

Linear Bushings and Shafts

R310EN 3100 (2007.03)

The Drive & Control Company

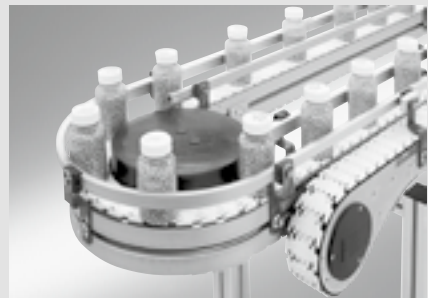
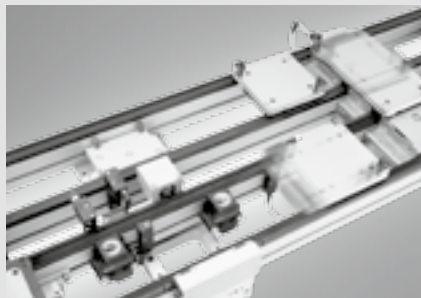
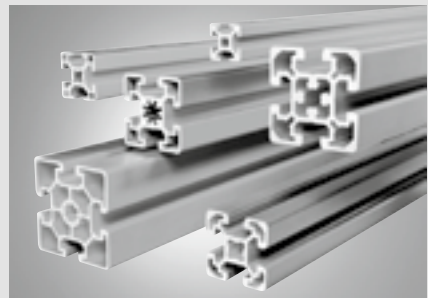
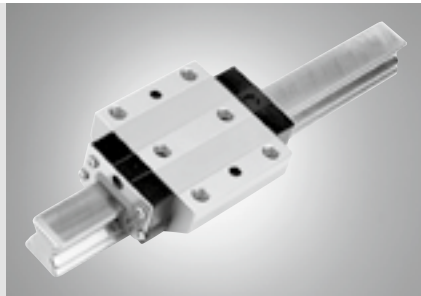
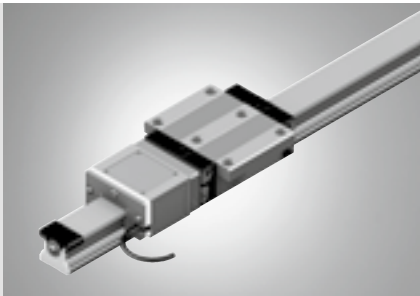


Linear Motion and Assembly Technologies


















Ball Rail Systems
Roller Rail Systems
Linear Bushings and Shafts

Ball Screw Drives
Linear Motion Systems

Basic Mechanical Elements
Manual Production Systems
Transfer Systems



Linear Bushings and Shafts

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eLINE, Compact Linear Bushings

Normal	R0658		24
Corrosion-resistant			

eLINE, Compact Linear Sets

Closed type, normal or corrosion-resistant	R1027		26
Adjustable, normal	R1028		26
Tandem	R1029		28
Closed type, normal or corrosion-resistant			


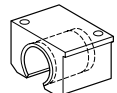

Super Linear Bushings **A**

Closed type	R0670		42
Open type	R0671		42

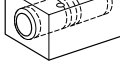
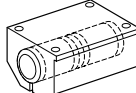
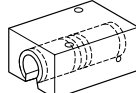
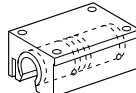
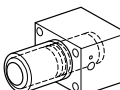
Super Linear Bushings **B**

Closed type	R0672		44
Open type	R0673		44


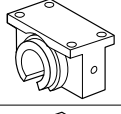
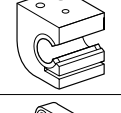
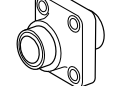
Linear Sets with Super Linear Bushings **A** or **B**, aluminum housing

Closed type	R1035		48
Adjustable	R1036		48
Open type	R1037		50
Open type, adjustable	R1038		50
With side opening	R1071		52
With side opening, adjustable	R1072		52

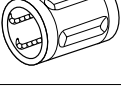
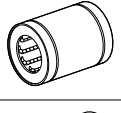
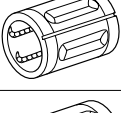
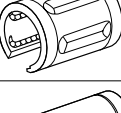
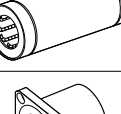
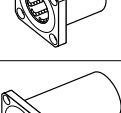
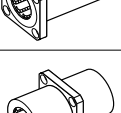
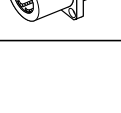
Linear Sets with Super Linear Bushings **A**, tandem

Closed type	R1085		54
Adjustable	R1032		54
Open type	R1087		56
Open type, adjustable	R1034		56
Flanged type	R1083		58

Linear Sets with Super Linear Bushings **A or **B**, cast-iron housing**


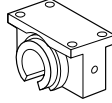
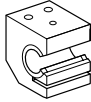
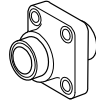
Closed type	R1065		60
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Closed type, with wiper seals	R0602		76
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Linear Sets with Standard Linear Bushings

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Normal or corrosion-resistant	R0668		106
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Linear Sets with Segmental Linear Bushings

Adjustable, normal or corrosion-resistant	R1060		108
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Torque-Resistant Linear Bushings

Type 1: one ball guide groove	R0696 0		116
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Torque-Resistant Compact Linear Bushings

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Type 2: two ball guide grooves	R1098 5		122
Tandem			
Type 1: one ball guide groove	R1099 2		124
Type 2: two ball guide grooves	R1099 5		124

Linear Sets with Torque-Resistant Linear Bushings, steel housing

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Type 2: two ball guide grooves	R1096 5		126
Tandem			
Type 1: one ball guide groove	R1097 2		128
Type 2: two ball guide grooves	R1097 5		128

Linear Sets with Torque-Resistant Compact Linear Bushings

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Linear Bushings for Combined Linear and Rotary Motion

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Solid shaft – Heat-treated steel or corrosion-resistant or hard chrome plated	R1000		166
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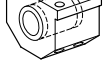
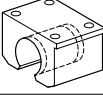

Super Linear Bushings

Closed type	R0732		198
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Super Linear Bushings

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Linear Sets with Super Linear Bushings or

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Linear Sets with Radial Linear Bushings

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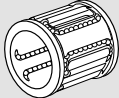
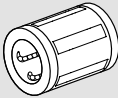
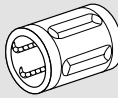
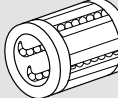
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Open type, adjustable	R1613		212
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Steel Shafts with ready-mounted Shaft Support Rails, Shaft Support Rails

For Radial Compact Sets	R1012	213
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For Radial Linear Bushings	R1018	216
For Radial Linear Bushings	R1020	218

Product Selection Guide for Linear Bushings

	eLINE, Compact 	Super 	Standard 	Segmental 
Frequency of use	+++	+++	++	++
Low costs	+++	++	++	+++
Especially easy installation	+++	++	++	++
Very compact design	+++	+	+	+++
Corrosion-resistant version available	+++	o	+++	+++
Normal loads	+++	+++	+++	+++
High loads	++	+++	++	++
With self-alignment	o	+++ ¹⁾	o	o
Especially smooth running	++	+++	++	++
Also in open-type design	o	+++	+++	o
High temperature	o	o	+++	o
Heavy contamination	o	o	+++	o
Suitability for vacuum	o	o	+++	o

1) Super  only


- +++ Very good
- ++ Good
- + Satisfactory
- o Not recommended

Product Overview


Our wide product selection of Linear Bushings in this catalog ensures that you will find the right solution for every application.

The eLINE Linear Bushing is distinguished by its compact dimensions and reduced radial clearance. In this type of linear bushing, the use of integrated metal retaining rings avoids the otherwise usual requirement for additional axial retention in the receiving bore. The eLINE Linear Bushing has two integrated wiper seals and is available in normal or corrosion-resistant versions, both pre-lubricated in-factory prior to shipment.

The Compact Linear Bushing is essentially identical in design to the eLINE Linear Bushing. It is supplied with standard radial clearance and is available with and without integrated wiper seals, in normal and corrosion resistant versions.

The Super Linear Bushing  has a built-in self-alignment feature that compensates for angular misalignment between the housing and shaft up to 0.5 degrees tilt without any reduction in load capacity due to angular pressure. Possible causes of misalignment include shaft flex due to heavy loads or inaccuracies in the adjoining structure. Angular self-adjustment ensures that the balls enter the load-bearing zone smoothly and that the load is distributed evenly across the whole row of balls. As a result, this type of linear bushing offers unparalleled smooth motion, a very high load-carrying capacity and extremely long service life.

For high loads or very long guides, the Super Linear Bushing is also available in an open version for use on supported shafts.

The Super Linear Bushing  without self-alignment is the solution for applications where only one linear bushing is used per shaft and the linear bushing may not rock on the shaft.

The Standard Linear Bushing is especially durable due to its steel ball retainer and is suitable for applications with high contamination, for example in the woodworking industry. It is available in three designs: closed-type, adjustable, and open-type. For use at very high temperatures, there is also an unsealed version. Closed-type Standard Linear Bushings are also available in versions made entirely of corrosion-resistant steel, which are particularly suitable for applications under vacuum and in the food industry.

The Segmental Linear Bushing with its durable plastic housing, is a cost-effective, ready-to-install Linear Bushing. For applications in corrosive conditions or where there are heavy requirements on cleanliness, such as in the food, semiconductor or medical equipment industries, these linear bushings are also available in corrosion-resistant versions.



Torque-Resistant Linear Bushings allow full linear guidance with only one shaft. The torque is transferred through extra-deep ball races. Depending on the level of torque to be transmitted, the shafts for these torque-resistant linear bushings can be supplied with one or more ball guide grooves.



Linear Bushings for Combined Linear and Rotary Motion are available with deep-groove ball bearings or needle bearings. They are suitable for swiveling movements as well as for medium rotary speeds.



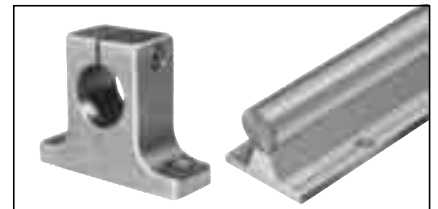
Linear Sets are complete bearing units consisting of a housing with one or two Rexroth Linear Bushings. They are available in many different configurations. Because of their rationalized construction and fabrication, Linear Sets offer users significant cost advantages over customer-built designs. The housings can be easily aligned during mounting, thereby avoiding distortive stresses on the Linear Bushings.



Precision Steel Shafts are available in various tolerances, as solid shafts and tubular shafts, made from heat-treated steel, corrosion-resistant steel or hard chrome plated steel. Rexroth supplies Precision Steel Shafts square-cut to the desired length, with chamfering at both ends, or machined to your drawings or specifications.

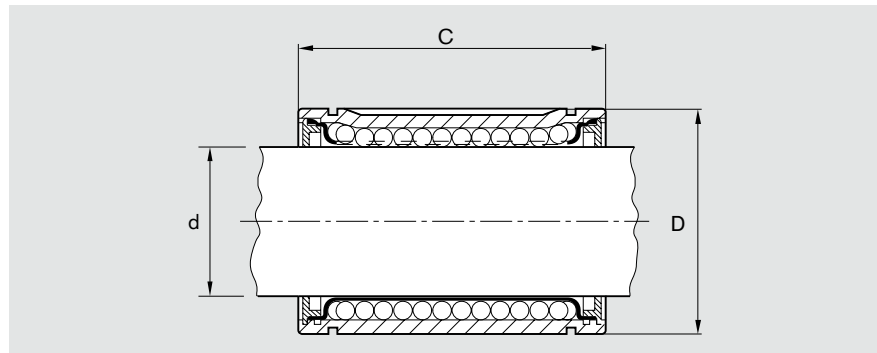


Steel Shafts with ready-mounted shaft support rails, shaft support rails and shaft support blocks in various versions complete the Linear Bushings range.



Main dimensions

Comparison of the various types of Linear Bushings



Dimensions (mm)									
Shaft	eLINE, Compact Linear Bushings		Super Linear Bushings H and SH		Standard Linear Bushings		Segmental Linear Bushings		
$\varnothing d$	D	C	D	C	D	C	D	C	
3	-	-	-	-	7	10	-	-	-
4	-	-	-	-	8	12	-	-	-
5	-	-	-	-	12	22	-	-	-
8	15	24	-	-	16	25	-	-	-
10	17	26	19	29	19	29	-	-	-
12	19	28	22	32	22	32	20	24	-
14	21	28	-	-	-	-	-	-	-
16	24	30	26	36	26	36	25	28	-
20	28	30	32	45	32	45	30	30	-
25	35	40	40	58	40	58	37	37	-
30	40	50	47	68	47	68	44	44	-
40	52	60	62	80	62	80	56	56	-
50	62	70	75	100	75	100	-	-	-
60	-	-	-	-	90	125	-	-	-
80	-	-	-	-	120	165	-	-	-

DIN ISO 10285 Linear ball bearings, metric series

This standard contains the main dimensions, tolerances and definitions for linear ball bearings. It subdivides linear ball bearings into dimension series and tolerance classes.

DIN ISO 13012 Linear ball bearings, accessories

This standard specifies the main dimensions and other functional dimensions of accessories for linear ball bearings, metric series.

These accessories are bearing housings, shafts, shaft support blocks and shaft support rails.

The standard is applied in association with ISO 10285.

Load capacities

Definition per ISO 14728

Dynamic load capacity C

The radial loading of constant magnitude and direction which a linear rolling bearing can theoretically endure for a nominal life of 10^5 meters distance traveled.

Note: The value for dynamic load capacity assumes that the stroke of the linear bushing is at least three times its overall length.

In some cases, the dynamic load capacities in the tables may exceed the ISO values by up to 30%. These values have been confirmed in tests.

Static load capacity C_0

Static radial load that corresponds to a calculated load at the center of the contact point with the greatest load between the rolling element and track zone (shaft) of 5300 MPa.

Note: The permanent overall deformation of the rolling element and the track zone is approximately 0.0001 times the rolling element diameter.

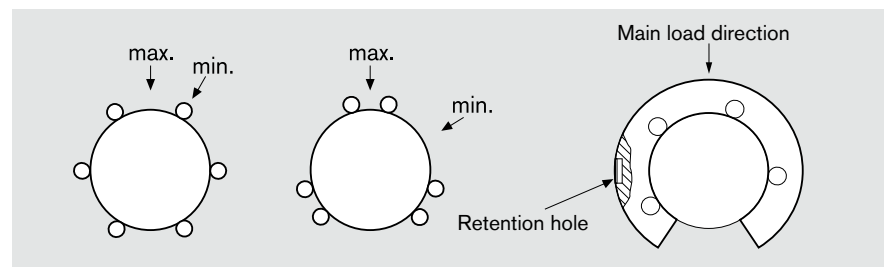
Nominal life

The calculated service life which an individual linear rolling bearing, or a group of apparently identical rolling element bearings operating under the same conditions, can attain with a 90% probability, with contemporary, commonly used materials and manufacturing quality under conventional operating conditions.

Direction of loading

If the load direction and orientation of the linear bushings is not clearly defined, calculations must be based on the minimum load capacity ratings. The maximum load capacity may only be used when the bushings are oriented in the load direction. For **closed-type** and adjustable Linear Bushings, the minimum and/or maximum load capacities are listed in the tables according to type.

Open-type linear bushings always require retention. In this case, the stated load capacity applies to the main direction of loading acting perpendicular to the opening.



Life Expectancy Calculation

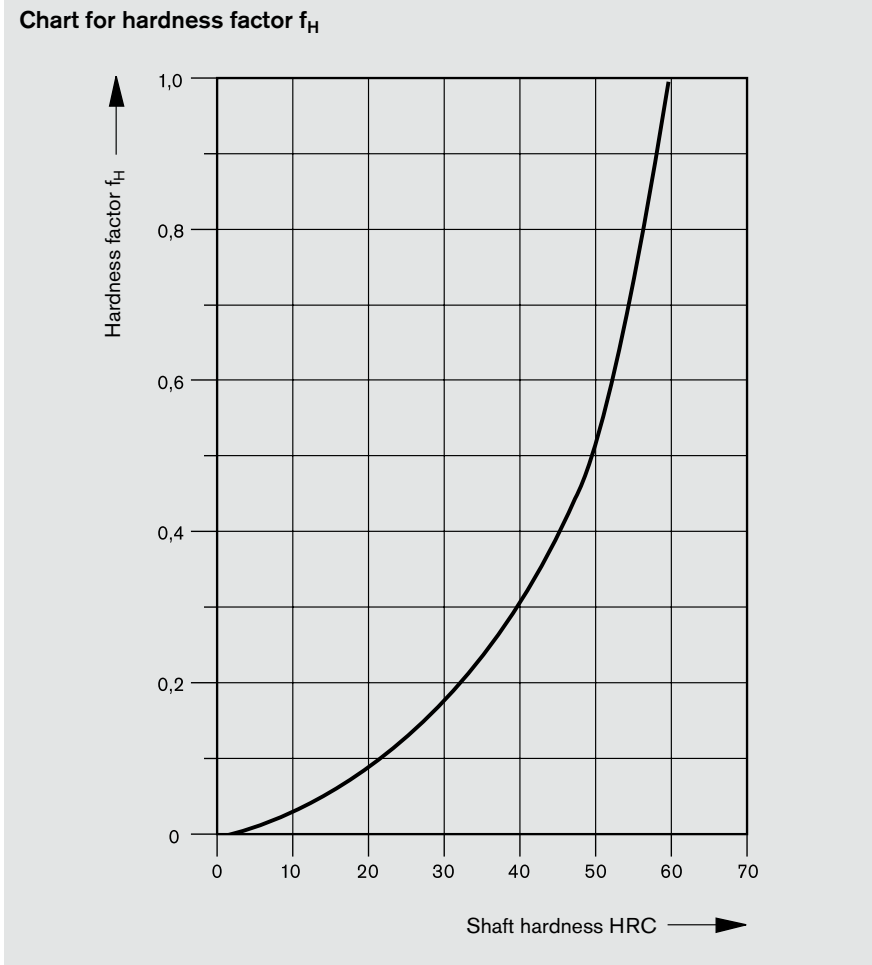
Nominal life

$$L = \left(\frac{C}{F_m} \cdot f_H \cdot f_t \cdot f_s \right)^3 \cdot 10^5$$

$$L_h = \frac{L}{2 \cdot s \cdot n_s \cdot 60}$$

- L = nominal life (m)
- L_h = nominal life (h)
- C = dynamic load capacity (N)
- F_m = equivalent dynamic load (N)
- f_H = shaft hardness factor -
- f_t = temperature factor -
- f_s = short stroke factor (for Segmental, Compact, eLINE and Super Linear Bushings only) -
- s = length of stroke (m)
- n_s = stroke repetition rate (full cycles) (min⁻¹)

Shaft hardness factor



Temperature factor

Bushing temperature (°C)	100	125	150	175	200
Temperature factor f _t	1	0.92	0.85	0.77	0.70

Short stroke factor

For eLINE, Compact, Super and Segmental Linear Bushings, a short stroke is defined as a stroke length of less than three times the length of the linear bushing. In short-stroke applications, the life of the shaft is shorter than that of the Linear Bushing. For further information, please refer to the technical data given for the individual linear bushing types. For applications with a stroke that is longer than three times the linear bushing length, the short stroke factor is f_s = 1.

Equivalent dynamic load on bearing

If the load acts from several directions, the overall resultant load must be calculated. Any preloads and tilting moments must be also be considered in the nominal life calculation.

