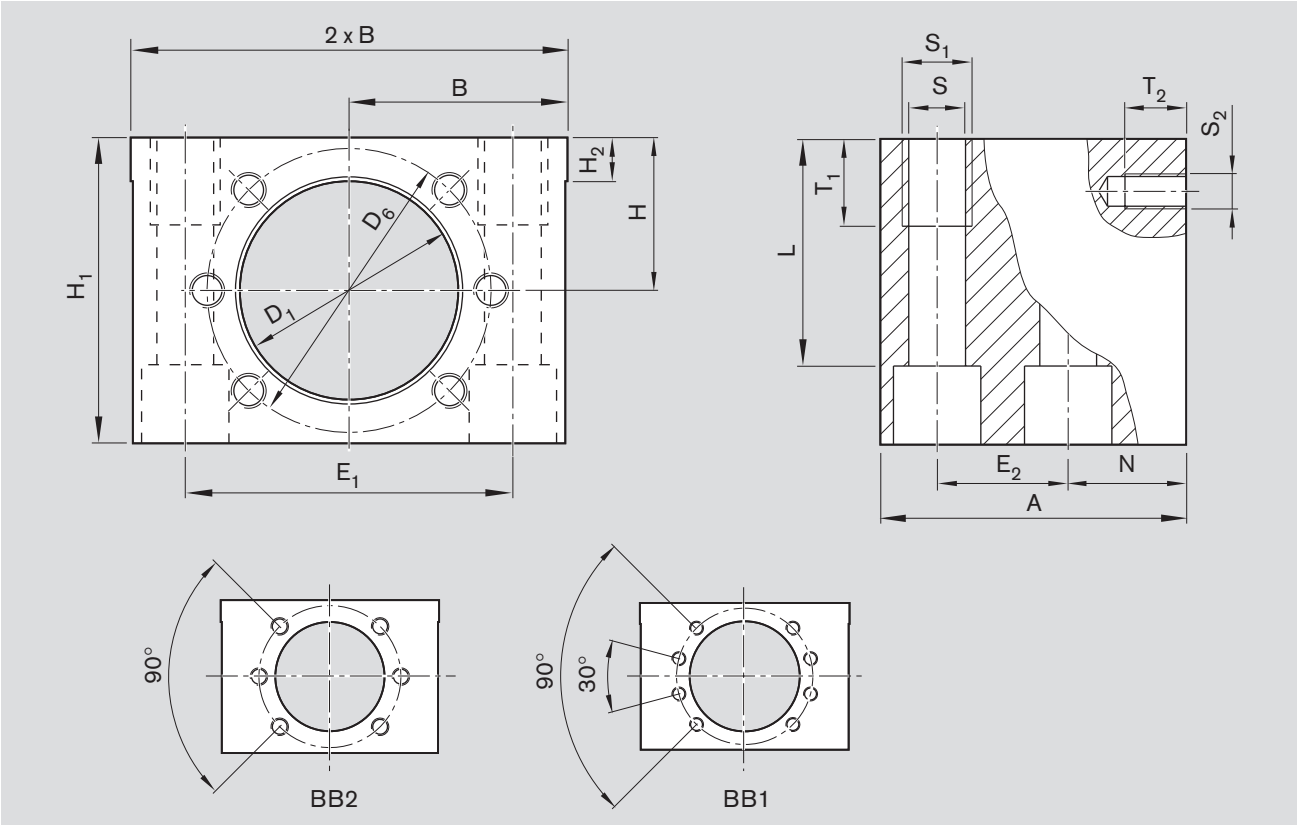
Nut Housing MGD

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 dowel pins with a diameter equal to that of the screws). We recommend using screws with a strength class of 8.8.
Tightening torque
➠ see "Mounting" on Page 112.
Reference edges are formed on both sides.



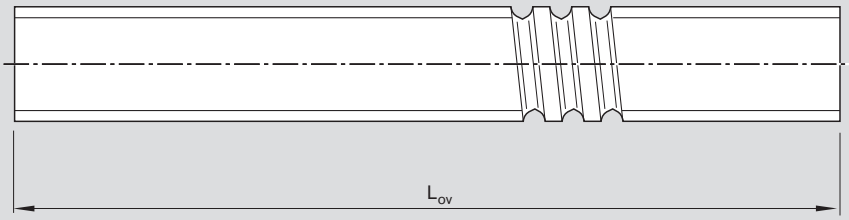
Size d_0 x P	Part number
16x5 16x10 16x16	R1506 000 50
20x5 20x20	R1506 100 50
25x5 25x10 25x25	R1506 200 50
32x5 32x10 32x20 32x32	R1506 300 50
40x5 40x10 40x12 40x16 40x20 40x40	R1506 400 50
50x5 50x10 50x12 50x16 50x20 50x40	R1506 500 50
63x10 63x20 63x40	R1506 600 50 R1506 600 51
80x10 80x20	R1506 700 50 R1506 700 51



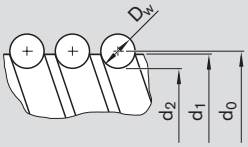
Dimensions (mm)															Hole pattern	Hex socket cap screw	Clamping length	Weight
D_1 H7	D_6	A	B ±0.01	H ±0.01	H_1	H_2	E_1	E_2	N	S	S_1	T_1	S_2	T_2		ISO 4762	L	(kg)
28	38	50	35	24	48	10	50±0.1	20±0.1	20	8.4	M10	15	M5	10	BB2	M8	37	0.91
36	47	55	37.5	28	56	10	55±0.1	23±0.1	22	8.4	M10	15	M6	11	BB2	M8	45	1.18
40	51	55	40	30	60	10	60±0.1	23±0.1	22	8.4	M10	15	M6	11	BB2	M8	49	1.33
50	65	70	50	35	70	10	75±0.1	30±0.1	27	13	M16	20	M8	14	BB2	M12	52	2.27
63	78	80	60	42	84	12	90±0.1	35±0.1	31	15	M18	25	M8	17	BB1	M14	65.5	3.61
75	93	95	70	48	96	12	110±0.15	45±0.15	34	17	M20	30	M10	17	BB1	M16	75	5.63
90	108	100	75	55	110	15	120±0.2	46±0.15	37	17	M20	30	M10	20	BB1	M16	89	6.72
95	115	100	80	58	116	15	130±0.2	46±0.15	37	17	M20	30	M12	20	BB1	M16	95	7.67
105	125	100	85	63	126	15	140±0.2	46±0.15	37	17	M20	30	M12	20	BB1	M16	105	8.60
125	145	100	95	73	146	15	160±0.2	46±0.15	37	17	M20	30	M12	22	BB1	M16	125	10.53

Precision Ball Screw Assemblies

Precision-Rolled Screw SN-R



Please state length in the “Inquiry/Order Form”.
L_{ov} = overall length



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 Tolerance grade T5	Part number Tolerance grade T7	Part number Tolerance grade T9	d_1 (mm)	d_2 (mm)	Moment of inertia Js (kgcm²/m)	Maximum length Stand-ard	On request	Weight (kg/m)
6x1Rx0.8	R1531 105 00	R1531 107 00	R1531 109 00	6.0	5.3	0.02			0.19
6x2Rx0.8	R1531 125 00	R1531 127 00	R1531 129 00	6.0	5.3	0.02			0.19
8x1Rx0.8	R1531 205 00	R1531 207 00	R1531 209 00	8.0	7.3	0.04	On request		0.36
8x2Rx1.2	R1531 225 00	R1531 227 00	R1531 229 00	8.0	7.1	0.04			0.36
8 x2.5Rx1.588	R1531 235 00	R1531 237 00	R1531 239 00	7.5	6.3	0.04			0.30
12x2Rx1.2	R1531 425 00	R1531 427 00	R1531 429 00	11.7	10.8	0.13			0.79
12x5Rx2	R1531 465 10	R1531 467 10	R1531 469 10	11.4	9.9	0.11			0.75
12x10Rx2	R1531 495 00	R1531 497 00	R1531 499 00	11.4	9.9	0.11			0.74
16x5Lx3	R1551 015 00	R1551 017 00	R1551 019 00	15	12.9	0.31			1.24
16x5Rx3	R1511 015 00	R1511 017 00	R1511 019 00	15	12.9	0.31			1.24
16x10Rx3	R1511 045 00	R1511 047 00	R1511 049 00	15	12.9	0.31	1500	2500	1.23
16x16Rx3	R1511 065 10	R1511 067 10	R1511 069 10	15	12.9	0.34			1.29
20x5Rx3	R1511 115 00	R1511 117 00	R1511 119 00	19	16.9	0.84			2.03
20x40Rx3.5-4	R2521 150 00	R2521 170 00	R2521 190 00	19	16.4	0.86			2.06
20x20Rx3.5	R1511 175 10	R1511 177 10	R1511 179 10	19*	16.7	0.81			1.99
25x5Rx3	R1511 215 00	R1511 217 00	R1511 219 00	24	21.9	2.22			3.31
25x10Rx3	R1511 245 00	R1511 247 00	R1511 249 00	24	21.9	2.39			3.43
25x25Rx3.5	R1511 285 10	R1511 287 10	R1511 289 10	24	21.4	2.15			3.25
32x5Rx3.5	R1511 315 00	R1511 317 00	R1511 319 00	31	28.4	6.05			5.45
32x5Lx3.5	R1551 315 00	R1551 317 00	R1551 319 00	31	28.4	6.05	2500	5000	5.45
32x10Rx3.969	R1511 345 10	R1511 347 10	R1511 349 10	31	27.9	6.40			5.60
32x20Rx3.969	R1511 375 10	R1511 377 10	R1511 379 10	31	27.9	6.39			5.60
32x32Rx3.969	R1511 395 10	R1511 397 10	R1511 399 10	31	27.9	6.17			5.50
40x5Rx3.5	R1511 415 00	R1511 417 00	R1511 419 00	39	36.4	15.64			8.78
40x5Lx3.5	R1551 415 00	R1551 417 00	R1551 419 00	39	36.4	15.64	4500	5000	8.78
40x10Rx6	R1511 445 00	R1511 447 00	R1511 449 00	38	33.8	13.55			8.15
40x10Lx6	R1551 445 00	R1551 447 00	R1551 449 00	38	33.8	13.55			8.15
40x12Rx6	R1511 455 00	R1511 457 00	R1511 459 00	38	33.8	13.97			8.27
40x16Rx6	R1511 465 00	R1511 467 00	R1511 469 00	38	33.8	12.90	4500	7500	7.95
40x20Rx6	R1511 475 00	R1511 477 00	R1511 479 00	38	33.8	13.52			8.14
40x40Rx6	R1511 495 10	R1511 497 10	R1511 499 10	38	33.8	13.42			8.11
50x5Rx3.5	R1511 515 00	R1511 517 00	R1511 519 00	49	46.4	40.03	4500	5000	14.05
50x10Rx6	R1511 545 00	R1511 547 00	R1511 549 00	48	43.8	35.71			13.25
50x12Rx6	R1511 555 00	R1511 557 00	R1511 559 00	48	43.8	36.58			13.41
50x16Rx6	R1511 565 00	R1511 567 00	R1511 569 00	48	43.8	34.37			13.00
50x20Rx6.5	R1511 575 10	R1511 577 10	R1511 579 10	48	43.3	34.50			13.01
50x40Rx6.5	R1511 595 10	R1511 597 10	R1511 599 10	48	43.3	34.34			12.98
63x10Rx6	R1511 645 00	R1511 647 00	R1511 649 00	61	56.8	95.82	4500	7500	21.72
63x20Rx6.5	R1511 675 10	R1511 677 10	R1511 679 10	61	56.3	93.29			21.42
63x40Rx6.5	R1511 695 10	R1511 697 10	R1511 699 10	61	56.3	93.08			21.40
80x10Rx6.5	R1511 745 00	R1511 747 00	R1511 749 00	78	73.3	256.86			35.58

* The outer diameter d_1 has been changed from 19.3.

Friction-welded blanks made of precision-rolled screws SN-R

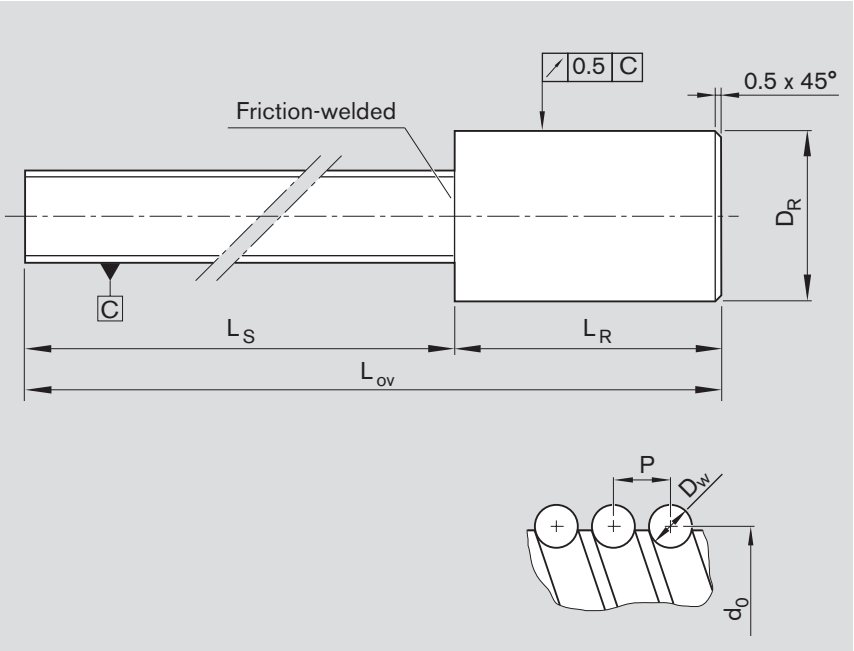
Friction-welded blanks consist of

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

The spigot is fitted to the one end by friction welding and is available in various 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.

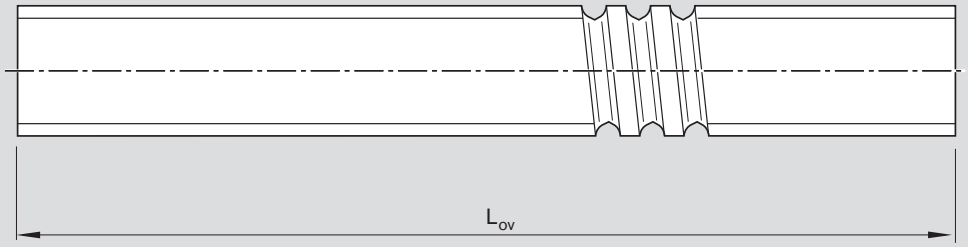
Separate delivery of a screw without end machining and without nut is not possible. This information is provided for reference and engineering purposes only.



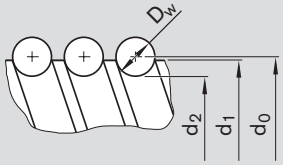
Size d_0 x P x D_w	Tolerance grade	Dimensions (mm) D_R -1	L_R +2	L_{ov}	L_S
6x1Rx0.8 6x2Rx0.8 8x1Rx0.8 8x2Rx1.2			On request		
8x2.5Rx1.588	T5	14.25	100	1100	1000
12x2Rx1.2	T5	23.25	100	1100	1000
12x5Rx2	T5	23.25	150	1250	1100
12x10Rx2	T5	23.30	150	1250	1100
16x5Rx3	T5	30.35	200	1700	1500
16x10Rx3	T5	30.35	200	1700	1500
16x16Rx3	T5	30.35	200	1700	1500
20x5Rx3	T5	31.50	200	1700	1500
20x20Rx3.5	T5	30.35	160	1160	1000
25x5Rx3	T5	36.60	200	1700	1500
25x10Rx3	T5	36.60	200	1700	1500
25x25Rx3.5	T5	36.60	200	1700	1500
32x5Rx3.5	T5	46.60	250	2050	1800
32x10Rx3.969	T5	46.60	250	2050	1800
32x20Rx3.969	T5	46.60	250	2050	1800
32x32Rx3.969	T5	46.60	250	2050	1800
40x10Rx6	T5	49.30	300	2300	2000
40x20Rx6	T5	49.30	300	2300	2000
50x10Rx6	T5	61.30	300	2300	2000
50x20Rx6.5	T5	61.30	300	2300	2000

Precision Ball Screw Assemblies

Precision Screw SN-F



L_{ov} = overall length



Note: On a precision screw the root diameter d_2 can be smaller by max. 0.3 mm for manufacturing reasons.

Size d_0 x P x D_w	Part number Tolerance grade P1	Part number Tolerance grade P3	Part number Tolerance grade P5	d_1 (mm)	d_2 (mm)	Moment of inertia Js ($kgcm^2/m$)	Maximum length Avail-able at short notice	Maximum length On request	Weight (kg/m)
8 x 2.5R x 1.588	–	R1521 233 00	R1521 235 00	7.5	6.2	0.02	800	1500	0.30
12 x 5R x 2	–	R1521 463 10	R1521 465 10	11.4	9.8	0.11	800	1500	0.75
12 x 10R x 2	–	R1521 493 00	R1521 495 00	11.4	9.8	0.12	800	1500	0.73
16 x 5R x 3	R1501 011 00	R1501 013 00	R1501 015 00	15	12.8	0.31	1000	3000	1.24
16 x 10R x 3	R1501 041 00	R1501 043 00	R1501 045 00	15	12.8	0.35	1000	3000	1.31
16 x 16R x 3	R1501 061 10	R1501 063 10	R1501 065 10	15	12.8	0.37	1000	3000	1.34
20 x 5R x 3	R1501 111 00	R1501 113 00	R1501 115 00	19	16.8	0.85	1200	3000	2.03
20 x 20R x 3.5	R1501 171 10	R1501 173 10	R1501 175 10	19.3	16.6	1.01	1200	3000	2.22
25 x 5R x 3	R1501 211 00	R1501 213 00	R1501 215 00	24	21.8	2.23	1500	5000	3.31
25 x 10R x 3	R1501 241 00	R1501 243 00	R1501 245 00	24	21.8	2.39	1500	5000	3.43
25 x 25R x 3.5	R1501 281 10	R1501 283 10	R1501 285 10	24	21.3	2.46	1500	5000	3.48
32 x 5R x 3.5	R1501 311 00	R1501 313 00	R1501 315 00	31	28.3	6.05	3000	5000	5.45
32 x 10R x 3.969	R1501 341 10	R1501 343 10	R1501 345 10	31	27.8	6.40	3000	5000	5.60
32 x 20R x 3.969	R1501 371 10	R1501 373 10	R1501 375 10	31	27.8	6.76	3000	5000	5.76
32 x 32R x 3.969	R1501 391 10	R1501 393 10	R1501 395 10	31	27.8	6.89	3000	5000	5.83
40 x 5R x 3.5	R1501 411 00	R1501 413 00	R1501 415 00	39	36.3	15.66	4000	5000	8.78
40 x 10R x 6	R1501 441 00	R1501 443 00	R1501 445 00	38	33.7	13.53	5000	8000	8.14
40 x 12R x 6	R1501 451 00	R1501 453 00	R1501 455 00	38	33.7	13.40	5000	8000	8.27
40 x 16R x 6	R1501 461 00	R1501 463 00	R1501 465 00	38	33.7	14.48	5000	8000	8.43
40 x 20R x 6	R1501 471 00	R1501 473 00	R1501 475 00	38	33.7	14.80	5000	8000	8.52
40 x 40R x 6	R1501 491 10	R1501 493 10	R1501 495 10	38	33.7	15.42	5000	8000	8.71
50 x 5R x 3.5	R1501 511 00	R1501 513 00	R1501 515 00	49	46.3	40.06	4000	5000	14.05
50 x 10R x 6	R1501 541 00	R1501 543 00	R1501 545 00	48	43.7	35.57	5000	8000	13.24
50 x 12R x 6	R1501 551 00	R1501 553 00	R1501 555 00	48	43.7	36.55	5000	8000	13.40
50 x 16R x 6	R1501 561 00	R1501 563 00	R1501 565 00	48	43.7	37.64	5000	8000	13.60
50 x 20R x 6.5	R1501 571 10	R1501 573 10	R1501 575 10	48	43.2	37.70	5000	8000	13.61
50 x 40R x 6.5	R1501 591 10	R1501 593 10	R1501 595 10	48	43.2	39.29	5000	8000	13.91
63 x 10R x 6	R1501 641 00	R1501 643 00	R1501 645 00	61	56.7	95.71	5000	8000	21.71
63 x 20R x 6.5	R1501 671 10	R1501 673 10	R1501 675 10	61	56.2	99.98	5000	8000	22.18
63 x 40R x 6.5	R1501 691 10	R1501 693 10	R1501 695 10	61	56.2	103.36	5000	8000	22.57
80 x 10R x 6.5	R1501 741 00	R1501 743 00	R1501 745 00	78	73.2	256.36	5000	8000	35.54
80 x 20R x 12.7	R1501 771 00	R1501 773 00	R1501 775 00	76	66.9	211.51	5000	8000	32.16
100 x 10R x 6.5	R1501 841 00	R1501 843 00	R1501 845 00	98	93.2	652.67	5000	8000	56.74
100 x 20R x 12.7	R1501 871 00	R1501 873 00	R1501 875 00	96	86.9	560.12	5000	8000	52.44
125 x 10R x 6.5	R1501 941 00	R1501 943 00	R1501 945 00	123	118.2	1574.25	5000	8000	90.02
125 x 20R x 12.7	R1501 971 00	R1501 973 00	R1501 975 00	121	111.9	1460.94	5000	8000	84.73

Area of application

The precision screw SN-F is the solution for high-precision applications.

Stocks

As a rule, precision screws SN-F are manufactured to order complete with end machining.

Separate delivery of a SNF screw without end machining or without nut is not possible.

Screws of class P3 and P1 are supplied with a lead test report as standard .

Note:

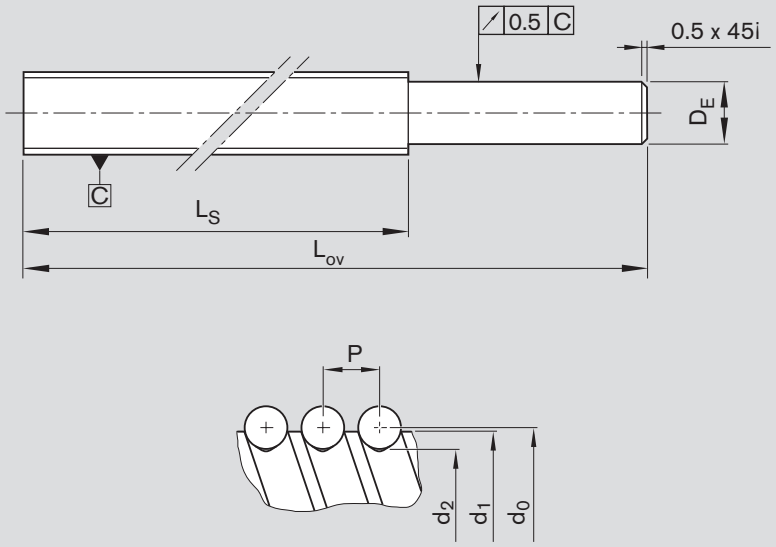
The part numbers given in the table refer to per-meter lengths of screw without end machining. We assign separate ID numbers to screws with customer-specific end machining and mounted nut.

Precision screw SN-F “fixed dimension lengths”

We keep stocks of screws in standard sizes and conventional lengths in case you need delivery at extremely short notice, e.g. for repairs, as samples or for prototypes.

The number of standard sizes kept in stock is increased in accordance with the number of inquiries. Please ask.

Please note that with very large end bearing diameters (bigger than d_2), the thread grooves may remain partly visible.

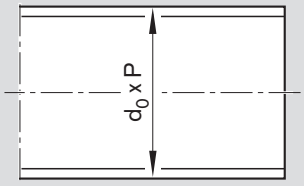


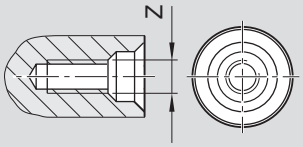
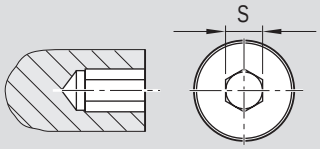
Note: On a precision screw SN-F the root diameter d_2 can be smaller by max. 0.3 mm for manufacturing reasons.

Precision Ball Screw Assemblies

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

00



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

Ordering code:

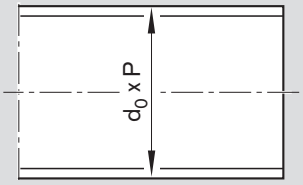
SEM-E-S	20 x 5R x 3-4	X	X	T7	R	00Z200	82Z120	1250	1	0

Form	Version	Ball screw size		Centering hole	Hex socket
		d_0	P	Z	S
00	060	6	1/2	–	–
	080	8	1/2/2.5	–	–
	120	12	2/5/10	M3	4
	160	16	5/10/16	M4	5
	200	20	5/20/40	M6	8
	250	25	5/10/25	M8	10
	320	32	5/10/20/32	M10	12
	400	40	5/10/12/16/20/40	M12	14
	500	50	5/10/12/16/20/40	M16	17
	630	63	10/20/40	M20	17
	800	80	10/20	M20	17

Screw End 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

00



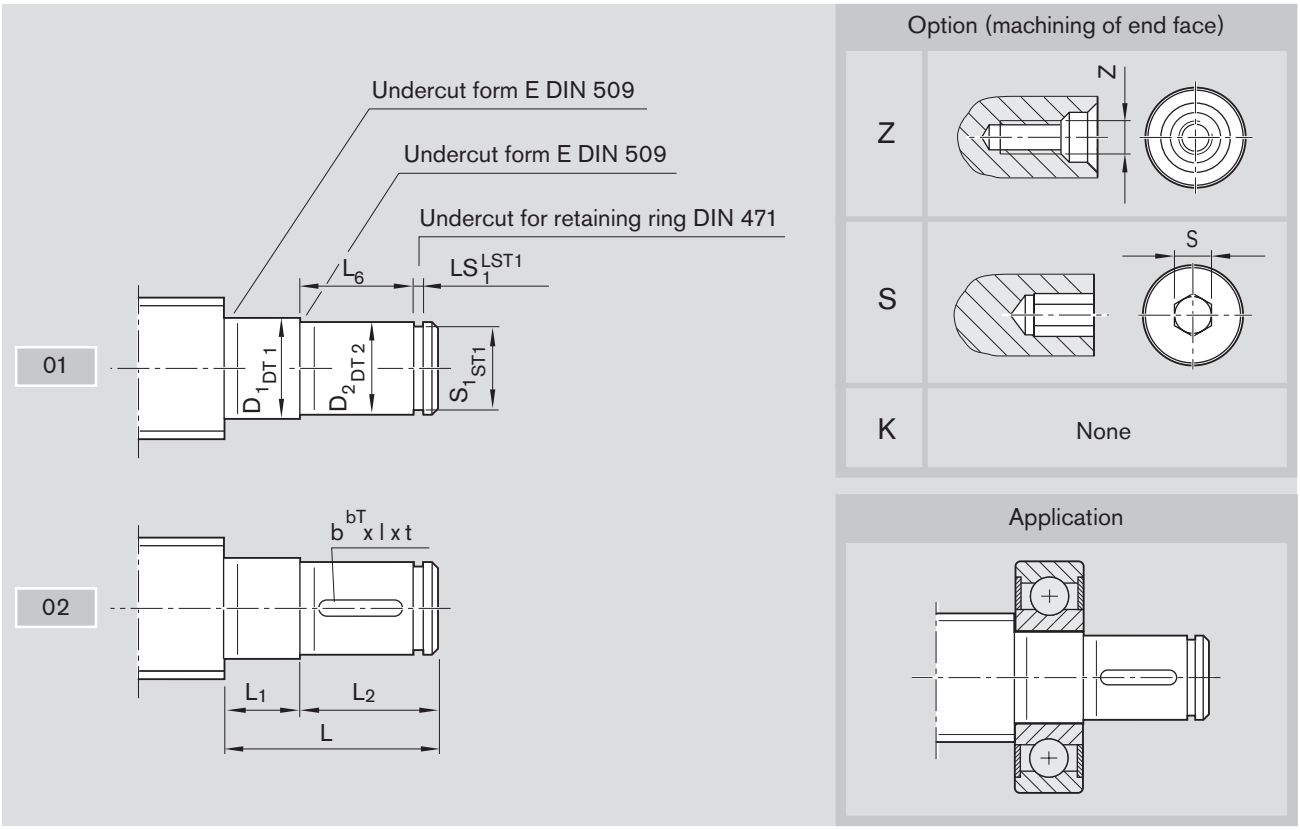
Ordering code:

SN	20 x 5R x 3-4	X	X	T7	R	00T200	00T200	1250	0	0

Form	Version	Ball screw size d_0	P
	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
00	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

Precision Ball Screw Assemblies

Screw End Form 01–02



Ordering code:

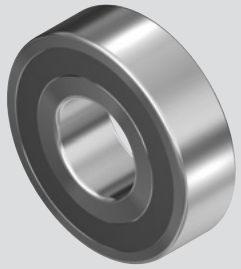
SEM-E-S	20 x 5R x 3-4	X	X	T7	R	02Z120	82Z120	1250	1	0

Form	Version*	Size		Dimensions (mm)											Keyway to DIN 6885				Centering hole	Hex socket
		d_0	P	L	D_1	DT1	L_1	D_2	DT2	L_2	L_6	S_1	ST1	LS_1	LST1	b	bT	l	t	Z	S
01	050	8	2.5	19	5	j6	5	4	h7	14	12	3.8	h10	0.50	H13					-	-
	060	12	2/5/10	24	6	j6	6	5	h7	18	16	4.8	h10	0.70	H13					-	-
	100	16	5/10/16	32	10	j6	9	8	h7	23	20	7.6	h10	1.10	H13					M3	-
	120	20	5/20/40	38	12	j6	10	10	h7	28	25	9.6	h10	1.10	H13					M3	4
	150	20	5/20/40	39	15	j6	11	12	h7	28	25	11.5	h11	1.10	H13					M4	4
	170	25	5/10/25	45	17	j6	12	15	h7	33	30	14.3	h11	1.10	H13					M5	4
	200	32	5/10/20/32	58	20	j6	14	18	h7	44	40	17.0	h11	1.30	H13					M6	5
	250	32	5/10/20/32	69	25	j6	15	22	h7	54	50	21.0	h11	1.30	H13					M8	6
	300	40	5/10/12/16/20/40	70	30	j6	16	28	h7	54	50	26.6	h12	1.60	H13					M10	10
	350	50	5/10/12/16/20/40	82	35	j6	17	32	h7	65	60	30.3	h12	1.60	H13					M12	10
	500	63	10/20/40	107	50	j6	20	48	h7	87	80	45.5	h12	1.85	H13					M16	17
	600	80	10/20	109	60	j6	22	58	h7	87	80	55.0	h12	2.15	H13					M20	17
02	100	16	5/10/16	32	10	j6	9	8	h7	23	20	7.6	h10	1.10	H13	2	P9	14	1.2	M3	-
	120	20	5/20/40	38	12	j6	10	10	h7	28	25	9.6	h10	1.10	H13	3	P9	20	1.8	M3	4
	150	20	5/20/40	39	15	j6	11	12	h7	28	25	11.5	h11	1.10	H13	4	P9	20	2.5	M4	4
	170	25	5/10/25	45	17	j6	12	15	h7	33	30	14.3	h11	1.10	H13	5	P9	25	3.0	M5	4
	200	32	5/10/20/32	58	20	j6	14	18	h7	44	40	17.0	h11	1.30	H13	6	P9	28	3.5	M6	5
	250	32	5/10/20/32	69	25	j6	15	22	h7	54	50	21.0	h11	1.30	H13	6	P9	36	3.5	M8	6
	300	40	5/10/12/16/20/40	70	30	j6	16	28	h7	54	50	26.6	h12	1.60	H13	8	P9	36	4.0	M10	10
	350	50	5/10/12/16/20/40	82	35	j6	17	32	h7	65	60	30.3	h12	1.60	H13	10	P9	40	5.0	M12	10
	500	63	10/20/40	107	50	j6	20	48	h7	87	80	45.5	h12	1.85	H13	14	P9	63	6.0	M16	17
	600	80	10/20	109	60	j6	22	58	h7	87	80	55.0	h12	2.15	H13	16	P9	63	6.0	M20	17

* The allocation of screw ends to the bearings is defined by the version.

End Bearings for Screw Ends Form 01–02

Deep-groove ball bearing to DIN 625

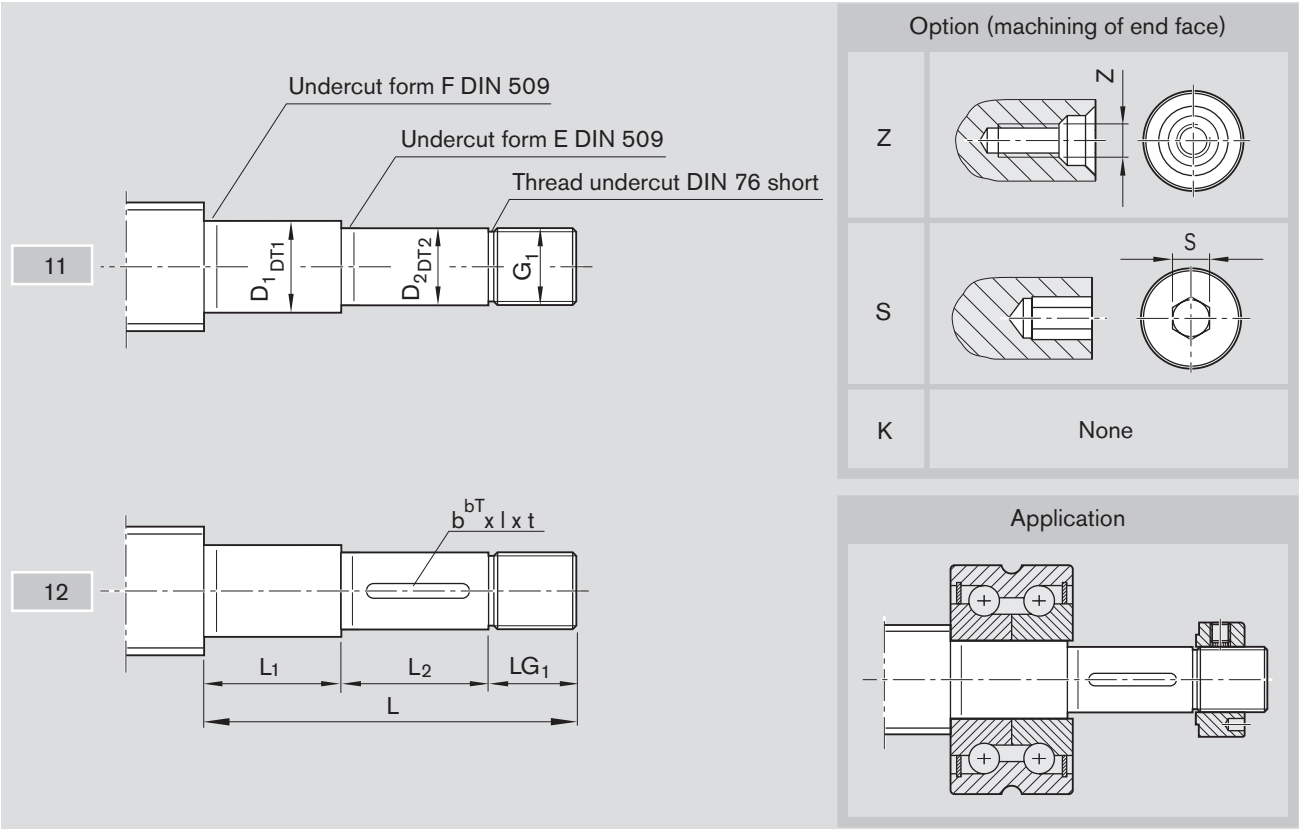


Retaining ring to DIN 471

Form	Version	Size		Deep-groove ball bearing to DIN 625		Retaining ring to DIN 471	
		d_0	P	Designation	Part number	Designation	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	5/20/40	6201.2RS	R3414 042 00	10x1	R3410 745 00
	150	20	5/20/40	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	6204.2RS	R3414 038 00	18x1.2	R3410 723 00
	250	32	5/10/20/32	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	100	16	5/10/16	6200.2RS	R3414 049 00	8x0.8	R3410 737 00
	120	20	5/20	6201.2RS	R3414 042 00	10x1	R3410 745 00
	150	20	5/20	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	6204.2RS	R3414 038 00	18x1.2	R3410 723 00
	250	32	5/10/20/32	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

Precision Ball Screw Assemblies

Screw End Form 11–12



Ordering code:

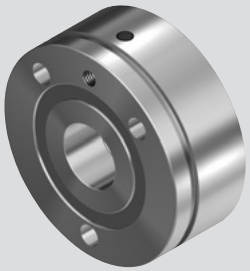
SEM-E-S	20 x 5R x 3-4	1	2	T7	R	12Z120	41Z120	1250	1	0

Form	Version*	Size		Dimensions (mm)									Keyway to DIN 6885				Centering hole	Hex socket
		d_0	P	L	D_1	DT1	L_1	D_2	DT2	L_2	G_1	LG_1	b	bT	l	t	Z	S
11	100	16	5/10/16	48	10	h6	18	8	h7	20	M6x0.5	10					–	–
	120	20	5/20/40	60	12	h6	23	10	h7	25	M10x1	12					M3	4
	170	25	5/10/25	75	17	h6	23	15	h7	30	M15x1	22					M5	4
	200	32	5/10/20/32	88	20	h6	26	18	h7	40	M17x1	22					M5	5
	250	40	10/12/16/20/40	126	25	h6	54	22	h7	50	M20x1	22					M6	5
	300	40	5	101	30	h6	25	28	h7	50	M25x1.5	26					M8	8
	301	50	10/12/16/20/40	130	30	h6	54	28	h7	50	M25x1.5	26					M8	8
	350	50	5	118	35	h6	32	32	h7	60	M30x1.5	26					M10	10
	400	63	10/20/40	132	40	h6	44	38	h7	60	M35x1.5	28					M12	12
	500	80	10/20	160	50	h6	52	48	h7	80	M40x1.5	28					M16	12
12	100	16	5/10/16	48	10	h6	18	8	h7	20	M6x0.5	10	2	P9	14	1.2	–	–
	120	20	5/20/40	60	12	h6	23	10	h7	25	M10x1	12	3	P9	20	1.8	M3	4
	170	25	5/10/25	75	17	h6	23	15	h7	30	M15x1	22	5	P9	25	3	M5	4
	200	32	5/10/20/32	88	20	h6	26	18	h7	40	M17x1	22	6	P9	28	3.5	M5	5
	250	40	10/12/16/20/40	126	25	h6	54	22	h7	50	M20x1	22	6	P9	36	3.5	M6	5
	300	40	5	101	30	h6	25	28	h7	50	M25x1.5	26	8	P9	36	4	M8	8
	301	50	10/12/16/20/40	130	30	h6	54	28	h7	50	M25x1.5	26	8	P9	36	4	M8	8
	350	50	5	118	35	h6	32	32	h7	60	M30x1.5	26	10	P9	40	5	M10	10
	400	63	10/20/40	132	40	h6	44	38	h7	60	M35x1.5	28	10	P9	40	5	M12	12
	500	80	10/20	160	50	h6	52	48	h7	80	M40x1.5	28	14	P9	63	5.5	M16	12

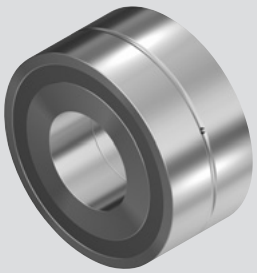
* The allocation of screw ends to the bearings is defined by the version.

End Bearings for Screw Ends Form 11–12

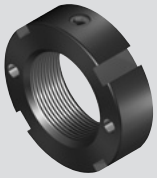
Angular-contact thrust ball bearing LGF



Angular-contact thrust ball bearing LGN



Slotted nut
NMZ



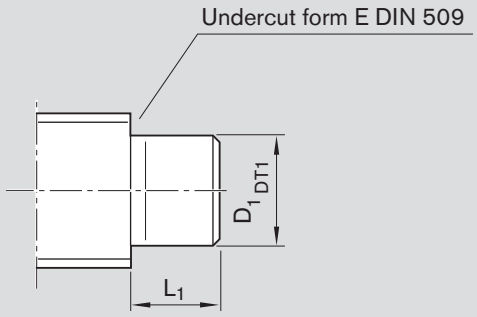
Slotted nut
NMA

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	5/20/40	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	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	100	16	5/10/16	-	-	LGN-B-1034	R3414 003 06	NMZ6x0.5	R3446 001 04
	120	20	5/20/40	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	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

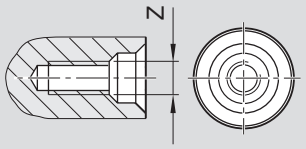
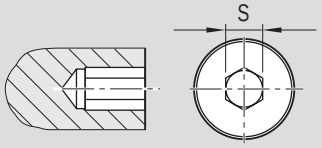
Precision Ball Screw Assemblies

Screw End Form 21

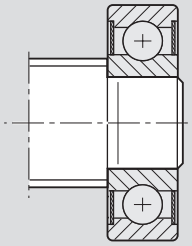
21



Option (machining of end face)

Z	
S	
K	None

Application



Ordering code:

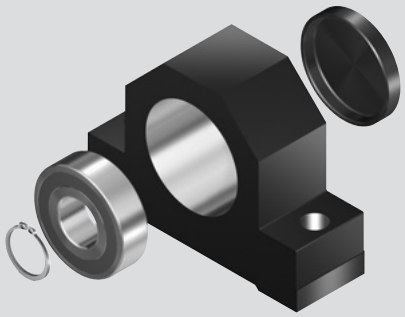
SEM-E-S	20 x 5R x 3-4	1	2	T7	R	21Z120	82Z120	1250	1	0

Form	Version*	Size		Dimensions (mm)			Centering hole	Hex socket
		d_0	P	D_1	DT1	L_1	Z	S
	050	8	2.5	5	j6	5	-	-
	060	12	2/5/10	6	j6	6	-	-
	100	16	5/10/16	10	j6	9	M3	4
	120	20	5/20/40	12	j6	10	M4	4
	150	20	5/20/40	15	j6	11	M5	4
	170	25	5/10/25	17	j6	12	M6	5
21	200	32	5/10/20/32	20	j6	14	M6	5
	250	32	5/10/20/32	25	j6	15	M10	8
	300	40	5 10/12/16/20/40	30	j6	16	M10	10
	350	50	5/10/12/16/20/40	35	j6	17	M12	12
	500	63	10/20/40	50	j6	20	M16	17
	600	80	10/20	60	j6	22	M20	17

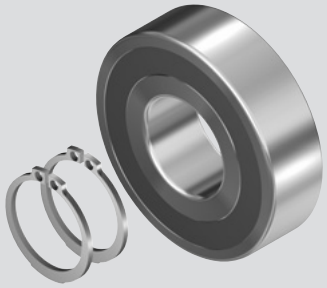
* The allocation of screw ends to the bearings is defined by the version.

End Bearings for Screw Ends Form 21

Pillow block unit SEB-L



Bearing LAD*

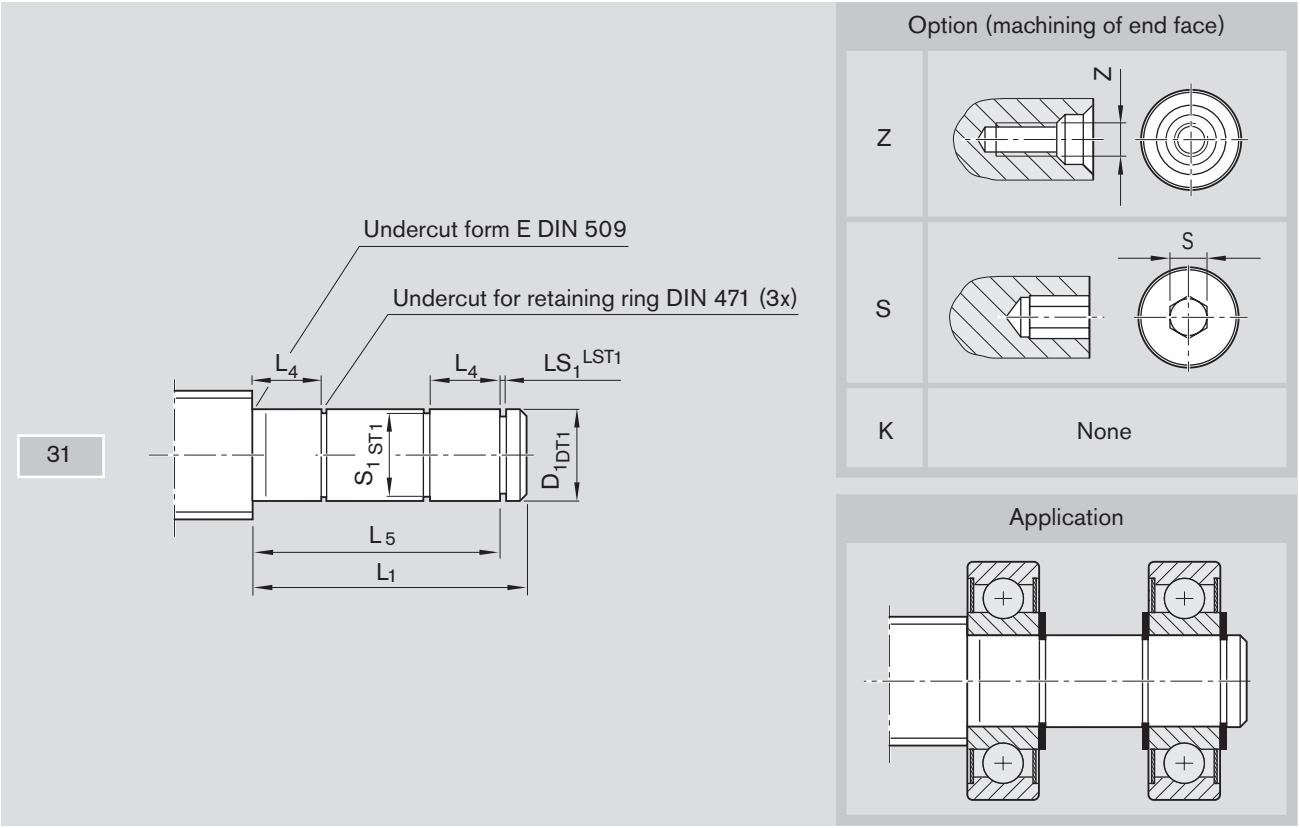


Form	Version	Size		Pillow block unit SEB-L	Bearing LAD*
		d_0	P	Part number	Part number
21	050	8	2.5	R1591 605 00	R1590 605 00
	060	12	2/5/10	R1591 606 20	R1590 606 00
	100	16	5/10/16	R1591 610 20	R1590 610 00
	120	20	5/20/40	R1591 612 20	R1590 612 00
	150	20	5/20/40	–	R1590 615 00
	170	25	5/10/25	R1591 617 20	R1590 617 00
	200	32	5/10/20/32	R1591 620 20	R1590 620 00
	250	32	5/10/20/32	–	R1590 625 00
	300	40	5 10/12/16/20/40	R1591 630 20 R1591 630 10	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

* Items delivered: 1 bearing, 2 retaining rings.

Precision Ball Screw Assemblies

Screw Ends Form 31



Ordering code:

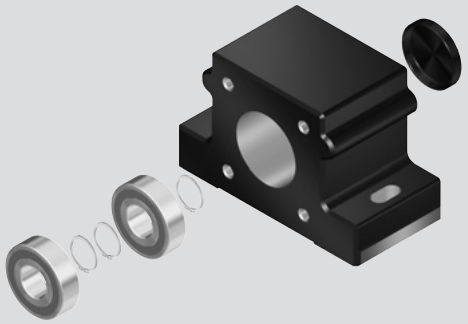
SEM-E-S	20 x 5R x 3-4	1	2	T7	R	31Z120	82Z120	1250	1	0

Form	Version*	Size		Dimensions (mm)									Centering hole	Hex socket
		d_0	P	D_1	DT1	L_1	L_4	L_5	S_1	ST1	LS_1	LST1	Z	S
31	050	8	2.5	5	j6	22	5	20	4.8	h10	0.70	H13	–	–
	060	12	2/5/10	6	j6	26	6	24	5.7	h10	0.80	H13	–	–
	100	16	5/10/16	10	j6	39	9	36	9.6	h10	1.10	H13	M3	4
	120	20	5/20/40	12	j6	43	10	40	11.5	h11	1.10	H13	M4	4
	150	20	5/20/40	15	j6	47	11	44	14.3	h11	1.10	H13	M5	4
	170	25	5/10/25	17	j6	51	12	48	16.2	h11	1.10	H13	M6	5
	200	32	5/10/20/32	20	j6	60	14	56	19.0	h11	1.30	H13	M6	5
	250	32	5/10/20/32	25	j6	64	15	60	23.9	h12	1.30	H13	M10	8
	300	40	5/10/12/16/20/40	30	j6	68	16	64	28.6	h12	1.60	H13	M10	10
	350	50	5/10/12/16/20/40	35	j6	73	17	68	33.0	h12	1.60	H13	M12	12
	500	63	10/20/40	50	j6	87	20	80	47.0	h12	2.15	H13	M16	17
	600	80	10/20	60	j6	95	22	88	57.0	h12	2.15	H13	M20	17

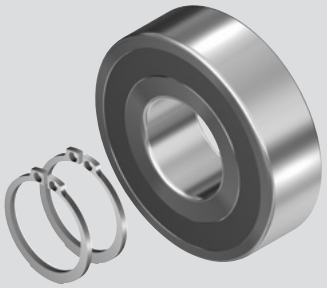
* The allocation of screw ends to the bearings is defined by the version.
Note: Form 31 with double floating bearing increases the critical speed, see Page 120.

End Bearings for Screw Ends Form 31

Pillow block unit SEC-L



Bearing LAD*

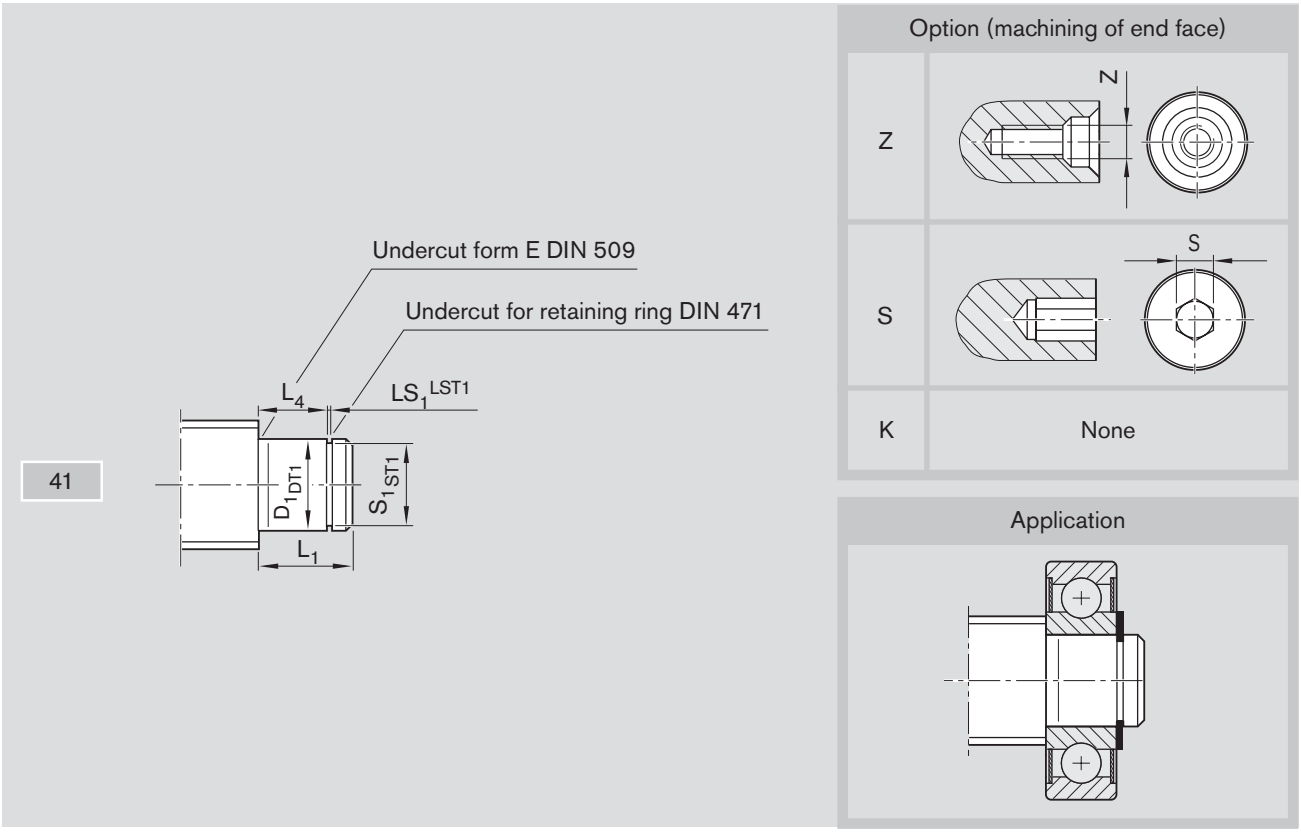


Form	Version	Size		Pillow block unit SEC-L	Bearing LAD*
		d_0	P	Part number	Part number
31	050	8	2.5	–	R1590 605 00
	060	12	2/5/10	–	R1590 606 00
	100	16	5/10/16	–	R1590 610 00
	120	20	5/20/40	–	R1590 612 00
	150	20	5/20/40	R1594 615 00	R1590 615 00
	170	25	5/10/25	–	R1590 617 00
	200	32	5/10/20/32	R1594 620 00	R1590 620 00
	250	32	5/10/20/32	–	R1590 625 00
	300	40	5/10/12/16/20/40	R1594 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

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

Precision Ball Screw Assemblies

Screw Ends Form 41



Ordering code:

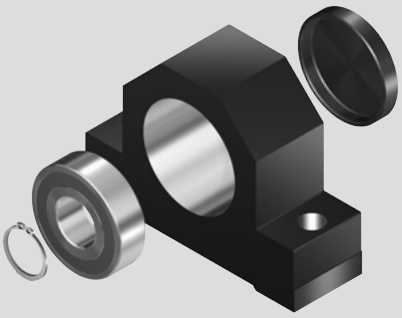
SEM-E-S	20 x 5R x 3-4	1	2	T7	R	41Z120	82Z120	1250	1	0

Form	Version*	Size		Dimensions (mm)								Centering hole	Hex socket
		d_0	P	D_1	DT1	L_1	L_4	S_1	ST1	LS_1	LST1	Z	S
	050	8	1/2/2.5	5	j6	7	5	4.8	h10	0.70	H13	–	–
	060	12	2/5/10	6	j6	8	6	5.7	h10	0.80	H13	–	–
	100	16	5/10/16	10	j6	12	9	9.6	h10	1.10	H13	M3	4
	120	20	5/20/40	12	j6	13	10	11.5	h11	1.10	H13	M4	4
	150	20	5/20/40	15	j6	14	11	14.3	h11	1.10	H13	M5	4
	170	25	5/10/25	17	j6	15	12	16.2	h11	1.10	H13	M6	5
41	200	32	5/10/20/32	20	j6	18	14	19.0	h11	1.30	H13	M6	5
	250	32	5/10/20/32	25	j6	19	15	23.9	h12	1.30	H13	M10	8
	300	40	5 10/12/16/20/40	30	j6	20	16	28.6	h12	1.6	H13	M10	10
	350	50	5/10/12/16/20/40	35	j6	22	17	33.0	h12	1.60	H13	M12	12
	500	63	10/20/40	50	j6	27	20	47.0	h12	2.15	H13	M16	17
	600	80	10/20	60	j6	29	22	57.0	h12	2.15	H13	M20	17

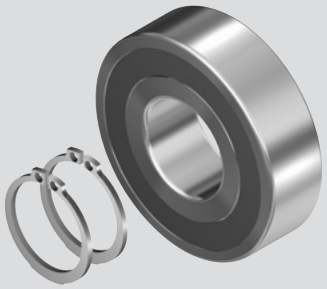
* The allocation of screw ends to the bearings is defined by the version.

End Bearings for Screw Ends Form 41

Pillow block unit SEB-L



Bearing LAD*

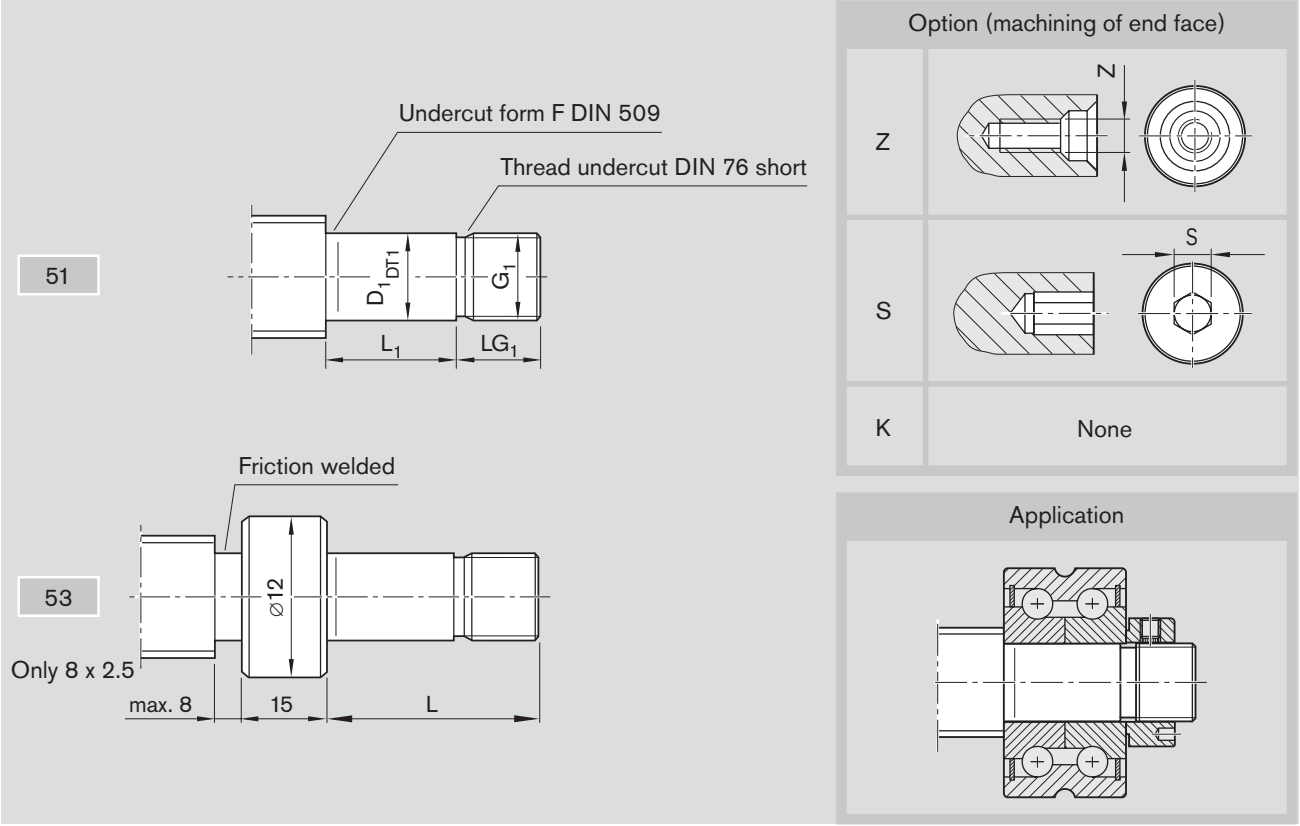


Form	Version	Size		Bearing LAD*	Pillow block unit SEB-L
		d_0	P	Part number	Part number
41	050	8	1/2/2.5	R1590 605 00	R1591 605 00
	060	12	2/5/10	R1590 606 00	R1591 606 20
	100	16	5/10/16	R1590 610 00	R1591 610 20
	120	20	5/20/40	R1590 612 00	R1591 612 20
	150	20	5/20/40	R1590 615 00	–
	170	25	5/10/25	R1590 617 00	R1591 617 20
	200	32	5/10/20/32	R1590 620 00	R1591 620 20
	250	32	5/10/20/32	R1590 625 00	–
	300	40	5 10/12/16/20/40	R1590 630 00	R1591 630 20 R1591 630 10
	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	–

* Items delivered: 1 bearing, 2 retaining rings.

Precision Ball Screw Assemblies

Screw Ends Form 51–53



Ordering code:

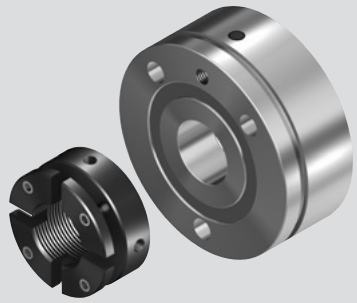
SEM-E-S	20 x 5R x 3-4	1	2	T7	R	51Z120	82Z120	1250	1	0

Form	Version*	Size		Dimensions (mm)						Centering hole	Hex socket
		d_0	P	L	D_1	DT1	L_1	G_1	LG_1	Z	S
51	060	12	2/5/10	24	6	h6	14	M6x0.5	10	–	–
	100	16	5/10/16	30	10	h6	18	M10x1	12	M3	4
	120	20	5/20/40	35	12	h6	23	M12x1	12	M4	4
	170	25	5/10/25	45	17	h6	23	M17x1	22	M5	5
	200	32	5/10/20/32	48	20	h6	26	M20x1	22	M6	5
	250	40	10/12/16/20/40	80	25	h6	54	M25x1.5	26	M8	8
	300	40	5 10/12/16/20/40	51	30	h6	25	M30x1.5	26	M10	10
	301	50	10/12/16/20/40	80	30	h6	54	M30x1.5	26	M10	10
	350	50	5	60	35	h6	32	M35x1.5	28	M12	12
	400	63	10/20/40	72	40	h6	44	M40x1.5	28	M16	12
	500	80	10/20	84	50	h6	52	M50x1.5	32	M16	17
53	060	8	2.5	24	6	h6	14	M6x0.5	10	–	–

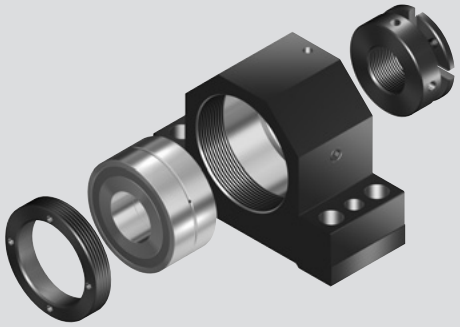
* The allocation of screw ends to the bearings is defined by the version.