If the bushings are subjected to variable loads but constant direction of load, the equivalent dynamic load F_m is calculated as follows:

$$F_m = \sqrt[3]{|F_1|^3 \cdot \frac{q_{s1}}{100\%} + |F_2|^3 \cdot \frac{q_{s2}}{100\%} + \dots + |F_n|^3 \cdot \frac{q_{sn}}{100\%}}$$

- F_m = equivalent dynamic load on the bearing (N)
- $F_1, F_2 \dots F_n$ = discrete dynamic load steps in phases 1 ... n (N)
- $q_{s1}, q_{s2} \dots q_{sn}$ = discrete travel steps for $F_1 \dots F_n$ (%)
- n = number of phases (-)

Load capacity calculation

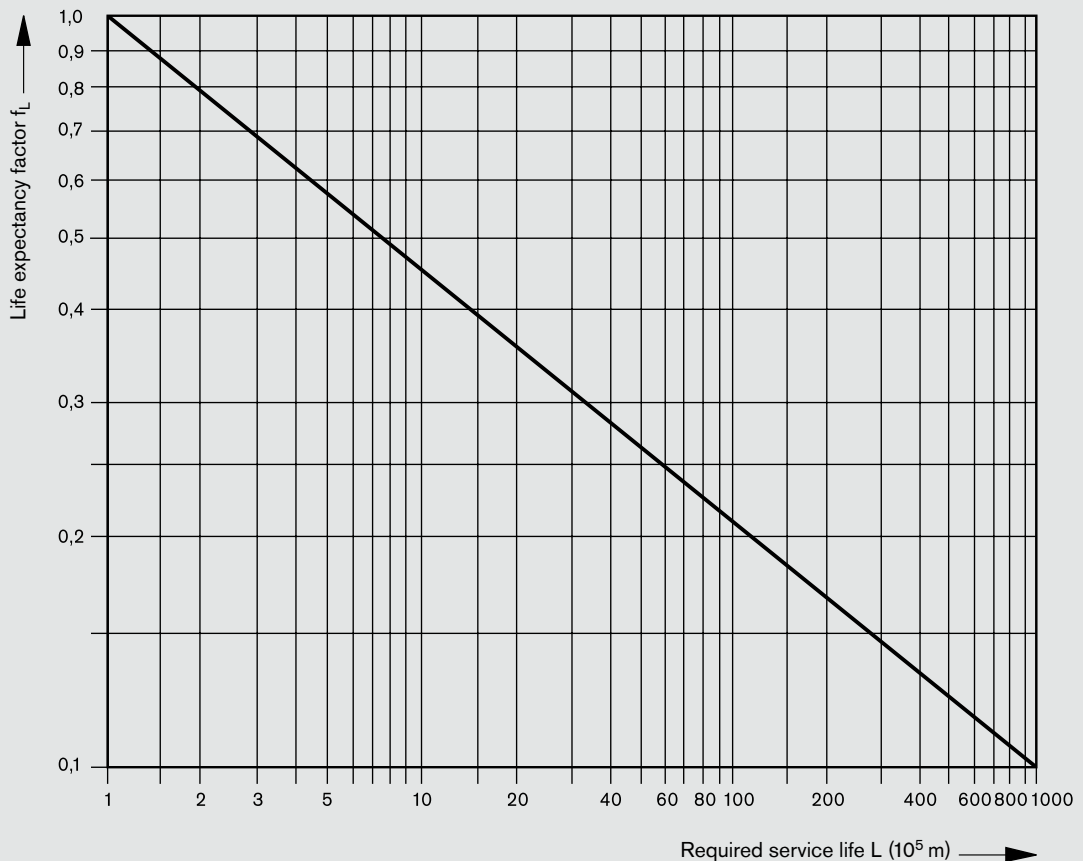
The following formula can be used in rough design calculations:

$$C_{req} = \frac{F_m}{f_H \cdot f_t \cdot f_s \cdot f_L}$$

- C_{req} = required dynamic load capacity (N)
- F_m = equivalent dynamic load on the bearing (N)
- f_H = shaft hardness factor (-)
- f_t = temperature factor (-)
- f_s = short stroke factor (for Segmental, Compact, eLINE and Super Linear Bushings only) (-)
- f_L = life expectancy factor (-)

Effect of the required life

Chart for the life expectancy factor f_L



Life Expectancy Calculation

Load capacities

Dimensions (mm) Shaft	Load capacities (N)							
	eLINE, Compact Linear Bushings		Super Linear Bushings <small>SA, SB</small>		Standard Linear Bushings		Segmental Linear Bushings	
Ø d	C	C ₀	C	C ₀	C	C ₀	C	C ₀
3	-	-	-	-	55	45	-	-
4	-	-	-	-	70	60	-	-
5	-	-	-	-	180	140	-	-
8	500	350	-	-	320	240	-	-
10	600	410	600	330	300	260	-	-
12	730	420	830	420	420	280	480	420
14	760	430	-	-	-	-	-	-
16	950	500	1020	530	580	440	720	620
20	1120	610	2020	1050	1170	860	1020	870
25	2330	1310	3950	2180	2080	1560	1630	1360
30	3060	1880	4800	2790	2820	2230	2390	1960
40	5040	3140	8240	4350	5170	3810	3870	3270
50	5680	3610	12060	6470	8260	6470	-	-
60	-	-	-	-	11500	9160	-	-
80	-	-	-	-	21000	16300	-	-

Note on dynamic load capacities

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Static load safety factor

The static load safety factor S_0 is required in order to avoid any inadmissible permanent deformations of the running tracks and rolling elements. It is the ratio of the static load capacity C_0 to the maximum load occurring, F_{0max} . Calculations must always be based on the highest occurring amplitude, even if this is only of very short duration.

$$S_0 = \frac{C_0}{F_{0max}}$$

S_0 = static load safety factor (-)
 C_0 = static load capacity (N)
 F_{0max} = maximum static load on bearing (N)

Recommendations for the static load safety factor under different conditions of use

Conditions of use	S_0
Normal conditions of use	1 ... 2
Low impact loads and vibrations	2 ... 4
Moderate impact loads and vibrations	3 ... 5
Heavy impact loads and vibrations	4 ... 6
Unknown load parameters	6 ... 15

Calculation example

The load on a carriage acting perpendicular to the twin shafts is 800 N. It is assumed that the load is distributed evenly over the four Linear Bushings. The carriage travels back and forth over a stroke of $s = 0.2$ m with a frequency of $n_s = 30$ full cycles per minute. The minimum required service life is $L_h = 8000$ hours. The operating temperature lies between 0 °C and 80 °C. Precision Steel Shafts with a minimum hardness of HRC 60 and eLINE Linear Bushings are to be used. The conditions of use are assumed to be low impact loads and vibrations.

Determination of the Linear Bushing size

Since the load is distributed evenly among the four Linear Bushings, the same load value can be applied for each Linear Bushing.

$$F_m = \frac{800 \text{ N}}{4} = 200 \text{ N}$$

F_m = equivalent dynamic load on the bearing (per Linear Bushing) (N)

The nominal life L as total travel in meters is calculated as follows:

$$L = 2 \cdot s \cdot n_s \cdot 60 \cdot L_h$$

$$L = 2 \cdot 0,2 \cdot 30 \cdot 60 \cdot 8000$$

$$L = 57,6 \cdot 10^5 \text{ m}$$

L = nominal life (m)

L_h = nominal life (h)

s = length of stroke (m)

n_s = stroke repetition rate (min)

The life expectancy factor f_L associated with the calculated service life of $57,6 \cdot 10^5$ m can be read off from the "Life expectancy factor" chart as $f_L = 0,25$.

For a shaft hardness of 60 HRC, the reading from the chart for Shaft hardness factor f_H gives a value of $f_H = 1$.

The temperature factor (as given in the table) is $f_t = 1$.

Since this is not a short-stroke application, the short stroke is $f_s = 1$.

The resulting required load capacity C_{req} is as follows:

$$C_{req} = \frac{F_m}{f_H \cdot f_t \cdot f_s \cdot f_L}$$

$$C_{req} = \frac{200}{1 \cdot 1 \cdot 1 \cdot 0,25}$$

$$C_{req} = 800 \text{ N}$$

C_{req} = required dynamic load capacity (N)

F_m = equivalent dynamic load on the bearing (N)

The Linear Bushing with the next highest load capacity would be, for example, R0658 252 44.

Because the orientation of the Linear Bushings relative to the load direction is not clearly defined, the calculation must be based on the minimum load capacities. In this case, these are:

Dynamic load capacity $C_{min} = 950$ N.

Static load capacity $C_{0min} = 500$ N.

Life Expectancy Calculation

Calculation of the nominal life

The nominal life in meters of the selected Linear Bushing R0658 252 44 can now be calculated by introducing the following values into the formula:

$$L = \left(\frac{C}{F_m \cdot f_H \cdot f_t \cdot f_s} \right)^3 \cdot 10^5$$

$$L = \left(\frac{950}{200 \cdot 1 \cdot 1 \cdot 1} \right)^3 \cdot 10^5$$

L = nominal life (m)

Dynamic load capacity	C	=	950 N
Equivalent dynamic load on bearing	F _m	=	200 N
Hardness factor	f _H	=	1
Temperature factor	f _t	=	1
Short stroke factor	f _s	=	1

$$L = \left(\frac{950}{200} \cdot 1 \cdot 1 \cdot 1 \right)^3 \cdot 10^5$$

$$L = 107 \cdot 10^5 \text{ m}$$

L = nominal life (m)

The service life in operating hours can be calculated from the travel life in meters by using the following formula:

$$L_h = \frac{L}{2 \cdot s \cdot n_s \cdot 60}$$

$$L_h = \frac{107 \cdot 10^5}{2 \cdot 0,2 \cdot 30 \cdot 60}$$

$$L_h = 14861 \text{ h}$$

L_h = nominal life (h)
s = length of stroke (m)
n_s = stroke repetition rate (min)

The required minimum service life of 8000 hours is therefore met.

Calculation of the static load safety factor

The static load safety factor can now be calculated for the selected Linear Bushing R0658 252 44 with the help of the formula:

$$S_0 = \frac{C_0}{F_{0\max}}$$

$$S_0 = \frac{500}{200} = 2,5$$

S₀ = static load safety factor (-)
C₀ = static load capacity (N)
F_{0max} = maximum static load on bearing (N)

Static load capacity	C ₀	=	500 N
Maximum static load on bearing	F _{0max}	=	200 N

$$S_0 = \frac{500}{200} = 2,5$$

S₀ = static load safety factor (-)

The conditions of use defined for this calculation example call for a static load safety factor S₀ = 2 ... 4, which is fulfilled by the result of the calculation.

Tolerance Tables

Tolerances for inside dimensions

Rated dimension (mm)	Tolerances (μm) = 0.001 mm															
	G7	H5	H6	H7	H8	H11	H12	H13	JS6	JS7	JS14	K6	K7	M6	M7	P9
> 3	+16	+5	+8	+12	+18	+75	+120	+180	+4	+6	+150	+2	+3	-1	0	-12
≤ 6	+4	0	0	0	0	0	0	0	-4	-6	-150	-6	-9	-9	-12	-42
> 6	+20	+6	+9	+15	+22	+90	+150	+220	+4.5	+7.5	+180	+2	+5	-3	0	-15
≤ 10	+5	0	0	0	0	0	0	0	-4.5	-7.5	-180	-7	-10	-12	-15	-51
> 10	+24	+8	+11	+18	+27	+110	+180	+270	+5.5	+9	+215	+2	+6	-4	0	-18
≤ 18	+6	0	0	0	0	0	0	0	-5.5	-9	-215	-9	-12	-15	-18	-61
> 18	+28	+9	+13	+21	+33	+130	+210	+330	+6.5	+10.5	+260	+2	+6	-4	0	-22
≤ 30	+7	0	0	0	0	0	0	0	-6.5	-10.5	-260	-11	-15	-17	-21	-74
> 30	+34	+11	+16	+25	+39	+160	+250	+390	+8	+12.5	+310	+3	+7	-4	0	-26
≤ 50	+9	0	0	0	0	0	0	0	-8	-12.5	-310	-13	-18	-20	-25	-88
> 50	+40	+13	+19	+30	+46	+190	+300	+460	+9.5	+15	+370	+4	+9	-5	0	-32
≤ 80	+10	0	0	0	0	0	0	0	-9.5	-15	-370	-15	-21	-24	-30	-106
> 80	+47	+15	+22	+35	+54	+220	+350	+540	+11	+17.5	+435	+4	+10	-6	0	-37
≤ 120	+12	0	0	0	0	0	0	0	-11	-17.5	-435	-18	-25	-28	-35	-124
> 120	+54	+18	+25	+40	+63	+250	+400	+630	+12.5	+20	+500	+4	+12	-8	0	-43
≤ 180	+14	0	0	0	0	0	0	0	-12.5	-20	-500	-21	-28	-33	-40	-143
> 180	+61	+20	+29	+46	+72	+290	+460	+720	+14.5	+23	+575	+5	+13	-8	0	-50
≤ 250	+15	0	0	0	0	0	0	0	-14.5	-23	-575	-24	-33	-37	-46	-165

Tolerances for outside dimensions

Rated dimension (mm)	Tolerances (μm) = 0.001 mm															
	g7	h5	h6	h7	h8	h11	h12	h13	js6	js7	js14	k6	k7	m6	m7	p9
> 3	-4	0	0	0	0	0	0	0	+4	+6	+150	+9	+13	+12	+16	+42
≤ 6	-16	-5	-8	-12	-18	-75	-120	-180	-4	-6	-150	+1	+1	+4	+4	+12
> 6	-5	0	0	0	0	0	0	0	+4.5	+7.5	+180	+10	+16	+15	+21	+51
≤ 10	-20	-6	-9	-15	-22	-90	-150	-220	-4.5	-7.5	-180	+1	+1	+6	+6	+15
> 10	-6	0	0	0	0	0	0	0	+5.5	+9	+215	+12	+19	+18	+25	+61
≤ 18	-24	-8	-11	-18	-27	-110	-180	-270	-5.5	-9	-215	+1	+1	+7	+7	+18
> 18	-7	0	0	0	0	0	0	0	+6.5	+10.5	+260	+15	+23	+21	+29	-
≤ 30	-28	-9	-13	-21	-33	-130	-210	-330	-6.5	-10.5	-260	+2	+2	+8	+8	-
> 30	-9	0	0	0	0	0	0	0	+8	+12.5	+310	+18	+27	+25	+34	-
≤ 50	-34	-11	-16	-25	-39	-160	-250	-390	-8	-12.5	-310	+2	+2	+9	+9	-
> 50	-10	0	0	0	0	0	0	0	+9.5	+15	+370	+21	+32	+30	+41	-
≤ 80	-40	-13	-19	-30	-46	-190	-300	-460	-9.5	-15	-370	+2	+2	+11	+11	-
> 80	-12	0	0	0	0	0	0	0	+11	+17.5	+435	+25	+38	+35	+48	-
≤ 120	-47	-15	-22	-35	-54	-220	-350	-540	-11	-17.5	-435	+3	+3	+13	+13	-
> 120	-14	0	0	0	0	0	0	0	+12.5	+20	+500	+28	+43	+40	+55	-
≤ 180	-54	-18	-25	-40	-63	-250	-400	-630	-12.5	-20	-500	+3	+3	+15	+15	-
> 180	-15	0	0	0	0	0	0	0	+14.5	+23	+575	+33	+50	+46	+63	-
≤ 250	-61	-20	-29	-46	-72	-290	-460	-720	-14.5	-23	-575	+4	+4	+17	+17	-

eLINE, Compact Linear Bushings

Product Overview

Advantages

- Very attractively priced linear bushing for general requirements
- Small outside dimensions for especially compact constructions
- Integrated metal holding rings with approx. 0.1 mm oversize on the outer diameter (shaft diameter 12 to 50) for secure seating in the housing bore
- Easy installation:
Simply press in – no additional retention necessary
- High load capacities and long service life due to hardened segmental steel plates with ball conformity in the running track
- High travel speed (5 m/s)
- Many pockets acting as lubricant reservoirs for extended lubrication intervals or lubrication for life
- Pockets also whisk away any dirt that may have worked its way in and so prevent jamming of the linear bushing
- With integrated wiper seals, external seals, or without seals
- Corrosion resistant versions available for medical, chemical and food industry applications
- Linear Sets with aluminum housing
- Lubed for life (eLINE)



Shaft diameter 8 and 10



Shaft diameter 12 to 50

eLINE, Compact Linear Bushings

Technical Data, Mounting Instructions

Please also refer to the general technical principles and the lubricating and mounting instructions.

Sealing

The sealed version contains integrated wiper seals.
Separate external seals are also available (no retention necessary).

Friction

The friction coefficient μ of unsealed Linear Bushings using oil as a lubricant lies between 0.001 and 0.004.

The friction is lowest under high load. It may, however, be greater than the stated value when only a slight load is applied.

For the Linear Bushings fitted with integrated wiper seals at both ends and not subject to radial loading, the frictional drag (see table below) depends on the speed and the type of lubrication.

Shaft \varnothing d (mm)	Breakaway force ¹⁾ (N) approx.	Frictional drag ¹⁾ (N) approx.
8	0.8	0.4
10	1	0.5
12	1.5	0.8
14	1.8	0.9
16	2	1
20	3	1.5
25	4.5	2
30	6	2.5
40	8	3
50	10	4

1) For separate seals, the values must be multiplied by a factor of 1.5.

Travel speed

$$v_{\max} = 5 \text{ m/s}$$

Acceleration

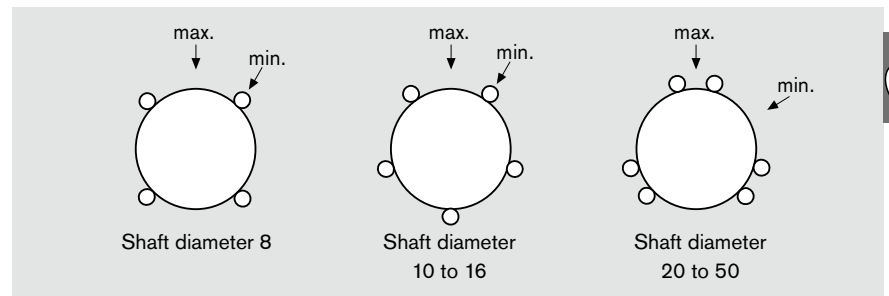
$$a_{\max} = 150 \text{ m/s}^2$$

Operating temperature

$$-10 \text{ }^{\circ}\text{C to } 80 \text{ }^{\circ}\text{C}$$

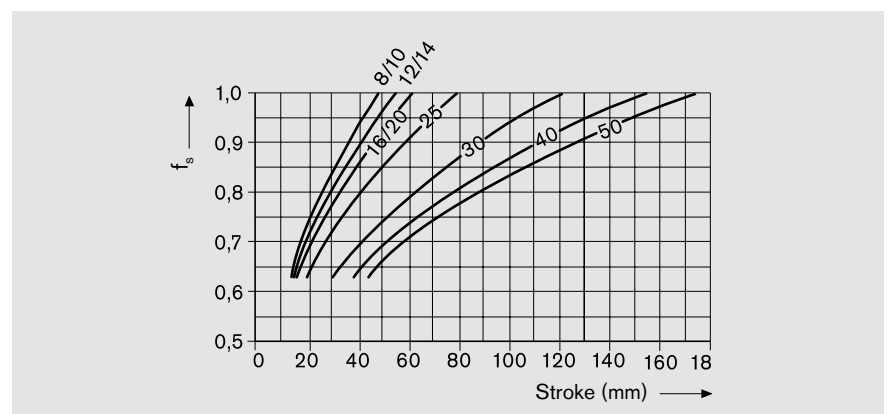
Direction of loading and its influence on the load capacity

The load capacities should be selected as appropriate for installation in the “min” or “max” position, and all calculations should then be based on the selected values. In applications where the load direction is exactly known and where the Linear Bushings can be mounted in the “max” position, the load capacity ratings C_{\max} (dynamic load capacity) and $C_{0\max}$ (static load capacity) can be used. If aligned installation is not possible or if the direction of loading is not defined, the minimum load capacities will apply.



Reduced load capacity in short-stroke applications

In short-stroke applications, the life of the shaft is shorter than that of the Linear Bushing. In such cases, the load capacities C given in the table must be multiplied by the factor f_s .



Mounting

The Linear Bushings can be pressed in using a special tool (see “Mounting Instructions”).

If a Linear Bushing is slightly skewed on entering the housing bore, it will align itself as it is inserted further.

Removal and re-alignment are unnecessary.

Retention

Shaft diameter 8 and 10: The plastic outer sleeve is oversized.

For applications subject to vibration or with higher acceleration rates, additional retention will be necessary.