End Bearings for Screw Ends Form 51–53

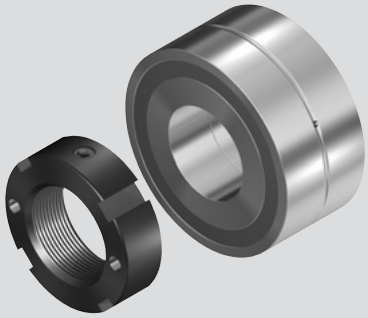
Bearing LAF



Pillow block unit SEB-F



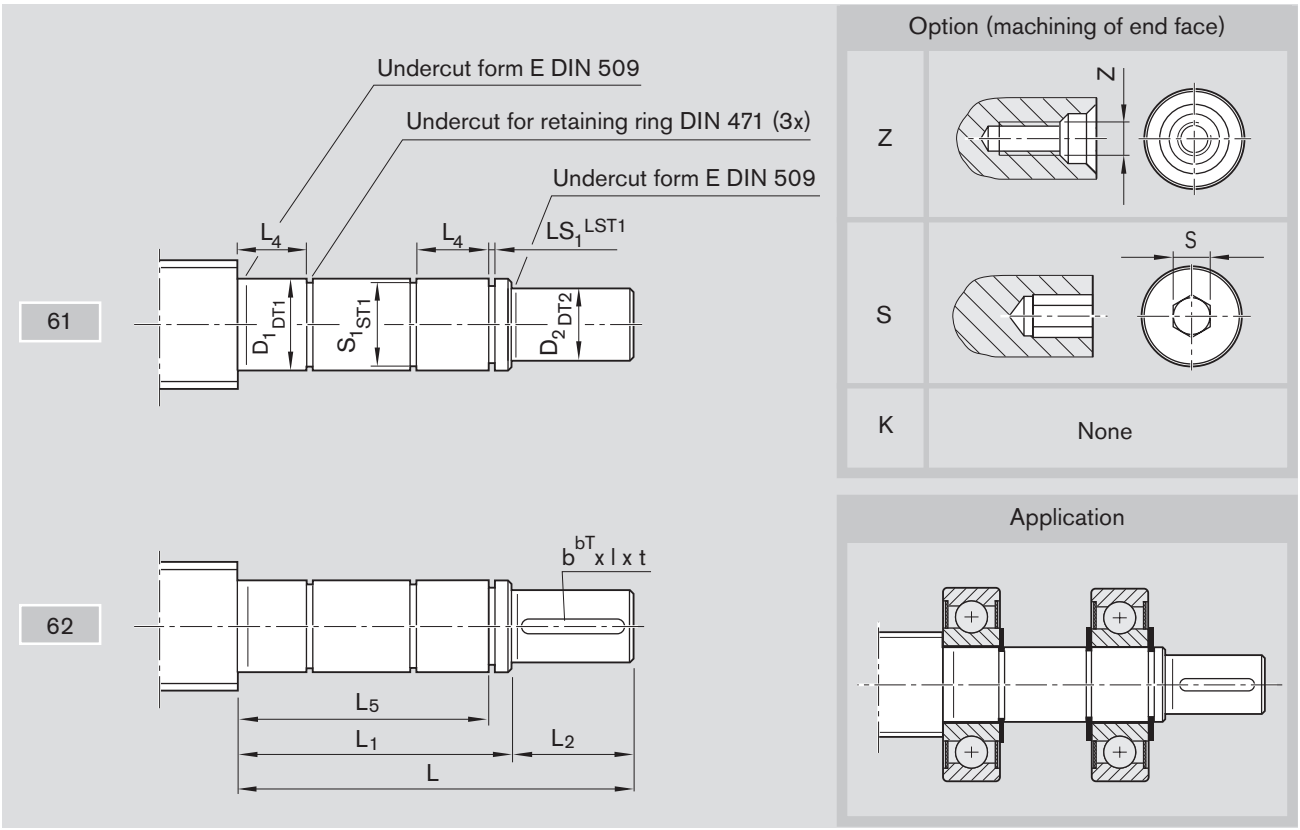
Bearing LAN



Form	Version	Size		Pillow block unit	Bearing	
	d_0	P	SEB-F Part number	LAF Part number	LAN Part number	
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	5/20/40	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	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
			10/12/16/20/40	–	–	–
	301	50	10/12/16/20/40	–	R1590 330 30	R1590 230 30
	350	50	5	–	R1590 035 30	R1590 135 30
	400	63	10/20/40	–	R1590 040 30	R1590 140 30
	500	80	10/20	–	R1590 050 30	R1590 150 30
53	060	8	2.5	R1591 106 00	–	R1590 106 00

Precision Ball Screw Assemblies

Screw Ends Form 61–62



Ordering code:

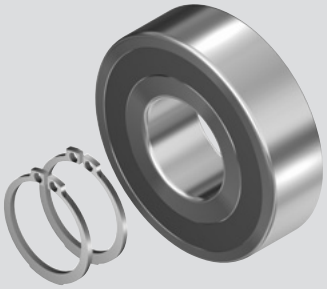
SEM-E-S	20 x 5R x 3-4	1	2	T7	R	62Z120	51Z120	1250	1	0

Form	Version*	Size		Dimensions (mm)												Keyway to DIN 6885				Centering hole	Hex socket
		d_0	P	L	D_1	DT1	L_1	D_2	DT2	L_2	L_4	L_5	S_1	ST1	LS_1	LST1	b	bT	l	t	Z	S
61	050	8	2.5	34	5	j6	22	4	h7	12	5	20	4.8	h10	0.70	H13					–	–
	060	12	2/5/10	42	6	j6	26	5	h7	16	6	24	5.7	h10	0.80	H13					–	–
	100	16	5/10/16	59	10	j6	39	8	h7	20	9	36	9.6	h10	1.10	H13					M3	–
	120	20	5/20/40	68	12	j6	43	10	h7	25	10	40	11.5	h11	1.10	H13					M3	4
	150	20	5/20/40	72	15	j6	47	12	h7	25	11	44	14.3	h11	1.10	H13					M4	4
	170	25	5/10/25	81	17	j6	51	15	h7	30	12	48	16.2	h11	1.10	H13					M5	4
	200	32	5/10/20/32	100	20	j6	60	18	h7	40	14	56	19.0	h11	1.30	H13					M6	5
	250	32	5/10/20/32	114	25	j6	64	22	h7	50	15	60	23.9	h12	1.30	H13					M8	6
	300	40	5/10/12/16/20/40	118	30	j6	68	28	h7	50	16	64	28.6	h12	1.60	H13					M10	10
	350	50	5/10/12/16/20/40	133	35	j6	73	32	h7	60	17	68	33.0	h12	1.60	H13					M12	10
	500	63	10/20/40	167	50	j6	87	48	h7	80	20	80	47.0	h12	2.15	H13					M16	17
	600	80	10/20	175	60	j6	95	58	h7	80	22	88	57.0	h12	2.15	H13					M20	17
62	100	16	5/10/16	59	10	j6	39	8	h7	20	9	36	9.6	h10	1.10	H13	2	P9	14	1.2	M3	–
	120	20	5/20/40	68	12	j6	43	10	h7	25	10	40	11.5	h11	1.10	H13	3	P9	20	1.8	M3	4
	150	20	5/20/40	72	15	j6	47	12	h7	25	11	44	14.3	h11	1.10	H13	4	P9	20	2.5	M4	4
	170	25	5/10/25	81	17	j6	51	15	h7	30	12	48	16.2	h11	1.10	H13	5	P9	25	3	M5	4
	200	32	5/10/20/32	100	20	j6	60	18	h7	40	14	56	19.0	h11	1.30	H13	6	P9	28	3.5	M6	5
	250	32	5/10/20/32	114	25	j6	64	22	h7	50	15	60	23.9	h12	1.30	H13	6	P9	36	3.5	M8	6
	300	40	5/10/12/16/20/40	118	30	j6	68	28	h7	50	16	64	28.6	h12	1.60	H13	8	P9	36	4	M10	10
	350	50	5/10/12/16/20/40	133	35	j6	73	32	h7	60	17	68	33.0	h12	1.60	H13	10	P9	40	5	M12	10
	500	63	10/20/40	167	50	j6	87	48	h7	80	20	80	47.0	h12	2.15	H13	14	P9	63	5.5	M16	17
	600	80	10/20	175	60	j6	95	58	h7	80	22	88	57.0	h12	2.15	H13	16	P9	63	6	M20	17

* The allocation of screw ends to the bearings is defined by the version.

End Bearings for Screw Ends Form 61–62

Bearing LAD*

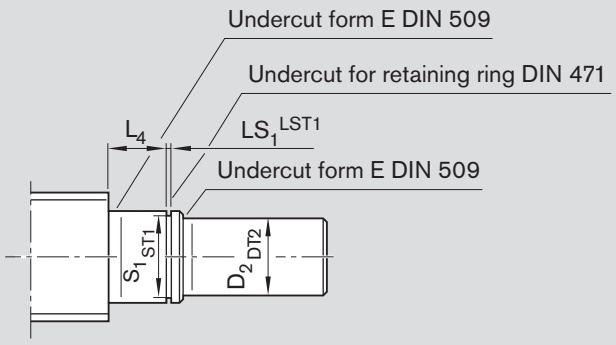


Form	Version	Size		Bearing LAD*
		d_0	P	Part number
61	050	8	2.5	R1590 605 00
	060	12	2/5/10	R1590 606 00
	100	16	5/10/16	R1590 610 00
	120	20	5/20/40	R1590 612 00
	150	20	5/20/40	R1590 615 00
	170	25	5/10/25	R1590 617 00
	200	32	5/10/20/32	R1590 620 00
	250	32	5/10/20/32	R1590 625 00
	300	40	5/10/12/16/20/40	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	100	16	5/10/16	R1590 610 00
	120	20	5/20	R1590 612 00
	150	20	5/20	R1590 615 00
	170	25	5/10/25	R1590 617 00
	200	32	5/10/20/32	R1590 620 00
	250	32	5/10/20/32	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

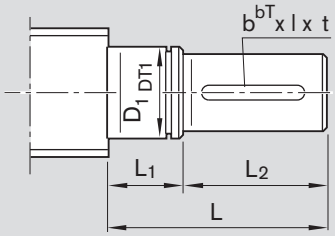
* Items delivered per bearing: 1 bearing, 2 retaining rings.
Two sets are required for applications with Form 61-62.

Screw Ends Form 71–72

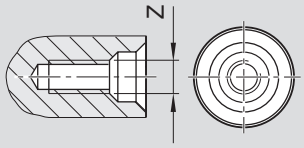
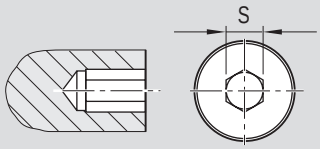
71



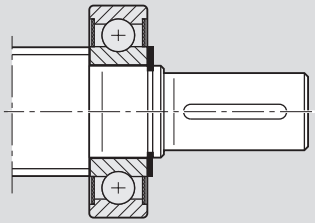
72



Option (machining of end face)

Z	
S	
K	None

Application



Ordering code:

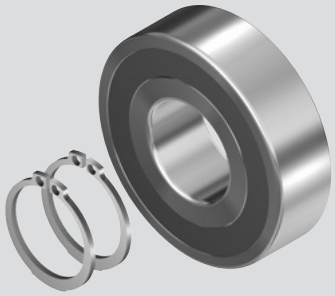
SEM-E-S	20 x 5R x 3-4	1	2	T7	R	72Z120	51Z120	1250	1	0

Form	Version*	Size		Dimensions (mm)											Keyway to DIN 6885				Centering hole	Hex socket
		d_0	P	L	D_1	DT1	L_1	D_2	DT2	L_2	L_4	S_1	ST1	LS_1	LST1	b	bT	l	t	Z	S
71	050	8	2.5	19	5	j6	7	4	h7	12	5	4.8	h10	0.70	H13					-	-
	060	12	2/5/10	24	6	j6	8	5	h7	16	6	5.7	h10	0.80	H13					-	-
	100	16	5/10/16	32	10	j6	12	8	h7	20	9	9.6	h10	1.10	H13					M3	-
	120	20	5/20/40	38	12	j6	13	10	h7	25	10	11.5	h11	1.10	H13					M3	4
	150	20	5/20/40	39	15	j6	14	12	h7	25	11	14.3	h11	1.10	H13					M4	4
	170	25	5/10/25	45	17	j6	15	15	h7	30	12	16.2	h11	1.10	H13					M5	4
	200	32	5/10/20/32	58	20	j6	18	18	h7	40	14	19.0	h11	1.30	H13					M6	5
	250	32	5/10/20/32	69	25	j6	19	22	h7	50	15	23.9	h12	1.30	H13					M8	6
	300	40	5/10/12/16/20/40	70	30	j6	20	28	h7	50	16	28.6	h12	1.60	H13					M10	10
	350	50	5/10/12/16/20/40	82	35	j6	22	32	h7	60	17	33.0	h12	1.60	H13					M12	10
	500	63	10/20/40	107	50	j6	27	48	h7	80	20	47.0	h12	2.15	H13					M16	17
	600	80	10/20	109	60	j6	29	58	h7	80	22	57.0	h12	2.15	H13					M20	17
72	100	16	5/10/16	32	10	j6	12	8	h7	20	9	9.6	h10	1.10	H13	2	P9	14	1.2	M3	-
	120	20	5/20/40	38	12	j6	13	10	h7	25	10	11.5	h11	1.10	H13	3	P9	20	1.8	M3	4
	150	20	5/20/40	39	15	j6	14	12	h7	25	11	14.3	h11	1.10	H13	4	P9	20	2.5	M4	4
	170	25	5/10/25	45	17	j6	15	15	h7	30	12	16.2	h11	1.10	H13	5	P9	25	3	M5	4
	200	32	5/10/20/32	58	20	j6	18	18	h7	40	14	19.0	h11	1.30	H13	6	P9	28	3.5	M6	5
	250	32	5/10/20/32	69	25	j6	19	22	h7	50	15	23.9	h12	1.30	H13	6	P9	36	3.5	M8	6
	300	40	5/10/12/16/20/40	70	30	j6	20	28	h7	50	16	28.6	h12	1.60	H13	8	P9	36	4	M10	10
	350	50	5/10/12/16/20/40	82	35	j6	22	32	h7	60	17	33.0	h12	1.60	H13	10	P9	40	5	M12	10
	500	63	10/20/40	107	50	j6	27	48	h7	80	20	47.0	h12	2.15	H13	14	P9	63	5.5	M16	17
	600	80	10/20	109	60	j6	29	58	h7	80	22	57.0	h12	2.15	H13	16	P9	63	6	M20	17

* The allocation of screw ends to the bearings is defined by the version.

End Bearings for Screw Ends Form 71–72

Bearing LAD*

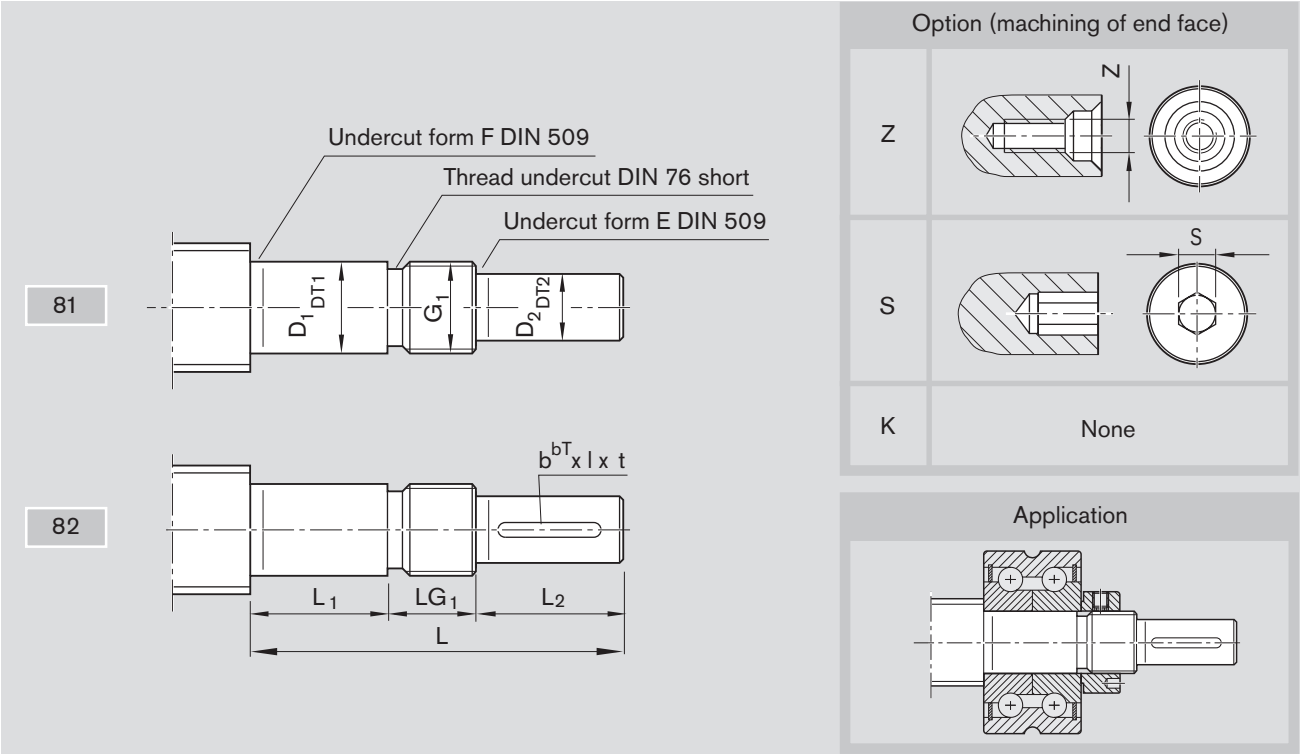


Form	Version	Size		Bearing LAD*
		d_0	P	Part number
71	050	8	2.5	R1590 605 00
	060	12	2/5/10	R1590 606 00
	100	16	5/10/16	R1590 610 00
	120	20	5/20/40	R1590 612 00
	150	20	5/20/40	R1590 615 00
	170	25	5/10/25	R1590 617 00
	200	32	5/10/20/32	R1590 620 00
	250	32	5/10/20/32	R1590 625 00
	300	40	5/10/12/16/20/40	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	100	16	5/10/16	R1590 610 00
	120	20	5/20/40	R1590 612 00
	150	20	5/20/40	R1590 615 00
	170	25	5/10/25	R1590 617 00
	200	32	5/10/20/32	R1590 620 00
	250	32	5/10/20/32	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

* Items delivered: 1 bearing, 2 retaining rings.

Precision Ball Screw Assemblies

Screw Ends Form 81–82



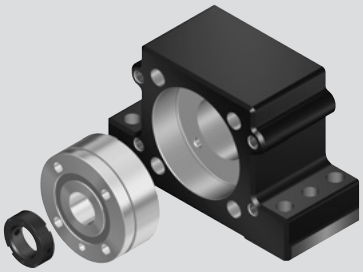
Ordering code:

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

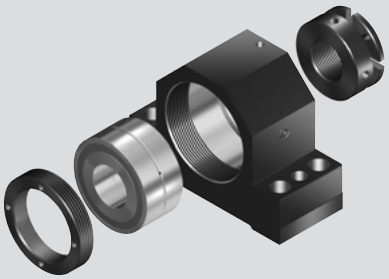
Form	Version*	Size		Dimensions (mm)									Keyway to DIN 6885				Centering hole	Hex socket
		d_0	P	L	D_1	DT1	L_1	D_2	DT2	L_2	G_1	LG_1	b	bT	l	t	Z	S
81	060	12	2/5/10	40	6	h6	14	5	h7	16	M6x0.5	10					-	-
	061	12	2/5/10	41	6	h6	10	5	h7	16	M6x0.5	15					-	-
	100	16	5/10/16	50	10	h6	18	8	h7	20	M10x1	12					M3	-
	120	20	5/20/40	60	12	h6	23	10	h7	25	M12x1	12					M3	4
	122	20	5	60	12	h6	17	10	h7	25	M12x1	18					M3	4
	151	25	5/10	60	15	h6	19	12	h7	25	M15x1	16					M4	4
	170	25	5/10/25	75	17	h6	23	15	h7	30	M17x1	22					M5	4
	200	32	5/10/20/32	88	20	h6	26	18	h7	40	M20x1	22					M6	5
	203	32	5/10/20/32	78	20	h6	26	16	h7	35	M20x1	17					M5	4
	204	32	5/10	80	20	h6	25	18	h7	40	M20x1	15					M5	4
	250	40	10/12/16/20/40	130	25	h6	54	22	h7	50	M25x1.5	26					M8	6
	300	40	5 10/12/16/20/40	101	30	h6	25	25	h7	50	M30x1.5	26					M10	8
	301	40	5/10/12/16/20/40	93	30	h6	25	25	h7	50	M30x1.5	18					M10	8
	302	50	10/12/16/20/40	130	30	h6	54	25	h7	50	M30x1.5	26					M10	8
	350	50	5	110	35	h6	32	30	h7	50	M35x1.5	28					M10	10
	400	63	10/20/40	132	40	h6	44	36	h7	60	M40x1.5	28					M12	12
	500	80	10/20	154	50	h6	52	40	h7	70	M50x1.5	32					M16	12
82	100	16	5/10/16	50	10	h6	18	8	h7	20	M10x1	12	2	P9	14	1.2	M3	-
	120	20	5/20/40	60	12	h6	23	10	h7	25	M12x1	12	3	P9	20	1.8	M3	4
	170	25	5/10/25	75	17	h6	23	15	h7	30	M17x1	22	5	P9	25	3	M5	4
	200	32	5/10/20/32	88	20	h6	26	18	h7	40	M20x1	22	6	P9	28	3.5	M6	5
	203	32	5/10/20/32	78	20	h6	26	16	h7	35	M20x1	17	5	P9	28	3	M5	4
	250	40	10/12/16/20/40	130	25	h6	54	22	h7	50	M25x1.5	26	6	P9	36	3.5	M8	6
	300	40	5 10/12/16/20/40	101	30	h6	25	25	h7	50	M30x1.5	26	8	P9	36	4	M10	8
	301	40	5/10/12/16/20/40	93	30	h6	25	25	h7	50	M30x1.5	18	8	P9	36	4	M10	8
	302	50	10/12/16/20/40	130	30	h6	54	25	h7	50	M30x1.5	26	8	P9	36	4	M10	8
	350	50	5	110	35	h6	32	30	h7	50	M35x1.5	28	8	P9	36	4	M10	10
	400	63	10/20/40	132	40	h6	44	36	h7	60	M40x1.5	28	10	P9	40	5	M12	12
	500	80	10/20	154	50	h6	52	40	h7	70	M50x1.5	32	12	P9	50	5	M16	12

End Bearings for Screw Ends Form 81–82

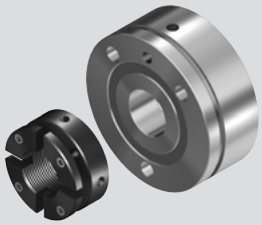
Pillow block unit SEC-F



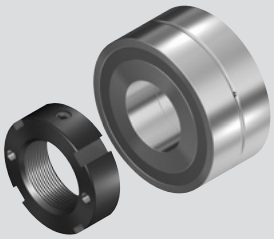
Pillow block unit SEB-F



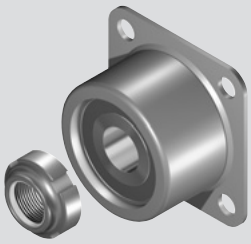
Bearing LAF



Bearing LAN



Bearing LAL

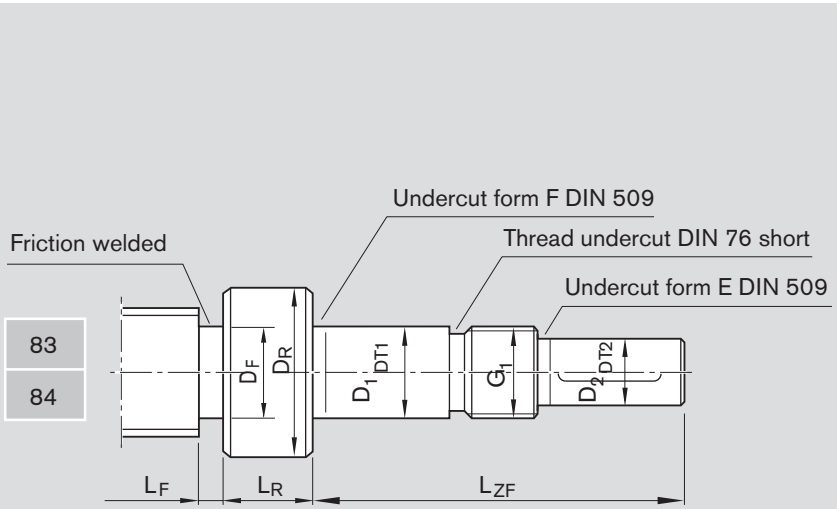


* The allocation of screw ends to the bearings is defined by the version.

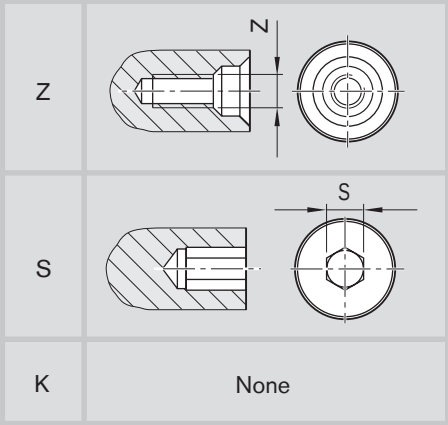
Form	Version	Size		Pillow block unit for motor attachment		Bearing		
		d_0	P	SEC-F	SEB-F	LAF	LAN	LAL
81	060	12	2/5/10	–	R1591 106 20	–	R1590 1 06 00	–
	061	12	2/5/10	–	–	–	–	R1590 406 00
	100	16	5/10/16	–	R1591 110 20	–	R1590 1 10 00	–
	122	20	5	–	–	–	–	R1590 412 00
	151	25	5/10	–	–	–	–	R1590 415 00
	120	20	5/20/40	R1594 012 00	R1591 112 20	R1590 012 00	R1590 1 12 00	–
	170	25	5/10/25	–	R1591 117 30	R1590 017 30	R1590 1 17 30	–
	200	32	5/10/20/32	–	R1591 120 30	R1590 020 30	R1590 1 20 30	–
	203	32	5/10/20/32	R1594 020 00	–	R1590 020 00	R1590 1 20 00	–
	204	32	5/10	–	–	–	–	R1590 420 00
	250	40	10/12/16/20/40	–	R1591 225 30	R1590 325 30	R1590 2 25 30	–
	300	40	5 10/12/16/20/40	–	R1591 130 30	R1590 030 30	R1590 1 30 30	–
	301	40	5/10/12/16/20/40	R1594 030 00	–	R1590 030 00	R1590 130 00	–
	302	50	10/12/16/20/40	–	–	R1590 330 30	R1590 230 30	–
	350	50	5	–	–	R1590 035 30	R1590 135 30	–
	400	63	10/20/40	–	–	R1590 040 30	R1590 140 30	–
	500	80	10/20	–	–	R1590 050 30	R1590 150 30	–
82	100	16	5/10/16	–	R1591 110 20	–	R1590 110 00	–
	120	20	5/20/40	R1594 012 00	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	–	R1591 120 30	R1590 020 30	R1590 120 30	–
	203	32	5/10/20/32	R1594 020 00	–	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 10/12/16/20/40	–	R1591 130 30	R1590 030 30	R1590 130 30	–
	301	40	5/10/12/16/20/40	R1594 030 00	–	R1590 030 00	R1590 130 00	–
	302	50	10/12/16/20/40	–	–	R1590 330 30	R1590 230 30	–
	350	50	5	–	–	R1590 035 30	R1590 135 30	–
	400	63	10/20/40	–	–	R1590 040 30	R1590 140 30	–
	500	80	10/20	–	–	R1590 050 30	R1590 150 30	–

Precision Ball Screw Assemblies

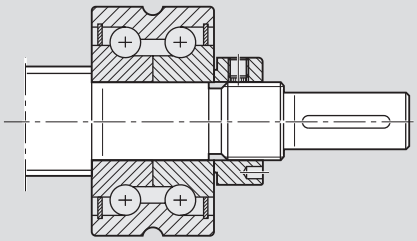
Screw Ends Form 83–84



Option (machining of end face)



Application



Ordering code:

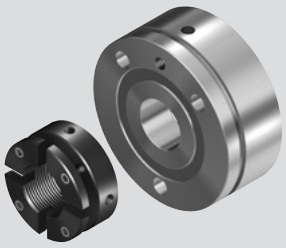
SEM-E-S	20 x 5R x 3-4	1	2	T7	R	83Z200	51Z120	1250	1	0

Form	Version	Size		Dimensions (mm)								Keyway to DIN 6885 for form 84				Centering hole	Hex socket
		d_0	P	L_{ZF}	D_1	DT1	L_1	D_2	DT2	L_2	G_1	LG_1	b	bT	l	t	Z	S
	060	6	all	40	6	h6	14	5	h7	16	M6x0.5	10	-	-	-	-	-	-
	061	6	1/2	41	6	h6	10	5	h7	16	M6x0.5	15	-	-	-	-	-	-
	060	8	all	40	6	h6	14	5	h7	16	M6x0.5	10	-	-	-	-	-	-
	062	8	1	41	6	h6	10	5	h7	16	M6x0.5	15	-	-	-	-	-	-
	063	8	2	41	6	h6	10	5	h7	16	M6x0.5	15	-	-	-	-	-	-
	064	8	2.5	41	6	h6	10	5	h7	16	M6x0.5	15	-	-	-	-	-	-
	120	12	all	60	12	h6	23	10	h7	25	M12x1	12	3	P9	20	1.8	M3	4
83/84	121	12	5/10	60	12	h6	17	10	h7	25	M12x1	18	-	-	-	-	M3	4
	122	16	5/10	60	12	h6	17	10	h7	25	M12x1	18	-	-	-	-	M3	4
	170	16	all	75	17	h6	23	15	h7	30	M17x1	22	4	P9	20	2.5	M5	4
	200	20	all	88	20	h6	26	18	h7	40	M20x1	22	6	P9	28	3.5	M6	5
	250	25	all	102	25	h6	26	22	h7	50	M25x1.5	26	6	P9	36	3.5	M8	6
	300	32	all	101	30	h6	25	25	h7	50	M30x1.5	26	8	P9	36	4.0	M10	8
	400	40	all	132	40	h6	44	36	h7	60	M35x1.5	28	10	P9	40	5.0	M12	12
	500	50	all	154	50	h6	52	40	h7	70	M50x1.5	32	12	P9	50	5.0	M16	12
	600	63	all	155	60	h6	43	55	h7	80	M60x2	32	16	P9	63	6.0	M20	17

End Bearings for Screw Ends Form 83–84

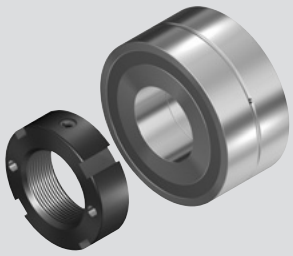
Bearing LAF

Shown with slotted nut NMA

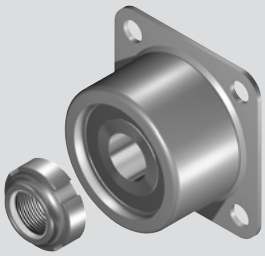


Bearing LAN

Shown with slotted nut NMZ



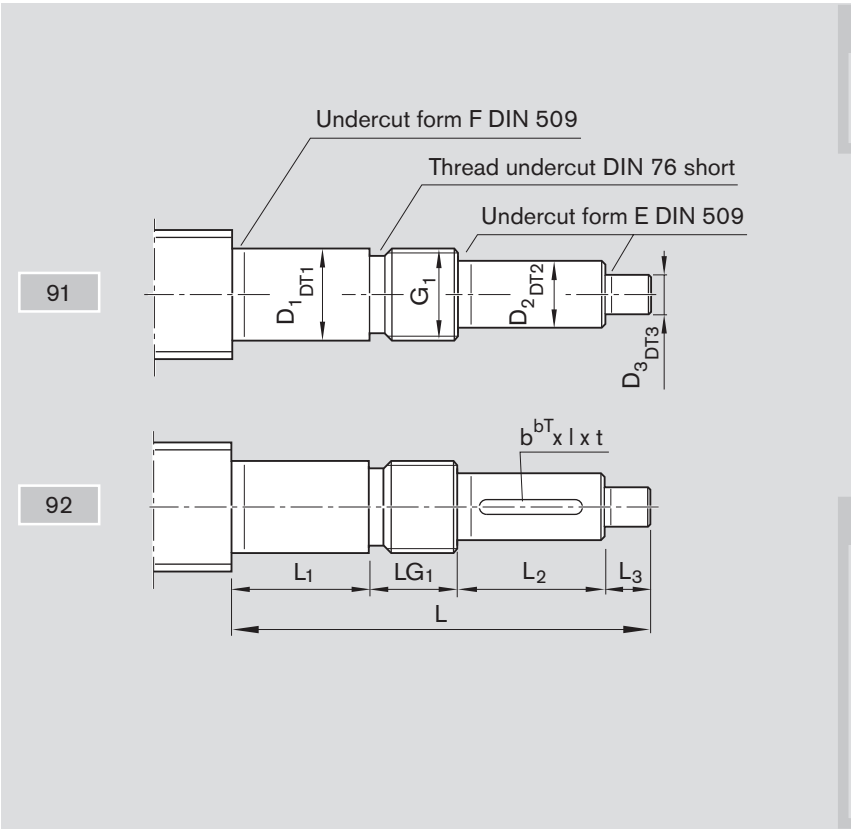
Bearing LAL



Form	Version	Size		Friction welding				Bearing		
		d_0	P	D_R	L_R	D_F	L_F	LAF	LAN	LAL
	060	6	all	12	15	5.2	8	–	R1590 106 00	–
	061	6	1/2	12	15	5.2	8	–	–	R1590 406 00
	060	8	all	12	15	6.2	8	–	R1590 106 00	–
	062	8	1	12	15	7.2	8	–	–	R1590 406 00
	063	8	2	12	15	6.9	8	–	–	R1590 406 00
	064	8	2.5	12	15	6.2	8	–	–	R1590 406 00
	120	12	all	16	15	9.5	8	–	R1590 112 00	–
83/84	121	12	5/10	15	15	9.5	8	–	–	R1590 412 00
	122	16	5/10	15	15	12.5	8	–	–	R1590 412 00
	170	16	all	23	15	12.5	8	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	none	none	–

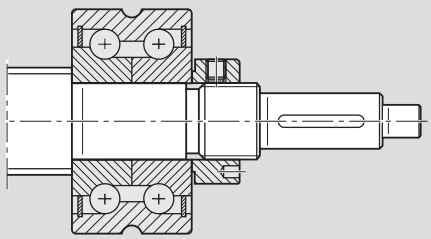
Precision Ball Screw Assemblies

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

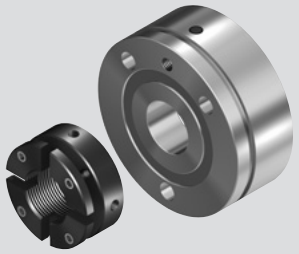
Form	Version*	Size		Dimensions (mm)												Keyway to DIN 6885			
		d_0	P	L	D_1	DT1	L_1	D_2	DT2	L_2	D_3	DT3	L_3	G_1	LG_1	b	bT	l	t
91	060	12	2/5/10	50	6	h6	14	5	h7	16	4	h7	10	M6x0.5	10				
	100	16	5/10/16	60	10	h6	18	8	h7	20	4	h7	10	M10x1	12				
	120	20	5/20/40	75	12	h6	23	10	h7	25	6	h7	15	M12x1	12				
	170	25	5/10/25	90	17	h6	23	15	h7	30	6	h7	15	M17x1	22				
	200	32	5/10/20/32	103	20	h6	26	18	h7	40	6	h7	15	M20x1	22				
	250	40	10/12/16/20/40	145	25	h6	54	22	h7	50	6	h7	15	M25x1.5	26				
	300	40	5 10/12/16/20/40	116	30	h6	25	25	h7	50	6	h7	15	M30x1.5	26				
	301	50	10/12/16/20/40	145	30	h6	54	25	h7	50	6	h7	15	M30x1.5	26				
	350	50	5	125	35	h6	32	30	h7	50	6	h7	15	M35x1.5	28				
	400	63	10/20/40	147	40	h6	44	36	h7	60	6	h7	15	M40x1.5	28				
	500	80	10/20	169	50	h6	52	40	h7	70	6	h7	15	M50x1.5	32				
92	100	16	5/10/16	60	10	h6	18	8	h7	20	4	h7	10	M10x1	12	2	P9	14	1.2
	120	20	5/20/40	75	12	h6	23	10	h7	25	6	h7	15	M12x1	12	3	P9	20	1.8
	170	25	5/10/25	90	17	h6	23	15	h7	30	6	h7	15	M17x1	22	5	P9	25	3
	200	32	5/10/20/32	103	20	h6	26	18	h7	40	6	h7	15	M20x1	22	6	P9	28	3.5
	250	40	10/12/16/20/40	145	25	h6	54	22	h7	50	6	h7	15	M25x1.5	26	6	P9	36	3.5
	300	40	5 10/12/16/20/40	116	30	h6	25	25	h7	50	6	h7	15	M30x1.5	26	8	P9	36	4
	301	50	10/12/16/20/40	145	30	h6	54	25	h7	50	6	h7	15	M30x1.5	26	8	P9	36	4
	350	50	5	125	35	h6	32	30	h7	50	6	h7	15	M35x1.5	28	8	P9	36	4
	400	63	10/20/40	147	40	h6	44	36	h7	60	6	h7	15	M40x1.5	28	10	P9	40	5
	500	80	10/20	169	50	h6	52	40	h7	70	6	h7	15	M50x1.5	32	12	P9	50	5

* The allocation of screw ends to the bearings is defined by the version.

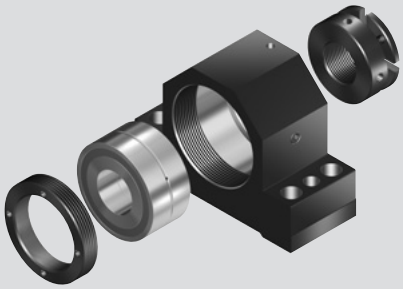
End Bearings for Screw Ends Form 91–92

Bearing LAF

Shown with slotted nut NMA

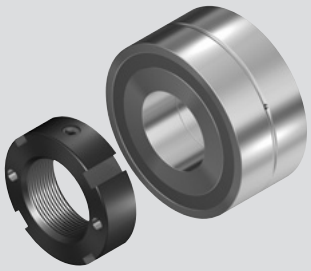


Pillow block unit SEB-F



Bearing LAN

Shown with slotted nut NMZ

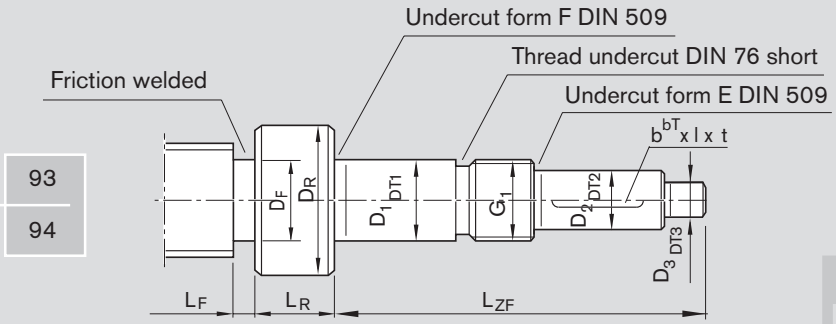


Form	Version	Size		Pillow block unit	Bearing	
		d_0	P	SEB-F Part number	LAF Part number	LAN Part number
91	060	12	2/5/10	R1591 106 20	–	R1590 106 00
	100	16	5/10/16	R1591 110 20	–	R1590 110 00
	120	20	5/20/40	R1591 112 20	R1590 012 00	R1590 112 00
	170	25	5/10/25	R1591 117 30	R1590 017 30	R1590 117 30
	200	32	5/10/20/32	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
			10/12/16/20/40	–	–	–
	301	50	10/12/16/20/40	–	R1590 330 30	R1590 230 30
	350	50	5	–	R1590 035 30	R1590 135 30
	400	63	10/20/40	–	R1590 040 30	R1590 140 30
	500	80	10/20	–	R1590 050 30	R1590 150 30
92	100	16	5/10/16	R1591 110 20	–	R1590 110 00
	120	20	5/20/40	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	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
			10/12/16/20/40	–	–	–
	301	50	10/12/16/20/40	–	R1590 330 30	R1590 230 30
	350	50	5	–	R1590 035 30	R1590 135 30
	400	63	10/20/40	–	R1590 040 30	R1590 140 30
	500	80	10/20	–	R1590 050 30	R1590 150 30

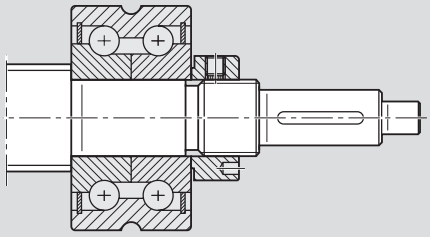
Precision Ball Screw Assemblies

Screw Ends Form 93–94

Option (machining of end face)	
K	None



Application



Ordering code:

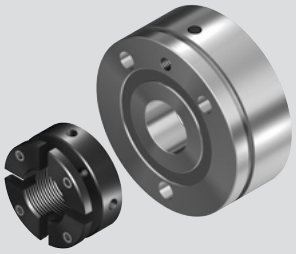
SEM-E-S	20 x 5R x 3-4	1	2	T7	R	93K200	41Z120	1250	1	0

Form	Version	Size		Dimensions (mm)											Keyway to DIN 6885 for form 94			
		d_0	P	L_{ZF}	D_1	DT1	L_1	D_2	DT2	L_2	D_3	DT3	L_3	G_1	LG_1	b	bT	l	t
93/94	060	8	all	50	6	h6	14	5	h7	16	4	h7	10	M6x0.5	10				
	120	12	all	75	12	h6	23	10	h7	25	6	h7	15	M12x1	12	3	P9	20	2.0
	170	16	all	90	17	h6	23	15	h7	30	6	h7	15	M17x1	22	5	P9	25	3.0
	200	20	all	103	20	h6	26	18	h7	40	6	h7	15	M20x1	22	6	P9	28	4.0
	250	25	all	117	25	h6	26	22	h7	50	6	h7	15	M25x1.5	26	6	P9	36	4.0
	300	32	all	116	30	h6	25	25	h7	50	6	h7	15	M30x1.5	26	8	P9	36	4.0
	400	40	all	147	40	h6	44	36	h7	60	6	h7	15	M40x1.5	28	10	P9	40	5.0
	500	50	all	169	50	h6	52	40	h7	70	6	h7	15	M50x1.5	32	12	P9	50	5.0
	600	63	all	170	60	h6	43	55	h7	80	6	h7	15	M60x2	32	16	P9	63	6.0

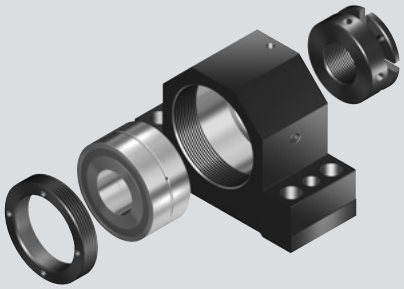
End Bearings for Screw Ends Form 93–94

Bearing LAF

Shown with slotted nut NMA

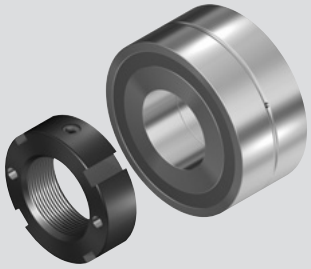


Pillow block unit SEB-F



Bearing LAN

Shown with slotted nut NMZ



Form	Version	Size		Pillow block unit	Bearing	
		d_0	P	SEB-F	LAF	LAN
93/94	060	8	all	R1591 106 20		R1590 106 00
	120	12	all	R1591 112 20		R1590 112 00
	170	16	all	R1591 117 30	R1590 017 30	R1590 117 30
	200	20	all	R1591 120 30	R1590 020 30	R1590 120 30
	250	25	all	R1591 225 30	R1590 325 30	R1590 225 30
	300	32	all	R1591 113 30	R1590 030 30	R1590 130 30
	400	40	all	R1591 114 30	R1590 040 30	R1590 140 30
	500	50	all	R1591 115 30	R1590 050 30	R1590 150 30
	600	63	all	none	none	none

Form	Version	Size		Friction welding			
		d_0	P	D_R	L_R	D_F	L_F
93/94	060	8	all	12	15	6.2	8
	120	12	all	16	15	9.5	8
	170	16	all	23	15	12.5	8
	200	20	all	25	15	16.5	8
	250	25	all	32	15	21.0	8
	300	32	all	40	20	28.0	8
	400	40	all	50	20	33.5	8
	500	50	all	63	20	43.5	8
	600	63	all	82	25	56.0	8

Precision Ball Screw Assemblies

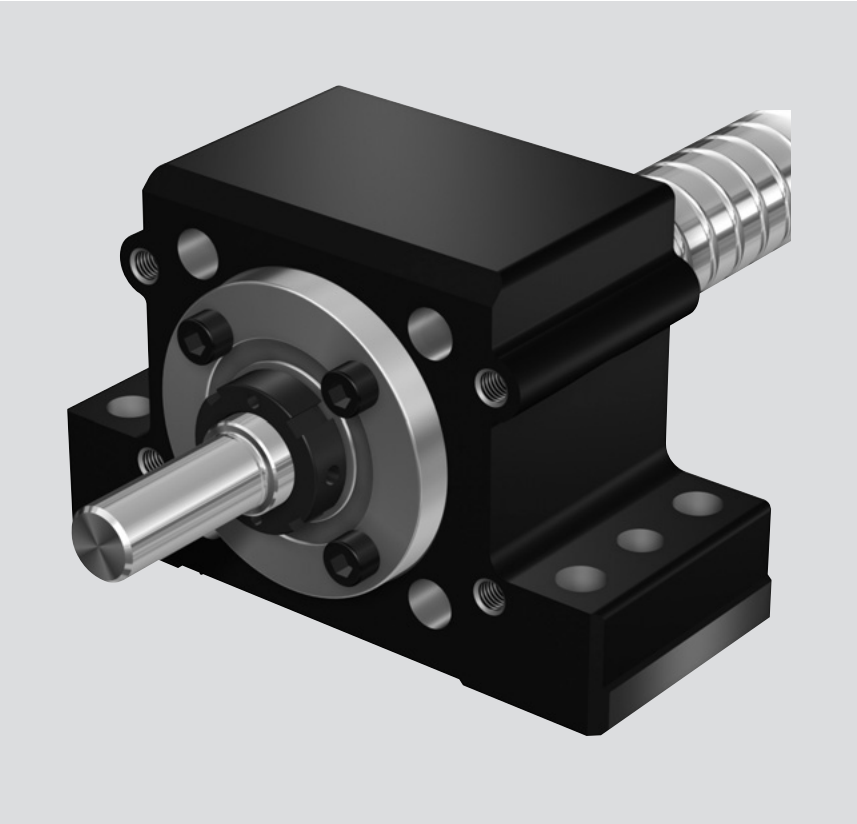
Pillow Block Unit SEC-F

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

The pillow block unit consists of:

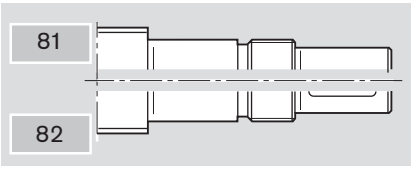
- precision pillow block housing made of aluminum with reference edges on two sides
- angular-contact thrust ball bearing LGF...
- slotted nut NMZ

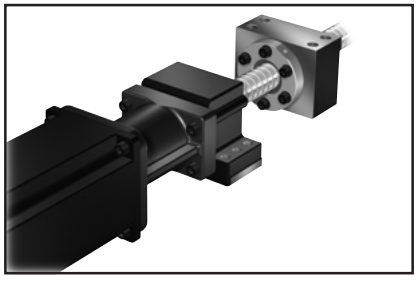
The slotted nut is delivered unmounted.

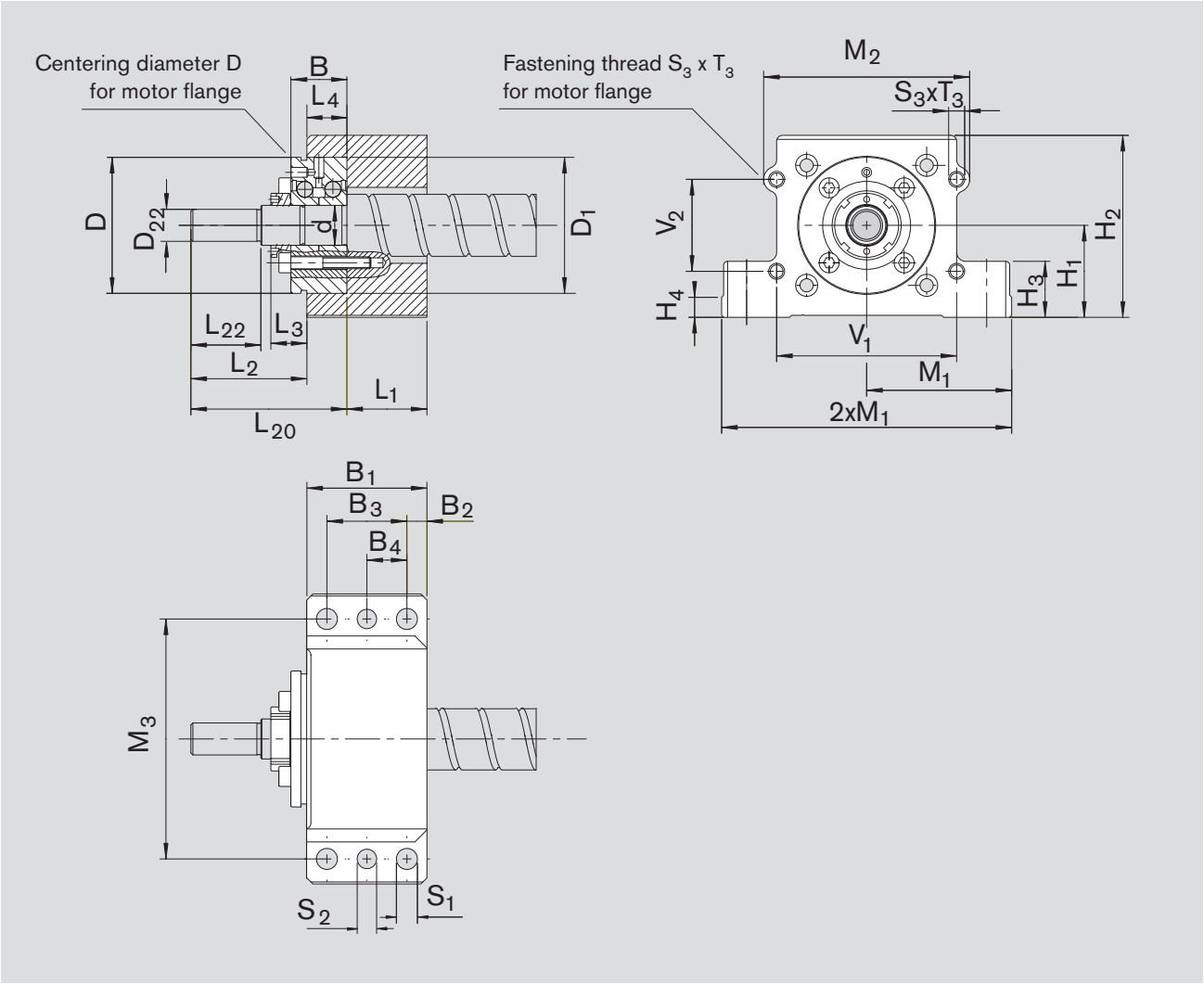


Size	Pillow block unit Part number	Angular-contact thrust ball bearing Load ratings (axial)		Dimensions (mm)			Slotted nut Designation	Weight M_A	Designation	complete
d_0 x P	complete	dyn. C (N)	stat. C_0 (N)	d	D	B		(Nm)		(kg)
20x5/20/40	R1594 012 00	17000	24700	12	55	25	LGF-B-1255	8.0	NMZ 12x1	1.49
32x5/10/20/32	R1594 020 00	26000	47000	20	68	28	LGF-B-2068	18.0	NMZ 20x1	1.88
40x5/10/12/16/20/40	R1594 030 00	29000	64000	30	80	28	LGF-B-3080	32.0	NMZ 30x1.5	2.75

Screw end form 81/82 suitable for motor mounting, see Page 72







Dimensions (mm)

B_1	B_2	B_3	B_4	L_1	L_2	L_3	L_4	L_{20}	L_{22}	D_1	D_{22}	M_1 ±0.015	M_2	M_3	H_1 ±0.015	H_2	H_3	H_4	S_1	S_2	S_3	T_3	V_1	V_2
60	10	40	20	42	42	15	18	60	25	55	10	72.5	80	120	41	81	28	10	10.5	9.7	M8	20	66	50
60	10	40	20	40	58	18	20	78	35	68	16	72.5	103	120	46	91	28	10	10.5	9.7	M8	20	90	46
65	12.5	40	20	45	73	20	20	93	50	80	25	90	116	150	56	111	33	10	13	11.7	M10	20	100	65

Precision Ball Screw Assemblies

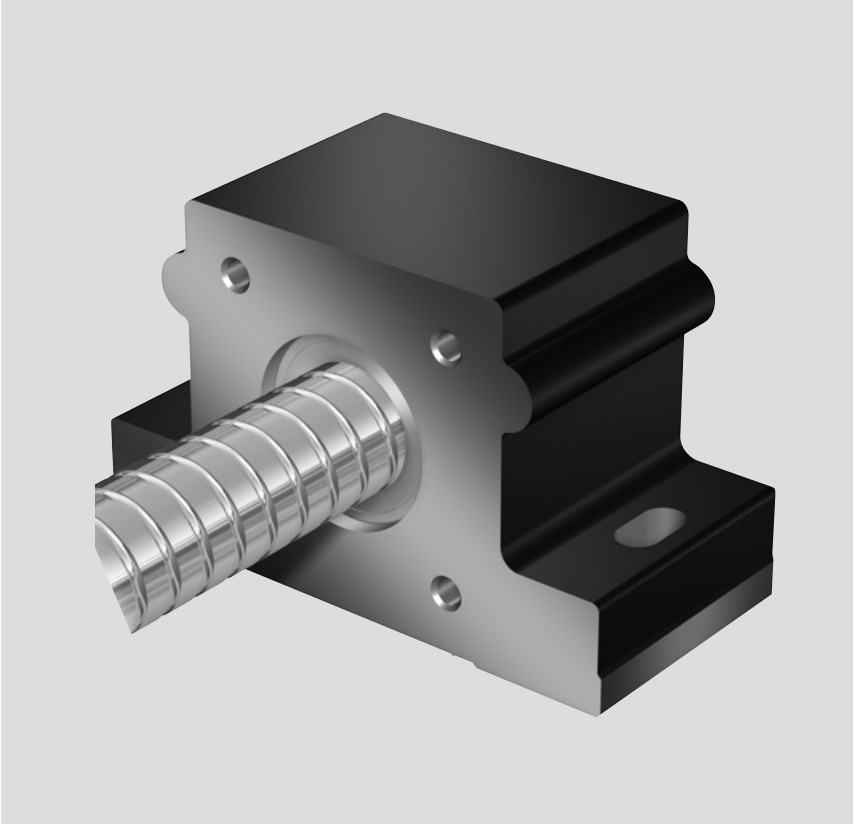
Pillow Block Unit SEC-L

Floating bearing with deep-groove ball bearing to DIN 625

The pillow block unit consists of:

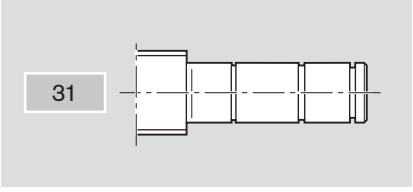
- precision pillow block housing made of aluminum with reference edges on two sides
- deep-groove ball bearing to DIN 625... .2RS
- retaining ring to DIN 471

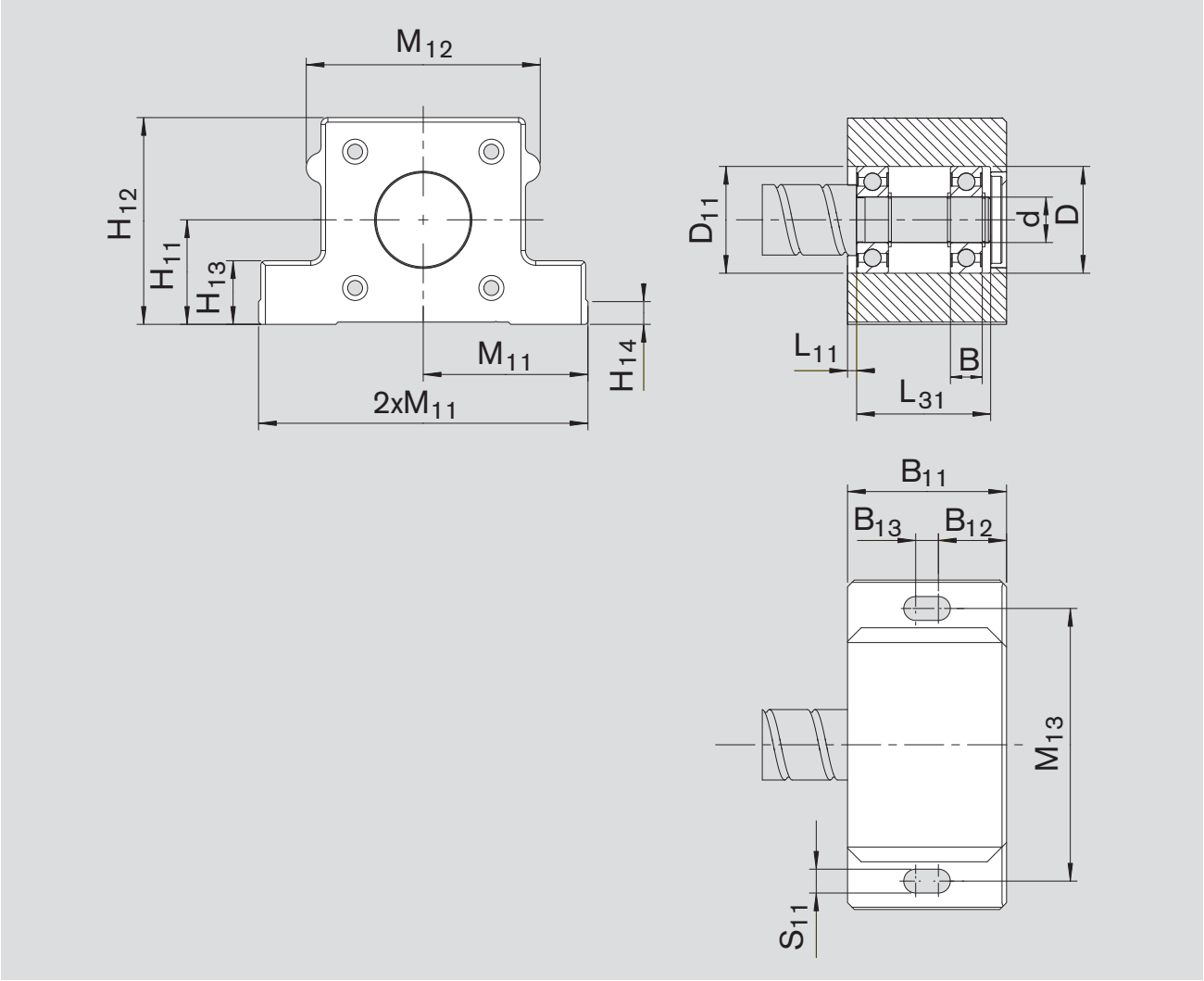
All parts are supplied unmounted.



Size	Pillow block unit Part number	Deep-groove ball bearing to DIN 625 Load ratings (radial)		Dimensions (mm)			Designation	Retaining ring to	Weight complete
d_0 x P	complete	dyn. C (N)	stat. C_0 (N)	d	D	B	DIN 625...	DIN 471	(kg)
20x5/20/40	R1594 615 00	7800	3250	15	35	11	6202.2RS	15x1	1.24
32x5/10/20/32	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





Dimensions (mm)

B_{11}	B_{12}	B_{13}	L_{11}	L_{31}	D_{11}	M_{11} ±0.015	M_{12}	M_{13}	H_{11} ±0.015	H_{12}	H_{13}	H_{14}	S_{11}
60	25	10	4	47	35	72.5	80	120	41	81	28	10	10.5
70	30	10	4	60	47	72.5	103	120	46	91	28	10	10.5
80	35	10	4	68	62	90	116	150	56	111	33	10	13

Precision Ball Screw Assemblies

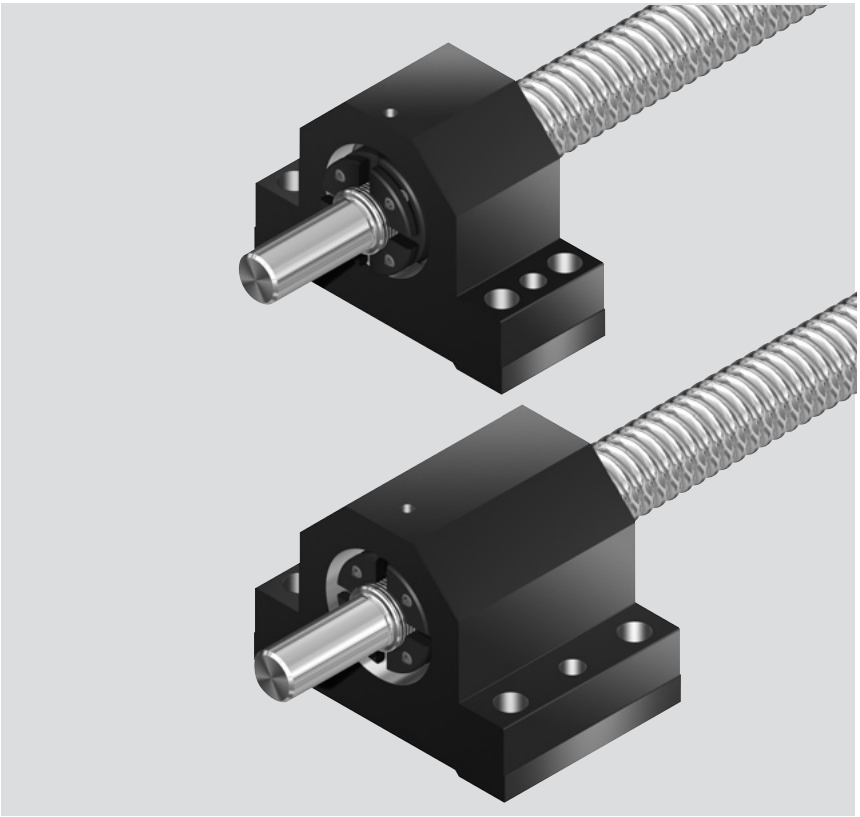
Pillow Block Unit SEB-F

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

The pillow block unit consists of:

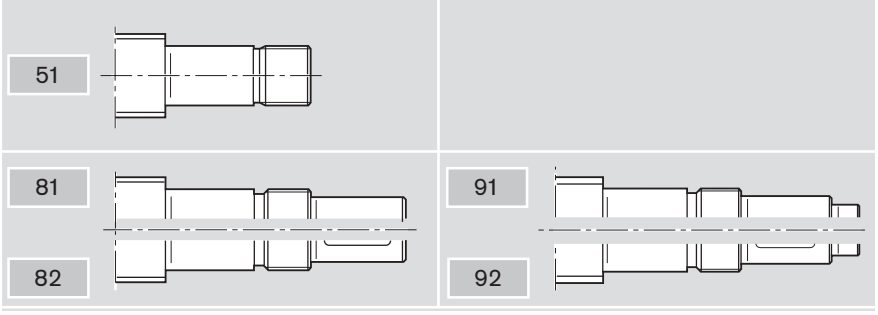
- precision pillow block housing with reference edges on two sides
- angular-contact thrust ball bearing LGN
- slotted nut NMA or NMZ
- housing nut GWR

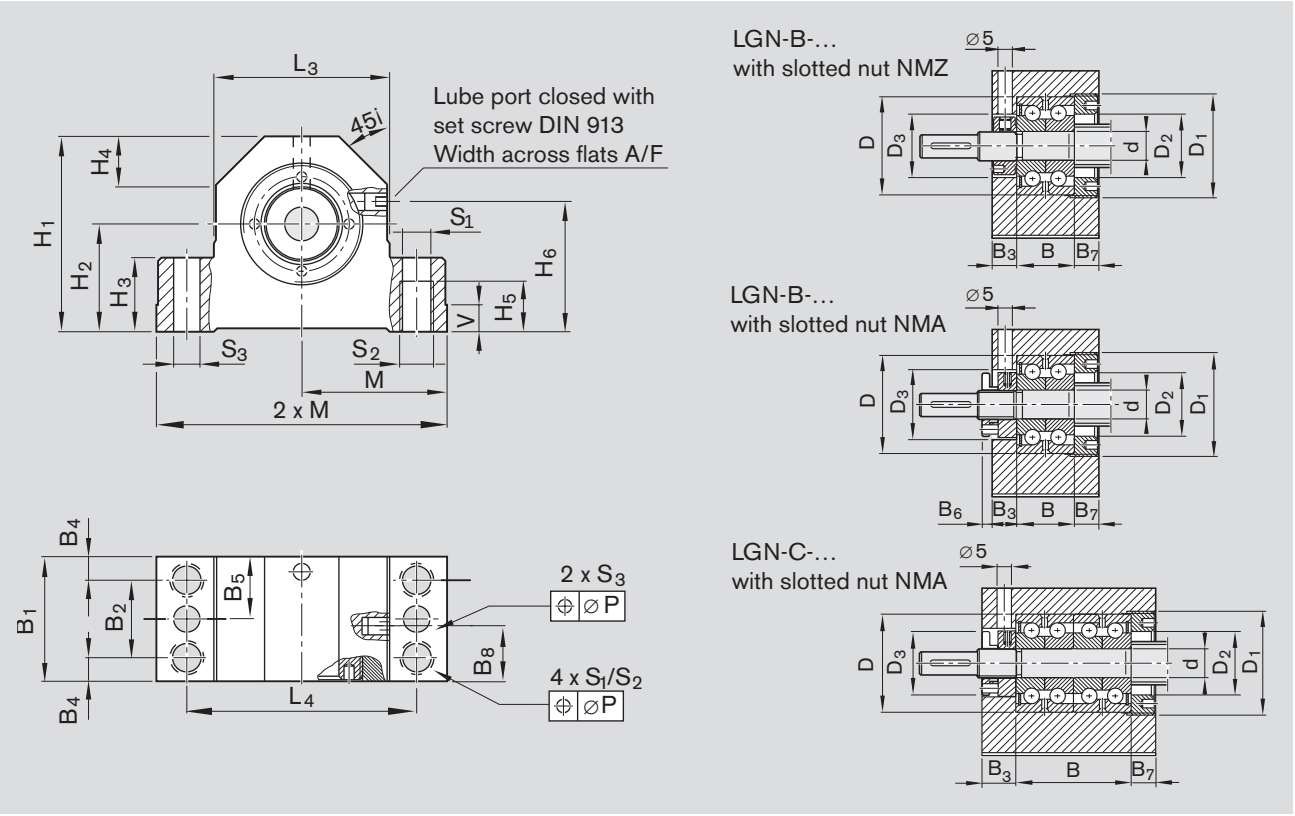
The slotted nut is delivered unmounted.