Shaft diameter 12 to 50: The metal holding rings have an oversized outer diameter. No additional retention needed (bore length $\geq C$).

eLINE, Compact Linear Bushings

eLINE, Compact Linear Bushings, R0658**Structural design, eLINE Linear Bushings**

- POM ball retainer
- Integrated wiper seals
- Balls made of anti-friction bearing steel
- Hardened steel segments
- Metal retaining rings (shaft diameter 12 and above)

Structural design, Compact Linear Bushings

- With reduced radial clearance for applications requiring low-clearance bearings with a H7 bore
- Pre-lubricated with Dynalub 510
- Also available in corrosion-resistant version (per ISO 683-17/EN 10088)
- With normal radial clearance
- Non-lubricated
- With or without integrated wiper seals

Shaft diameter 8 and 10

Shaft Ø d (mm)	Part numbers without seals		Weight (kg)
	Compact Linear Bushing Normal	Compact Linear Bushing Corrosion-resistant	
8	R0658 008 00	R0658 008 30	0.011
10	R0658 010 00	R0658 010 30	0.014
12	R0658 012 00	R0658 012 30	0.016
14	R0658 014 00	R0658 014 30	0.018
16	R0658 016 00	R0658 016 30	0.025
20	R0658 020 00	R0658 020 30	0.028
25	R0658 025 00	R0658 025 30	0.058
30	R0658 030 00	R0658 030 30	0.080
40	R0658 040 00	R0658 040 30	0.140
50	R0658 050 00	R0658 050 30	0.170

Shaft diameter 12 to 50

Shaft Ø d (mm)	Part numbers with 2 integrated wiper seals				Weight (kg)
	eLINE Linear Bushing (reduced radial clearance, pre-lubricated)		Compact Linear Bushing ¹⁾ (normal radial clearance, non-lubricated)		
	Normal	Corrosion-resistant	Normal	Corrosion-resistant	
8	R0658 262 44	R0658 262 34	R0658 208 40	R0658 208 30	0.011
10	R0658 261 44	R0658 261 34	R0658 210 40	R0658 210 30	0.014
12	R0658 251 44	R0658 251 34	R0658 212 40	R0658 212 30	0.016
14	-	-	R0658 214 40	R0658 214 30	0.018
16	R0658 252 44	R0658 252 34	R0658 216 40	R0658 216 30	0.025
20	R0658 253 44	R0658 253 34	R0658 220 40	R0658 220 30	0.028
25	R0658 254 44	R0658 254 34	R0658 225 40	R0658 225 30	0.058
30	R0658 255 44	R0658 255 34	R0658 230 40	R0658 230 30	0.080
40	R0658 256 44	R0658 256 34	R0658 240 40	R0658 240 30	0.140
50	-	-	R0658 250 40	R0658 250 30	0.170

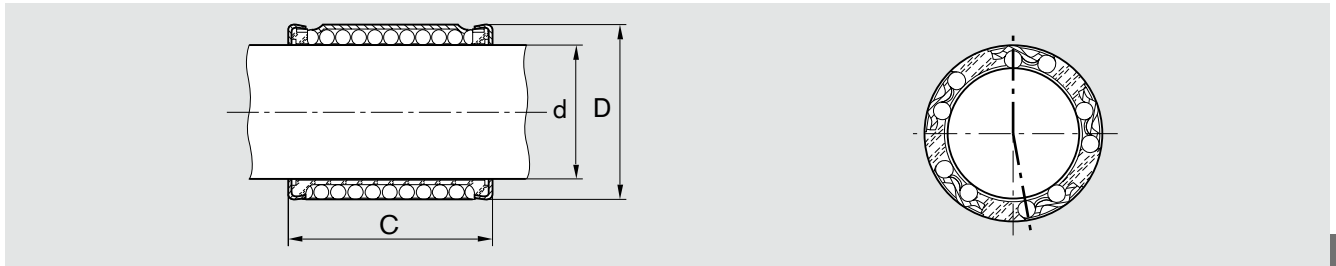
¹⁾ With one integrated wiper seal: R0658 1.. 40 or R0658 1.. 30.

Separate seals

Shaft Ø d (mm)	Part numbers Separate seals
12	R1331 812 10
16	R1331 816 10
20	R1331 820 10
25	R1331 825 10
30	R1331 830 10
40	R1331 840 10
50	R1331 850 10

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Dimensions

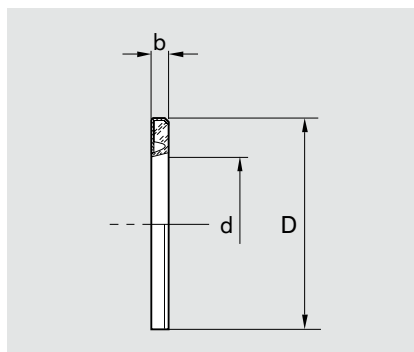


Dimensions (mm)			No. of ball circuits	Radial clearance (μm) Shaft/bore		Load capacities (N)				Corrosion-resistant			
$\varnothing d$	D	C ± 0.2		Shaft/bore		Normal C		C_0		C		C_0	
				eLINE h6/H7	Compact h6/H7	min.	max.	min.	max.	min.	max.	min.	max.
8	15	24	4	+5 -18	+25 +2	500	580	350	500	350	410	280	400
10	17	26	5	+5 -18	+25 +2	600	720	410	600	420	500	330	480
12	19	28	5	+8 -24	+32 0	730	870	420	620	510	610	340	500
14	21	28	5	-	+32 0	760	900	430	630	530	630	340	500
16	24	30	5	+8 -24	+32 0	950	1120	500	730	660	780	400	580
20	28	30	6	+9 -25	+33 -1	1120	1410	610	900	780	990	480	720
25	35	40	6	+12 -24	+36 0	2330	2930	1310	1950	1630	2050	1050	1560
30	40	50	6	+12 -24	+36 0	3060	3250	1880	2790	2140	2700	1510	2230
40	52	60	6	+18 -25	+42 -1	5040	6380	3140	4650	3520	4470	2510	3720
50	62	70	6	-	+42 -1	5680	7180	3610	5350	3970	5030	2890	4280

Separate seals

Structural design

- Metal case
- Elastomer seal



Dimensions (mm)

$\varnothing d$	D ¹⁾	b
12	19	3
16	24	3
20	28	4
25	35	4
30	40	4
40	52	5
50	62	5

- 1) The outside diameter D is oversized by approx. 0.1 mm. No additional retention is needed.

eLINE, Compact Linear Sets

eLINE Linear Sets, R1027 Closed type, normal or corrosion-resistant

Compact Linear Sets, R1028 Adjustable, normal

Structural design, eLINE Linear Sets R1027

- Precision housing in lightweight construction (aluminum)
- With eLINE Linear Bushing (shaft diameter 50 with Compact Linear Bushing)
- Integrated wiper seals
- Reduced radial clearance
- Pre-lubricated with Dynalub 510
- Also available in corrosion-resistant version (per ISO 683-17/EN 10088)

Structural design, Compact Linear Sets R1028

- With Compact Linear Bushing



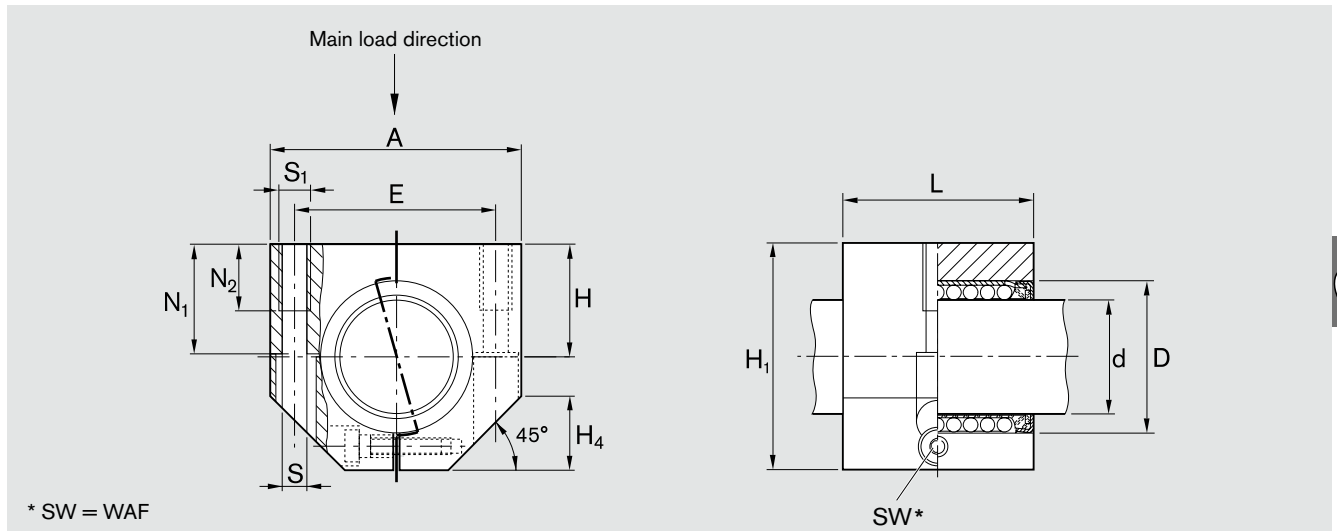
Shaft Ø d (mm)	Part numbers eLINE Linear Set		Weight (kg)
	Normal	Corrosion-resistant	
12	R1027 251 44	R1027 251 34	0.08
16	R1027 252 44	R1027 252 34	0.11
20	R1027 253 44	R1027 253 34	0.15
25	R1027 254 44	R1027 254 34	0.27
30	R1027 255 44	R1027 255 34	0.40
40	R1027 256 44	R1027 256 34	0.75
50	R1027 250 44 ¹⁾	R1027 250 34 ¹⁾	1.20

1) With Compact Linear Bushing (normal radial clearance)



Shaft Ø d (mm)	Part numbers Compact Linear Set		Weight (kg)
	Normal		
12	R1028 212 44		0.08
16	R1028 216 44		0.11
20	R1028 220 44		0.15
25	R1028 225 44		0.27
30	R1028 230 44		0.40
40	R1028 240 44		0.75
50	R1028 250 44		1.20

Dimensions



* SW = WAF

Dimensions (mm)

Ø d	D	H	H ₁	A	L	E ±0.15	S ¹⁾	S ₁	N ₁	N ₂	H ₄	WAF
12	19	17	33	40	28	29	4.3	M5	16	11	11	2.5
16	24	19	38	45	30	34	4.3	M5	18	11	13	2.5
20	28	23	45	53	30	40	5.3	M6	22	13	15	3
25	35	27	54	62	40	48	6.6	M8	26	18	17	4
30	40	30	60	67	50	53	6.6	M8	29	18	19	4
40	52	39	76	87	60	69	8.4	M10	38	22	24	5
50	62	47	92	103	70	82	10.5	M12	46	26	30	6

Ø d (mm)	Radial clearance (µm)		Tolerance for H ²⁾ (µm)		Load capacities ³⁾ (N)			
	R1027 Shaft	R1028	R1027	R1028	Normal		Corrosion-resistant	
	h6				C	C ₀	C	C ₀
12	+8 -24	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	+24 0	+12 -12	810	490	570	390
16	+8 -24		+24 0	+12 -12	1050	570	730	460
20	+9 -25		+25 0	+13 -12	1410	900	990	720
25	+12 -24		+25 0	+13 -12	2930	1950	2050	1560
30	+12 -24		+25 0	+13 -12	3850	2790	2700	2230
40	+18 -25		+26 0	+14 -12	6380	4650	4470	3720
50	+42 -1		+14 -12	+14 -12	7180	5350	5030	4280

- 1) Mounting screws ISO 4762-8.8.
- 2) Relative to Ø d.
- 3) The load capacities apply for the main direction of loading. If the load does not act in the main direction of loading, the load capacities must be multiplied by the following factors:

Ø d 12 and 16: f = 0.90, f₀ = 0.86

Ø d 20 to 50: f = 0.79, f₀ = 0.68

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

eLINE, Compact Linear Sets

**eLINE Linear Sets, R1029
Tandem
Closed type
Normal or corrosion-resistant**

Structural design

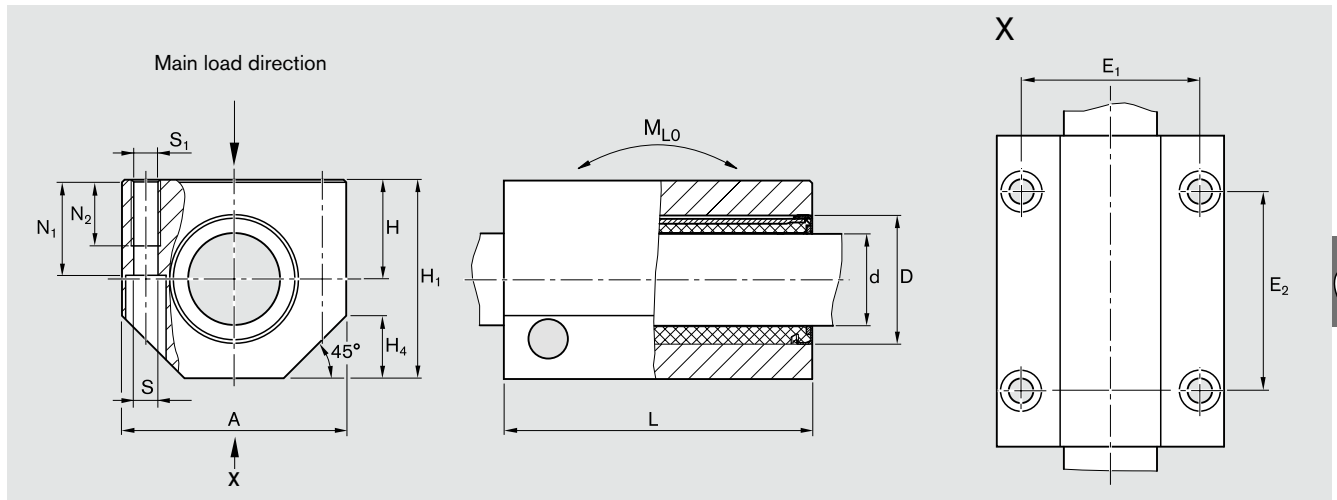
- Precision tandem housing in light-weight construction (aluminum)
 - With two eLINE Linear Bushings (shaft diameter 50 with Compact Linear Bushings)
 - Integrated wiper seals
 - Reduced radial clearance
- Pre-lubricated with Dynalub 510
 - Also available in corrosion-resistant version (per ISO 683-17/EN 10088)



Shaft Ø d (mm)	Part numbers		Weight (kg)
	Normal	Corrosion-resistant	
12	R1029 251 44	R1029 251 34	0.17
16	R1029 252 44	R1029 252 34	0.24
20	R1029 253 44	R1029 253 34	0.31
25	R1029 254 44	R1029 254 34	0.57
30	R1029 255 44	R1029 255 34	0.80
40	R1029 256 44	R1029 256 34	1.54
50	R1029 250 44 ¹⁾	R1029 250 34 ¹⁾	2.45

1) With Compact Linear Bushing (normal radial clearance)

Dimensions



Dimensions (mm)

$\varnothing d$	D	H	H ₁	A	L	E ₁ ±0.15	E ₂ ±0.15	S ¹⁾	S ₁	N ₁	N ₂	H ₄
12	19	17	33	40	60	29	35	4.3	M5	16	11	11
16	24	19	38	45	65	34	40	4.3	M5	18	11	13
20	28	23	45	53	65	40	45	5.3	M6	22	13	15
25	35	27	54	62	85	48	55	6.6	M8	26	18	17
30	40	30	60	67	105	53	70	6.6	M8	29	18	19
40	52	39	76	87	125	69	85	8.4	M10	38	22	24
50	62	47	92	103	145	82	100	10.5	M12	46	26	30



$\varnothing d$ (mm)	Radial clearance (μm) Shaft h6	Tolerance for H ²⁾ (μm)	Load capacities ³⁾ (N)				Tipping moment (Nm) stat. M _{Lo}
			Normal		Corrosion-resistant		
			C	C ₀	C	C ₀	
12	+8 -24	+24 0	1310	980	920	780	13
16	+8 -24	+24 0	1700	1140	1180	920	18
20	+9 -25	+25 0	2290	1800	1610	1440	21
25	+12 -24	+25 0	4760	3900	3330	3120	59
30	+12 -24	+25 0	6250	5580	4385	4460	103
40	+18 -25	+26 0	10360	9300	7260	7440	204
50	+42 -1	+14 -12	11660	10700	8170	8560	271

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

- 1) Mounting screws ISO 4762-8.8.
- 2) Relative to $\varnothing d$.
- 3) The load capacities apply for the main direction of loading. If the load does not act in the main direction of loading, the load capacities must be multiplied by the following factors:



$$\varnothing d \text{ 12 and 16: } f = 0.90, f_0 = 0.86$$

$$\varnothing d \text{ 20 to 50: } f = 0.79, f_0 = 0.68$$

Super Linear Bushings  and 

Product Overview

Advantages

- An economical linear bushing for demanding applications
- Steel load-bearing plates with ground ball tracks and optimal ball entry zone geometry for unbeatably smooth operation and long life
- Super Linear Bushings  are self-aligning and automatically compensate for shaft flex
- Super Linear Bushings  without self-alignment to transfer small tipping forces in the axial direction
- High travel speed (up to 5 m/s)
- Integrated wiper seals, external seals, or without seals
- Open-type Linear Bushings on fully supported shafts for applications where other linear guides might be susceptible to distortive stresses because of inaccuracies in supporting structures
- Optional side seals for open-type Linear Bushings
- Linear Sets with aluminum or cast-iron housing



Super  (closed type)





Super  (closed type)



Super 1 (open type)



Super 2 (open type)

Super Linear Bushings  and 

Technical Data

Please also refer to the general technical principles and the lubricating and mounting instructions.

Sealing

Super Linear Bushings are available with internal or with separate seals. The use of separate seals is advisable in applications involving a high degree of contamination. In very dirty environments, additional sealing may be necessary (e.g. bellows-type dust boots or telescoping sleeves).

Open-type Super Linear Bushings can also be supplied fully sealed (with side seal). It should be noted that the friction values for the fully sealed version will be higher.

Friction

The friction coefficient μ of unsealed Super Linear Bushings using oil as a lubricant lies between 0.001 and 0.0025. The friction coefficient is lowest under high load. It may, however, be greater than the stated value when only a slight load is applied.

For Super Linear Bushings fitted with integrated wiper seals at both ends and not subject to radial loading, the frictional drag (see table below) depends on the speed and the type of lubrication.

Shaft $\varnothing d$ (mm)	Closed and open types With integrated wiper seals		Open type Fully sealed	
	Breakaway force ¹⁾ (N) approx.	Frictional drag ¹⁾ (N) approx.	Breakaway force (N) approx.	Frictional drag (N) approx.
10	1	0.5	–	–
12	1.5	0.8	6	3
16	2	1	9	4
20	3	1.5	10	5
25	4.5	2	14	6
30	6	2.5	18	8
40	8	3	24	10
50	10	4	30	12

1) For separate seals, the values must be multiplied by a factor of 1.5.

Travel speed

$$v_{\max} = 3 \text{ m/s}$$

Travel speeds of up to 5 m/s are possible, though the service life will be restricted due to the increased wear on the plastic parts. Units have been known to travel 50 to $100 \cdot 10^5$ without failure under test conditions.

Acceleration

$$a_{\max} = 150 \text{ m/s}^2$$

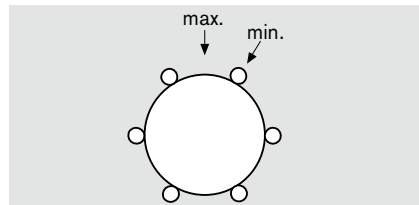
Operating temperature

–10 °C to 80 °C

Direction of load and its influence on the load capacity of closed Super Linear Bushings

The load capacities should be selected as appropriate for installation in the “min” or “max” position, and all calculations should then be based on the selected values. In applications where the load direction is exactly known and where the Super Linear Bushings can be mounted in the “max” position, the load capacity ratings C_{\max} (dynamic load capacity) and $C_{0 \max}$ (static load capacity) can be used.

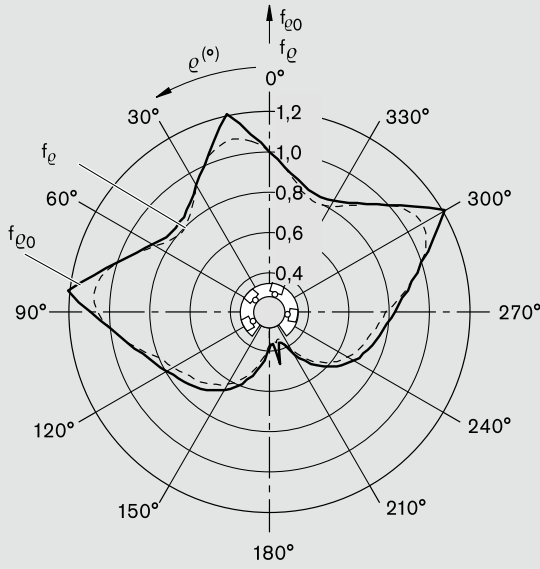
If aligned installation is not possible or if the direction of loading is not defined, the minimum load capacities will apply.



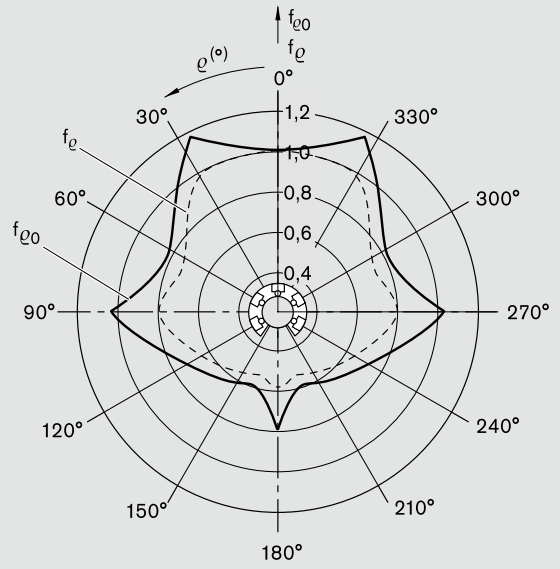
on the load capacity of open Super Linear Bushings

The load capacities C and C_0 apply only when the load is acting along the line $\varrho = 0^\circ$. If the load is acting in any other direction, these load capacities must be multiplied by the factor f_ϱ (dynamic load capacity C) or f_{ϱ_0} (static load capacity C_0). A reduction in load capacity can be eliminated by selective circumferential positioning of the Super Linear Bushing (see Linear Set with Side Opening).

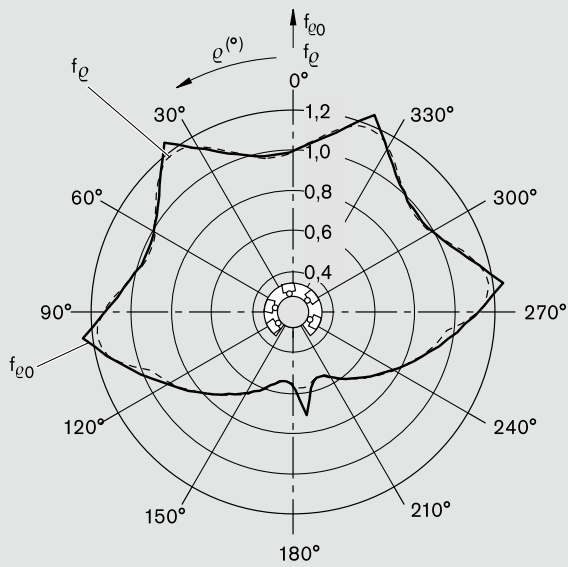
Load direction factors



Shaft diameter 12 and 16





Shaft diameter 20



Shaft diameter 25 to 50



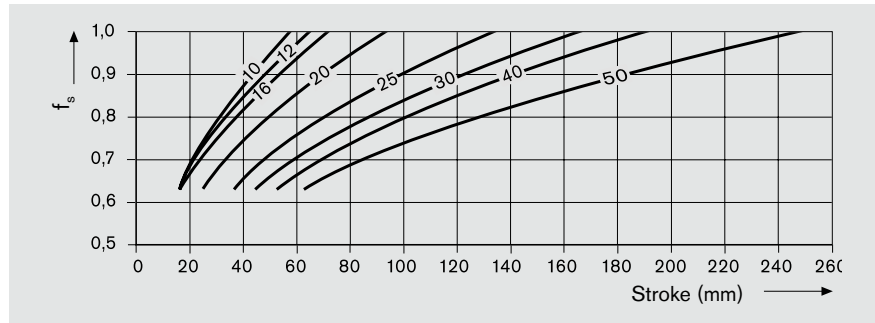
Super Linear Bushings  and 

Technical Data


Reduced load capacity in short-stroke applications

In short-stroke applications, the service life of the shafts is shorter than that of the Super Linear Bushings.

In such cases, the load capacities C given in the table must be multiplied by the factor f_s .

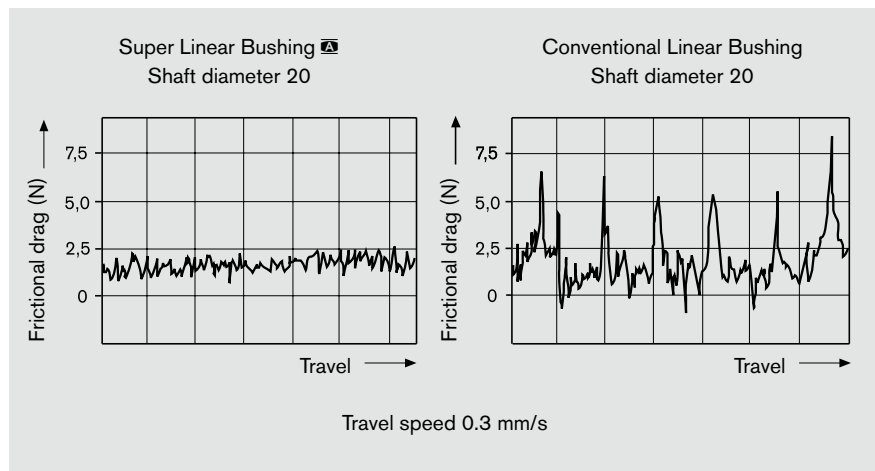
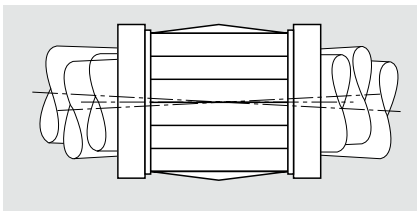


Reduced load capacity at high loads

If the load acting on Super Linear Bushing  is $F > 0.5 \times C$, there will be a reduction in the dynamic load capacity C .

Super Linear Bushing self-alignment feature

The self-alignment feature together with the ground finish of the ball tracks result in extremely smooth operation. The travel profile shows a comparison with a conventional linear bushing for a load of 800 N and an alignment error of about $8'$ (due to shaft deflection).



When this type is used, the self-alignment feature requires two Super Linear Bushings to be mounted on at least one of the two shafts of the assembly.

Operation under difficult conditions

For applications involving water-based coolants/lubricants, we recommend the use of the following linear bushing models:

- Standard Linear Bushings
 - In permanently humid or wet environments (water vapor, condensation), we recommend the use of the following corrosion-resistant linear bushing models with steel parts made from corrosion-resistant steel per ISO 683-17 / EN 10088:
- Segmental Linear Bushing
- eLINE Linear Bushing
- Compact Linear Bushing
- Standard Linear Bushing

Mounting Notes

Radial clearance

The radial clearance values given in the tables have been obtained by statistical methods and are representative of the clearances to be expected in actual practice.

Adjusting the radial clearance

The radial clearance is adjustable in all types of Super Linear Bushings. If an application calls for zero-clearance, the linear bushing's radial clearance must be reduced by means of an adjusting screw in the housing (see also Linear Sets) until a slight resistance is felt when the shaft is turned.

In applications subject to vibrations, the adjusting screw should be suitably secured against working loose once the desired clearance has been established.

Adjusting the preload

If negative clearance (preloading) is required, we recommend that zero-clearance should first be established using a dummy shaft whose diameter is smaller by the amount of the desired preload than the actual guide shaft on which the linear bushing is to run.



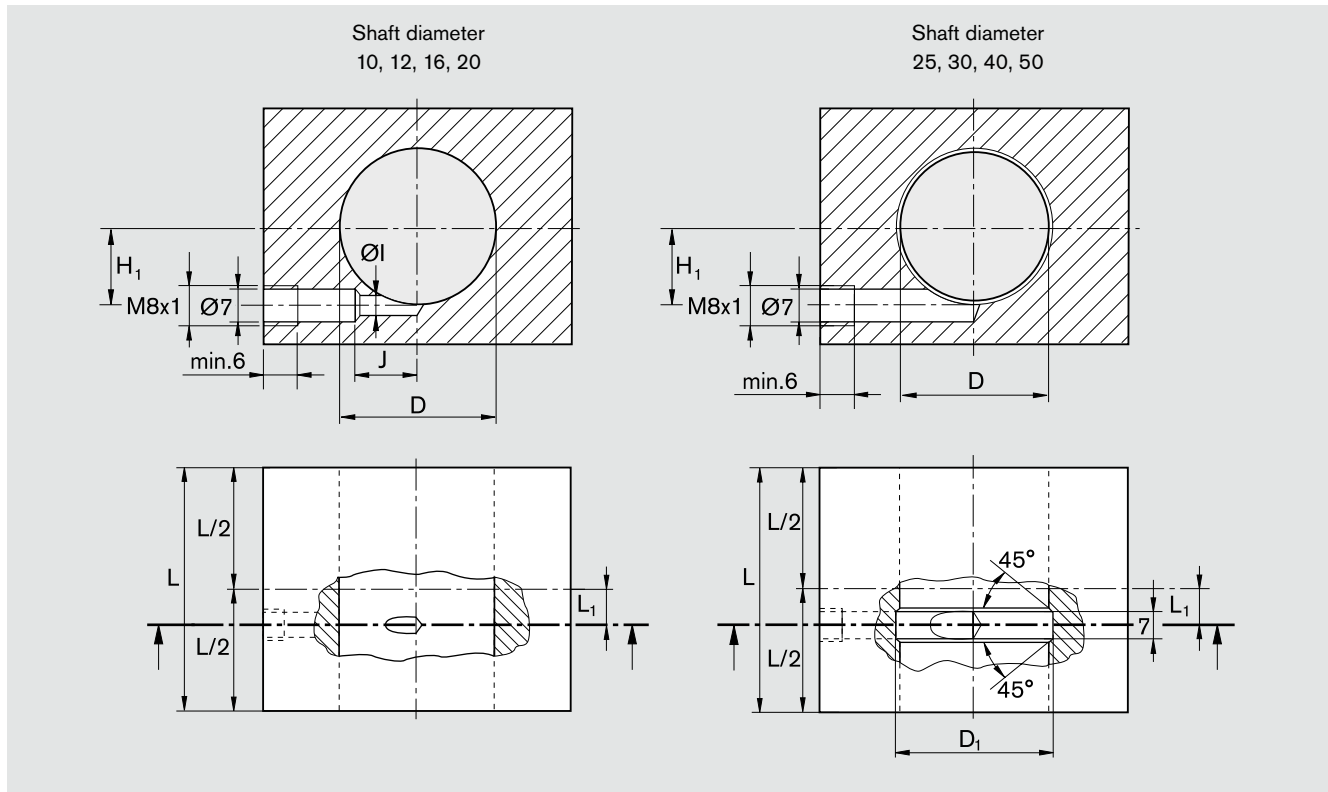
Super Linear Bushings **A** and **B**

Customer-Built Housings

Tolerance recommendations for housing bore D:

- H7 Clearance, for all normal applications
 - K7 Low clearance, for applications with alternating loads
 - M7 Slight preload, for applications with vibrations or high acceleration
- Please note the radial clearance (shaft/bore) values in the corresponding tables.

Lube groove und lube port for Super Linear Bushings **A**, **B**, closed type – with external seals

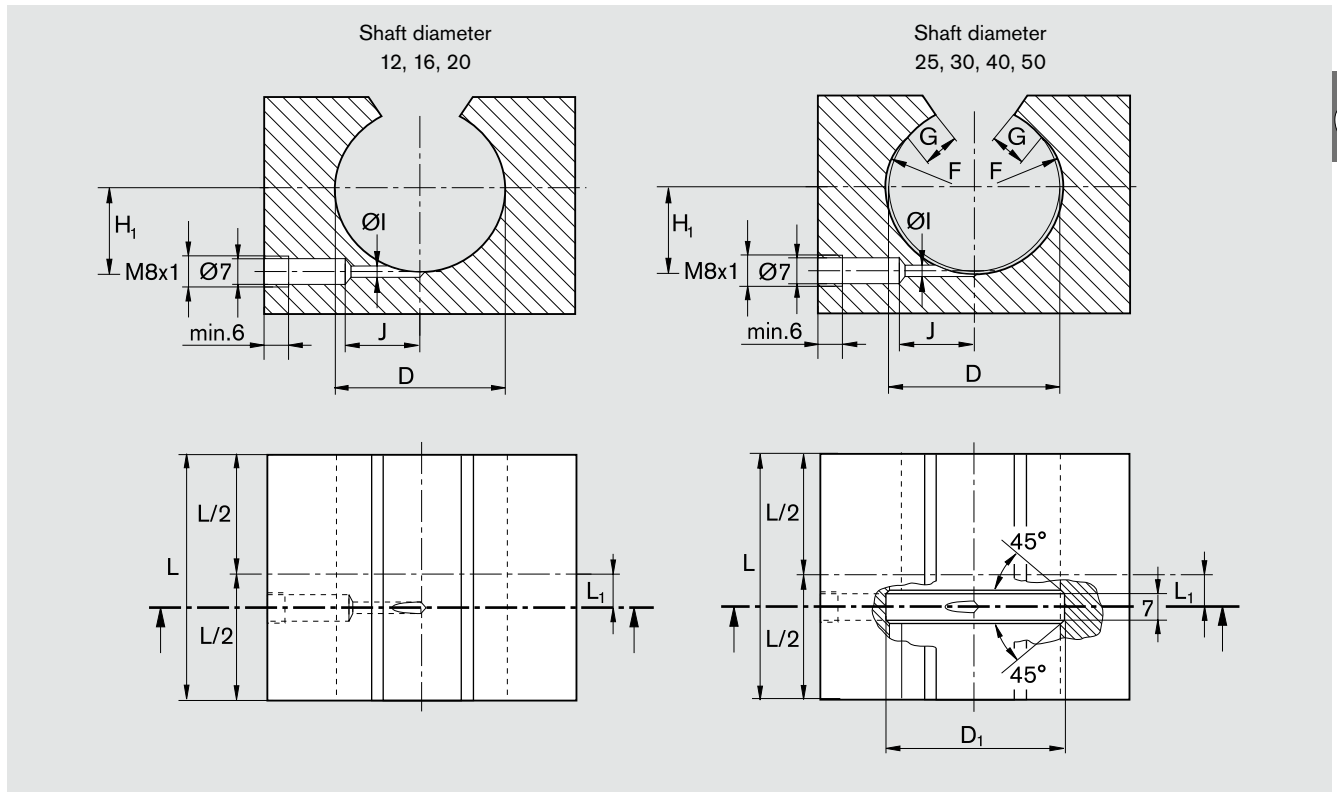


The lube channels shown in the illustration have been designed for grease lubricants.

Part numbers			Shaft Ø d (mm)	Lubricant quantities ¹⁾ (cm ³)		Dimensions (mm)						
Super Linear Bushings		Seals		Initial lubrication	Relubrication	L ₁	H ₁	L (min)	D	D ₁	ØI	J
R0670 010 00	R0672 010 00	R1331 610 00	10	1.3	0.4	7.5	6	36	19	-	3	11.5
R0670 012 00	R0672 012 00	R1331 612 00	12	1.6	0.5	9	8	39	22	-	5	13
R0670 016 00	R0672 016 00	R1331 616 00	16	1.6	0.5	10	12	43	26	-	5	18
R0670 020 00	R0672 020 00	R1331 620 00	20	3.5	1.1	13.5	15	54	32	-	2	15.5
R0670 025 00	R0672 025 00	R1331 625 00	25	5.5	1.7	18.5	20	67	40	42	-	-
R0670 030 00	R0672 030 00	R1331 630 00	30	8	2.4	23.5	23.5	79	47	49	-	-
R0670 040 00	R0672 040 00	R1331 640 00	40	14	4.2	27.5	31	91	62	66	-	-
R0670 050 00	R0672 050 00	R1331 650 00	50	24	7.2	34.5	37.5	113	75	79	-	-

1) Maximum fill volume for Rexroth Linear Bushings installed in a housing.
 The shown fill volumes for initial lubrication and relubrication apply to Linear Sets R1035 / R1036.
 For customer-built housings with different lube port dimensions, the fill volumes for initial lubrication will vary.

Lube groove und lube port for Super Linear Bushings **A, **B**, open type – with external seals**





The lube channels shown in the illustration have been designed for grease lubricants. Seals must be secured axially.

Part numbers			Shaft Ø d (mm)	Lubricant quantities ¹⁾ (cm ³)		Dimensions (mm)									
Super Linear Bushings		Seals		Initial lubrication	Relubrication	L ₁	H ₁	L(min)	D	D ₁	F	G	ØI	J	
A	B														
R0671 012 00	R0673 012 00	R1331 712 50	12	1.3	0.4	9	8	39	22	-	-	-	2	13	
R0671 016 00	R0673 016 00	R1331 716 50	16	1.3	0.4	10	12	43	26	-	-	-	2	14	
R0671 020 00	R0673 020 00	R1331 720 50	20	3.0	0.9	13.5	15	54	32	-	-	-	2	16	
R0671 025 00	R0673 025 00	R1331 725 50	25	5.0	1.5	18.5	20	67	40	42	R15	4	7	-	
R0671 030 00	R0673 030 00	R1331 730 50	30	7.0	2.1	23.5	23.5	79	47	49	R18	4.5	7	-	
R0671 040 00	R0673 040 00	R1331 740 50	40	13.0	3.9	27.5	31	91	62	66	R23	6	7	-	
R0671 050 00	R0673 050 00	R1331 750 50	50	22.0	6.6	34.5	37.5	113	75	79	R28	7	4	30	

1) Maximum fill volume for Rexroth Linear Bushings installed in a housing.

The shown fill volumes for initial lubrication and relubrication apply to Linear Sets R1037 / R1038.

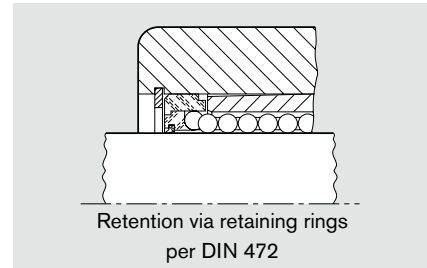
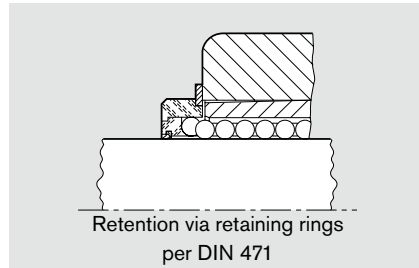
For customer-built housings with different lube port dimensions, the fill volumes for initial lubrication will vary.

Super Linear Bushings  and 

Customer-Built Housings – Retention

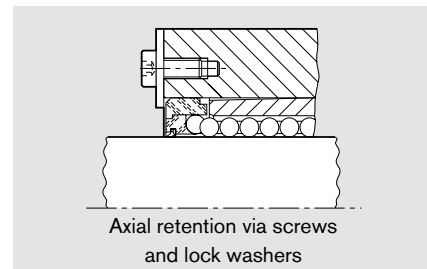
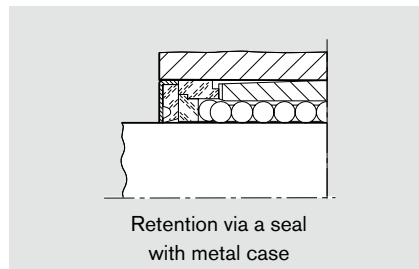
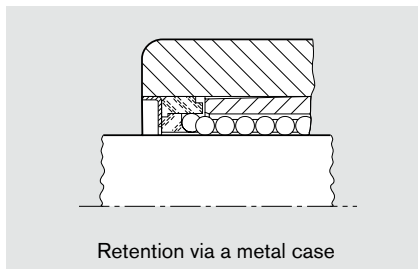
Super Linear Bushings Closed type

- Retaining rings
- Metal case
- Seal with metal case
- Special design



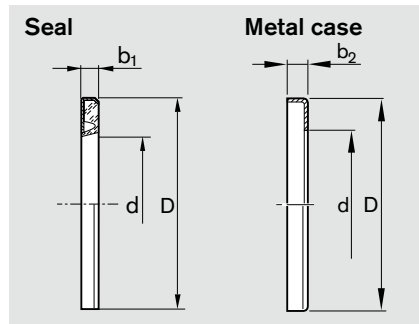
Shaft Ø d (mm)	Retaining rings DIN 471		Retaining rings DIN 472	
	Part numbers	Dimensions (mm)	Part numbers	Dimensions (mm)
10	R3410 763 00	19 x 1.2	R3410 221 00	19 x 1
12	R3410 714 00	22 x 1.2	R3410 209 00	22 x 1
16	R3410 715 00	27 x 1.2 ¹⁾	R3410 210 00	26 x 1.2
20	R3410 716 00	33 x 1.5 ¹⁾	R3410 211 00	32 x 1.2
25	R3410 717 00	42 x 1.75	R3410 212 00	40 x 1.75
30	R3410 718 00	48 x 1.75	R3410 213 00	47 x 1.75
40	R3410 719 00	62 x 2	R3410 214 00	62 x 2
50	R3410 720 00	75 x 2.5	R3410 215 00	75 x 2.5

1) Not per DIN 471.