Size	Pillow block unit Part number	Angular-contact thrust ball bearing Load ratings (axial)		Dimensions (mm)			Slotted nut Designation	Weight M_A	Designation	complete
d_0 x P	complete	dyn. C (N)	stat. C_0 (N)	d	D	B		(Nm)		(kg)
6x1/2	R1591 106 00	6900	8500	6	24	15	LGN-B-0624	2.0	NMZ 6x0.5	0.38
8x1/2/2.5	R1591 106 00	6900	8500	6	24	15	LGN-B-0624	2.0	NMZ 6x0.5	0.38
12x2/5/10	R1591 106 20	6900	8500	6	24	15	LGN-B-0624	2.0	NMZ 6x0.5	0.38
16x5/10/16	R1591 110 20	13400	18800	10	34	20	LGN-B-1034	6.0	NMZ 10x1	0.87
20x5/20	R1591 112 20	17000	24700	12	42	25	LGN-B-1242	8.0	NMZ 12x1	1.12
25x5/10/25	R1591 117 20	18800	31000	17	47	25	LGN-B-1747	15.0	NMZ 17x1	1.65
	R1591 117 30							15.0	NMA 17x1	1.69
32x5/10/20/32	R1591 120 20	26000	47000	20	52	28	LGN-B-2052	18.0	NMZ 20x1	1.93
	R1591 120 30							18.0	NMA 20x1	2.03
40x10/12/16/20/40	R1591 225 30	44500	111000	25	57	56	LGN-C-2557	25.0	NMA 25x1.5	5.13
40x5	R1591 130 20	29000	64000	30	62	28	LGN-B-3062	32.0	NMZ 30x1.5	2.64
	R1591 130 30							32.0	NMA 30x1.5	2.77
50x5	R1591 135 30	41000	89000	35	72	34	LGN-B-3572	40.0	NMA 35x1.5	4.66
50x10/12/16/20/40	R1591 230 30	47500	127000	30	62	56	LGN-C-3062	32.0	NMA 30x1.5	7.04
63x10/20/40	R1591 140 30	72000	149000	40	90	46	LGN-A-4090	55.0	NMA 40x1.5	10.49
80x10/20	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 x1/2/2.5: Form 53, 83, 93





Dimensions (mm)

M js7	L_3	L_4	H_1	H_2 ±0.02	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 H_{12}	S_2	S_3	A/F	D_1	D_2	D_3	P
31	38	50	34	18	13	8	9	22	32	16	8.5	8.0	16.0	-	8.5	16	6	5.3	M6	3.7	3	M26x1.5	16.5	18	0.1
31	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	0.1
31	38	50	41	22	13	8	9	22	32	16	8.5	8.0	16.0	-	8.5	16	6	5.3	M6	3.7	3	M26x1.5	16.5	18	0.1
43	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
47	60	77	64	34	22	16	15	40	42	25	8.5	8.5	21.0	-	8.5	21	8	8.4	M10	7.7	4	M45x1.5	28.0	32	0.15
54	66	88	72	39	27	18	18	45	46	29	10.5	8.5	23.0	- 7.5	10.5	23	10	10.5	M12	9.7	4	M50x1.5	31.0	36 36	0.2
56	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	0.2
63	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	0.2
63	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	0.2
72	92	118	105	58	38	25	22	63	70	43	20.5	13.5	35	-	15.5	32.5	12	12.5	M14	9.7	4	M78x2	54	60	0.2
72	92	118	112	65	38	25	22	70	92	65	20.5	13.5	46	-	15.5	57.5	12	12.5	M14	9.7	4	M78x2	54	53	0.2
95	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	72	0.2
102.5	145	175	165	93	50	40	36	98	98	58	25.5	20	49	-	18.5	45.5	16	17.3	M20	11.7	4	M115x2	85	90	0.2

Precision Ball Screw Assemblies

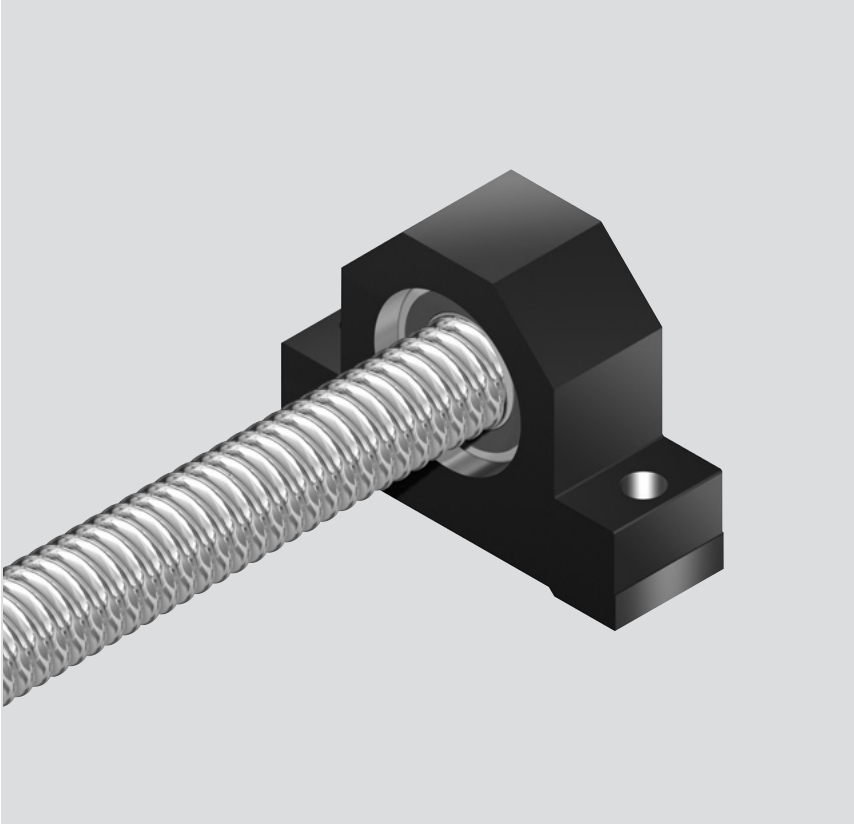
Pillow Block Unit SEB-L

Floating bearing with deep-groove ball bearing to DIN 625

The pillow block unit consists of:

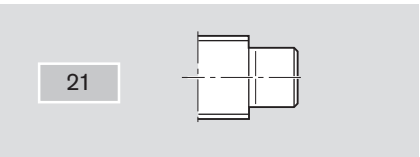
- precision pillow block housing with reference edge on one side
- deep-groove ball bearing to DIN 625-... .2RS
- retaining ring to DIN 471
- cover

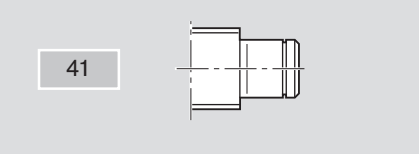
All parts are supplied unmounted.

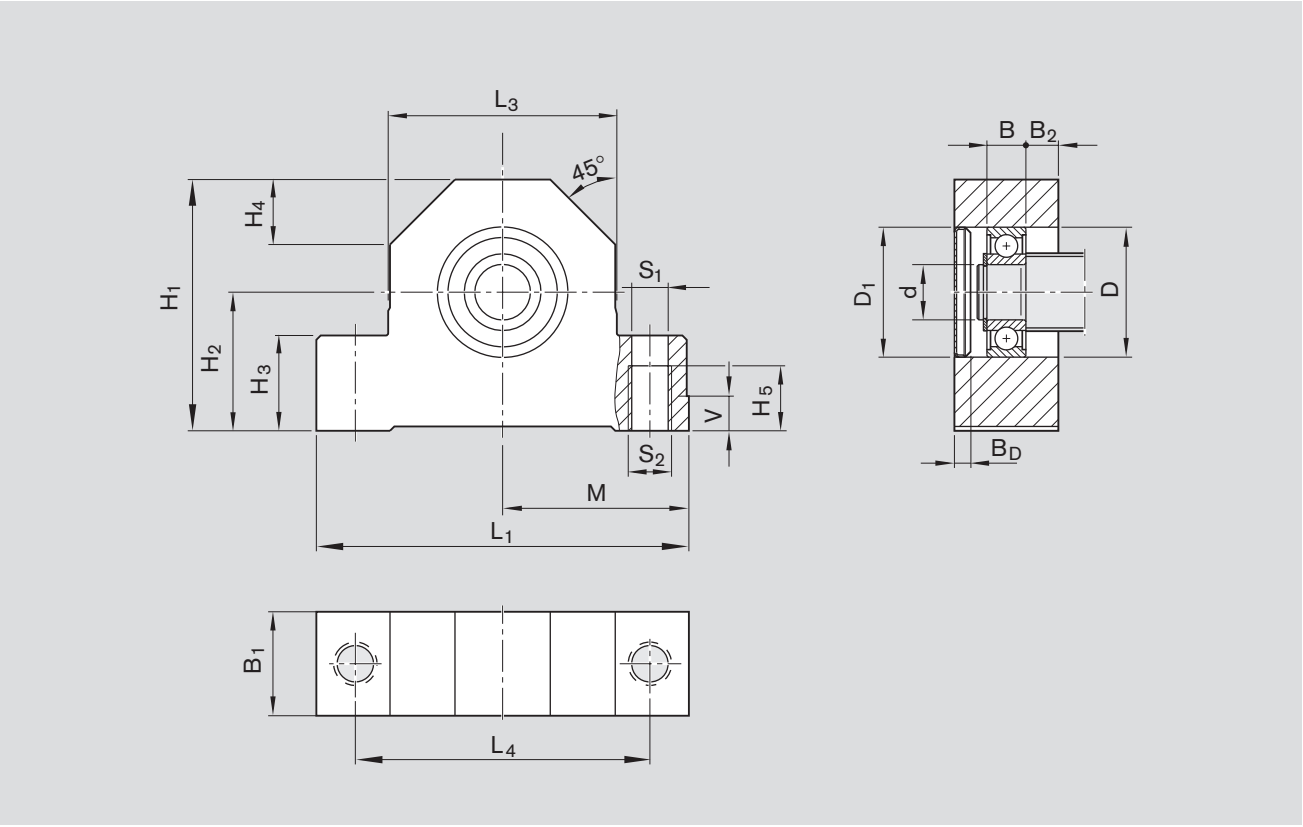


Size	Pillow block unit	Deep-groove ball bearing to DIN 625					Retaining ring	Weight	
	Part number	Load ratings (radial)		Dimensions (mm)			Designation	Designation	complete
		dyn.	stat.						
d_0 x P	complete	C (N)	C_0 (N)	d	D	B	DIN 625...	DIN 471	(kg)
8x1/2/2.5	R1591 605 00	1900	590	5	16	5	625.2RS	5x0.6	0.14
12x2/5/10	R1591 606 20	2450	900	6	19	6	626.2RS	6x0.7	0.18
16x5/10/16	R1591 610 20	6000	2240	10	30	9	6200.2RS	10x1	0.54
20x5/20/40	R1591 612 20	6950	2650	12	32	10	6201.2RS	12x1	0.73
25x5/10/25	R1591 617 20	9500	4150	17	40	12	6203.2RS	17x1	0.96
32x5/10/20/32	R1591 620 20	12700	5700	20	47	14	6204.2RS	20x1.2	1.24
40x5	R1591 630 20	19300	9800	30	62	16	6206.2RS	30x1.5	1.66
40x10/12/16/20/40	R1591 630 10	19300	9800	30	62	16	6206.2RS	30x1.5	1.82
50x5	R1591 635 10	25500	13200	35	72	17	6207.2RS	35x1.5	2.66
50x10/12/16/20/40	R1591 635 20	25500	13200	35	72	17	6207.2RS	35x1.5	2.87
63x10/20/40	R1591 650 20	36500	20800	50	90	20	6210.2RS	50x2	5.39
80x10/20	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







Dimensions (mm)															Cover
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 H_{12}	S_2	D_1 J_6	BD
62	38	50	34	18	13	11	9	13	4	31	6	5.3	M6	16	2.6
62	38	50	41	22	13	11	9	15	4.5	31	6	5.3	M6	19	2.6
86	52	68	58	32	22	15	15	24	7.5	43	8	8.4	M10	30	3.8
94	60	77	64	34	22	17	15	26	8	47	8	8.4	M10	32	3.8
108	66	88	72	39	27	19	18	28	8	54	10	10.5	M12	40	3.7
112	70	92	77	42	27	20	18	34	10	56	10	10.5	M12	47	4.8
126	80	105	90	50	32	23	21	38	11	63	12	12.6	M14	62	4.5
126	80	105	98	58	32	23	21	38	11	63	12	12.6	M14	62	4.5
144	92	118	105	58	38	25	22	41	12	72	12	12.5	M14	72	5
144	92	118	112	65	38	25	22	41	12	72	12	12.5	M14	72	5
190	130	160	138	73	50	35	22	46	13	95	16	12.5	M14	90	5
205	145	175	165	93	50	40	36	50	14	102.5	16	17.3	M20	110	6

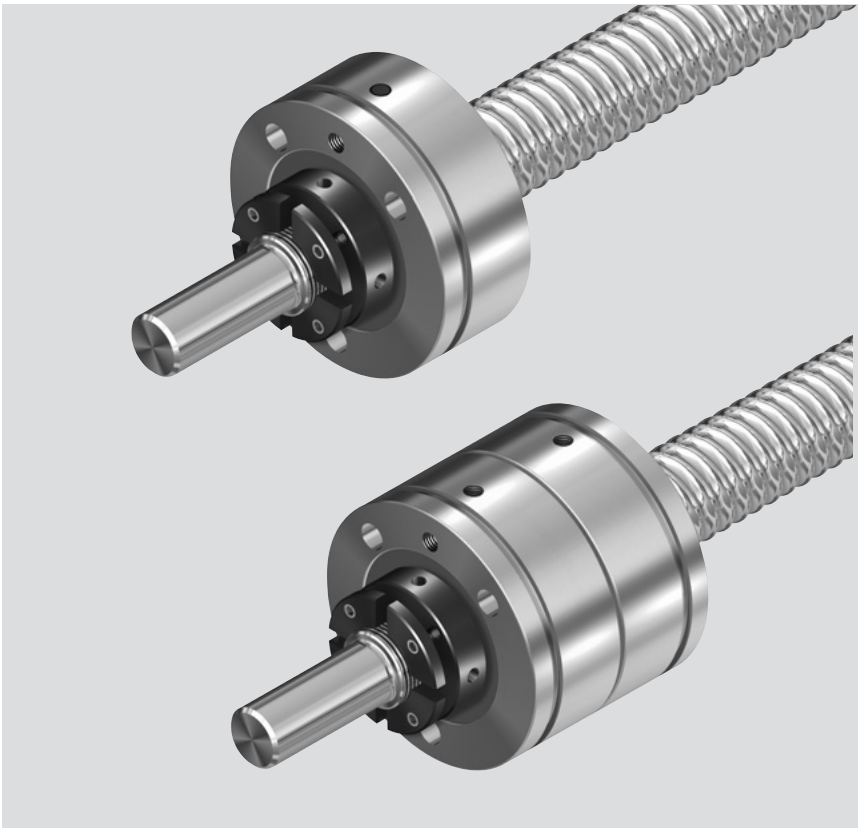
Precision Ball Screw Assemblies

Bearing LAF

Fixed bearing with angular-contact thrust ball bearing LGF

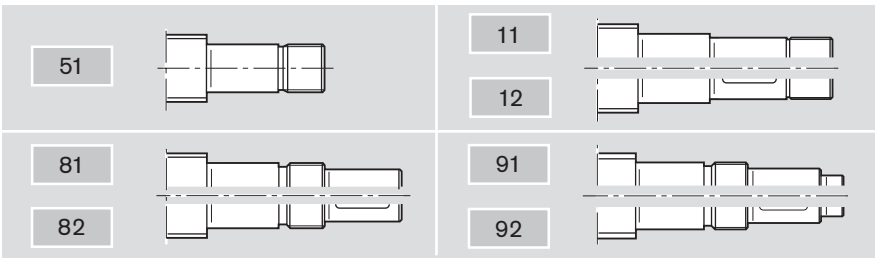
Double-thrust, screw-down,
Series LGF-B-…
LGF-A-…
Double-thrust, screw-down,
Series LGF-C-…

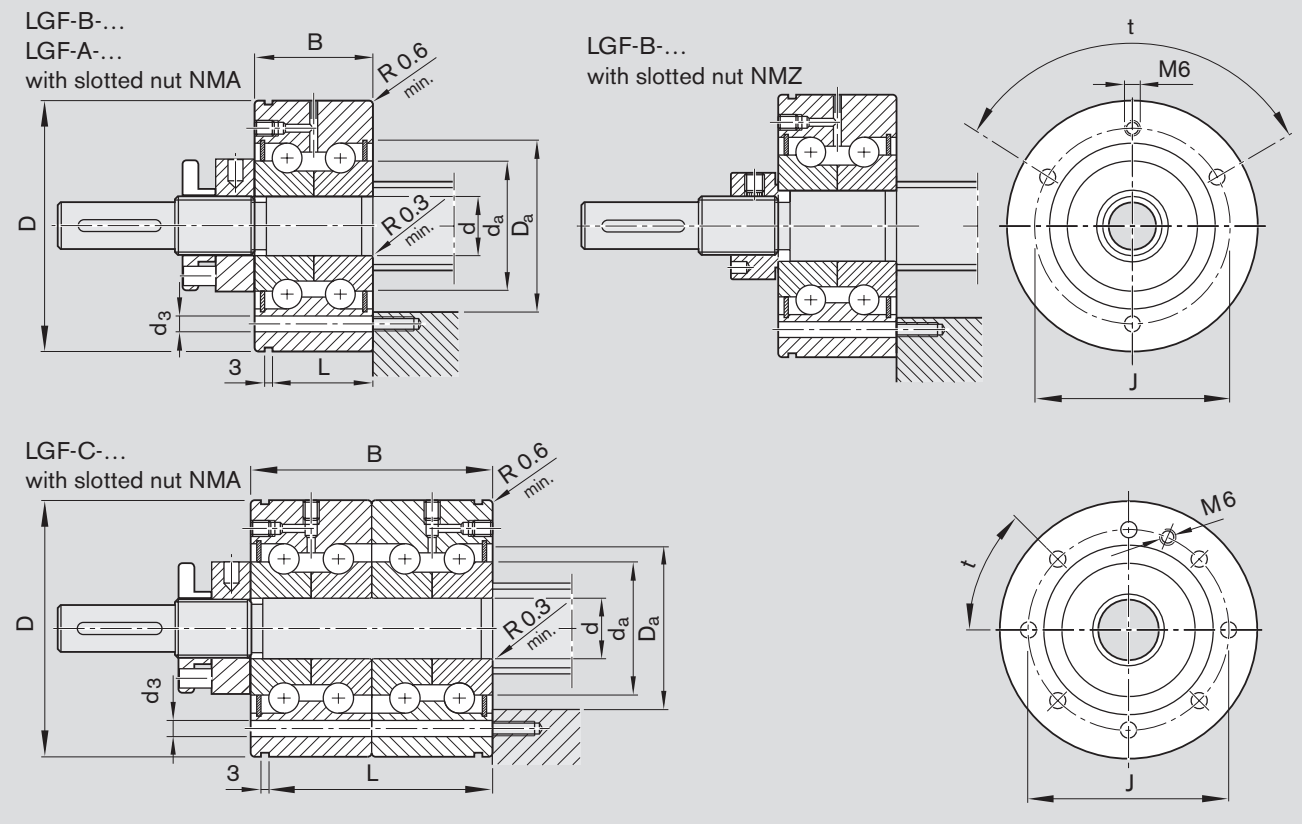
The fixed bearing consists of:
– angular-contact thrust ball bearing LGF
– slotted nut NMA..., NMZ...



Size	Angular-contact thrust ball bearing with slotted nut	Single parts				Load ratings	
		Angular-contact thrust ball bearing		Slotted nut		dyn.	stat.
d_0 x P	Part number	Designation	Part number	Designation	Part number	C (N)	C_0 (N)
20x5/20/40	R1590 012 00	LGF-B-1255	R3414 009 06	NMZ 12x1	R3446 003 04	17000	24700
25x5/10/25	R1590 017 00 R1590 017 30	LGF-B-1762	R3414 01006	NMZ 17x1 NMA 17x1	R3446 004 04 R3446 014 04	18800	31000
32x5/10/20/32	R1590 020 00 R1590 020 30	LGF-B-2068	R3414 001 06	NMZ 20x1 NMA 20x1	R3446 005 04 R3446 015 04	26000	47000
40x5	R1590 030 00 R1590 030 30	LGF-B-3080	R3414 011 06	NMZ 30x1.5 NMA 30x1.5	R3446 006 04 R3446 016 04	29000	64000
40x10/12/16/20/40	R1590 325 30	LGF-C-2575	R3414 015 06	NMA 25x1.5	R3446 011 04	44500	111000
50x5	R1590 035 30	LGF-B-3590	R3414 026 06	NMA 35x1.5	R3446 012 04	41000	89000
50x10/12/16/20/40	R1590 330 30	LGF-C-3080	R3414 027 06	NMA 30x1.5	R3446 016 04	47500	127000
63x10/20/40	R1590 040 30	LGF-B-40115	R3414 028 06	NMA 40x1.5	R3446 018 04	72000	149000
80x10/20	R1590 050 30	LGF-A-50140	R3414 029 06	NMA 50x1.5	R3446 019 04	113000	250000

Suitable for screw ends: Form





Bearing friction torque with seal	Rigidity (axial)	Rigidity against tilting	Limit speed (grease)	Dimensions (mm)											Quantity				Weight complete
											Mounting dimensions								
M_{RL} (Nm)	R_{aL} (N/µm)	R_{kl} (Nm/mrad)	nG min^{-1}	d	Tolerance	D	Tolerance	B	Tolerance	J	D_a min.	D_a max.	d_a min.	d_a max.	L	n	d_3	t (°)	(kg)
0.16	375	50	3800	12	-0.010	55	-0.013	25	-0.25	42	30	33	16	29	17	3	6.8	120	0.385
0.24	450	80	3300	17	-0.010	62	-0.013	25	-0.25	48	34	37	23	33	17	3	6.8	120	0.485 0.520
0.3	650	140	3000	20	-0.010	68	-0.013	28	-0.25	53	40	43	25	39	19	4	6.8	90	0.645 0.740
0.5	850	300	2200	30	-0.010	80	-0.013	28	-0.25	63	50	53	40	49	19	6	6.8	60	0.855 0.980
0.60	1300	450	2600	25	-0.005	75	-0.010	56	-0.05	58	45	48	32	44	47	8	6.5	45	1.600
0.60	900	400	2000	35	-0.010	90	-0.013	34	-0.25	75	59	62	45	58	25	4	8.8	90	1.360
0.75	1500	620	2200	30	-0.005	80	-0.010	56	-0.50	63	50	53	40	49	47	12	6.5	30	1.760
1.3	1200	750	1600	40	-0.010	115	-0.013	46	-0.25	94	71	80	56	70	36	12	8.5	30	2.500
2.6	1400	1500	1200	50	-0.010	140	-0.013	54	-0.25	113	88	100	63	87	45	12	10.5	30	5.130

Precision Ball Screw Assemblies

Bearing LAN

Fixed bearing with angular-contact thrust ball bearing LGN

Double-thrust,
Series LGN-B-…
LGN-A-…

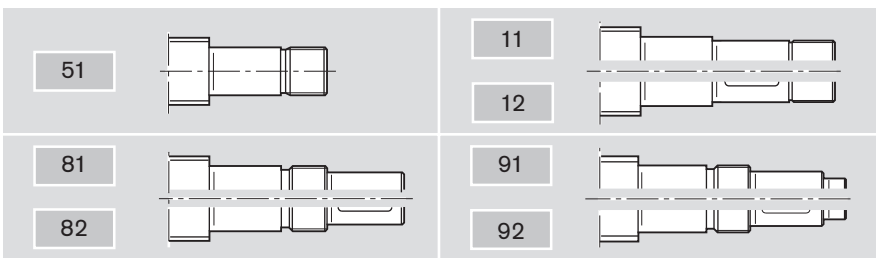
Double-thrust, in pairs,
Series LGN-C-…

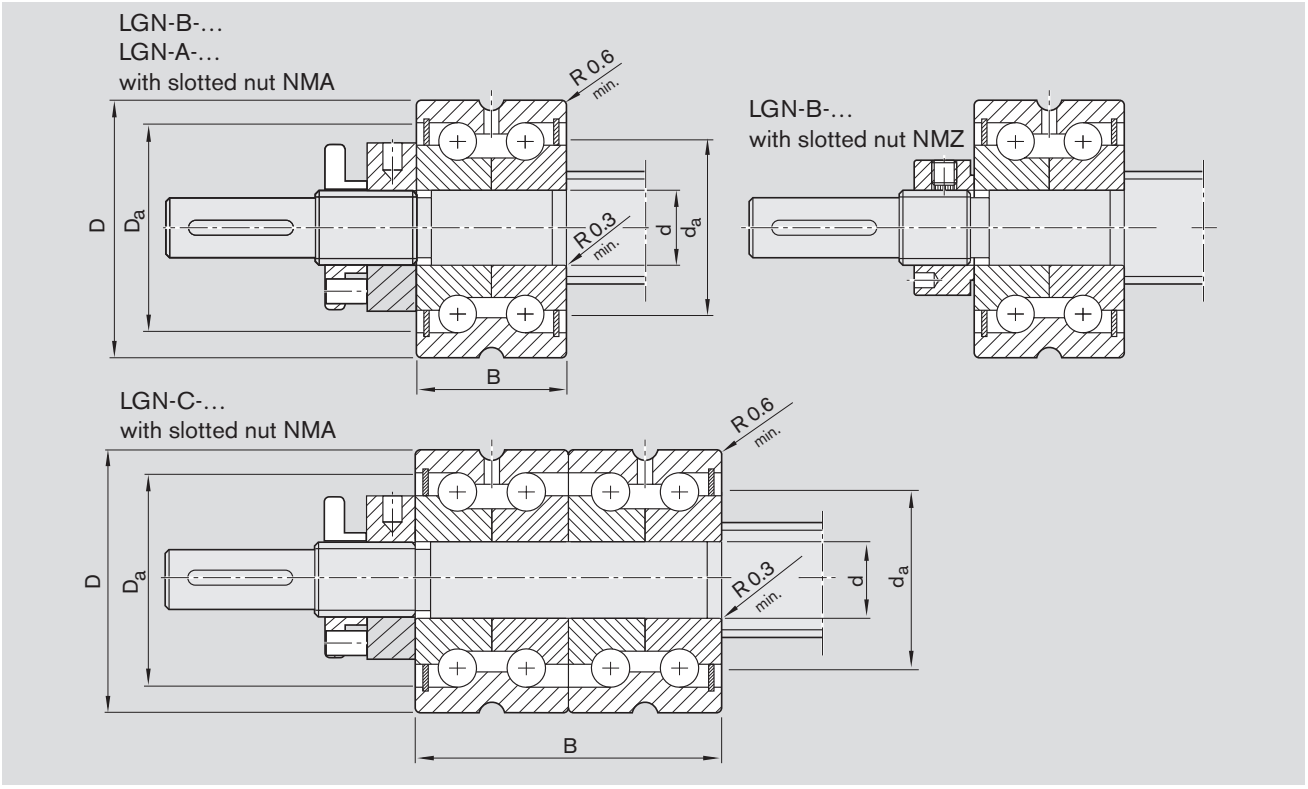
The fixed bearing consists of:
– angular-contact thrust ball bearing LGN
– slotted nut NMA..., NMZ...