Seal, closed type Structural design

- Metal case
- Elastomer seal



Shaft Ø d (mm)	Dimensions (mm)			Part numbers	
	D ²⁾	b_1 +0.3	b_2 +0.5	Seals	Metal cases
10	19	3	3	R1331 610 00	R0901 184 00
12	22	3	3	R1331 612 00	R0901 074 00
16	26	3	3	R1331 616 00	R0901 075 00
20	32	4	4	R1331 620 00	R0901 076 00
25	40	4	4	R1331 625 00	R0901 077 00
30	47	5	5	R1331 630 00	R0901 078 00
40	62	5	5	R1331 640 00	R0901 079 00
50	75	6	6	R1331 650 00	R0901 115 00

2) The outside diameter D is oversized by approx. 0.1 mm. No additional retention is needed.


Metal case, closed type Material: steel



Super Linear Bushings Open type

- Axial and rotary retention by means of grooved taper pins

Notes for mounting:

Open-type Super Linear Bushings are delivered with a ready-made locating pin hole. This hole is marked with a  from shaft diameter 25 upwards.

The grooved locating pin must be driven in to the depth shown in the illustrations, as applicable, at the time of mounting.

The outside diameter of the Super Linear Bushing must then be reduced until the bushing can be slipped past the pin.

When the linear bushing is aligned in the housing bore, the taper pin will engage in the retaining hole.

Size of the hole through housing for grooved locating pin:

Shaft diameter 12 to 40:

Ø 3.0 H11

(Grooved pin per ISO 8744-3x ...-St)

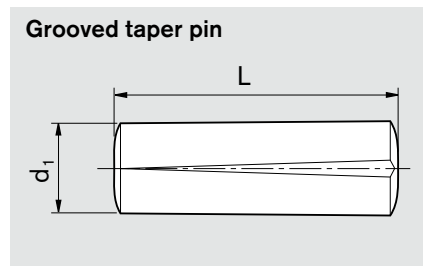
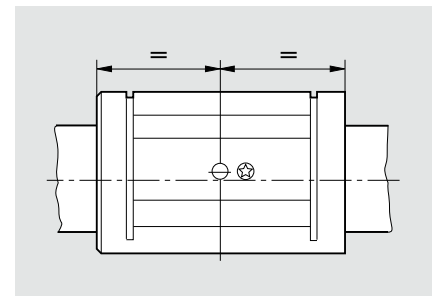
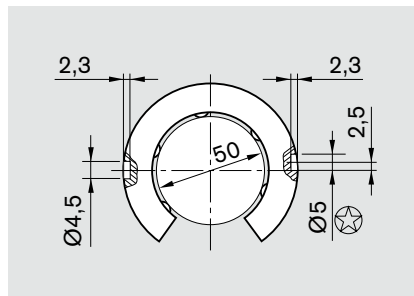
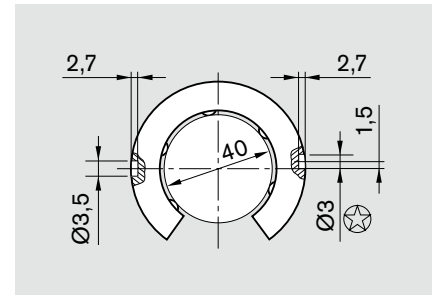
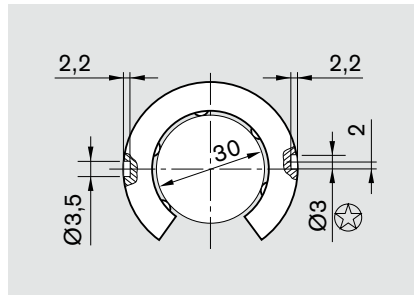
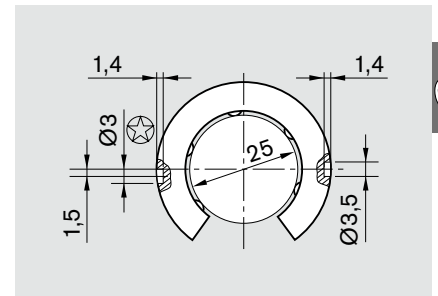
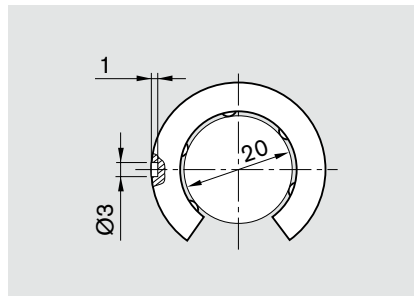
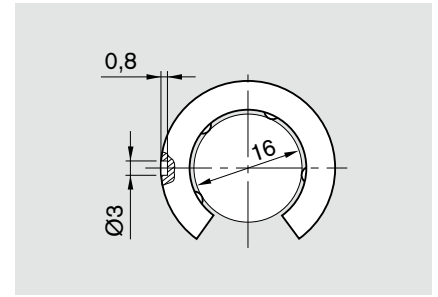
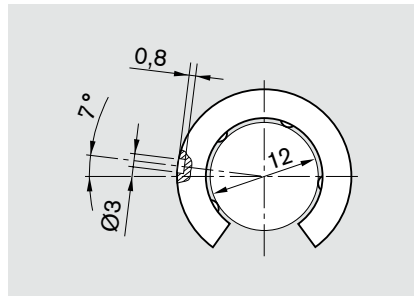
Shaft diameter 50:

Ø 5.0 H11



(Grooved pin per ISO 8744-5x ...-St)

Super Linear Bushings for shaft diameters 25 to 50 are provided with 2 locating pin holes.

The second locating pin hole (Ø 3.5 for shaft diameters 25, 30 and 40, and Ø 4.5 for shaft diameter 50) is provided as an alternative means for retention of the Linear Bushing.




Shaft Ø d (mm)	Dimensions (mm)		Mounting hole for grooved taper pin (mm)	Part numbers Grooved taper pin
	d ₁	L		
12 ... 40	3	8.2	Ø 3 H11	R3425 013 00
	3	10.2		R3425 014 00
	3	14.2		R3425 015 00
50	5	20.4	Ø 5 H11	R3425 016 00
	5	14		R3425 017 00

Super Linear Bushings  and 

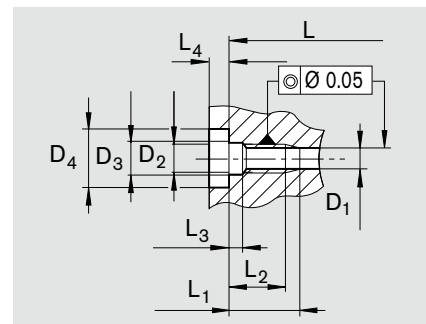
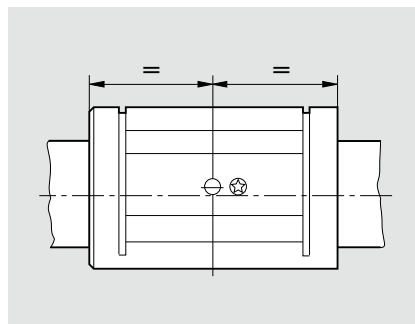
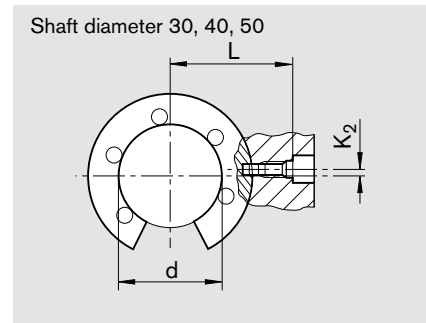
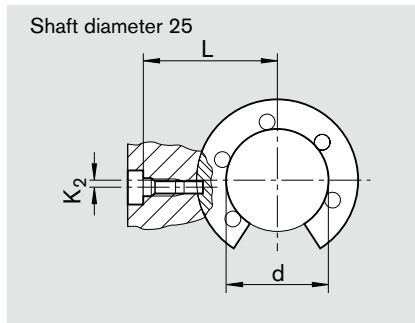
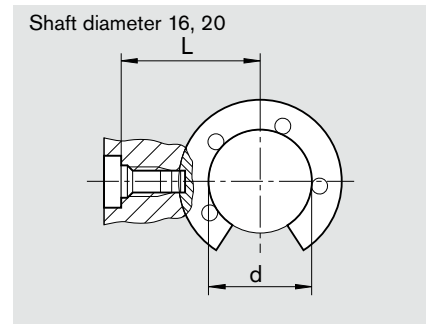
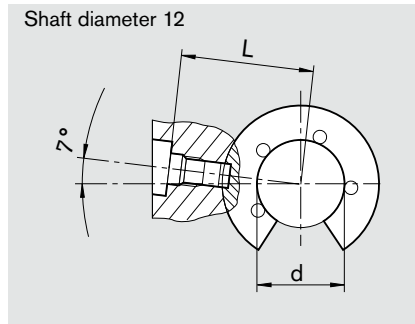
Customer-Built Housings

– Axial and rotary retention by means of locating screw

Notes for mounting:

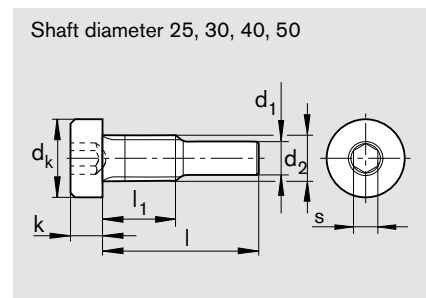
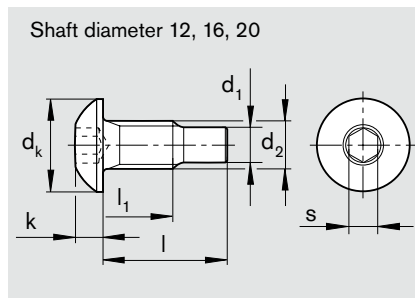
Open-type Super Linear Bushings have been provided with the necessary retention hole. This hole is marked with a  from shaft diameter 25 upwards.

On installation, the retention hole of the Linear Bushing must be aligned with the tapped hole in the housing. The screw is then inserted, screwed down to the specified depth and tightened to the specified torque.



Locating screws

The locating screws are of the self-locking type.

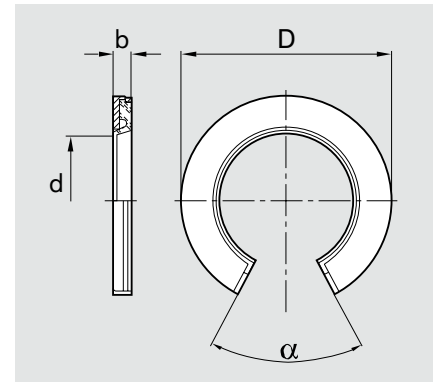


Dimensions (mm)																			Locating screw	
Shaft Ød	L	K ₂	L ₁	L ₂ min.	L ₃ +0.2	L ₄ min.	D ₁ +0.1	D ₂	D ₃ H13	D ₄ H13	d ₂	d _k	d ₁	l	l ₁	k	s	Locating screw Part numbers	Tightening torque (Nm)	
12	18.8 _{-0.1}	–	7.2 _{max}	5.2	1.3	2.5	3.1	M4	4.5	8	M4	7.6	3	8.45	4.5	2.2	2.5	R3429 008 01	1.9	
16	22.5 _{-0.1}	0	8.5 _{+0.2}	6.5	1.3	2.5	3.1	M4	4.5	8	M4	7.6	3	10.15	5.7	2.2	2.5	R3429 009 01	1.9	
20	25.5 _{-0.1}	0	8.5 _{+0.2}	6.5	1.3	2.5	3.1	M4	4.5	8	M4	7.6	3	10.15	5.7	2.2	2.5	R3429 009 01	1.9	
25	33.05 _{-0.1}	1.5	10 _{+0.2}	8	2	3.2	3.1	M4	4.5	8	M4	7	3	14.1	6.5	2.8	2.5	R3427 009 09	1.9	
30	36 _{-0.15}	2	10 _{+0.2}	8	2	3.2	3.1	M4	4.5	8	M4	7	3	14.1	6.5	2.8	2.5	R3427 009 09	1.9	
40	42.9 _{-0.15}	1.5	10 _{+0.2}	8	2	3.2	3.1	M4	4.5	8	M4	7	3	14.1	6.5	2.8	2.5	R3427 009 09	1.9	
50	58.5 _{-0.2}	2.5	17.5 _{+0.5}	13.5	3.7	6	5.1	M8	9	15	M8	13	5	22.8	12.5	5	5	R3427 005 09	16	

Seals, open type


Structural design

- Metal case
- Elastomer seal



Dimensions (mm)		b	Angle (°)	Part numbers
Shaft Ø d	D ¹⁾			
12	22	+0.1 -0.2	3	66 R1331 712 50
16	26		3	68 R1331 716 50
20	32		4	55 R1331 720 50
25	40		4	57 R1331 725 50
30	47		5	57 R1331 730 50
40	62		5	56 R1331 740 50
50	75		6	54 R1331 750 50

- 1) The outside diameter D is oversized by approx. 0.3 mm. No additional retention is needed. Additional means of retention recommended for applications subject to vibration or high acceleration rates.
- 2) Lower limit, measured when mounted in a bore of nominal diameter D.

Super Linear Bushings 

Super Linear Bushing with self-alignment feature

Super Linear Bushings, R0670 Closed type

Super Linear Bushings, R0671 Open type

Structural design

- Ball retainer and outer sleeve made of PA or POM
- Hardened steel segmental load bearing plates with ground ball tracks
- Balls made of anti-friction bearing steel
- Automatic compensation for alignment errors up to 30'
- Without seals
- With integrated/separate wiper seals



Shaft Ø d (mm)	Part numbers		Weight (kg)
	Without seals	With two integrated wiper seals	
10	R0670 010 00	R0670 210 40	0.017
12	R0670 012 00	R0670 212 40	0.023
16	R0670 016 00	R0670 216 40	0.028
20	R0670 020 00	R0670 220 40	0.061
25	R0670 025 00	R0670 225 40	0.122
30	R0670 030 00	R0670 230 40	0.185
40	R0670 040 00	R0670 240 40	0.360
50	R0670 050 00	R0670 250 40	0.580

With one integrated wiper seal: R0670 1.. 40.



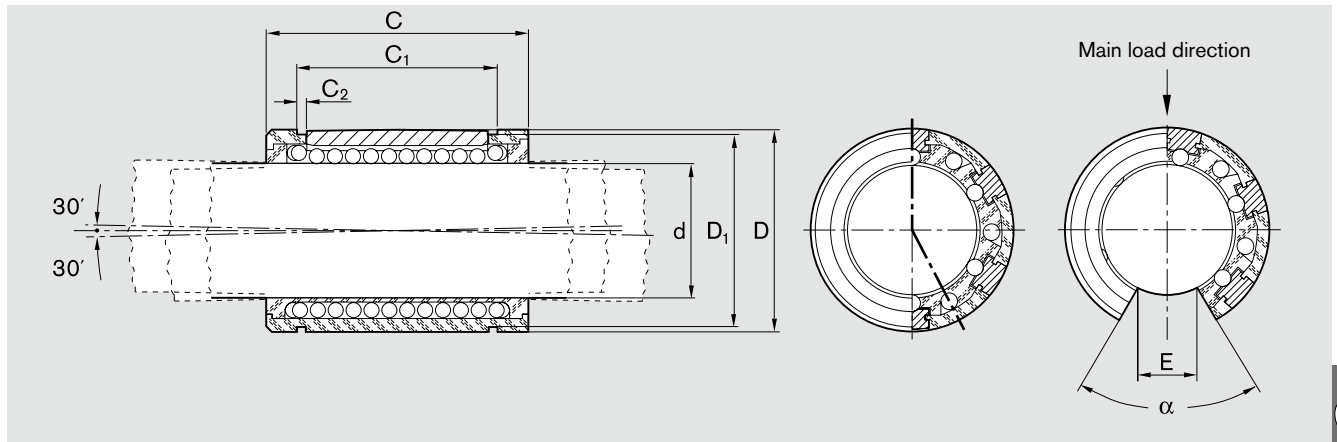
Shaft Ø d (mm)	Part numbers			Weight (kg)
	Without seals	With two integrated wiper seals	With two integrated wiper seals and side seal	
12	R0671 012 00	R0671 212 40	R0671 212 45	0.018
16	R0671 016 00	R0671 216 40	R0671 216 45	0.022
20	R0671 020 00	R0671 220 40	R0671 220 45	0.051
25	R0671 025 00	R0671 225 40	R0671 225 45	0.102
30	R0671 030 00	R0671 230 40	R0671 230 45	0.155
40	R0671 040 00	R0671 240 40	R0671 240 45	0.300
50	R0671 050 00	R0671 250 40	R0671 250 45	0.480

With one integrated wiper seal: R0671 1.. 40.

For seals, see section on "Customer-Built Housings".

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Dimensions



Closed type

Dimensions (mm)						No. of ball circuits	Radial clearance (μm) Shaft/bore			Load capacities (N)			
$\varnothing d$	D	C h13	C_1 H13	C_2	D_1		h6/H7	h6/K7	h6/M7	min.	C max.	min.	C_0 max.
10	19	29	21.6	1.3	18	5	+9 +36	+21 -6	+15 -12	600	820	330	480
12	22	32	22.6	1.3	21	5	+38 +10	+23 -5	+17 -11	830	1140	420	620
16	26	36	24.6	1.3	24.9	5	+38 +10	+23 -5	+17 -11	1020	1400	530	780
20	32	45	31.2	1.6	30.5	6	+43 +11	+25 -7	+18 -14	2020	2470	1050	1340
25	40	58	43.7	1.85	38.5	6	+43 +11	+25 -7	+18 -14	3950	4820	2180	2790
30	47	68	51.7	1.85	44.5	6	+43 +11	+25 -7	+18 -14	4800	5860	2790	3570
40	62	80	60.3	2.15	58.5	6	+50 +12	+29 -9	+20 -18	8240	10070	4350	5570
50	75	100	77.3	2.65	71.5	6	+50 +12	+29 -9	+20 -18	12060	14730	6470	8280

Open type

Dimensions (mm)						Angle α ($^\circ$)	No. of ball circuits	Radial clearance (μm) Shaft/bore			Load capacities ²⁾ (N)	
$\varnothing d$	D	C h13	C_1 H13	C_2	$E^1)$			h6/H7	h6/K7	h6/M7	C	C_0
12	22	32	22.6	1.3	6.5	66	4	+38 +10	+23 -5	+17 -11	1060	510
16	26	36	24.6	1.3	9	68	4	+38 +10	+23 -5	+17 -11	1280	630
20	32	45	31.2	1.6	9	55	5	+43 +11	+25 -7	+18 -14	2570	1180
25	40	58	43.7	1.85	11.5	57	5	+43 +11	+25 -7	+18 -14	4130	2250
30	47	68	51.7	1.85	14	57	5	+43 +11	+25 -7	+18 -14	5020	2880
40	62	80	60.3	2.15	19.5	56	5	+50 +12	+29 -9	+20 -18	8620	4480
50	75	100	77.3	2.65	22.5	54	5	+50 +12	+29 -9	+20 -18	12500	6620

1) Lower limit relative to $\varnothing d$.

2) The load capacities apply for the main direction of loading.

Super Linear Bushings 

Super Linear Bushing without self-alignment feature

Super Linear Bushings, R0672 Closed type

Super Linear Bushings, R0673 Open type

Structural design

- Ball retainer and outer sleeve made of PA or POM
- Hardened steel segmental load bearing plates with ground ball tracks
- Balls made of anti-friction bearing steel
- Without seals
- With integrated/separate wiper seals



Shaft Ø d (mm)	Part numbers		Weight (kg)
	Without seals	With two integrated wiper seals	
10	R0672 010 00	R0672 210 40	0.017
12	R0672 012 00	R0672 212 40	0.023
16	R0672 016 00	R0672 216 40	0.028
20	R0672 020 00	R0672 220 40	0.061
25	R0672 025 00	R0672 225 40	0.122
30	R0672 030 00	R0672 230 40	0.185
40	R0672 040 00	R0672 240 40	0.360
50	R0672 050 00	R0672 250 40	0.580

With one integrated wiper seal: R0672 1.. 40.



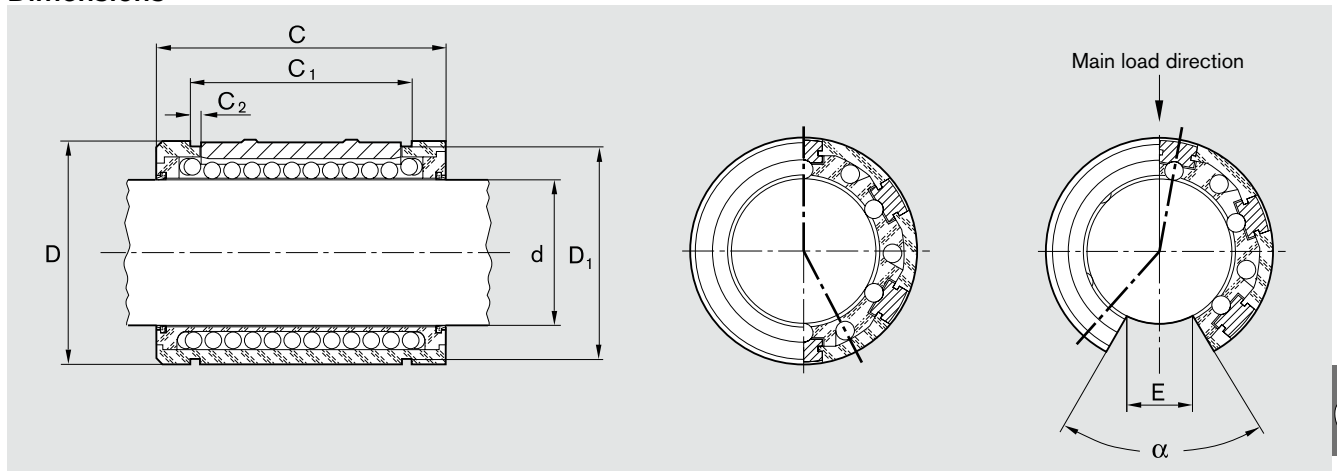
Shaft Ø d (mm)	Part numbers			Weight (kg)
	Without seals	With two integrated wiper seals	With two integrated wiper seals and side seal	
12	R0673 012 00	R0673 212 40	R0673 212 45	0.018
16	R0673 016 00	R0673 216 40	R0673 216 45	0.022
20	R0673 020 00	R0673 220 40	R0673 220 45	0.051
25	R0673 025 00	R0673 225 40	R0673 225 45	0.102
30	R0673 030 00	R0673 230 40	R0673 230 45	0.155
40	R0673 040 00	R0673 240 40	R0673 240 45	0.300
50	R0673 050 00	R0673 250 40	R0673 250 45	0.480

With one integrated wiper seal: R0673 1.. 40.

For seals, see section on “Customer-Built Housings”.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Dimensions



Closed type

Dimensions (mm)						No. of ball circuits	Radial clearance (μm)			Load capacities (N)			
$\varnothing d$	D	C h13	C ₁ H13	C ₂	D ₁		Shaft/bore			min.	C max.	min.	C ₀ max.
10	19	29	21.6	1.3	18	5	+9 +36	+21 -6	+15 -12	600	820	330	480
12	22	32	22.6	1.3	21	5	+38 +10	+23 -5	+17 -11	830	1140	420	620
16	26	36	24.6	1.3	24.9	5	+38 +10	+23 -5	+17 -11	1020	1400	530	780
20	32	45	31.2	1.6	30.5	6	+43 +11	+25 -7	+18 -14	2020	2470	1050	1340
25	40	58	43.7	1.85	38.5	6	+43 +11	+25 -7	+18 -14	3950	4820	2180	2790
30	47	68	51.7	1.85	44.5	6	+43 +11	+25 -7	+18 -14	4800	5860	2790	3570
40	62	80	60.3	2.15	58.5	6	+50 +12	+29 -9	+20 -18	8240	10070	4350	5570
50	75	100	77.3	2.65	71.5	6	+50 +12	+29 -9	+20 -18	12060	14730	6470	8280

Open type




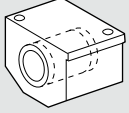
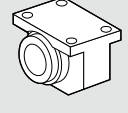
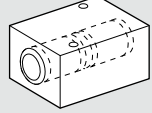
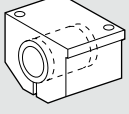
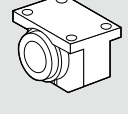
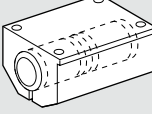
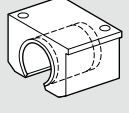
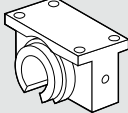
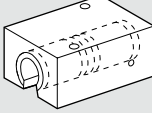
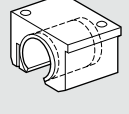
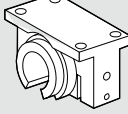
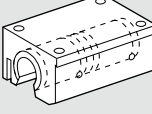
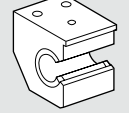
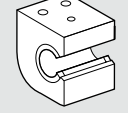
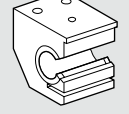
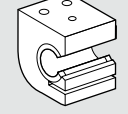
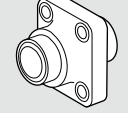
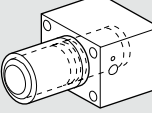
Dimensions (mm)						Angle α (°)	No. of ball circuits	Radial clearance (μm)			Load capacities ²⁾ (N)	
$\varnothing d$	D	C h13	C ₁ H13	C ₂	E ¹⁾			Shaft/bore			C	C ₀
12	22	32	22.6	1.3	6.5	66	4	+38 +10	+23 -5	+17 -11	1060	510
16	26	36	24.6	1.3	9	68	4	+38 +10	+23 -5	+17 -11	1280	630
20	32	45	31.2	1.6	9	55	5	+43 +11	+25 -7	+18 -14	2570	1180
25	40	58	43.7	1.85	11.5	57	5	+43 +11	+25 -7	+18 -14	4130	2250
30	47	68	51.7	1.85	14	57	5	+43 +11	+25 -7	+18 -14	5020	2880
40	62	80	60.3	2.15	19.5	56	5	+50 +12	+29 -9	+20 -18	8620	4480
50	75	100	77.3	2.65	22.5	54	5	+50 +12	+29 -9	+20 -18	12500	6620

1) Lower limit relative to $\varnothing d$.

2) The load capacities apply for the main direction of loading.

Linear Sets with Super Linear Bushings  or 

Overview

	Linear Sets Super Linear Bushings  with self-alignment Super Linear Bushings  without self-alignment		Tandem Linear Sets Super Linear Bushings  with self-alignment
	Aluminum housing	Cast-iron housing	Aluminum housing
Closed type For high-precision guidance with extreme ease of mounting. Version with fixed working bore diameter.	R1035 ... 	R1065 ... 	R1085 ... 
Adjustable type For use when zero-clearance or preload is required. The desired radial clearance is established by means of an adjusting screw. These Linear Sets are adjusted to zero-clearance before delivery.	R1036 ... 	R1066 ... 	R1032 ... 
Open type For long guideways when the shafts must be supported and high rigidity is required.	R1037 ... 	R1067 ... 	R1087 ... 
Open type, adjustable For use when zero-clearance or preload is required. The desired radial clearance is established by means of an adjusting screw. These Linear Sets are adjusted to zero-clearance before delivery.	R1038 ... 	R1068 ... 	R1034 ... 
With side opening Handles forces from all directions without reduction of load capacity.	R1071 ... 	R1073 ... 	
With side opening, adjustable For use when zero-clearance or preload is required. The desired radial clearance is established by means of an adjusting screw. These Linear Sets are adjusted to zero-clearance before delivery.	R1072 ... 	R1074 .. 	
Flanged type This element was developed as a complement to our Linear Set series for use in applications requiring the shaft to be arranged at right angles to the mounting base.		R1081 ... 	R1083 ... 

Advantages / Mounting Instructions

Advantages

High load capacity and rigidity

These Linear Sets afford high rigidity irrespective of the direction of load action and even when their high load-carrying capacities are utilized to the full.

Compact block design and ease of mounting in the aluminum version

The Super Linear Bushing is completely enclosed in the compact housing to protect it against all external impacts. Tapped through-holes make it possible to insert the screws from above or below. A reference edge along the block facilitates alignment during installation and prevents any distortive stresses on the linear bushings. Centering bores are provided for the user to drill locating pin holes for extra stability.

High precision and reliability

The housing design and the integrated Super Linear Bushing ensure high precision and functional reliability.

Zero-clearance guideways

The adjustable versions can be used to achieve zero-clearance assemblies.

Operating temperatures

-10 °C to 80 °C

Mounting instructions

Radial clearance

The radial clearance values given in the tables have been obtained by statistical methods and are representative of the clearances to be expected in actual practice. Adjustable types of Linear Sets are adjusted to zero-clearance (when screwed down) on a shaft of diameter accurate to a tolerance of h5 (lower limit) before leaving the factory.

Vertical dimensions

The tables for Linear Sets contain tolerance values for the height dimension "H". These tolerance values have been obtained by statistical methods and are representative of the values to be expected in actual practice.

Screws

We recommend screws per ISO 4762-8.8 for mounting Linear Sets.

Lubrication

When lubricating relubricatable types of Linear Bushing, the shaft must always be inserted in the bushing. Add lubricant until excess emerges.

Notes on mounting of Linear Sets with side opening

Without reference edges

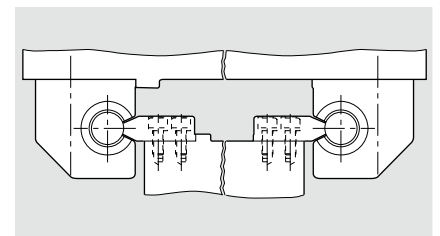
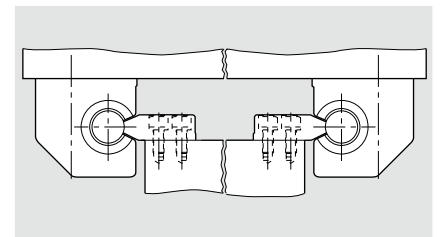
- Align first shaft mounted on shaft support rail and screw down support rail.
- Align second shaft to ensure parallelism and screw down support rail.
- Push Linear Sets onto shafts and screw down on the machine table.

With reference edges

- Push first shaft mounted on shaft support rail into contact with reference edge and screw down support rail.
- Align second shaft to ensure parallelism and screw down support rail.
- Push Linear Sets onto the shafts.



Further assembly:

- a) With two reference edges (one on machine base and one on table): Push the Linear Sets on the first shaft into contact with the reference edge on the machine table and screw down. Screw down the Linear Sets on the second shaft to the machine table.



- b) With only one reference edge (on the machine base): Screw Linear Sets down to the machine table.



Linear Sets with Super Linear Bushings  or , aluminum housing

Linear Sets, R1035 Closed type



Linear Sets, R1036 Adjustable type

Structural design

- Precision housing, lightweight series (aluminum)
- Super Linear Bushing with or without self-alignment
- External seals
- Fully sealed
- Relubricatable

Closed type



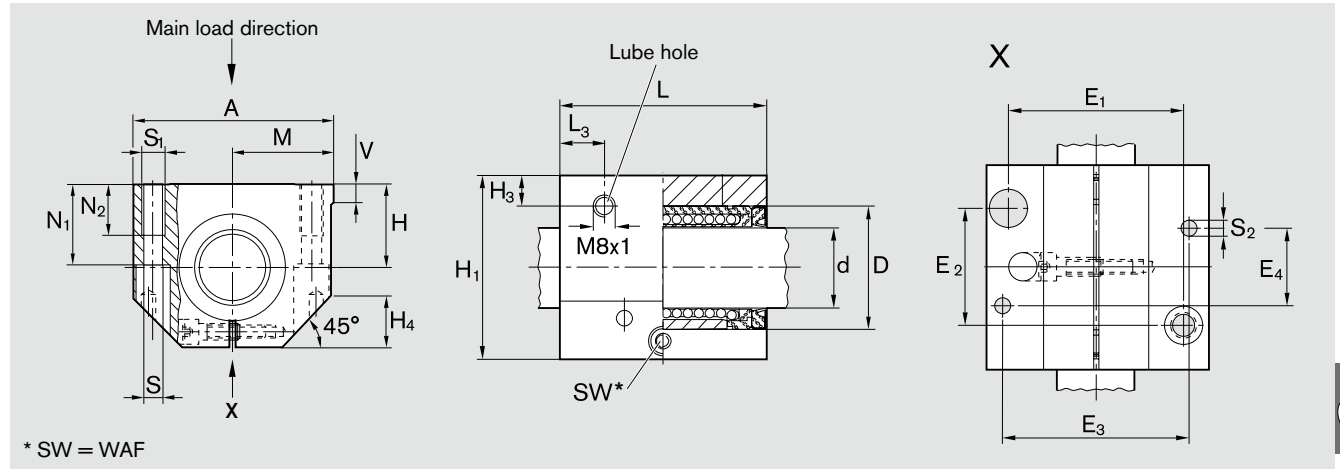
Shaft Ø d (mm)	Part numbers		Weight (kg)
	With Super Linear Bushing  Relubricatable With two seals	With Super Linear Bushing  Relubricatable With two seals	
10	R1035 610 20	R1035 810 20	0.10
12	R1035 612 20	R1035 812 20	0.13
16	R1035 616 20	R1035 816 20	0.20
20	R1035 620 20	R1035 820 20	0.34
25	R1035 625 20	R1035 825 20	0.65
30	R1035 630 20	R1035 830 20	0.97
40	R1035 640 20	R1035 840 20	1.80
50	R1035 650 20	R1035 850 20	3.00

Adjustable type



Shaft Ø d (mm)	Part numbers		Weight (kg)
	With Super Linear Bushing  Relubricatable With two seals	With Super Linear Bushing  Relubricatable With two seals	
10	R1036 610 20	R1036 810 20	0.10
12	R1036 612 20	R1036 812 20	0.13
16	R1036 616 20	R1036 816 20	0.20
20	R1036 620 20	R1036 820 20	0.34
25	R1036 625 20	R1036 825 20	0.65
30	R1036 630 20	R1036 830 20	0.97
40	R1036 640 20	R1036 840 20	1.80
50	R1036 650 20	R1036 850 20	3.00

Dimensions



* SW = WAF

Dimensions (mm)

Ø d	D	H ¹⁾ +0.008 -0.016	H ₁	M ¹⁾ ±0.01	A	L	E ₁	E ₂	E ₃	E ₄	S ²⁾	S ₁	S ₂ ³⁾	N ₁	N ₂	H ₃	L ₃	V	WAF	H ₄
10	19	16	31.5	20	40	36	29±0.15	20±0.15	31	29	4.3	M5	4	15	11	10	10.5	5	2.5	10
12	22	18	35	21.5	43	39	32±0.15	23±0.15	34	32	4.3	M5	4	16.5	11	10	10.5	5	2.5	10
16	26	22	42	26.5	53	43	40±0.15	26±0.15	42	35	5.3	M6	4	21	13	10	11.5	5	3	13
20	32	25	50	30	60	54	45±0.15	32±0.15	50	45	6.6	M8	5	24	18	10	13.5	5	4	16
25	40	30	60	39	78	67	60±0.15	40±0.15	64	20	8.4	M10	6	29	22	10	15	6.5	5	20
30	47	35	70	43.5	87	79	68±0.15	45±0.15	72	30	8.4	M10	6	34	22	11.5	16	8	5	22
40	62	45	90	54	108	91	86±0.15	58±0.15	90	35	10.5	M12	8	44	26	14	18	10	6	28
50	75	50	105	66	132	113	108±0.20	50±0.20	108	42	13.5	M16	10	49	34	12.5	22	12	8	37



Ø d (mm)	Radial clearance (µm)		Load capacities ⁴⁾ (N)	
	R1035 Shaft h6	R1036	C	C ₀
10	+36 +9	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	730	380
12	+38 +10		1020	490
16	+38 +10		1250	620
20	+43 +11		2470	1340
25	+43 +11		4820	2790
30	+43 +11		5860	3570
40	+50 +12		10070	5570
50	+50 +12		14730	8280

- 1) When screwed down, relative to shaft nominal dimension d.
- 2) Mounting screws ISO 4762-8.8.
- 3) Center-bores for locating pin holes.
- 4) The load capacities apply for the main direction of loading.
If the load does not act in the main direction of loading, the load capacities must be multiplied by the following factors:

Ø d 10 to 16: $f = 0.82, f_0 = 0.86$

Ø d 20 to 50: $f = 0.82, f_0 = 0.78$

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Linear Sets with Super Linear Bushings  or , aluminum housing

Linear Sets, R1037 Open type



Linear Sets, R1038 Open type, adjustable

Structural design

- Precision housing, lightweight series (aluminum)
- Retention via grooved taper pin
- Super Linear Bushing with or without self-alignment
- External seals
- Relubricatable



Open type



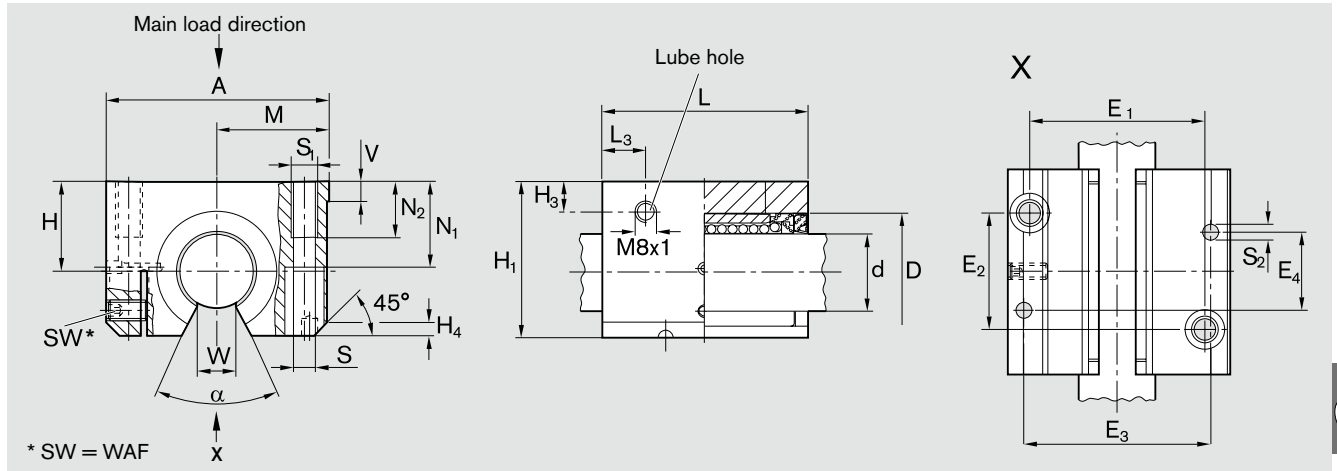
Shaft Ø d (mm)	Part numbers		Weight (kg)
	With Super Linear Bushing  Relubricatable With two seals	With Super Linear Bushing  Relubricatable With two seals	
12	R1037 612 20	R1037 812 20	0.11
16	R1037 616 20	R1037 816 20	0.17
20	R1037 620 20	R1037 820 20	0.30
25	R1037 625 20	R1037 825 20	0.57
30	R1037 630 20	R1037 830 20	0.86
40	R1037 640 20	R1037 840 20	1.60
50	R1037 650 20	R1037 850 20	2.60