Size	Angular-contact thrust ball bearing with slotted nut	Single parts				Load ratings	
		Angular-contact thrust ball bearing		Slotted nut		dyn.	stat.
d_0 x P	Part number	Designation	Part number	Designation	Part number	C (N)	C_0 (N)
6x1/2	R1590 106 00	LGN-B-0624	R3414 002 06	NMZ 6x0.5	R3446 001 04	6900	8500
8x1/2/2.5	R1590 106 00	LGN-B-0624	R3414 002 06	NMZ 6x0.5	R3446 001 04	6900	8500
12x2/5/10	R1590 106 00	LGN-B-0624	R3414 002 06	NMZ 6x0.5	R3446 001 04	6900	8500
16x5/10/16	R1590 110 00	LGN-B-1034	R3414 003 06	NMZ 10x1	R3446 002 04	13400	18800
20x5/20/40	R1590 112 00	LGN-B-1242	R3414 004 06	NMZ 12x1	R3446 003 04	17000	24700
25x5/10/25	R1590 117 00 R1590 117 30	LGN-B-1747	R3414 005 06	NMZ 17x1 NMA 17x1	R3446 004 04 R3446 014 04	18800	31000
32x5/10/20/32	R1590 120 00 R1590 120 30	LGN-B-2052	R3414 006 06	NMZ 20x1 NMA 20x1	R3446 005 04 R3446 015 04	26000	47000
40x5	R1590 130 00 R1590 130 30	LGN-B-3062	R3414 007 06	NMZ 30x1.5 NMA 30x1.5	R3446 006 04 R3446 016 04	29000	64000
40x10/12/16/20/40	R1590 225 30	LGN-C-2557	R3414 014 06	NMA 25x1.5	R3446 011 04	44500	111000
50x5	R1590 135 30	LGN-B-3572	R3414 022 06	NMA 35x1.5	R3446 012 04	41000	89000
50x10/12/16/20/40	R1590 230 30	LGN-C-3062	R3414 023 06	NMA 30x1.5	R3446 016 04	47500	127000
63x10/20/40	R1590 140 30	LGN-A-4090	R3414 024 06	NMA 40x1.5	R3446 018 04	72000	149000
80x10/20	R1590 150 30	LGN-A-50110	R3414 025 06	NMA 50x1.5	R3446 019 04	113000	250000

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





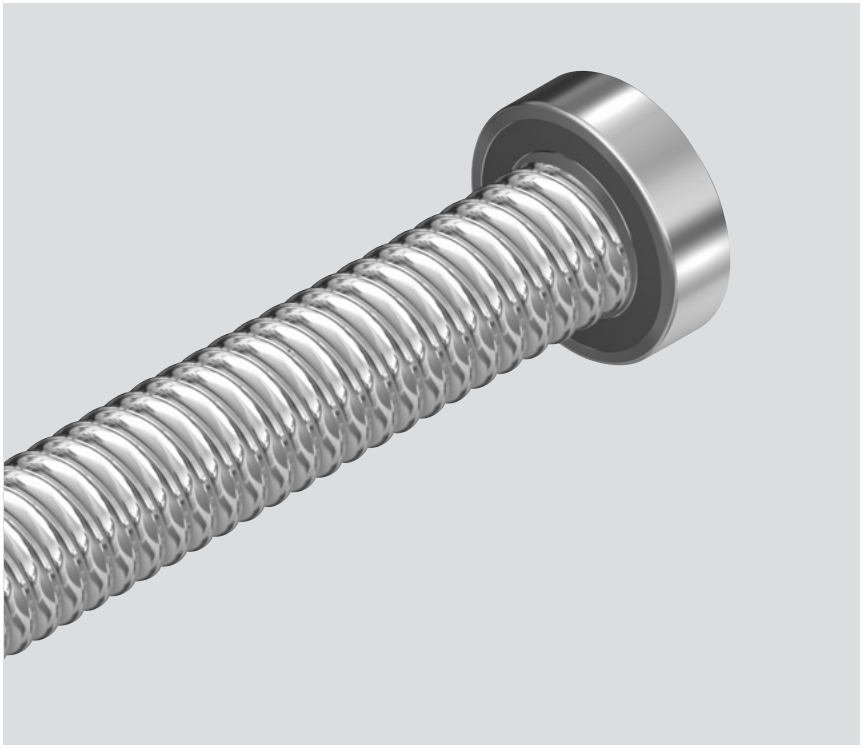
Bearing friction torque with seal M_{RL} (Nm)	Rigidity (axial) R_{aL} (N/µm)	Rigidity against tilting R_{kl} (Nm/mrad)	Limit speed (grease) n_G min^{-1}	Dimensions (mm) d	Tolerance	D	Tolerance	B	Tolerance	Mounting dimensions D_a min.	D_a max.	d_a min.	d_a max.	Weight complete (kg)
0.04	200	8	6800	6	+0.003 -0.005	24	-0.010	15	-0.25	16	19	9	15	0.040
0.04	200	8	6800	6	+0.003 -0.005	24	-0.010	15	-0.25	16	19	9	15	0.040
0.04	200	8	6800	6	+0.003 -0.005	24	-0.010	15	-0.25	16	19	9	15	0.040
0.12	325	25	4600	10	+0.003 -0.005	34	-0.010	20	-0.25	25	28	14	24	0.110
0.16	375	50	3800	12	-0.010	42	-0.011	25	-0.25	30	33	16	29	0.215
0.24	450	80	3300	17	-0.010	47	-0.011	25	-0.25	34	37	23	33	0.248 0.290
0.3	650	140	3000	20	-0.010	52	-0.013	28	-0.25	40	43	25	39	0.345 0.440
0.5	850	300	2200	30	-0.010	62	-0.013	28	-0.25	50	53	40	49	0.465 0.590
0.60	1300	450	2600	25	-0.005	57	-0.010	56	-0.05	45	48	32	44	0.840
0.60	900	400	2000	35	-0.010	72	-0.013	34	-0.25	59	62	45	58	0.740
0.75	1500	620	2200	30	-0.005	62	-0.010	56	-0.50	50	53	40	49	0.980
1.3	1200	750	1600	40	-0.010	90	-0.013	46	-0.25	71	80	56	70	1.250
2.6	1400	1500	1200	50	-0.010	110	-0.013	54	-0.25	88	100	63	87	2.930

Precision Ball Screw Assemblies

Bearing LAD

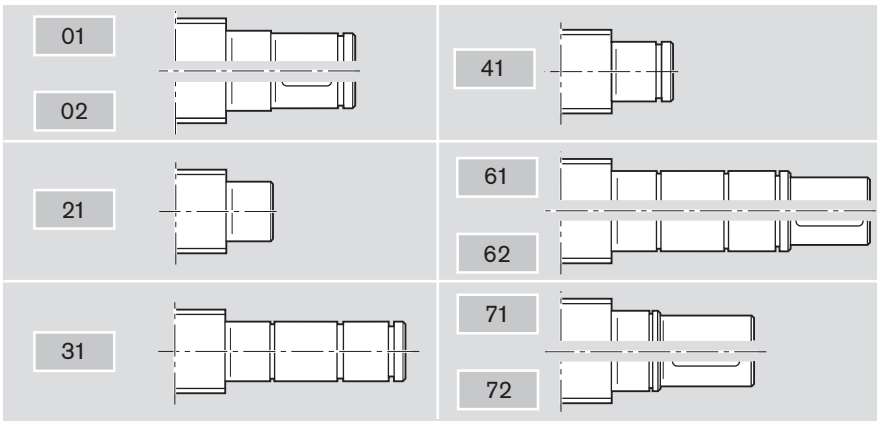
Floating bearing with deep-groove ball bearing

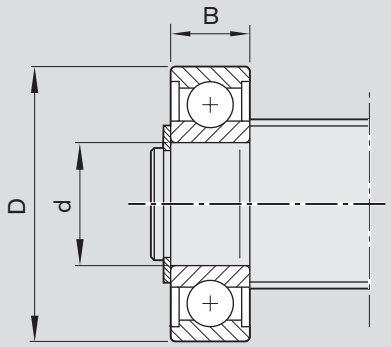
The floating bearing consists of:
- deep-groove ball bearing to DIN 625... .2RS
- retaining ring DIN 471 (2 pcs)



Size	Deep-groove ball bearing with retaining ring	Single parts				Load ratings	
		Deep-groove ball bearing DIN 625		Retaining ring DIN 471			
d_0 x P	Part number	Designation	Part number	Designation	Part number	dyn. C (N)	stat. C_0 (N)
8x1/2/2.5	R1590 605 00	625.2RS	R3414 048 00	5x0.6	R3410 742 00	1900	590
12x2/5/10	R1590 606 00	626.2RS	R3414 043 00	6x0.7	R3410 736 00	2450	900
16x5/10/16	R1590 610 00	6200.2RS	R3414 049 00	10x1	R3410 745 00	6000	2240
20x5/20/40	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
25x5/10/25	R1590 617 00	6203.2RS	R3414 050 00	17x1	R3410 749 00	9500	4150
32x5/10/20/32	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
40x5/10/12/16/20/40	R1590 630 00	6206.2RS	R3414 051 00	30x1.5	R3410 724 00	19300	9800
50x5/10/12/16/20/40	R1590 635 00	6207.2RS	R3414 075 00	35x1.5	R3410 725 00	25500	13200
63x10/20/40	R1590 650 00	6210.2RS	R3414 077 00	50x2	R3410 727 00	36500	20800
80x10/20	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





Dimensions (mm)			Weight complete
d	D	B	(kg)
5	16	5	0.005
6	19	6	0.008
10	30	9	0.030
12	32	10	0.035
15	35	11	0.043
17	40	12	0.064
20	47	14	0.106
25	52	15	0.125
30	62	16	0.195
35	72	17	0.288
50	90	20	0.453
60	110	22	0.783

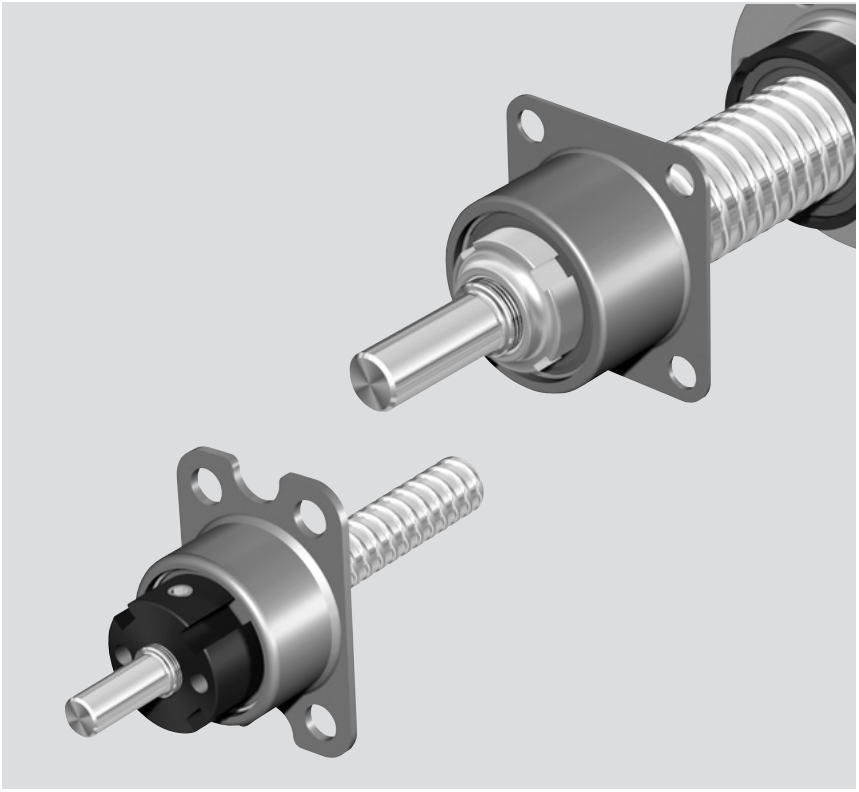
Precision Ball Screw Assemblies

Bearing LAL

Fixed bearing with angular-contact thrust ball bearing LGL

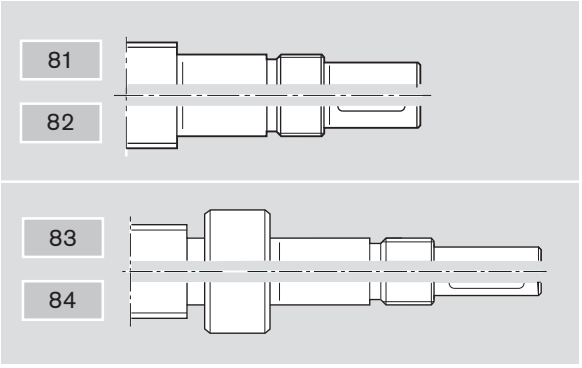
Double-thrust, screw-down,
for low-cost constructions

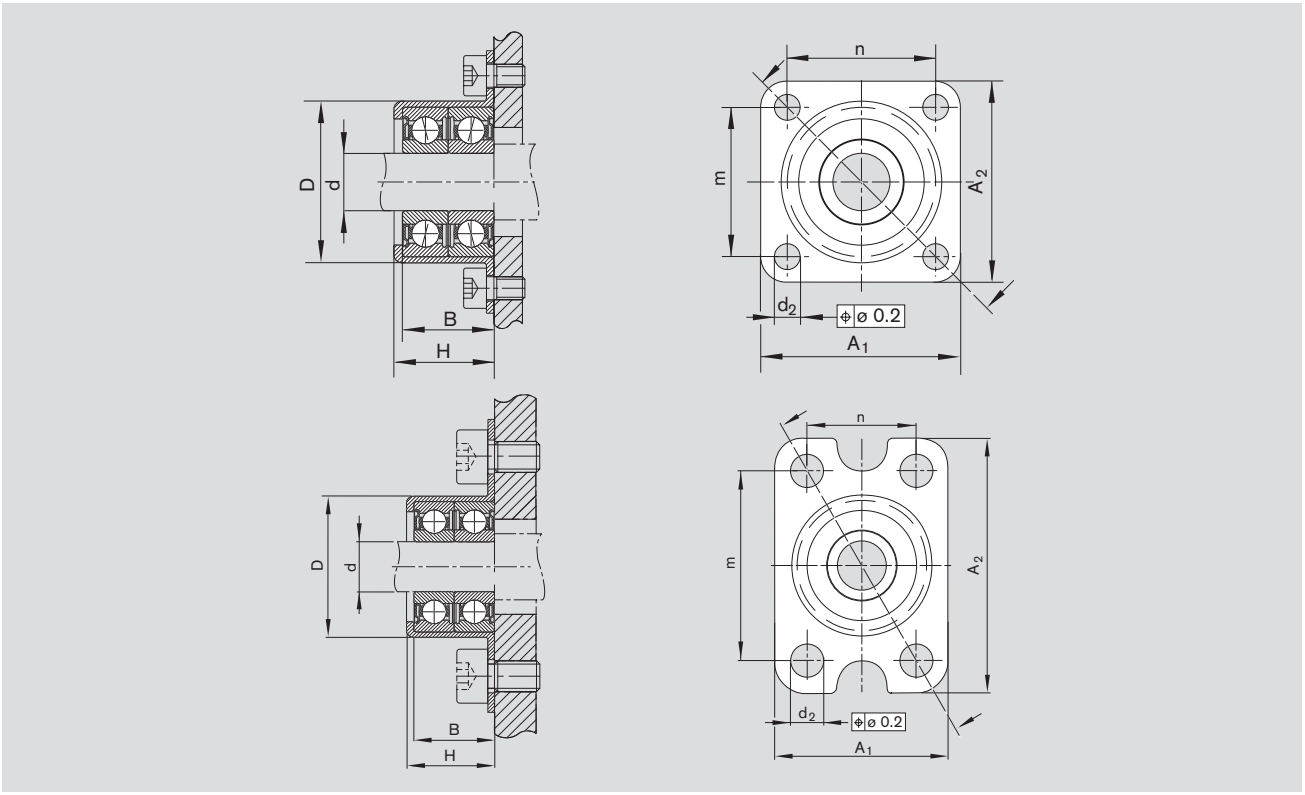
The fixed bearing consists of:
- angular-contact thrust ball bearing LGL
- slotted nut NMG..., NMZ...



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

Suitable for screw ends: Form





Dimensions (mm)									Weight of bearing
d	D +0.03 -0.01	A_1	A_2	n	m	H	B -0.25	d_2	(kg)
6	20.5	24	35	15	26	13	12	4.5	0.023
6	20.5	24	35	15	26	13	12	4.5	0.023
6	20.5	24	35	15	26	13	12	4.5	0.023
12	35.45	44	50	32	38	22	20	6.6	0.12
12	35.45	44	50	32	38	22	20	6.6	0.12
12	35.45	44	50	32	38	22	20	6.6	0.12
15	38.45	47	51	35	39	24	22	6.6	0.14
20	50.45	60	60	47	47	30	28	6.6	0.30

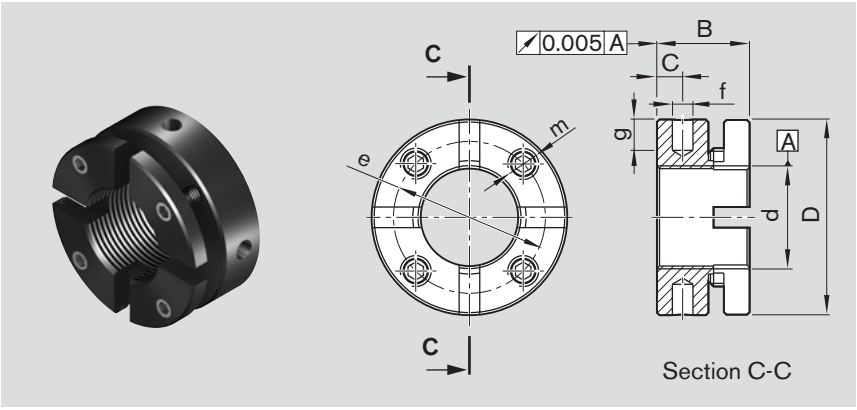
Precision Ball Screw Assemblies

Slotted Nuts and Housing Nuts

Slotted nuts NMA, NMZ and NMG for fixed bearings

Slotted nut NMA

- for maximum vibratory loads
- for new designs

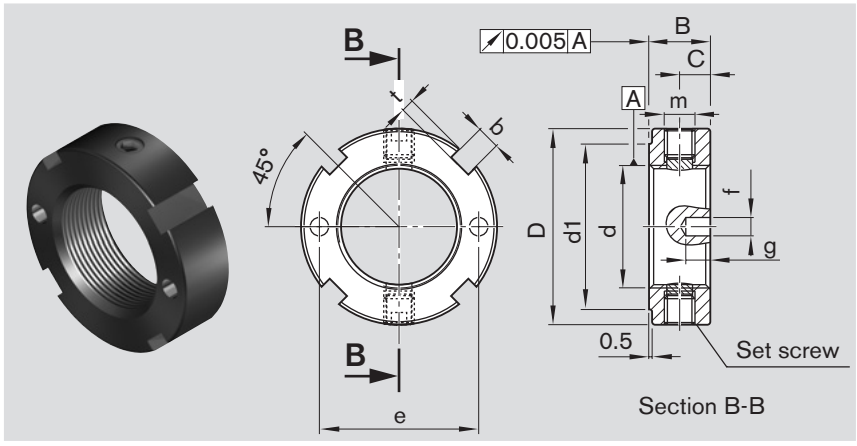


M_A = tightening torque for slotted nut
F_{aB} = axial breaking load of slotted nut
M_{AG} = tightening torque for set screw

Designation	Part number	Dimensions (mm)								M_A	F_{aB}	M_{AG}	Weight
		d	D	B	c	m	e	f	g	(Nm)	(kN)	(Nm)	(g)
NMA 15x1	R3446 020 04	M15x1	30	18	5	M5	24	4	5	10	100	3	60
NMA 17x1	R3446 014 04	M17x1	32	18	5	M5	26	4	5	15	120	3	70
NMA 20x1	R3446 015 04	M20x1	38	18	5	M6	31	4	6	18	145	5	130
NMA 25x1.5	R3446 011 04	M25x1.5	45	20	6	M6	38	5	6	25	205	5	160
NMA 30x1.5	R3446 016 04	M30x1.5	52	20	6	M6	45	5	7	32	250	5	200
NMA 35x1.5	R3446 012 04	M35x1.5	58	20	6	M6	51	5	7	40	280	5	230
NMA 40x1.5	R3446 018 04	M40x1.5	65	22	6	M6	58	6	8	55	350	5	300
NMA 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

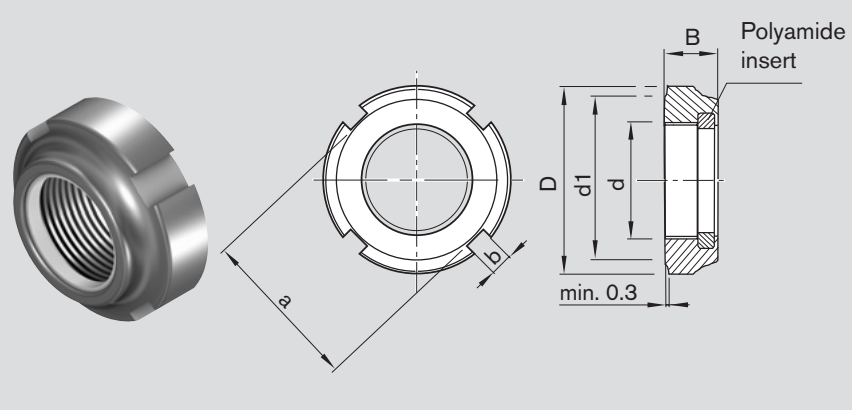


M_A = tightening torque for slotted nut
F_{aB} = axial breaking load of slotted nut
M_{AG} = tightening torque for set screw

Designation	Part number	Dimensions (mm)											M_A	F_{aB}	M_{AG}	Weight
		d	D	B	d_1	c	m	b	t	e	f	g	(Nm)	(kN)	(Nm)	(g)
NMZ 6x0.5	R3446 001 04	M6x0.5	16	8	12	4	M4	3	2	11	2.5	3.5	2	17	1	10
NMZ 10x1	R3446 002 04	M10x1	18	8	14	4	M4	3	2	14	2.5	3.5	6	31	1	10
NMZ 12x1	R3446 003 04	M12x1	22	8	18	4	M4	3	2	17	2.5	3.5	8	38	1	15
NMZ 17x1	R3446 004 04	M17x1	28	10	23	5	M5	4	2	22.5	3	4	15	57	3	28
NMZ 20x1	R3446 005 04	M20x1	32	10	27	5	M5	4	2	26	3	4	18	69	3	35
NMZ 30x1.5	R3446 006 04	M30x1.5	45	12	40	6	M6	5	2	37.5	4	5	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	–	–	–	95	229	5	230
NMZ 60x2	R3446 031 04	M60x2	80	16	73	8	M6	7	3	–	–	–	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	–	–	–	200	410	15	700

Slotted nut NMG

– for low-cost constructions



M_A = tightening torque of slotted nut

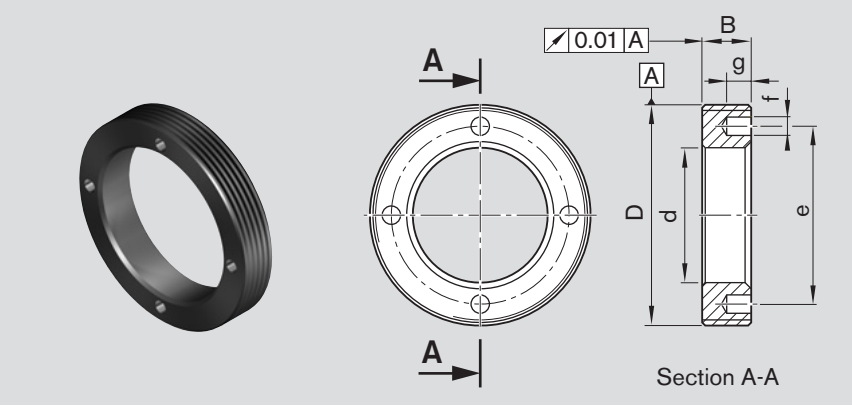
Designation	Part number	Dimensions (mm)						M_A	Weight
		d	D	B	d1	a	b	(Nm)	(g)
NMG 12x1	R3446 002 02	M12x1	21	7.6	18	18	3	8	10
NMG 15x1	R3446 011 02	M15x1	24	8.6	21	21	4	10	13
NMG 20x1	R3446 005 02	M20x1	32	9.6	27	27	4	18	24

Housing nut GWR

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

Note:

Use locking agent (e.g. Loctite 638) to secure against loosening.



Designation	Part number	Dimensions (mm)						Weight
		D	d	B	e	f	g	(g)
GWR 18x1	R1507 040 33	M18x1	8.5	8	12.5	2.5	3	10
GWR 23x1	R1507 240 35	M23x1	13	8	18	2.5	3	15
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	8	23	3	4	29
GWR 36x1.5	R1507 040 23	M36x1.5	22	8	29	3	4	35
GWR 40x1.5	R1507 140 03	M40x1.5	25	8	33	3	4	39.5
GWR 45x1.5	R1507 240 04	M45x1.5	28	8	38	3	4	55
GWR 50x1.5	R1507 240 25	M50x1.5	31	10	40	4	5	86
GWR 55x1.5	R1507 340 05	M55x1.5	36	10	46	4	5	96
GWR 58x1.5	R1507 440 32	M58x1.5	43	10	50	4	5	84
GWR 60x1	R1507 440 28	M60x1	43	10	51	4	5	97
GWR 62x1.5	R1507 440 29	M62x1.5	43	12	53	5	6	127
GWR 65x1.5	R1507 440 26	M65x1.5	47	12	55	4	5	136
GWR 70x1.5	R1507 440 06	M70x1.5	42	12	58	4	5	216
GWR 78x2	R1507 540 07	M78x2	52	15	67	6	7	286
GWR 92x2	R1507 640 09	M92x2	65	16	82	6	7	385
GWR 112x2	R1507 740 11	M112x2	82	18	100	8	8	596

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.

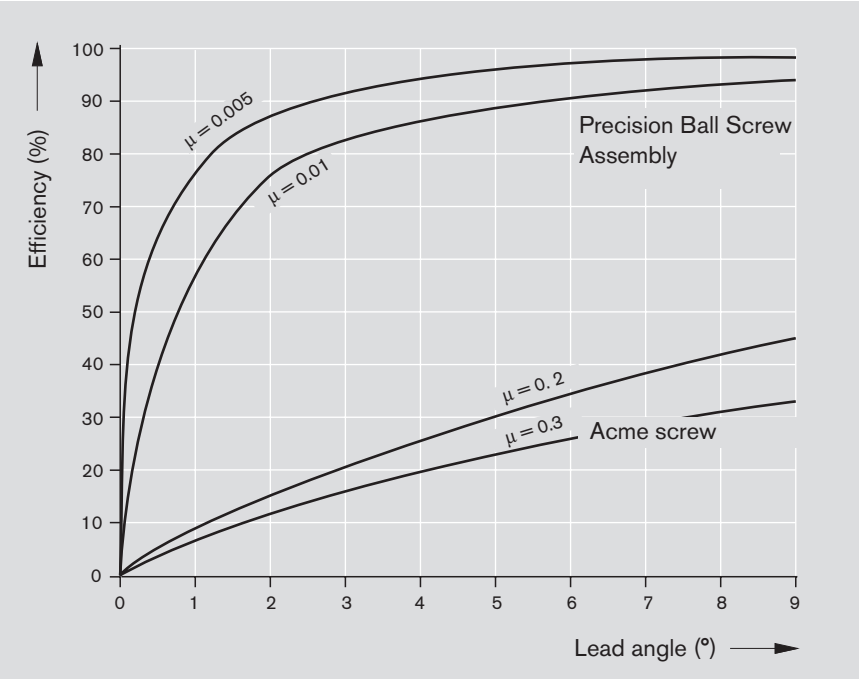
Advantages over the Acme screw drive

- 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

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 torque.
- The calculation of the service life should be based on average loads and average speeds, not on maximum values.
- In order for us to provide you with a customized solution, installation drawings or sketches of the nut environment should be enclosed 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 operation 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 re-lubrication 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

➠ see “Design Calculation” on Pages 118 and following.

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 = 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 Page 120)

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 17230, EN 10088) are also available upon request. Unless otherwise specified, the screw ends are not hardened.

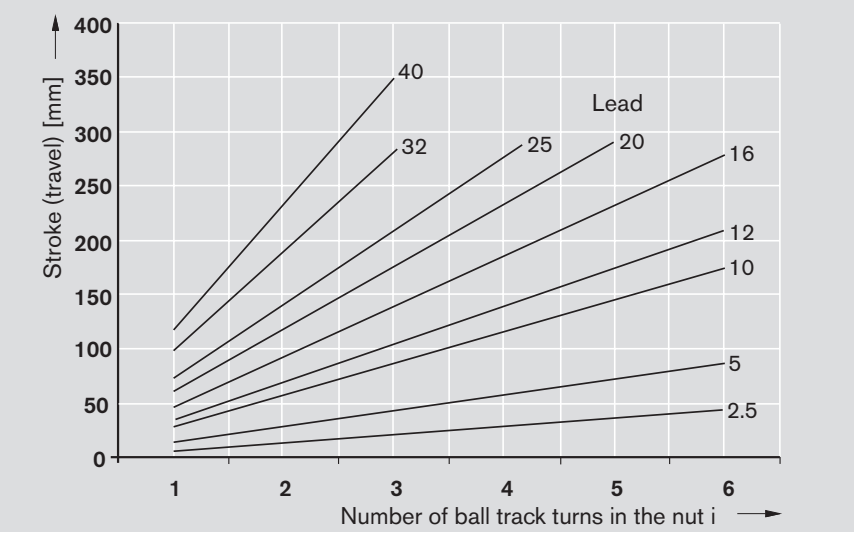
Sealing

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).

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



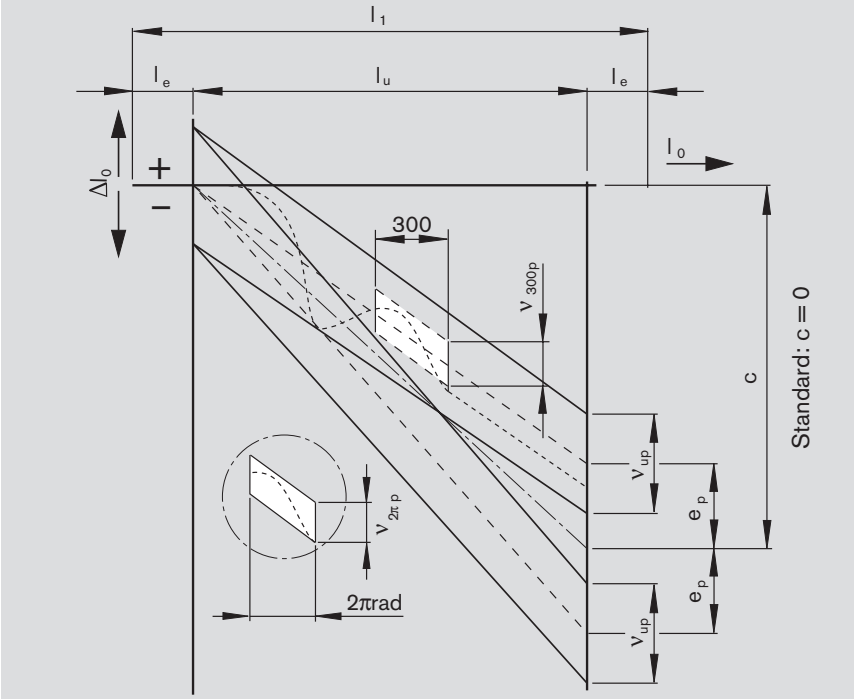
Acceptance Conditions and Tolerance Grades

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

P Ball screw with precision screw SN-F (SN-R)



l_u		P	e_p (µm) Tolerance grade				P	ν_{up} (µm) Tolerance grade		
>	≤	1	3	5	7	9	1	3	5
0	100	-	8	18	44	110	-	8	18
100	200	-	10	20	48	130	-	10	20
200	315	6	12	23	52	150	6	12	23
315	400	7	13	25	57	170	6	12	25
400	500	8	15	27	63	200	7	13	26
500	630	9	16	30	70	220	7	14	29
630	800	10	18	35	80	260	8	16	31
800	1000	11	21	40			9	17	35
1000	1250	13	24	46			10	19	39
1250	1600	15	29	54			11	22	44
1600	2000	18	35	65			13	25	51
2000	2500	22	41	77			15	29	59
2500	3150	26	50	93			17	34	69
3150	4000	32	62	115			21	41	82
4000	5000	-	76	140			-	49	99
5000	6300	-	-	170			-	-	119

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

ν_{300p} (µm) Tolerance grade				
1	3	5	7	9
6	12	23	52	130

$\nu_{2\pi p}$ (µm) Tolerance grade				
1	3	5	7	9
4	6	8	10	10

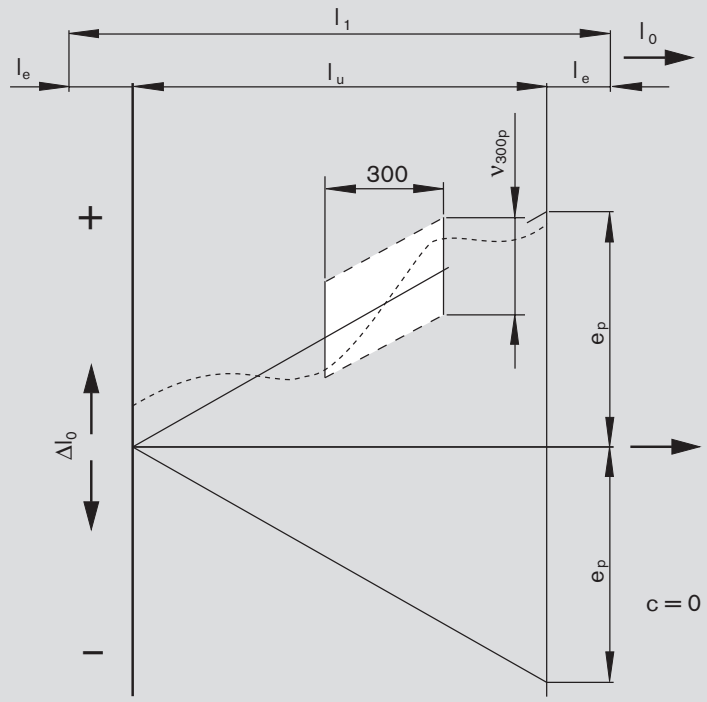
Symbol definitions (excerpt):

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 for useful travel, defined by use (standard: c = 0)
e_p = tolerance for actual mean travel deviation
ν_{up} = permissible travel variation within useful travel l_u
ν_{300p} = permissible travel deviation within 300 mm travel
$\nu_{2\pi p}$ = permissible travel deviation within 1 revolution

Subindices:

p = permissible
a = actual

T Ball screw with precision-rolled screw SN-R



Improved values

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

For e_p' values < 315 mm, see table on page 100.