Open type, adjustable



Shaft Ø d (mm)	Part numbers		Weight (kg)
	With Super Linear Bushing  Relubricatable With two seals	With Super Linear Bushing  Relubricatable With two seals	
12	R1038 612 20	R1038 812 20	0.11
16	R1038 616 20	R1038 816 20	0.17
20	R1038 620 20	R1038 820 20	0.30
25	R1038 625 20	R1038 825 20	0.57
30	R1038 630 20	R1038 830 20	0.86
40	R1038 640 20	R1038 840 20	1.60
50	R1038 650 20	R1038 850 20	2.60

Dimensions





Dimensions (mm)																					
Ø d	D	H ¹⁾ +0.008 -0.016	H ₁	M ¹⁾ ±0.01	A	L	E ₁	E ₂	E ₃	E ₄	S ²⁾	S ₁	S ₂ ³⁾	N ₁	N ₂	H ₃	L ₃	V	WAF	W ⁴⁾	H ₄
12	22	18	28	21.5	43	39	32±0.15	23±0.15	34	32	4.3	M5	4	16.5	11	10	10.5	5	2.5	6.5	1.5
16	26	22	35	26.5	53	43	40±0.15	26±0.15	42	35	5.3	M6	4	21	13	10	11.5	5	2.5	9	2.5
20	32	25	42	30	60	54	45±0.15	32±0.15	50	45	6.6	M8	5	24	18	10	13.5	5	2.5	9	3.5
25	40	30	51	39	78	67	60±0.15	40±0.15	64	20	8.4	M10	6	29	22	10	15	6.5	3	11.5	4
30	47	35	60	43.5	87	79	68±0.15	45±0.15	72	30	8.4	M10	6	34	22	11.5	16	8	3	14	6
40	62	45	77	54	108	91	86±0.15	58±0.15	90	35	10.5	M12	8	44	26	14	18	10	4	19.5	6
50	75	50	88	66	132	113	108±0.20	50±0.20	108	42	13.5	M16	10	49	34	12.5	22	12	5	22.5	6

Ø d (mm)	Angle α (°)	Radial clearance ⁵⁾ (µm)		Load capacities ⁶⁾ (N)	
		R1037 Shaft h6	R1038	C	C ₀
12	66	+28 -1	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	1060	510
16	68	+28 -1		1280	630
20	55	+31 -2		2570	1180
25	57	+31 -2		4130	2250
30	57	+31 -2		5020	2880
40	56	+35 -3		8620	4480
50	54	+35 -3		12500	6620

- 1) When screwed down, relative to shaft nominal dimension d.
- 2) Mounting screws ISO 4762-8.8.
- 3) Center-bores for locating pin holes.
- 4) Lower limit relative to Ø d.
- 5) When screwed down.
- 6) The load capacities apply for the main direction of loading.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Linear Sets with Super Linear Bushings  or , aluminum housing

Linear Sets, R1071 With side opening

Linear Sets, R1072 With side opening, adjustable



Structural design

- Precision housing, lightweight series (aluminum)
- Retention via grooved taper pin
- Super Linear Bushing with or without self-alignment
- External seals
- Relubricatable

The load carrying capacity of open linear bushings is considerably reduced when the load is applied to the "open" portion of the bushing. The Linear Set with Side Opening, lightweight series, has been developed to overcome this disadvantage and to permit selective circumferential positioning of the open linear bushing.



With side opening



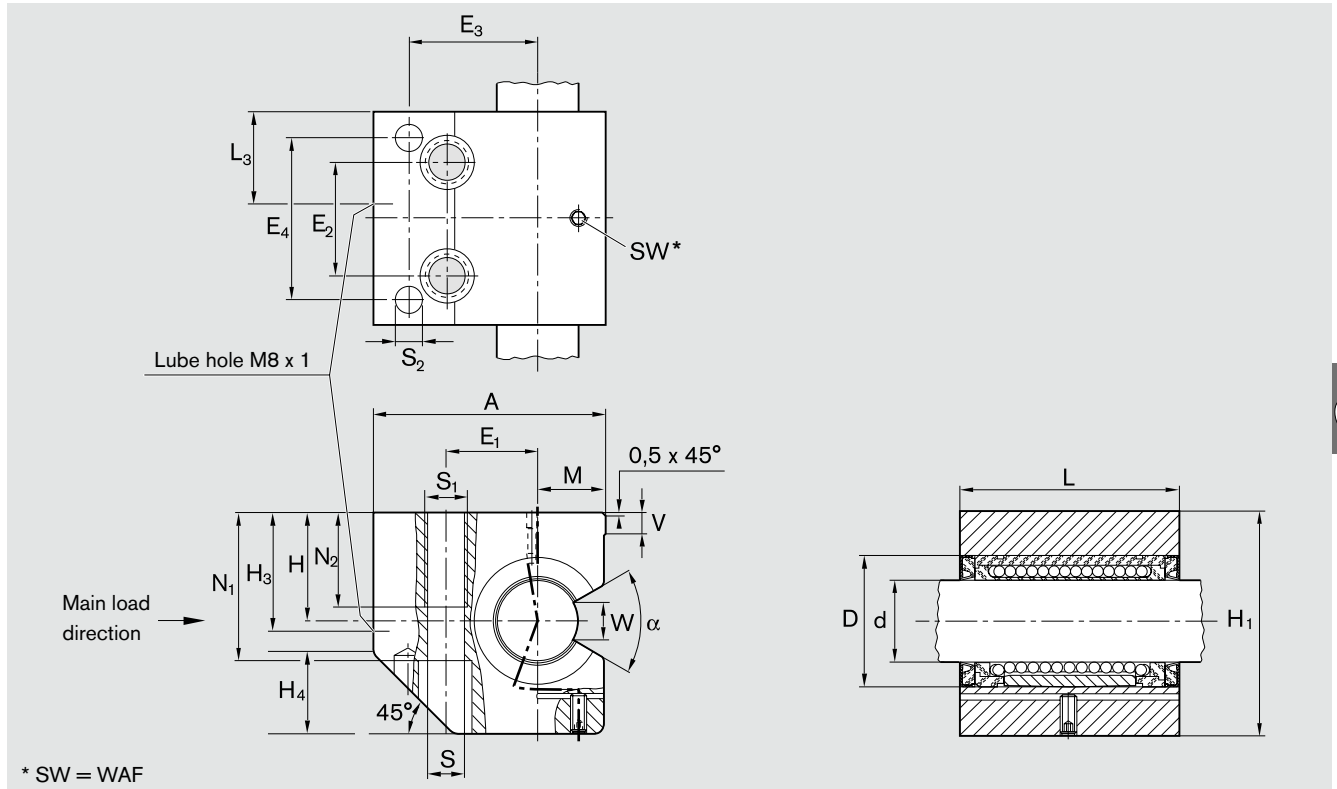
Shaft Ø d (mm)	Part numbers		Weight (kg)
	With Super Linear Bushing  Relubricatable With two seals	With Super Linear Bushing  Relubricatable With two seals	
20	R1071 620 20	R1071 820 20	0.42
25	R1071 625 20	R1071 825 20	0.8
30	R1071 630 20	R1071 830 20	1.2
40	R1071 640 20	R1071 840 20	2.0
50	R1071 650 20	R1071 850 20	3.2

With side opening, adjustable



Shaft Ø d (mm)	Part numbers		Weight (kg)
	With Super Linear Bushing  Relubricatable With two seals	With Super Linear Bushing  Relubricatable With two seals	
20	R1072 620 20	R1072 820 20	0.42
25	R1072 625 20	R1072 825 20	0.8
30	R1072 630 20	R1072 830 20	1.2
40	R1072 640 20	R1072 840 20	2.0
50	R1072 650 20	R1072 850 20	3.2

Dimensions




Dimensions (mm)																					
Ø d	D	H ¹⁾ +0.008 -0.016	H ₁	M ¹⁾ ±0.01	A	L	E ₁ ±0.15	E ₂ ±0.15	E ₃	E ₄	S ²⁾	S ₁	S ₂ ³⁾	N ₁	N ₂	V	WAF	W ⁴⁾	H ₃	L ₃	H ₄
20	32	30	60	17	60	54	22	30	33	42	8.4	M10	6	42	15	5	2.5	9	32	23.5	22
25	40	35	72	21	75	67	28	36	42	52	10.5	M12	8	50	18	6.5	3	11.5	38	29	26
30	47	40	82	25	86	79	34	42	48	60	13.5	M16	10	55	24	8	3	14	44	34	30
40	62	45	100	32	110	91	43	48	62	68	15.5	M20	12	67	30	10	4	19.5	50	40	38
50	75	50	115	38	127	113	50	62	70	85	17.5	M20	12	78	30	12	5	22.5	56	48	45

Shaft Ø d (mm)	Angle α (°)	Radial clearance ⁵⁾ (µm)		Load capacities ⁶⁾ (N)	
		R1071 Shaft h6	R1072	C	C ₀
20	55	+31 -2	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	2570	1180
25	57	+31 -2		4130	2250
30	57	+31 -2		5020	2880
40	56	+35 -3		8620	4480
50	54	+35 -3		12500	6620

- 1) When screwed down, relative to shaft nominal dimension d.
- 2) Mounting screws ISO 4762-8.8.
- 3) Center-bores for locating pin holes.
- 4) Lower limit relative to Ø d.
- 5) When screwed down.
- 6) The load capacities apply for the main direction of loading.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.


Please refer also to the mounting instructions for Linear Sets with side opening.

Linear Sets with Super Linear Bushings , tandem

Linear Sets, R1085 Closed type

Linear Sets, R1032 Adjustable type

Structural design

- Precision tandem housing, light-weight series (aluminum)
- Two Super Linear Bushings 
- External seals
- Fully sealed
- Reference edge (for adjustable Tandem version)
- Relubricatable

Closed type



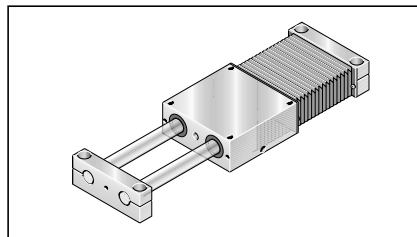
Shaft Ø d (mm)	Part numbers	Weight (kg)
12	R1085 612 20	0.27
16	R1085 616 20	0.41
20	R1085 620 20	0.72
25	R1085 625 20	1.35
30	R1085 630 20	2.01
40	R1085 640 20	3.67
50	R1085 650 20	6.30

Adjustable type

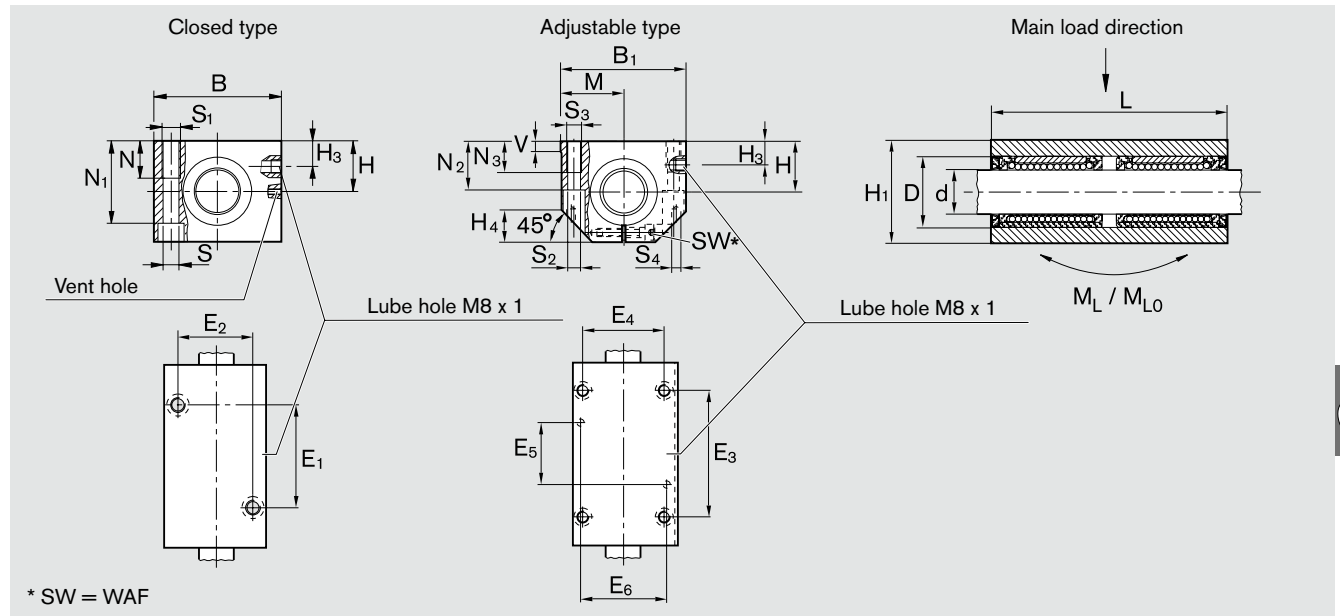


Shaft Ø d (mm)	Part numbers	Weight (kg)
10	R1032 610 20	0.20
12	R1032 612 20	0.27
16	R1032 616 20	0.41
20	R1032 620 20	0.72
25	R1032 625 20	1.35
30	R1032 630 20	2.01
40	R1032 640 20	3.67
50	R1032 650 20	6.30

Also available as a linear slide. See our "Linear Motion Slides" catalog.



Dimensions



Dimensions (mm)

Ø d	D	H ¹⁾ +0.008 -0.016	H ₁	H ₃	M ¹⁾ ±0.01	B	B ₁	L	E ₁ ²⁾ ±0.15	E ₂ ²⁾ ±0.15	E ₃ ²⁾ ±0.15	E ₄ ²⁾ ±0.15	E ₅	E ₆	S ³⁾	S ₁	S ₂ ³⁾	S ₃	S ₄ ⁴⁾	N	N ₁	N ₂	N ₃	V	WAF	H ₄
10	19	16	31.5	9	20	-	40	70	-	-	52	29	20	31	-	-	4.3	M5	4	-	-	15	11	5	2.5	10
12	22	18	35	10	21.5	42	43	76	40	30	56	32	24	34	5.3	M6	4.3	M5	4	13	28	16.5	11	5	2.5	10
16	26	22	42	12	26.5	50	53	84	45	36	64	40	28	42	5.3	M6	5.3	M6	4	13	35	21	13	5	3	13
20	32	25	50	13	30	60	60	104	55	45	76	45	32	50	6.6	M8	6.6	M8	5	18	41	24	18	5	4	16
25	40	30	60	15	39	74	78	130	70	54	94	60	42	64	8.4	M10	8.4	M10	6	22	49	29	22	6.5	5	20
30	47	35	70	16	43.5	84	87	152	85	62	106	68	52	72	10.5	M12	8.4	M10	6	26	56	34	22	8	5	22
40	62	45	90	20	54	108	108	176	100	80	124	86	60	90	13.5	M16	10.5	M12	8	34	74	44	26	10	6	28
50	75	50	105	20	66	130	132	224	125	100	160	108	80	108	13.5	M16	13.5	M16	10	34	89	49	35	12	8	37

Ø d (mm)	Radial clearance (µm)		Load capacities ⁵⁾ (N)		Tipping moment (Nm)	
	R1085 Shaft h6	R1032	C	C ₀	M _L	M _{L0}
10	-	-	1180	760	17	12
12	+38 +10	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	1660	980	26	16
16	+38 +10		2030	1240	35	22
20	+43 +11		4010	2680	84	54
25	+43 +11		7830	5580	205	140
30	+43 +11		9520	7140	289	206
40	+50 +12		16360	11140	576	374
50	+50 +12		23930	16560	1097	725

- When screwed down, relative to shaft nominal dimension d.
- Shaft diameter 50: Tolerance ± 0.2
- Mounting screws ISO 4762-8.8.
- Center-bores for locating pin holes.
- Load capacity when both Linear Bushings are equally loaded.
The load capacities apply for the main direction of loading.
If the load does not act in the main direction of loading, the load capacities must be multiplied by the following factors:

Ø d 10 to 16: f = 0.82, f₀ = 0.86

Ø d 20 to 50: f = 0.82, f₀ = 0.78

Note on lubrication for Linear Sets R1085:

Lubricate only when shaft inserted; add lubricant until excess emerges at the vent hole.


Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Linear Sets with Super Linear Bushings , tandem

Linear Sets, R1087 Open type

Linear Sets, R1034 Open type, adjustable

Structural design

- Precision tandem housing, lightweight series (aluminum)
- Two Super Linear Bushings 
- Two external seals
- Reference edge (for adjustable, open Tandem version)
- Relubricatable

Open type



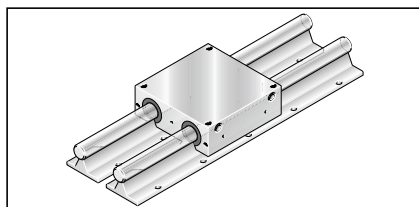
Shaft Ø d (mm)	Part numbers	Weight (kg)
12	R1087 612 20	0.22
16	R1087 616 20	0.34
20	R1087 620 20	0.62
25	R1087 625 20	1.17
30	R1087 630 20	1.68
40	R1087 640 20	3.15
50	R1087 650 20	5.50

Open type, adjustable

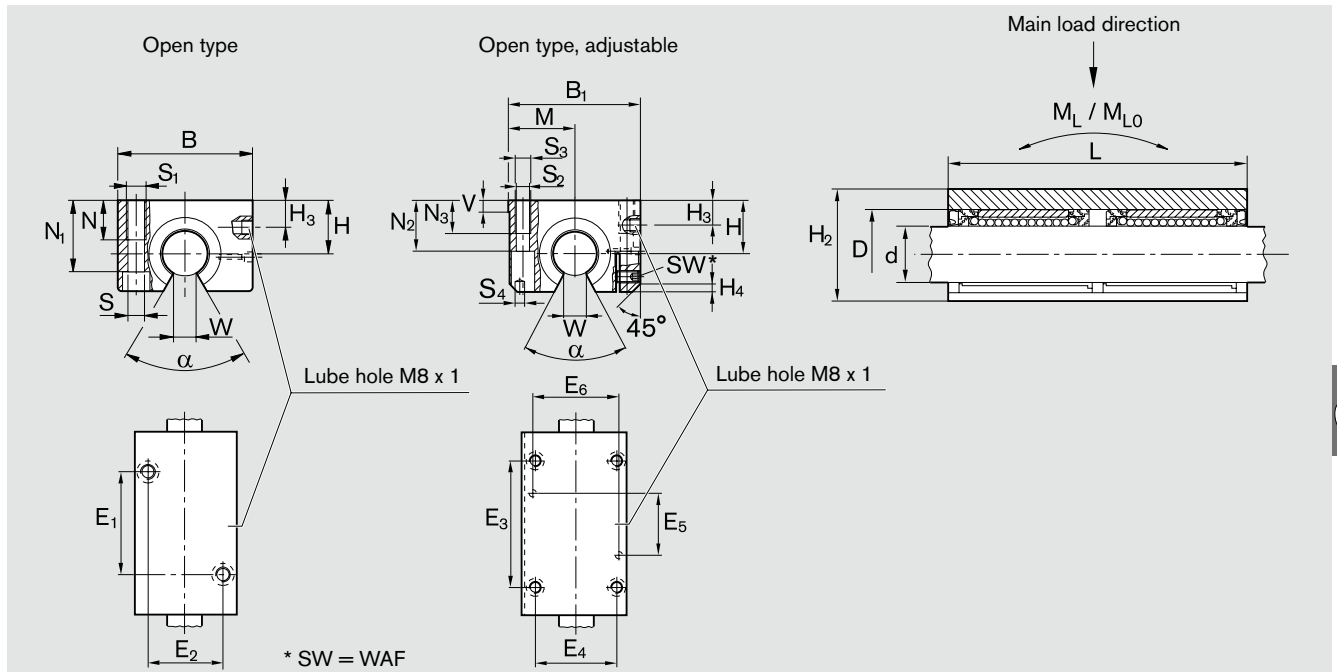


Shaft Ø d (mm)	Part numbers	Weight (kg)
12	R1034 612 20	0.22
16	R1034 616 20	0.34
20	R1034 620 20	0.62
25	R1034 625 20	1.17
30	R1034 630 20	1.68
40	R1034 640 20	3.15
50	R1034 650 20	5.50

Also available as a linear slide. See our "Linear Motion Slides" catalog.