T

e_p (µm) Tolerance grade				
1	3	5	7	9

$$e_p' = \frac{l_u}{300} \cdot \nu_{300p}$$

Minimum number of measurements within 300 mm (measuring interval) and permissible excess travel.

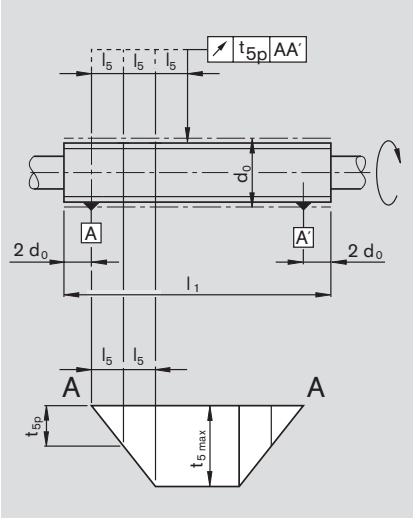
Lead P	Minimum number of measurements for tolerance grades					Excess travel $l_{emax.}$ (mm)
	1	3	5	7	9	
2.5	30	20	10	5	5	10
5	15	10	6	3	3	20
10	10	5	3	1	1	40
16	8	5	3	1	1	50
20	5	5	3	1	1	60
25	4	4	3	1	1	70
32	3	3	2	1	1	80
40	-	2	1	1	1	100

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 diam-eter of the ball screw shaft over the length l_5 used to determine the straightness in relation to AA′.



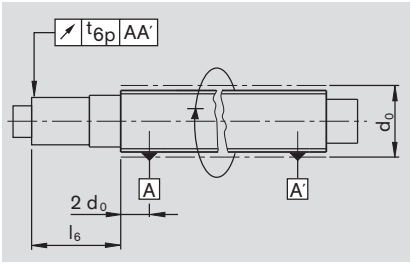
d_0 above	d_0 up to	l_5	t_{5p} in µm for l_5 for tolerance grade 1	3	5	7; 9
= 6	12	80				
12	25	160				
25	50	315	20	25	32	40
50	100	630				
100	200	1250				

l_1/d_0 above	l_1/d_0 up to	t_{5max} in µm for l_1 4l_5 for tolerance grade 1	3	5	7; 9
	40	40	50	64	80
40	60	60	75	96	120
60	80	100	125	160	200
80	100	160	200	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 $t_{6a} \leq t_{6p} \cdot \frac{l_{6a}}{l}$

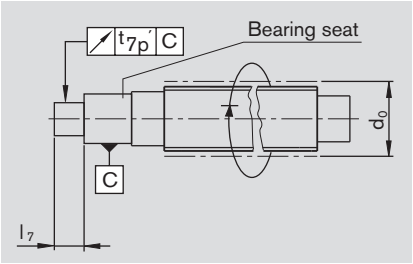


Nominal diameter d_0 above	d_0 up to	Ref. length l	t_{6p} in µm for $l_6 \leq l$ for tolerance grade 1	3	5; 7; 9
= 6	20	80	10	12	20
20	50	125	12	16	25
50	125	200	16	20	25
125	200	315	-	25	25

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

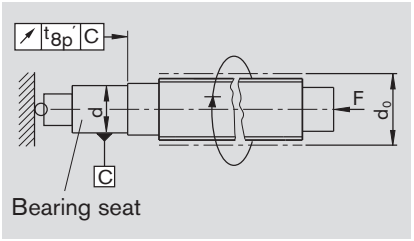
Table value t_{7p} applies when $l_7 \leq$ reference length l.

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



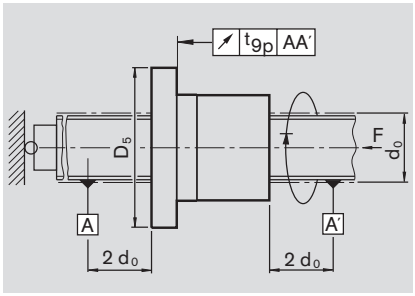
Nominal diameter d_0 above	d_0 up to	Ref. length l	t_{7p}' in µm for $l_7 \leq l$ for tolerance grade 1	3	5; 7; 9
= 6	20	80	5	5	6
20	50	125	5	5	6
50	125	200	6	6	7
125	200	315	-	8	12

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



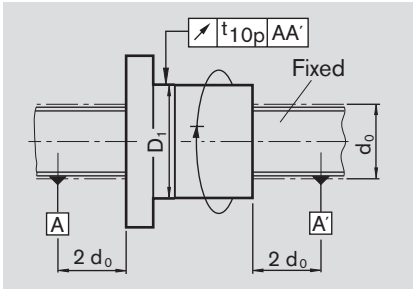
Nominal diameter d_0 above	up to	t_{8p}' in µm for tolerance grade 1	3	5; 7; 9
= 6	63	3	4	5
63	125	4	5	6
125	200	-	6	8

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



Flange diameter D_5 above	up to	t_{9p} in µm for tolerance grade 1	3	5; 7; 9
16	32	10	12	16
32	63	12	16	20
63	125	16	20	25
125	250	20	25	32
250	500	-	32	40

Radial run-out t_{10} of the outer diam-eter 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.



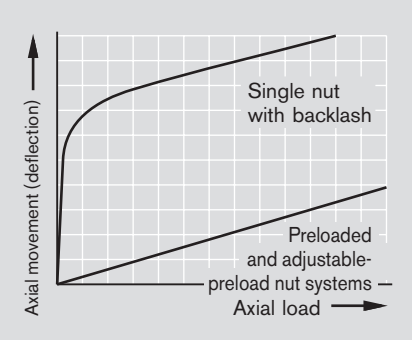
Outer diameter D_1 above	up to	t_{10p} in µm for tolerance grade 1	3	5; 7; 9
16	32	10	12	16
32	63	12	16	20
63	125	16	20	25
125	250	20	25	32
250	500	-	32	40

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

Preload and Rigidity

Nut system preload

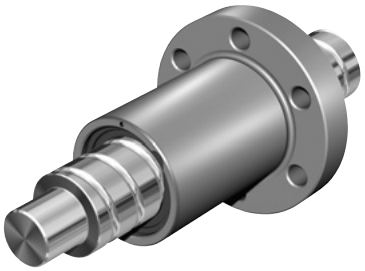
In addition to single nuts with reduced backlash, Rexroth supplies preloaded or adjustable-preload nut systems.



The rigidity of these types of Rexroth nut systems is approximately the same. This is because the adjustable-preload single nut and the preloaded single nut have a much more compact design and are thus only half as long as a double nut system. The screw is typically far less rigid than the nut unit (for details see “Overall axial rigidity...”).

Preloaded single nut

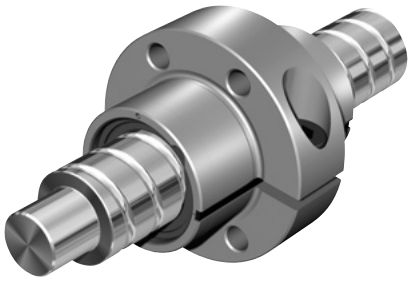
Single nuts can be preloaded to 2% or 5% of the basic dynamic load rating by means of optimized ball size selection.



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 “Mounting” on Page 112.

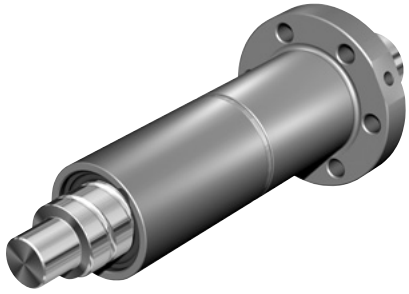
Depending on the application, we will preload the nut system to 2% or 5% of the basic dynamic load rating. The maximum preload equals approx. 5% of the basic dynamic load rating.



Double nut

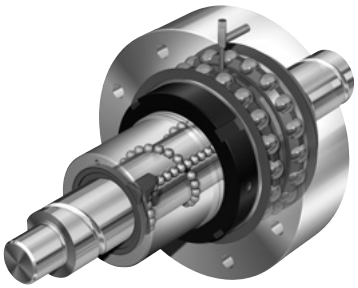
Tensioning two nuts against each other eliminates the inherent backlash of the ball screw, increases rigidity and thus improves positioning accuracy.

As excessive preload can cause a reduction in service life, we recommend that it not be more than 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 (in preparation) can be preloaded to 2% 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_{tot} of the ball screw

The overall axial rigidity R_{tot} is comprised of the component rigidity of the bearing R_{aL}, the screw R_s and the nut R_{nu} and is calculated according to the formula:

$$\frac{1}{R_{tot}} = \frac{1}{R_{aL}} + \frac{1}{R_s} + \frac{1}{R_{nu}} \qquad (16)$$

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_{aL}

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 preloaded nut unit is calculated according to DIN 69 051 (P5).

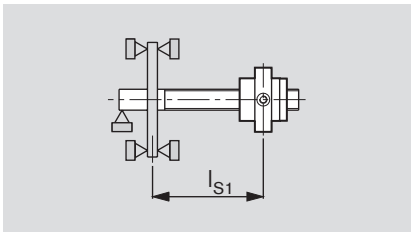
See the corresponding tables for rigidity values.

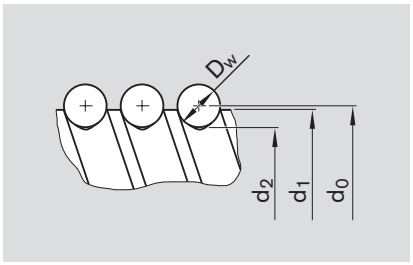
Rigidity of the screw R_S

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.

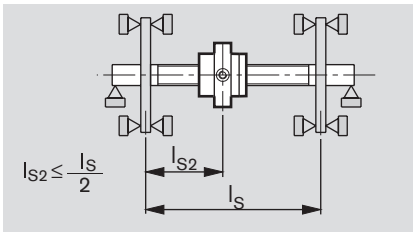




$$R_{S1} = 165 \cdot \frac{(d_0 - 0.71 \cdot D_w)^2}{l_{S1}} \quad (N/\mu m) \qquad (17)$$

R_{S1} = rigidity of the screw
d_0 = nominal diameter
D_w = ball diameter
l_{S1} = distance between bearing and nut

2. Ball screw shaft is fixed at both ends.



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

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

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

R_{S2} = rigidity of the screw
d_0 = nominal diameter
D_w = ball diameter
l_S = distance between bearing and bearing
l_{S2} = distance between bearing and nut

Precision Ball Screw Assemblies

Preload and Overall Rigidity of Single Nuts

Dynamic drag torque, preload and rigidity for screws of tolerance grade 1-7 with single nuts from diameter 16 mm (smaller dias. 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 (observe centering diameter D_1 to be set)

(ZEV-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 preload.

Note:

Measurement of the dynamic drag torque ➠ see “Mounting” on Page 112.

Size $d_0 \times P \times D_w - i$	Load ratings dyn. C (N)	Load ratings stat. C_0 (N)	Backlash of single nut Standard	Backlash of single nut Reduced	Overall rigidity of the screw R_S $\left(\frac{N \cdot m}{\mu m}\right)$
6 x 1R x 0.8 - 4	900	1290	0.01	0	5
6 x 2R x 0.8 - 4	890	1280	0.01	0	5
8 x 1R x 0.8 - 4	1020	1740	0.01	0	9
8 x 2R x 1.2 - 4	1870	2760	0.01	0	9
8 x 2.5R x 1.588 - 3	2200	2800	0.02	0.010	8
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 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 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 20R 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 - 1x4	8000	14900	0.04	0.020	52
25 x 5R 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 x 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 -1.2x4	19700	39400	0.04	0.020	84
32 x 5R x 3.5 - 4	21600	40000	0.04	0.020	144
32 x 5L 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 -1.2x4	26300	57600	0.04	0.020	141
40 x 5R x 3.5 - 5	29100	64100	0.04	0.020	232
40 x 5L x 3.5 - 5	29100	64100	0.04	0.020	232
40 x 10R 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 10L x 6 - 4	50000	86400	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 40R x 6 - 2	25500	40300	0.07	0.035	211
40 x 40R x 6 - 3	37000	62300	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 40R x 6.5 - 2	32100	55800	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 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
80 x 10R x 6.5 - 6	108400	291700	0.07	0.035	938
80 x 20R x 9 - 6	170900	403900	0.09	0.045	894
80 x 20R x 12.7 - 6	262700	534200	0.11	0.055	832
100 x 10R x 6.5 - 6	119500	371900	0.07	0.035	1501
100 x 20R x 12.7 - 6	295100	686400	0.11	0.055	1366
125 x 10R x 6.5 - 6	130600	468700	0.07	0.035	2391
125 x 20R x 12.7 - 6	326500	870400	0.11	0.055	2220

Screws with single nuts

2% preload		3% preload			5% preload						
R_{nu} (N/µm)	T_{pr0} (Nm) Tolerance grade 1 ; 3 ; 5 ; 7	R_{nu} (N/µm)	T_{pr0} (Nm) Tolerance grade 1 ; 3 ; 5 ; 7		R_{nu} (N/µm)	T_{pr0} (Nm) Tolerance grade 1		3 ; 5		7	
max.			min.	max.	max.	min.	max.	min.	max.	min.	max.
70	0.004										
100	0.009										
60	0.006										
210	0.040	240	0.03	0.13	280	0.06	0.14	0.05	0.15	0.04	0.16
160	0.030	190	0.02	0.1	220	0.05	0.11	0.04	0.12	0.03	0.12
100	0.020	120	0.01	0.06	140	0.03	0.07	0.03	0.08	0.02	0.08
160	0.030	180	0.02	0.1	210	0.04	0.10	0.04	0.11	0.03	0.12
260	0.060	300	0.03	0.14	350	0.09	0.20	0.07	0.21	0.06	0.23
330	0.070	375	0.04	0.17	440	0.11	0.25	0.09	0.26	0.07	0.28
130	0.040	150	0.02	0.09	180	0.05	0.13	0.05	0.14	0.04	0.15
200	0.050	220	0.03	0.13	270	0.08	0.19	0.07	0.20	0.05	0.21
170	0.030	-	-	-	-	-	-	-	-	-	-
310	0.080	350	0.04	0.2	410	0.12	0.28	0.10	0.30	0.08	0.32
320	0.080	360	0.04	0.19	430	0.12	0.27	0.10	0.29	0.08	0.31
160	0.050	180	0.03	0.12	210	0.08	0.18	0.06	0.19	0.05	0.20
240	0.070	270	0.04	0.18	320	0.11	0.26	0.09	0.28	0.07	0.29
350	0.100	-	-	-	-	-	-	-	-	-	-
380	0.140	420	0.1	0.31	500	0.26	0.43	0.24	0.45	0.21	0.48
380	0.140	420	0.1	0.31	500	0.26	0.43	0.24	0.45	0.21	0.48
500	0.200	570	0.15	0.46	670	0.38	0.63	0.36	0.66	0.30	0.71
200	0.090	230	0.05	0.21	270	0.16	0.27	0.15	0.28	0.13	0.30
300	0.130	340	0.07	0.31	410	0.24	0.39	0.22	0.41	0.19	0.44
200	0.090	220	0.05	0.21	260	0.16	0.27	0.15	0.28	0.13	0.30
300	0.120	340	0.07	0.31	400	0.23	0.39	0.22	0.41	0.19	0.44
440	0.170	-	-	-	-	-	-	-	-	-	-
550	0.230	620	0.17	0.52	720	0.44	0.73	0.41	0.76	0.35	0.81
550	0.230	620	0.17	0.52	720	0.44	0.73	0.41	0.76	0.35	0.81
500	0.400	570	0.36	0.84	670	0.80	1.20	0.75	1.25	0.70	1.30
760	0.580	860	0.36	0.84	1010	1.15	1.73	1.08	1.80	1.01	1.87
500	0.400	570	0.52	1.21	670	0.80	1.20	0.75	1.25	0.70	1.30
510	0.400	580	0.3	0.9	680	0.80	1.20	0.75	1.25	0.70	1.30
510	0.400	580	0.3	0.89	680	0.80	1.19	0.75	1.24	0.70	1.29
380	0.300	430	0.23	0.68	510	0.61	0.91	0.57	0.95	0.53	0.99
240	0.200	280	0.15	0.46	330	0.38	0.64	0.36	0.66	0.31	0.71
370	0.300	420	0.22	0.67	490	0.59	0.89	0.56	0.93	0.52	0.96
640	0.320	720	0.24	0.72	830	0.64	0.96	0.60	1.00	0.56	1.04
590	0.550	670	0.5	1.16	780	1.11	1.66	1.04	1.73	0.97	1.80
890	0.800	1000	0.72	1.67	1180	1.59	2.39	1.49	2.49	1.39	2.59
900	0.800	1020	0.72	1.67	1190	1.59	2.39	1.49	2.49	1.39	2.59
910	0.790	1030	0.71	1.67	1210	1.59	2.38	1.49	2.48	1.39	2.58
470	0.480	540	0.43	1.01	630	0.96	1.44	0.90	1.50	0.84	1.56
780	0.760	880	0.68	1.59	1050	1.51	2.27	1.42	2.37	1.32	2.46
300	0.320	340	0.24	0.72	410	0.64	0.96	0.60	1.00	0.56	1.04
450	0.470	520	0.42	0.98	610	0.93	1.40	0.87	1.45	0.81	1.51
700	0.780	790	0.7	1.64	920	1.56	2.34	1.46	2.43	1.36	2.53
1050	1.120	1190	1.01	2.35	1380	2.38	3.22	2.24	3.36	2.10	3.50
560	0.670	640	0.6	1.41	750	1.34	2.01	1.26	2.09	1.17	2.18
930	1.060	1060	0.95	2.22	1250	2.25	3.04	2.11	3.17	1.98	3.30
380	0.460	440	0.42	0.98	510	0.93	1.39	0.87	1.45	0.81	1.51
570	0.670	660	0.61	1.41	770	1.35	2.02	1.26	2.10	1.18	2.19
1240	1.730	1390	1.82	3.38	1610	3.69	4.99	3.47	5.20	3.25	5.42
1410	2.730	1600	2.87	5.33	1880	5.81	7.86	5.47	8.20	5.13	8.55
1400	4.200	1590	4.41	8.2	1870	8.93	12.08	8.41	12.61	7.88	13.14
1430	2.390	1600	2.51	4.66	1830	5.08	6.87	4.78	7.17	4.48	7.47
1680	5.900	1830	6.2	11.51	2230	12.54	16.97	11.8	17.71	11.07	18.44
1600	3.270	1780	3.43	6.37	2020	6.94	9.39	6.53	9.80	6.12	10.20
1970	8.160	2230	8.57	15.92	2600	17.35	23.47	16.33	24.49	15.30	25.51

Precision Ball Screw Assemblies

Preload and Rigidity of Double Nuts

Dynamic drag torque, preload and rigidity for screws of tolerance grade 1-7 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 preload.

Note:

Measurement of the dynamic drag torque ➠ see “Mounting” on Page 112.

Size $d_0 \times P \times D_w - i$	Load ratings dyn. C (N)	stat. C_0 (N)	Rigidity of the screw R_S $\left(\frac{N \cdot m}{\mu m}\right)$
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 9 - 6	170900	403900	894
80 x 20R x 12.7 - 6	262700	534200	832
100 x 10R x 6.5 - 6	119500	371900	1501
100 x 20R x 12.7 - 6	295100	686400	1366
125 x 10R x 6.5 - 6	130600	468700	2391
125 x 20R x 12.7 - 6	326500	870400	2220

Screws with double nuts FDM-E-S, FDM-E-C

7% preload							10% preload						
R_{nu} (N/µm)	T_{pr0} (Nm) Tolerance grade						R_{nu} (N/µm)	T_{pr0} (Nm) Tolerance grade					
	1		3 ; 5		7			1		3 ; 5		7	
	min.	max.	min.	max.	min.	max.		min.	max.	min.	max.	min.	max.
310	0.03	0.08	0.03	0.08	0.02	0.09	350	0.05	0.11	0.04	0.12	0.03	0.13
390	0.05	0.11	0.04	0.12	0.03	0.13	430	0.07	0.16	0.06	0.17	0.05	0.18
460	0.07	0.16	0.06	0.17	0.04	0.18	510	0.1	0.22	0.08	0.24	0.06	0.25
470	0.07	0.15	0.05	0.16	0.04	0.18	530	0.09	0.22	0.08	0.24	0.06	0.25
550	0.12	0.27	0.10	0.29	0.08	0.31	610	0.21	0.35	0.19	0.36	0.17	0.39
750	0.21	0.36	0.20	0.37	0.17	0.4	830	0.3	0.51	0.28	0.53	0.24	0.57
790	0.24	0.41	0.23	0.42	0.20	0.46	870	0.35	0.58	0.33	0.61	0.28	0.65
740	0.42	0.70	0.39	0.73	0.34	0.78	830	0.64	0.96	0.60	1.00	0.56	1.04
1120	0.65	0.97	0.61	1.01	0.57	1.05	1250	0.92	1.38	0.87	1.44	0.81	1.50
570	0.32	0.53	0.3	0.55	0.25	0.59	630	0.49	0.73	0.45	0.76	0.42	0.79
920	0.34	0.56	0.31	0.58	0.27	0.63	1010	0.51	0.77	0.48	0.80	0.45	0.83
870	0.62	0.93	0.58	0.97	0.54	1.01	960	0.89	1.33	0.83	1.39	0.78	1.44
1300	0.89	1.34	0.84	1.39	0.78	1.45	1450	1.28	1.91	1.20	1.99	1.12	2.07
1170	0.85	1.27	0.79	1.32	0.74	1.38	1310	1.21	1.82	1.14	1.89	1.06	1.97
1020	0.87	1.31	0.82	1.36	0.76	1.42	1120	1.25	1.87	1.17	1.95	1.09	2.02
1520	1.25	1.88	1.17	1.96	1.10	2.04	1690	1.79	2.69	1.68	2.80	1.57	2.91
1390	1.18	1.78	1.11	1.85	1.04	1.92	1560	1.69	2.54	1.59	2.64	1.48	2.75
1770	1.94	2.91	1.82	3.04	1.7	3.16	1950	2.95	3.99	2.78	4.16	2.60	4.34
2090	3.25	4.40	3.06	4.59	2.87	4.79	2330	4.65	6.29	4.38	6.56	4.10	6.84
2070	5.00	6.77	4.71	7.06	4.41	7.36	2320	7.15	9.67	6.73	10.09	6.30	10.51
2000	2.84	3.85	2.68	4.02	2.51	4.18	2190	4.06	5.50	3.82	5.74	3.59	5.98
2460	7.02	9.50	6.61	9.92	6.20	10.33	2740	10.03	13.57	9.44	14.16	8.85	14.76
2200	3.89	5.26	3.66	5.49	3.43	5.71	2390	5.55	7.51	5.22	7.84	4.90	8.16
2860	9.71	13.14	9.14	13.71	8.57	14.28	3170	13.88	18.77	13.06	19.59	12.24	20.41

Precision Ball Screw Assemblies

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 seal

d_0 = nominal diameter
P = lead
D_w = ball diameter

Note:

Measurement of the dynamic drag torque ➠ see “Mounting” on Page 112.

Size $d_0 \times P \times D_w$	Dynamic drag torque of 2 seals	
	T_{RD} approx. (Nm) Standard seal	T_{RD} approx. (Nm) Reinforced seal; for precision-rolled screw SN-R only
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	-
20 x 5R x 3	0.100	-
20 x 20R x 3.5	0.120	-
20 x 40R x 3.5	0.040	-
25 x 5R x 3	0.120	0.34
25 x 10R x 3	0.150	0.29
25 x 25R x 3.5	0.200	-
32 x 5R x 3.5	0.250	0.51
32 x 5L x 3.5	0.250	-
32 x 10R x 3.969	0.250	0.46
32 x 20R x 3.969	0.250	0.49
32 x 32R x 3.969	0.250	0.45
40 x 5R x 3.5	0.400	0.85
40 x 5L x 3.5	0.400	-
40 x 10R x 6	0.400	0.91
40 x 10L x 6	0.400	-
40 x 16R x 6	0.400	-
40 x 20R x 6	0.400	0.54
40 x 40R x 6	0.400	-
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	-
50 x 40R x 6.5	0.600	-
63 x 10R x 6	1.200	-
63 x 20R x 6.5	1.200	1.0
63 x 40R x 6.5	1.200	1.4
80 x 10R x 6.5	1.400	-
80 x 20R x 9	2.200	-
80 x 20R x 12.7	2.200	-
100 x 10R x 6.5	2.200	-
100 x 20R x 12.7	2.800	-
125 x 10R x 6.5	3.600	-
125 x 20R x 12.7	5.000	-

- Indicates that the reinforced seal is not available for this size.

Please bear in mind the following when modifying and retrofitting the seals:

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

However, precision-rolled screws SN-R with higher leads are designed as double or quadruple (Figs. 2 and 3). The sealing geometry here is therefore different from that for the precision screws SN-F. The distinction is made clear by the part number on the component.

“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.

Fig. 1
Single seal

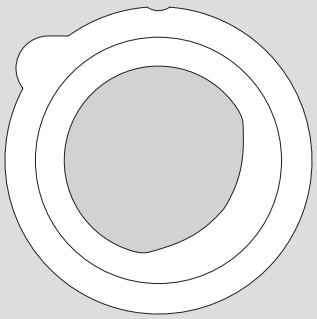


Fig. 2
Seal for double precision-rolled screw SN-R with average lead

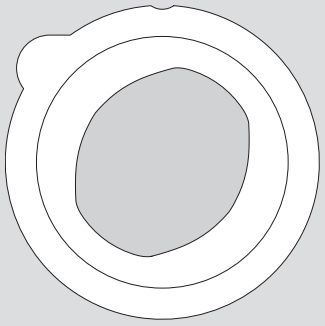
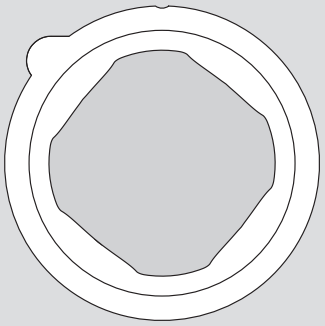


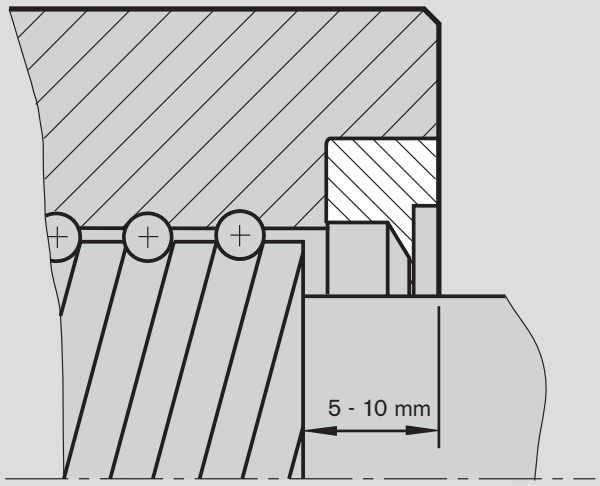
Fig. 3
Seal for quadruple precision-rolled screw SN-R with high lead



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 exposed face. Ensure that the lip is not damaged.

Detailed mounting instructions are delivered along with the parts.



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 avail-able. 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.

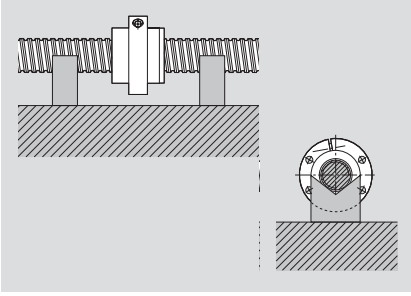
Cleaning

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

Machine tool series

These models are supplied with premounted nut units.

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

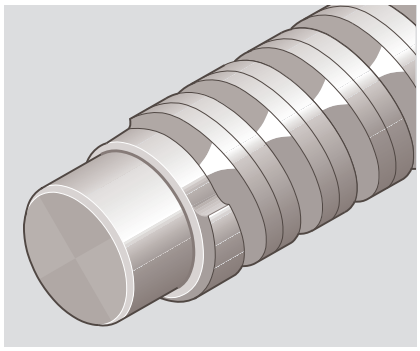
Nut mounting

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 may be 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.

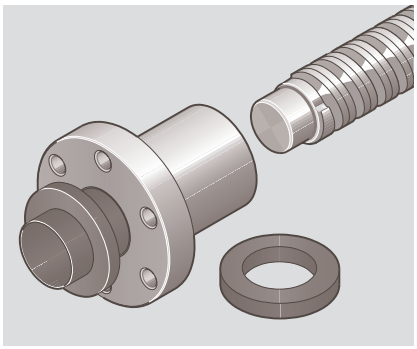


The various mounting steps are described below.

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.

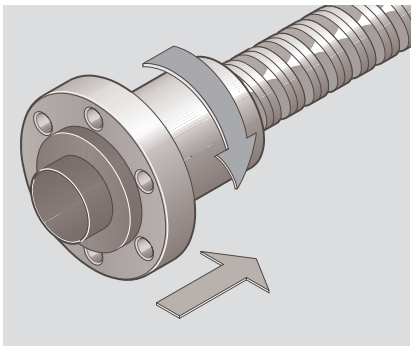
Mounting steps

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

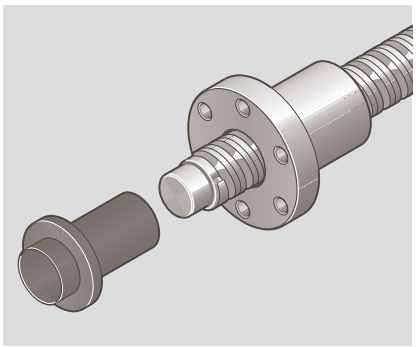


Push the mounting arbor with nut until it bears against the end of the thread. The arbor must make contact with no axial clearance.

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.



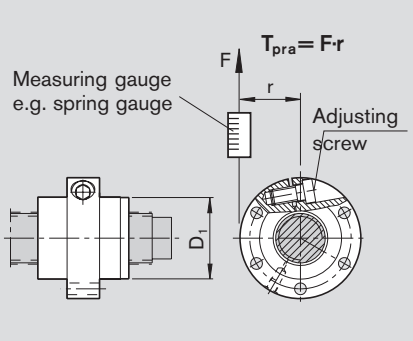
Preload of adjustable-preload single nuts

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_{pr0} specified in the table ➠ see Page 106, 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 ➠ see Pages 34 and 38. 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 reoiled.
- Push the nut unit into the mounting bore, taking care to avoid any impacts or misalignment.
- Tighten the mounting screws using a torque wrench if necessary. Maximum tightening torques for the steel/steel material pairing (R_m 370 N/mm²), see table.

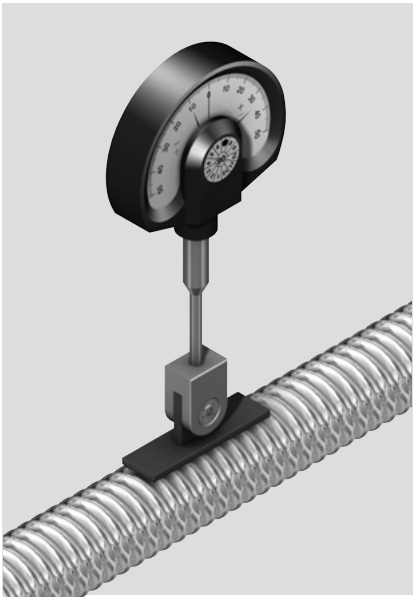
Steel/steel material pairing			
Screw diameter (mm)	Tightening torque (Nm) strength class to DIN ISO 898:		
	8.8	10.9	12.9
M3	1.3	1.8	2.1
M4	2.7	3.8	4.6
M6	9.5	13	16
M8	23	32	39
M10	46	64	77
M12	80	110	135
M16	195	275	330

- For the steel/aluminum and aluminum/aluminum material pairings (R_m 280 N/mm²), the maximum tightening torques specified in the follow table apply.
  When screwing into aluminum, the length of thread engagement should be at least 1.5 times the screw diameter.

Steel/aluminum and aluminum/aluminum material pairing			
Screw diameter (mm)	Tightening torque (Nm) strength class to DIN ISO 898:		
	8.8	10.9	12.9
M3	1.2	1.2	1.2
M4	2.4	2.4	2.4
M6	8.5	8.5	8.5
M8	20	20	20
M10	41	41	41
M12	70	70	70
M16	175	175	175

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.



Lubrication

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.

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 51501, 51517, 51519 and GfT Worksheet 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	Initial lubrication oil V_e (ml)	Relubrication oil V_n (ml)/10h	Revolutions (mill.)	Travel (km) with lead P = 5	10	16	20	25	32	40
8	0.300	0.030	1.3	7	13	21	26	33	42	52
12	0.300	0.030	1.3	7	13	21	26	33	42	52
16	0.300	0.030	1.3	7	13	21	26	33	42	52
20	0.600	0.060	1.0	5	10	16	20	25	32	40
25	0.600	0.060	1.0	5	10	16	20	25	32	40
32	0.600	0.060	1.0	5	10	16	20	25	32	40
40	2.000	0.400	1.0	5	10	16	20	25	32	40
50	4.000	0.800	1.0	5	10	16	20	25	32	40
63	4.000	0.800	1.0	5	10	16	20	25	32	40

d_0 = nominal diameter

Relubrication intervals for NLGI 2 greases

d_0	Relubrication quantity, see table for NLGI 2 greases.	Revolutions (mill.)	Travel (km) with lead P = 5	10	16	20	25	32	40
≤ 40		50	250	500	800	1000	1250	1600	2000
> 40		10	50	100	160	200	250	320	400

d_0 = nominal diameter

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 MoS_2).

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

Relubrication quantities for NLGI 2 greases: Standard series

For NLGI 2 greases:

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

Use double the amount of the relubrication quantity for initial lubrication.

Size d_0 x P x 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		Double nut FDM-E-C / FDM-E-S	
	Precision screw		Precision screw	
	SN-R	SN-F	SN-R	SN-F
8 x 2.5R x 1.588 - 3	0.1	0.1	-	-
12 x 5R x 2 - 3	0.3	0.3	-	-
12 x 10R x 2 - 2	0.3	0.3	-	-
16 x 5R x 3 - 4	0.6	0.6	1.7	1.7
16 x 10R x 3 - 3	0.8	0.7	-	-
16 x 16R x 3 - 2	0.9	0.8	-	-
16 x 16R x 3 - 3	1.1	1.0	-	-
20 x 5R x 3 - 4	0.9	0.9	2.7	2.7
20 x 5R x 3 - 5	1.0	1.0	-	-
20 x 20R x 3.5 - 2	1.7	1.3	-	-
20 x 20R x 3.5 - 3	2.2	1.6	-	-
25 x 5R x 3 - 4	1.4	1.4	3.2	3.2
25 x 10R x 3 - 4	1.7	1.7	3.8	3.8
25 x 25R x 3.5 - 2	2.4	1.9	-	-
25 x 25R x 3.5 - 3	3.1	2.4	-	-
32 x 5L x 3.5 - 4	2.3	2.3	-	-
32 x 5R x 3.5 - 4	2.0	2.0	4.5	4.5
32 x 10R x 3.969 - 5	2.8	2.8	6.0	6.0
32 x 20R x 3.969 - 2	2.5	2.2	-	-
32 x 20R x 3.969 - 3	3.2	2.8	-	-
32 x 32R x 3.969 - 2	3.7	2.8	-	-
32 x 32R x 3.969 - 3	4.9	3.7	-	-
40 x 5L x 3.5 - 5	3.1	3.1	-	-
40 x 5R x 3.5 - 5	2.7	2.7	6.9	6.9
40 x 10L x 6 - 4	6.0	6.0	-	-
40 x 10R x 6 - 4	6.0	6.0	15.1	15.1
40 x 10R x 6 - 6	7.3	7.3	17.7	17.7
40 x 12R x 6 - 4	6.1	6.1	-	-
40 x 16R x 6 - 4	8.3	6.9	19.3	16.5
40 x 20R x 6 - 3	7.8	6.8	18.5	16.4
40 x 40R x 6 - 2	9.4	7.4	-	-
40 x 40R x 6 - 3	12.9	10.1	-	-
50 x 10R x 6 - 4	8.0	8.0	19.7	19.7
50 x 10R x 6 - 6	9.7	9.7	23.0	23.0
50 x 12R x 6 - 6	10.4	10.4	-	-
50 x 16R x 6 - 6	14.6	12.1	-	-
50 x 20R x 6.5 - 3	11.4	9.7	-	-
50 x 20R x 6.5 - 5	15.6	13.1	31.3	26.3
50 x 40R x 6.5 - 2	13.9	10.7	-	-
50 x 40R x 6.5 - 3	18.6	14.1	-	-
63 x 10R x 6 - 4	9.0	9.0	23.0	23.0
63 x 10R x 6 - 6	11.0	11.0	27.0	27.0
63 x 20R x 6.5 - 3	13.9	11.7	-	-
63 x 20R x 6.5 - 5	19.2	16.0	39.4	33.0
63 x 40R x 6.5 - 2	17.0	13.0	-	-
63 x 40R x 6.5 - 3	22.9	17.3	-	-
80 x 10R x 6.5 - 6	16.3	16.3	39.0	39.0
80 x 20R x 9 - 6	38.9	38.9	76.2	76.2
80 x 20R x 12.7 - 6	59.0	59.0	119.5	119.5
100 x 10R x 6.5 - 6	20.8	20.8	43.0	43.0
100 x 20R x 12.7- 6	72.9	72.9	147.4	147.4
125 x 10R x 6.5 - 6	25.8	25.8	53.5	53.5
125 x 20R x 12.7 - 6	90.3	90.3	183.1	183.1

Relubrication quantities for NLGI 2 greases: Miniature, ECO series

For NLGI 2 greases:

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

Size d_0 x P x D_w-i	Relubrication quantity of grease (g) Single nut, precision-rolled screw R			
	FEM-E-B Miniature	FSZ-E-S	FEP-E-S	ZEV-E-S
6 x 1R x 0.8- 4	0.06	-	-	-
6 x 2R x 0.8- 4	0.12	-	-	-
8 x 1R x 0.8 - 4	0.12	-	-	-
8 x 2R x 1.2 - 4	0.24	-	-	-
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	-	-	0.3
12 x 10R x 2 - 2	0.30	-	-	0.3
16 x 5L x 3 - 3	-	-	-	0.85
16 x 5R x 3 - 3	-	-	-	0.85
16 x 10R x 3 - 3	-	-	-	1.0
20 x 5R x 3 - 4	-	0.7	-	1.2
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	-	-
25 x 10R x 3 - 4	-	1.3	-	-
25 x 25R x 3.5 - 1.2 x 4	-	-	1.5	-
32 x 5R x 3.5 - 4	-	1.6	-	-
32 x 10R x 3.969 - 5	-	2.3	-	-
32 x 20R x 3.969 - 2	-	2.0	-	-
32 x 32R x 3.969 - 1.2 x 4	-	-	2.6	-
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	-	-

Notes

Design Calculations

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

➠ see “Design Calculation Service Form” on Page 126.

Average speed and average load

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

– where the speed fluctuates, the average speed n_m is calculated as follows

$$n_m = \frac{q_1}{100}\cdot n_1 + \frac{q_2}{100}\cdot n_2 + \ldots + \frac{q_n}{100}\cdot n_n \quad (1)$$

n_m = average speed (min^{-1})
q = discrete time step (%)

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

$$F_m = \sqrt[3]{F_1^3\cdot\frac{q_1}{100} + F_2^3\cdot\frac{q_2}{100} + \ldots + F_n^3\cdot\frac{q_n}{100}} \quad (2)$$

F_m = average load (N)
q = discrete time step (%)

– where both the load and the speed fluctuate, the average load F_m is calculated as follows

$$F_m = \sqrt[3]{F_1^3\cdot\frac{n_1}{n_m}\cdot\frac{q_1}{100} + F_2^3\cdot\frac{n_2}{n_m}\cdot\frac{q_2}{100} + \ldots + F_n^3\cdot\frac{n_n}{n_m}\cdot\frac{q_n}{100}} \quad (3)$$

F_m = average load (N)
q = discrete time step (%)
n_m = average speed (min^{-1})

Service life in revolutions L

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

L = service life (revolutions)
F_m = average load (N)
C = dynamic load rating (N)

Nominal life

Service life in hours L_h

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

L_h = service life (h)
L = service life (revolutions)
n_m = average speed (min^{-1})

$$\text{Machine service life} = L_h\cdot\frac{\text{Machine operating hours}}{\text{Screw operating hours}} \quad (8)$$

Drive torque and drive power

Drive torque M_{ta}

for conversion of rotary motion into linear motion:

$$M_{ta} = \frac{F\cdot P}{2000\cdot\pi\cdot\eta} \quad (9)$$

Transmitted torque M_{te}

for conversion of linear motion into rotary motion:

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

M_{ta} = drive torque (Nm)
M_{te} = transmitted torque (Nm)
F = operating load (N)
P = lead (mm)
η = mechanical efficiency (approx. 0.9)
η' = mechanical efficiency (approx. 0.8)

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

Drive power P_a

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

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

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

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

Calculation procedure

Average speed n_m

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

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

Average load F_m for variable load and variable speed

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

$$F_m = 8757\ N \quad (3)$$

Required service life L (revolutions)
The life L can be calculated by transposing the formulas (7) (8) and :

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

$$L_h = \text{Machine service life} \cdot \frac{\text{Machine operating hours}}{\text{Ball screw operating hours}}$$

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

$$L = 24000 \cdot 304 \cdot 60 \qquad L = 437\ 760\ 000 \text{ revolutions}$$

Basic dynamic load rating C

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

Result and selection

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

e.g. ball screw,
size 63 x 10 R x 6-6, with preloaded single nut with flange FEM-E-S,
dyn. load rating C = 88 800 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

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

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.

Precision Ball Screw Assemblies

Design Calculations

Critical speed n_k

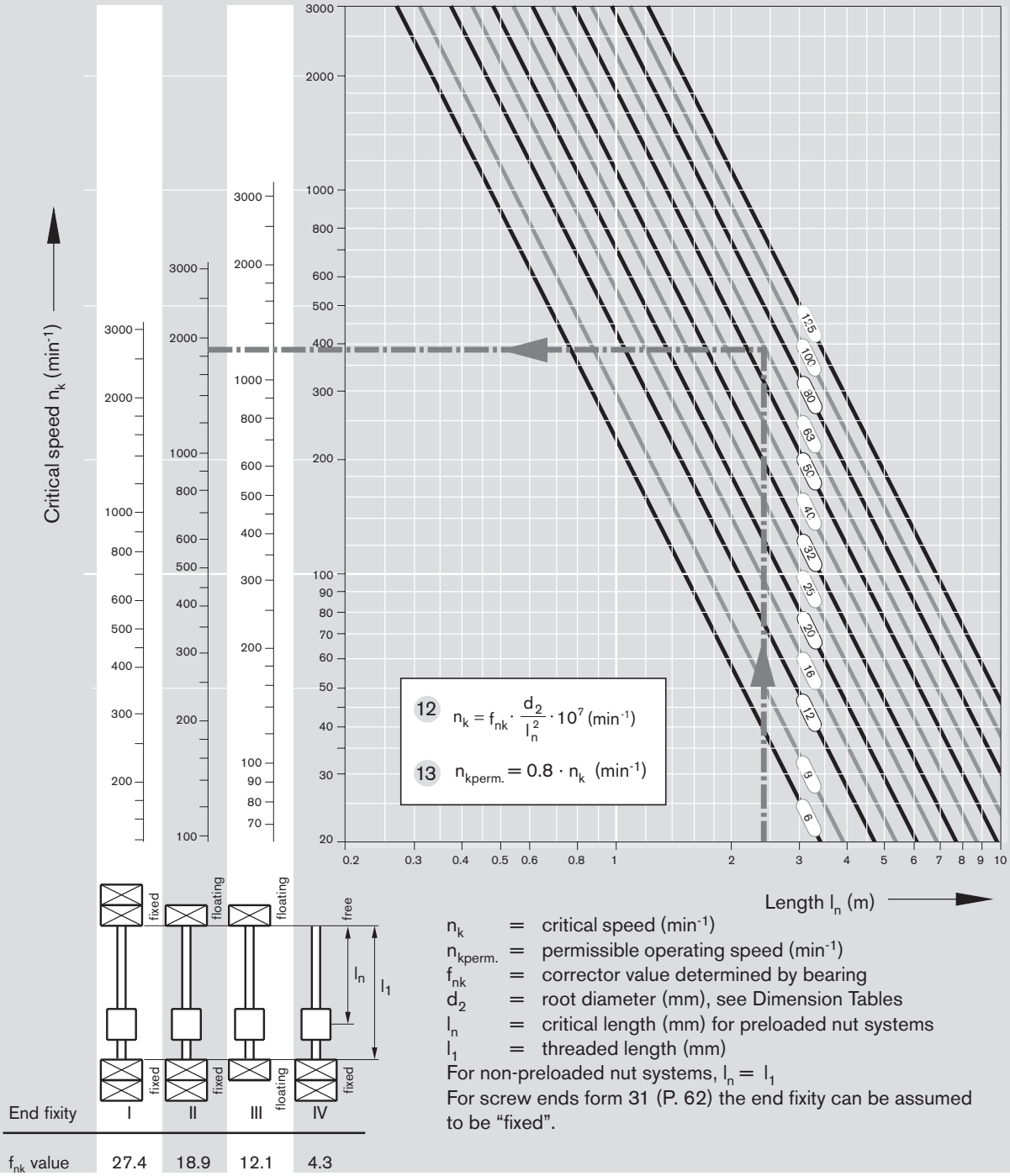
The critical speed n_k depends on the diameter of the screw, the type of end fixity and the free length l_n. No allowance must be made for guidance by a nut with backlash.
The operating speed should not reach more than 80% of the critical speed. The characteristic speed and the max. permissible linear speed must be taken into account, see “Technical Notes” P. 98.

Example

Screw diameter = 63 mm
Length l_n = 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 min^{-1} x 0.8 = 1480 min^{-1}.

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



n_k = critical speed (min^{-1})
$n_{kperm.}$ = permissible operating speed (min^{-1})
f_{nk} = corrector value determined by bearing
d_2 = root diameter (mm), see Dimension Tables
l_n = critical length (mm) for preloaded nut systems
l_1 = threaded length (mm)
For non-preloaded nut systems, $l_n = l_1$
For screw ends form 31 (P. 62) the end fixity can be assumed to be “fixed”.

Permissible axial load on screw F_k (buckling load)

The permissible axial load on the screw F_k depends on the diameter of the screw, the type of end fixity and the effective free (unsupported) length l_k.

A safety factor of g 2 should be taken into consideration when determining the permissible axial load.

Example

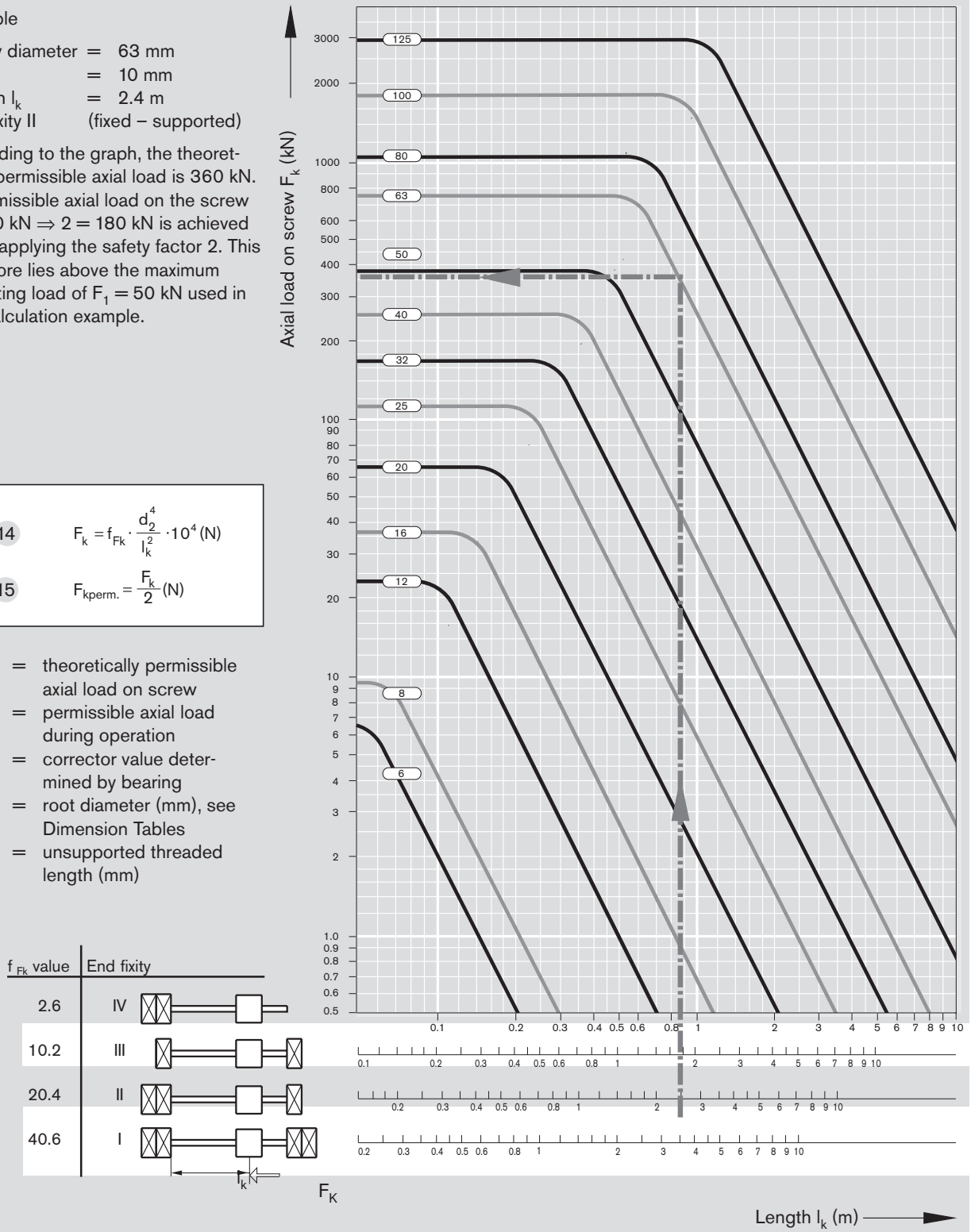
Screw diameter = 63 mm
Lead = 10 mm
Length l_k = 2.4 m
End fixity II (fixed – supported)

According to the graph, the theoretically permissible axial load is 360 kN. A permissible axial load on the screw of 360 kN ⇒ 2 = 180 kN is achieved when applying the safety factor 2. This therefore lies above the maximum operating load of F_1 = 50 kN used in our calculation example.

14 $$F_k = f_{Fk} \cdot \frac{d_2^4}{l_k^2} \cdot 10^4 \,(N)$$

15 $$F_{kperm.} = \frac{F_k}{2} \,(N)$$

F_k = theoretically permissible axial load on screw
$F_{kperm.}$ = permissible axial load during operation
f_{Fk} = corrector value determined by bearing
d_2 = root diameter (mm), see Dimension Tables
l_k = unsupported threaded length (mm)



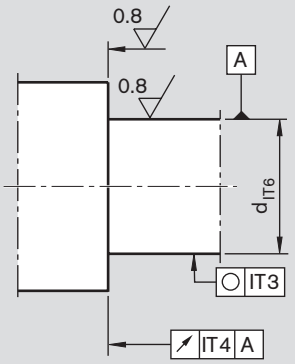
End Bearings, Design Notes, Mounting Instructions

Bearing design

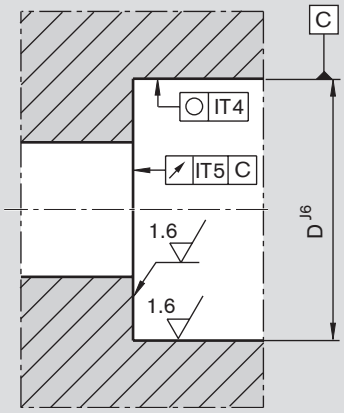
For customer-machined screw ends, please observe the design notes given for screw ends and housings.

For Rexroth screw end designs
➠ see “End Machining Details” starting on Page 54.

Rexroth delivers complete drive systems, including the end bearings. Calculations are performed with the formulas used in the antifriction bearing industry.



Screw end



Housing

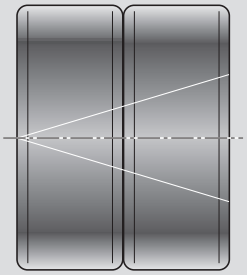
Accuracy

Series	Bore d (mm)	Axial run-out	Radial clearance (µm)	Tolerance (µm)		
				Bore	Outer diameter ≤ 50 > 50	Width
LGF-B... LGN-B...	≤ 10	P5 to DIN 620	preloaded	+ 3 - 5	- 10	- 250
	> 10	P5 to DIN 620	preloaded	- 10	- 11 - 13	- 250
LGF-C... LGN-C...	≤ 25 preloaded > 25	2 2.5	-5		-10 -500	

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 antifriction bearing elements or the seal rings! The two sections of the inner raceway may not be separated during assembly or disassembly for any reason! Tighten the mounting screws for screw-down or flange-mounted bearings in cross-wise sequence. The mounting screws may be subjected only to tension amounting to a maximum of 70% of their yielding point. The screw-down (LGF) bearings have a groove on the cylindrical surface of the outer raceway for dis-assembly. The individual bearings of the bearing pair series LGF-C... and LGN-C... are marked on the cylindrical surfaces of the outer raceways (see diagram). 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 slotted nuts.In order to prevent settling phenomena, we recommend first tightening the slot-ted 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 nutis tightened (M_A in accordance with Dimension Table).

Lubrication, Mounting the Housing

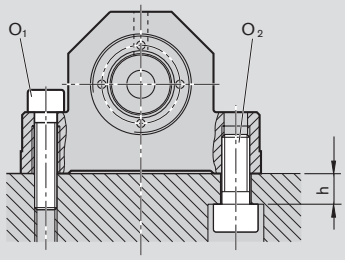
Mounting the housing SEB

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 screws and pins to fix the housing nut in place.

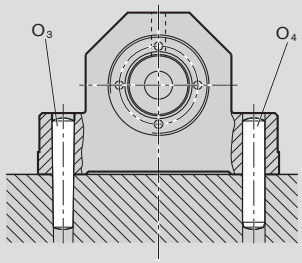
Note:

Take care to align the screw and ball nut assembly, the bearings and the guideway precisely with one another. The Rexroth gauge (see P. 113) is a useful aid here.

Mounting screw



Locating pins



Size d_0 x P	h (mm)	O_1 DIN 912	O_2 DIN 912 (hardened)	O_3 Tapered pin O_4 Straight pin (DIN 6325)
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

Strength class of O_1; O_2	M5	M6	M8	M10	M12	M14
Nm 8.8	5.5	9.5	23	46	80	125
Nm 12.9	9.5	16	39	77	135	215

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 to 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	0.4 / 0.3						
LGN-B-1747	LGF-B-1762	0.5 / 0.4						
LGN-B-2052	LGF-B-2068	0.8 / 0.5						
LGN-B-2557	LGF-B-2575	1.0 / 0.6	LGN-C-2557	LGF-C-2575	2.0 / 1.2			
LGN-B-3062	LGF-B-3080	1.0 / 0.6	LGN-C-3062	LGF-C-3080	2.0 / 1.2			
LGN-B-3572	LGF-B-3590	1.6 / 0.9						
LGN-A-4075		2.0 / 1.2				LGN-A-4090	LGF-B-40115	6.0 / 3.5
LGN-A-5090		2.5 / 1.5				LGN-A-50110	LGF-A-50140	9.0 / 5.5

End Bearings, Design Calculations

Resulting and equivalent bearing loads

Angular-contact thrust ball bearings are preloaded. The chart shows the resulting axial bearing load F_a as a function of preload and axial operating load F_{aB}. If the system is primarily subject to axial operating loads, then $F = F_a$.

$\alpha = 60°$	X	Y
$\frac{F_a}{F_r} \leq 2.17$	1.9	0.55
$\frac{F_a}{F_r} > 2.17$	0.92	1

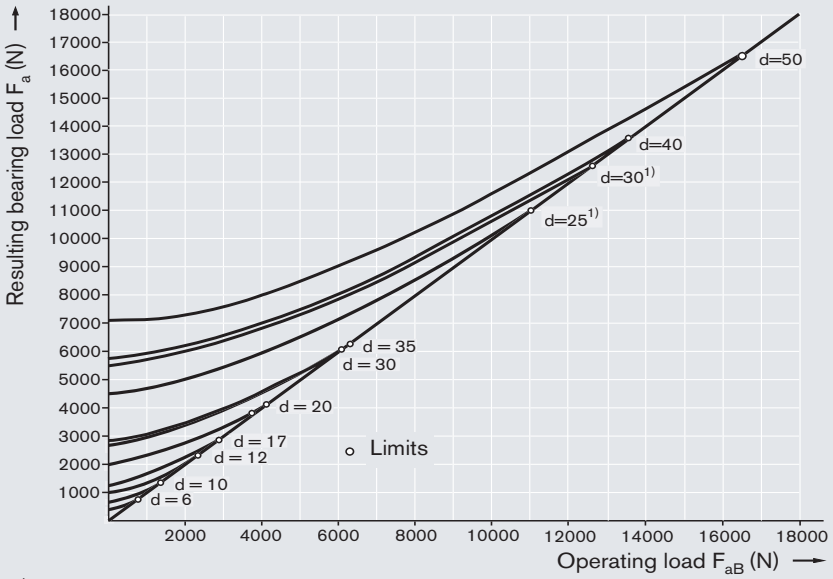
α = pressure angle
X, Y = dimensionless factor
F_a = resulting bearing load
F_{aB} = operating load

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.

$$F = X \cdot F_r + Y \cdot F_a \quad (20)$$

F_r = radial bearing load (N)
F_a = resulting axial bearing load (N)
F = equivalent bearing load (N)

Internal preload limit and resulting bearing load



1) Four row version

Average speed and average bearing load

If the bearing is subject to varying axial loads over time, the average axial bearing load can be calculated using formula 21.

If the speed varies, apply formula 22. In these formulas, the q_i values represent the discrete time steps in %.

If the radial load F_{rm} varies, calculate the average radial load in the same manner.

$$F_{am} = \sqrt[3]{F_1^3 \cdot \frac{n_1}{n_m} \cdot \frac{q_1}{100} + F_2^3 \cdot \frac{n_2}{n_m} \cdot \frac{q_2}{100} + \ldots + F_n^3 \cdot \frac{n_n}{n_m} \cdot \frac{q_n}{100}} \quad 21$$

$$n_m = \frac{q_1}{100} \cdot n_1 + \frac{q_2}{100} \cdot n_2 + \ldots + \frac{q_n}{100} \cdot n_n \quad 22$$

F_{am} = resulting average axial load (N)
q = discrete time step (%)
n_m = average speed (min^{-1})

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!

$$L = \left(\frac{C}{F}\right)^3 \quad 23$$

$$L_h = \frac{16666}{n} \left(\frac{C}{F}\right)^3 \quad 24$$

L = nominal life in millions of revolutions (10^6 revolutions)
L_h = nominal life in operating hours (h)
C = dynamic bearing load rating (N)
n = average speed (min^{-1})
F = equivalent bearing load (N)

Static load safety factor

The static load safety factor for machine tools should not be lower than 4.

$$S_0 = \frac{C_0}{F_0} \quad 25$$

S_0 = static load safety factor (-)
C_0 = static load rating (N)
F_0 = maximum static load (N)

Friction

The bearing friction torque M_{RL} is primarily dependent on the bearing preload. The influence of the operating load F_{aB} is insignificant as long as it does not exceed the limits at which the bearings have zero clearance. The bearing friction torque M_{RL} specified in the Dimension Tables applies to the preload generated by means of the slotted nut tightening torque M_A. The preloaded bearing has the rigidity R_{aL}. The bearing preload is selected so as to allow it to remain effective even at high operating loads and ensure that the bearing has zero clearance.

The bearing friction torque M_{RL} is measured at a speed of $n = 5\ min^{-1}$. The friction power loss N_{RL} of the bearing can be calculated using formula 26. The various operating speeds n_i must be incorporated in the heat balance as a function of their discrete time steps q_i.

$$N_{RL} = \frac{M_{RL} \cdot n}{9.55} \quad 26$$

N_{RL} = friction power loss (W)
n = speed (min^{-1})
M_{RL} = bearing friction torque (Nm)

Precision Ball Screw Assemblies

Bosch Rexroth Corporation
Linear Motion and Assembly Technologies
14001 South Lakes Drive
Charlotte, NC 28273

Telephone (704) 583-4338
or 800-438-5983
Fax (704) 583-0523
e-mail techdesk.chr@boschrexroth-us.com

To: Ball Screw Assemblies Department

Design Calculation Service Form

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	=

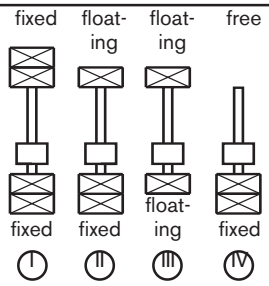
Average load (P. 118)		Average speed (P. 118)		Sum of time steps		
F_m	=	n_m	=	Q	=	100%

Maximum static load: N

Required service life _____ revolutions Operating hours or _____ x 10^6 ball screw

Screw end fixity

horizontal ☐ vertical ☐



(PP. 124/125)

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 _____ Name _____
Address _____ Department _____
_____ Telephone _____
_____ Fax _____
_____ e-mail _____

Bosch Rexroth Corporation
Linear Motion and Assembly Technologies
14001 South Lakes Drive
Charlotte, NC 28273

Telephone (704) 583-4338
or 800-438-5983
Fax (704) 583-0523
e-mail techdesk.chr@boschrexroth-us.com

To: Ball Screw Assemblies Department

Fax Inquiry/Order Form

Note: The processing of Inquiries/Orders based on customer drawings is also possible of course.

Example of an order

Ball screw assembly	SEM-E-S	20 x 5R x 3 - 4	1	2	T7	R	81Z120	41Z120	1250	1	1
Screw	SN	20 x 5R x3	X	X	T7	R	00T200	00T200	1250	1	0

Ball screw assembly		x x -									
Screw	**SN**	x x	**X**	**X**							

Ball screw assembly		x x -									
Screw	**SN**	x x	**X**	**X**							

Ball screw assembly		x x -									
Screw	**SN**	x x	**X**	**X**							

Comments:

Enclosures: Drawing ☐ Other ☐

Quantity **Order for ..... units, ... per month, ... per year, per order or .....**

Comments .....

Sender OEM ☐ User ☐ Distributor ☐

Company _____ Name _____
Address _____ Department _____
_____ Telephone _____
_____ Fax _____
_____ e-mail _____

Rexroth
Bosch Group

Bosch Rexroth Corporation
Linear Motion and
Assembly Technologies
14001 South Lakes Drive
Charlotte, NC 28273
Telephone (800) 438-5983
Facsimile (704) 583-0523
www.boschrexroth-us.com

Bosch Rexroth Corporation
Corporate Headquarters
5150 Prairie Stone Parkway
Hoffman Estates, IL 60192-3707
Telephone (847) 645-3600
Facsimile (847) 645-6201

Bosch Rexroth Corporation
Industrial Hydraulics
2315 City Line Road
Bethlehem, PA 18017-2131
Telephone (610) 694-8300
Facsimile (610) 694-8467

Bosch Rexroth Corporation
Electric Drives and Controls
5150 Prairie Stone Parkway
Hoffman Estates, IL 60192-3707
Telephone (847) 645-3600
Facsimile (847) 645-6201

Bosch Rexroth Corporation
Pneumatics
1953 Mercer Road
Lexington, KY 40511-1021
Telephone (859) 254-8031
Facsimile (859) 281-3491

Bosch Rexroth Corporation
Mobile Hydraulics
1700 Old Mansfield Road
Wooster, OH 44691-0394
Telephone (330) 263-3300
Facsimile (330) 263-3333

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