Dimensions



Dimensions (mm)

$\varnothing d$	D	H ²⁾ +0.008 -0.016	H ₂	H ₃	M ²⁾ ±0.01	B	B ₁	L	E ₁ ³⁾ ±0.15	E ₂ ³⁾ ±0.15	E ₃ ³⁾ ±0.15	E ₄ ³⁾ ±0.15	E ₅	E ₆	S ⁴⁾	S ₁	S ₂ ⁵⁾	S ₃	S ₄ ⁶⁾	N	N ₁	N ₂	N ₃	V	WAF	W ⁷⁾	H ₄
12	22	18	30 ¹⁾	10	21.5	42	43	76	40	30	56	32	24	34	5.3	M6	4.3	M5	4	13	25	16.5	11	5	2.5	6.5	1.5
16	26	22	35	12	26.5	50	53	84	45	36	64	40	28	42	5.3	M6	5.3	M6	4	13	29.5	21	13	5	2.5	9	2.5
20	32	25	42	13	30	60	60	104	55	45	76	45	32	50	6.6	M8	6.6	M8	5	18	35.5	24	18	5	2.5	9	3.5
25	40	30	51	15	39	74	78	130	70	54	94	60	42	64	8.4	M10	8.4	M10	6	22	43	29	22	6.5	3	11.5	4
30	47	35	60	16	43.5	84	87	152	85	62	106	68	52	72	10.5	M12	8.4	M10	6	26	50.5	34	22	8	3	14	6
40	62	45	77	20	54	108	108	176	100	80	124	86	60	90	13.5	M16	10.5	M12	8	34	66	44	26	10	4	19.5	6
50	75	50	88	10	66	130	132	224	125	100	160	108	80	108	13.5	M16	13.5	M16	10	34	77	49	35	12	5	22.5	6

$\varnothing d$ (mm)	Angle α (°)	Radial clearance ⁸⁾ (μm)		Load capacities ⁹⁾ (N)		Tipping moment (Nm)	
		R1087 Shaft h6	R1034	C	C ₀	M _L	M _{L0}
12	66	+28 -1	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	1720	1020	11	7
16	68	+28 -1		2080	1260	16	10
20	55	+31 -2		4170	2360	60	47
25	57	+31 -2		6710	4500	116	79
30	57	+31 -2		8150	5760	163	116
40	56	+35 -3		14000	8960	328	212
50	54	+35 -3		20300	13240	630	415


- 1) In the open type, adjustable version, H₂ = 28 mm.
- 2) When screwed down, relative to shaft nominal dimension d.
- 3) Shaft diameter 50: Tolerance ± 0.2
- 4) Mounting screws per DIN 6912-8.8.
- 5) Mounting screws ISO 4762-8.8.
- 6) Center-bores for locating pin holes.
- 7) Lower limit relative to $\varnothing d$.
- 8) When screwed down.
- 9) Load capacity when both Linear Bushings are equally loaded. The load capacities apply for the main direction of loading.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Linear Sets with Super Linear Bushings , tandem

Linear Sets, R1083 Flanged type

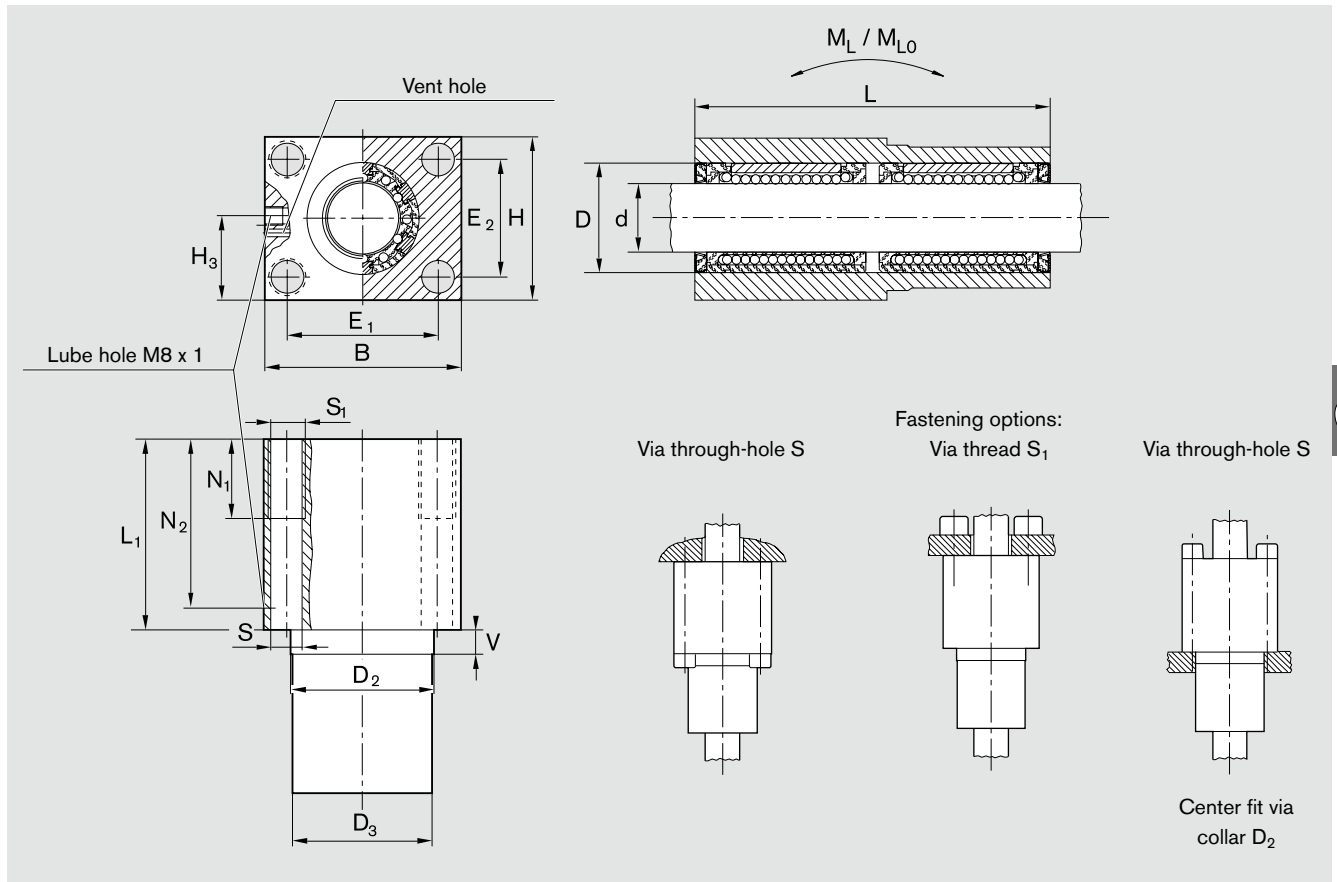
Structural design

- Precision flanged housing, lightweight series (aluminum)
- Two Super Linear Bushings 
- Two external seals
- Centering collar
- Fully sealed
- Tapped through holes for screw mounting from the base
- Relubricatable
- Radial clearance not adjustable



Shaft $\varnothing d$ (mm)	Part numbers	Weight (kg)
12	R1083 612 20	0.20
16	R1083 616 20	0.32
20	R1083 620 20	0.55
25	R1083 625 20	1.00
30	R1083 630 20	1.50

Dimensions





Dimensions (mm)																
Ø d	D	D ₂ ¹⁾	D ₃	H	H ₃	B	L	L ₁	E ₁	E ₂	S ²⁾	S ₁	N ₁	N ₂	V	
12	22	30 g7	30 -0.1 -0.3	34	19	42	76	46	32 ±0.15	24 ±0.15	5.3	M6	13	36	10	
16	26	35	35	40	22	50	84	50	38	28	6.6	M8	18	40	10	
20	32	42	42	50	27	60	104	60	45	35	8.4	M10	22	50	10	
25	40	52	52	60	32	74	130	73	56	42	10.5	M12	26	63	10	
30	47	61	61	70	37	84	152	82	64	50	13.5	M16	34	74	10	

Shaft Ø d (mm)	Radial clearance (µm) Shaft h6	Load capacities ³⁾ (N)		Tipping moment (Nm)	
		C	C ₀	M _L	M _{L0}
12	+38 +10	1350	840	26	16
16	+38 +10	1660	1060	35	22
20	+43 +11	3280	2100	84	54
25	+43 +11	6420	4360	205	140
30	+43 +11	7800	5580	289	206

- 1) Recommended mounting bore fit: D₂^{H7}.
- 2) Mounting screws ISO 4762-8.8.
- 3) Load capacity when both Linear Bushings are equally loaded.

Note on lubrication:
Lubricate only when shaft inserted; add lubricant until excess emerges at the vent hole.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Linear Sets with Super Linear Bushings  or , cast-iron housing

Linear Sets, R1065 Closed type



Linear Sets, R1066 Adjustable type

Structural design

- Precision housing (lamellar graphite cast iron)
- Super Linear Bushing with or without self-alignment
- Integrated wiper seals



Closed type



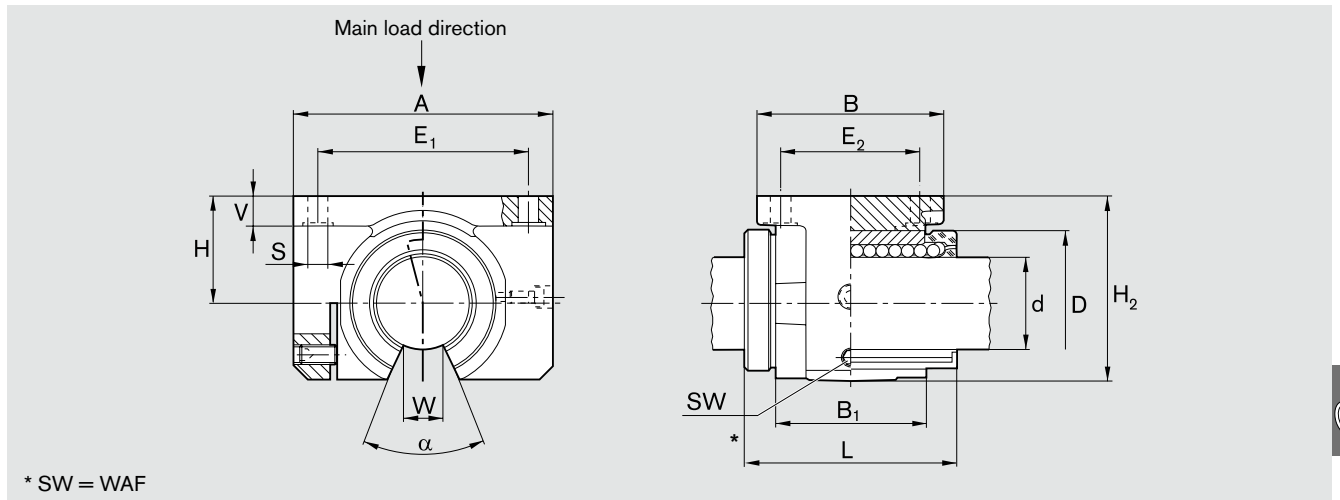
Shaft Ø d (mm)	Part numbers		Weight (kg)
	With Super Linear Bushing  With integrated wiper seals	With Super Linear Bushing  With integrated wiper seals	
12	R1065 612 40	R1065 812 40	0.15
16	R1065 616 40	R1065 816 40	0.24
20	R1065 620 40	R1065 820 40	0.42
25	R1065 625 40	R1065 825 40	0.83
30	R1065 630 40	R1065 830 40	1.22
40	R1065 640 40	R1065 840 40	2.29
50	R1065 650 40	R1065 850 40	3.23

Adjustable type



Shaft Ø d (mm)	Part numbers		Weight (kg)
	With Super Linear Bushing  With integrated wiper seals	With Super Linear Bushing  With integrated wiper seals	
12	R1066 612 40	R1066 812 40	0.15
16	R1066 616 40	R1066 816 40	0.24
20	R1066 620 40	R1066 820 40	0.41
25	R1066 625 40	R1066 825 40	0.79
30	R1066 630 40	R1066 830 40	1.19
40	R1066 640 40	R1066 840 40	2.26
50	R1066 650 40	R1066 850 40	3.15

Dimensions



Dimensions (mm)														
$\varnothing d$	D	H	H ₁ ¹⁾	L	A ¹⁾	A ₁ ¹⁾	B ¹⁾	B ₁	E ₁	E ₂	S	V ¹⁾	WAF	
12	22	18	35	32	42	21	32	20	32±0.15	23±0.15	4.5	5.5	2.5	
16	26	22	42	36	50	26	35	22	40±0.15	26±0.15	4.5	6.5	3	
20	32	25	50	45	60	28	42	28	45±0.15	32±0.15	4.5	8	3	
25	40	30	60	58	74	38	54	40	60±0.15	40±0.15	5.5	9	5	
30	47	35	70	68	84	41	60	48	68±0.20	45±0.20	6.6	10	5	
40	62	45	90	80	108	51	78	56	86±0.20	58±0.20	9	12	6	
50	75	50	105	100	130	57	70	72	108±0.20	50±0.20	9	14	8	



Shaft $\varnothing d$ (mm)	Radial clearance (μm)		Tolerance for H ²⁾ (μm)	Load capacities ³⁾ (N)	
	R1065 Shaft h6	R1066		C	C ₀
12	+38	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	+8	1020	490
	+10		-16		
16	+38		+8	1250	620
	+10		-16		
20	+43		+8	2470	1340
	+11		-16		
25	+43		+8	4820	2790
	+11		-16		
30	+43		+8	5860	3570
	+11		-16		
40	+50		+8	10070	5570
	+12		-16		
50	+50	+13	14730	8280	
	+12	-21			

- 1) Tolerance DIN 1686-GTB 15.
- 2) When screwed down, relative to shaft nominal dimension d.
- 3) The load capacities apply for the main direction of loading. If the load does not act in the main direction of loading, the load capacities must be multiplied by the following factors:

$\varnothing d$ 12 and 16: $f = 0.82, f_0 = 0.86$

$\varnothing d$ 20 to 50: $f = 0.82, f_0 = 0.78$

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Linear Sets with Super Linear Bushings  or , cast-iron housing



Linear Sets, R1067 Open type

Linear Sets, R1068 Open type, adjustable



Structural design

- Precision housing (spheroidal graphite cast iron)
- Retention via locating screw
- Super Linear Bushing with or without self-alignment
- Integrated wiper seals

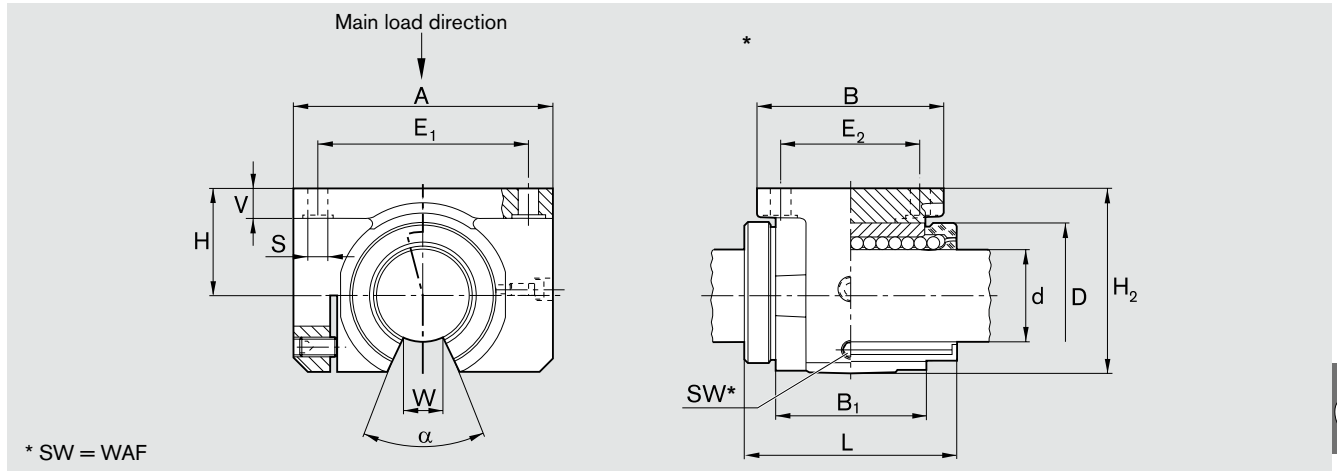


Shaft Ø d (mm)	Part numbers		Weight (kg)
	With Super Linear Bushing  With integrated wiper seals	With Super Linear Bushing  With integrated wiper seals	
12	R1067 612 40	R1067 812 40	0.13
16	R1067 616 40	R1067 816 40	0.20
20	R1067 620 40	R1067 820 40	0.36
25	R1067 625 40	R1067 825 40	0.70
30	R1067 630 40	R1067 830 40	1.05
40	R1067 640 40	R1067 840 40	2.05
50	R1067 650 40	R1067 850 40	2.77



Shaft Ø d (mm)	Part numbers		Weight (kg)
	With Super Linear Bushing  With integrated wiper seals	With Super Linear Bushing  With integrated wiper seals	
12	R1068 612 40	R1068 812 40	0.12
16	R1068 616 40	R1068 816 40	0.20
20	R1068 620 40	R1068 820 40	0.36
25	R1068 625 40	R1068 825 40	0.69
30	R1068 630 40	R1068 830 40	1.02
40	R1068 640 40	R1068 840 40	2.02
50	R1068 650 40	R1068 850 40	2.71

Dimensions





Dimensions (mm)														
Ø d	D	H	H ₂ ¹⁾	L	A ¹⁾	B ¹⁾	B ₁	E ₁	E ₂	S	V ¹⁾	W ²⁾	WAF	
12	22	18	28	32	42	32	20	32±0.15	23±0.15	4.5	5.5	6.5	2.5	
16	26	22	35	36	50	35	22	40±0.15	26±0.15	4.5	6.5	9	2.5	
20	32	25	42	45	60	42	28	45±0.15	32±0.15	4.5	8	9	2.5	
25	40	30	51	58	74	54	40	60±0.15	40±0.15	5.5	9	11.5	3	
30	47	35	60	68	84	60	48	68±0.20	45±0.20	6.6	10	14	3	
40	62	45	77	80	108	78	56	86±0.20	58±0.20	9	12	19.5	4	
50	75	50	88	100	130	70	72	108±0.20	50±0.20	9	14	22.5	5	

Ø d (mm)	Angle α (°)	Radial clearance (µm)		Tolerance for H ³⁾ (µm)	Load capacities ⁴⁾ (N)	
		R1067 Shaft h6	R1068		C	C ₀
12	66	+28	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	+8	1060	510
		-1		-16		
16	68	+28		+8	1280	630
		-1		-16		
20	55	+31		+8	2570	1180
		-2		-16		
25	57	+31		+8	4130	2250
		-2		-16		
30	57	+31		+8	5020	2880
		-2		-16		
40	56	+35		+8	8620	4480
		-3		-16		
50	54	+35		+13	12500	6620
		-3		-21		

- 1) Tolerance DIN 1685-GTB 16.
- 2) Lower limit relative to Ø d.
- 3) When screwed down, relative to shaft nominal dimension d.
- 4) The load capacities apply for the main direction of loading.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Linear Sets with Super Linear Bushings  or , cast-iron housing

Linear Sets, R1073 With side opening

Linear Sets, R1074 With side opening, adjustable



Structural design

- Precision housing (spheroidal graphite cast iron)
- Retention via grooved taper pin
- Super Linear Bushing with or without self-alignment
- External seals

The load carrying capacity of open linear bushings is considerably reduced when the load is applied to the “open” portion of the bushing. The Linear Set with Side Opening has been developed to overcome this disadvantage and to permit selective circumferential positioning of the open linear bushing.



With side opening



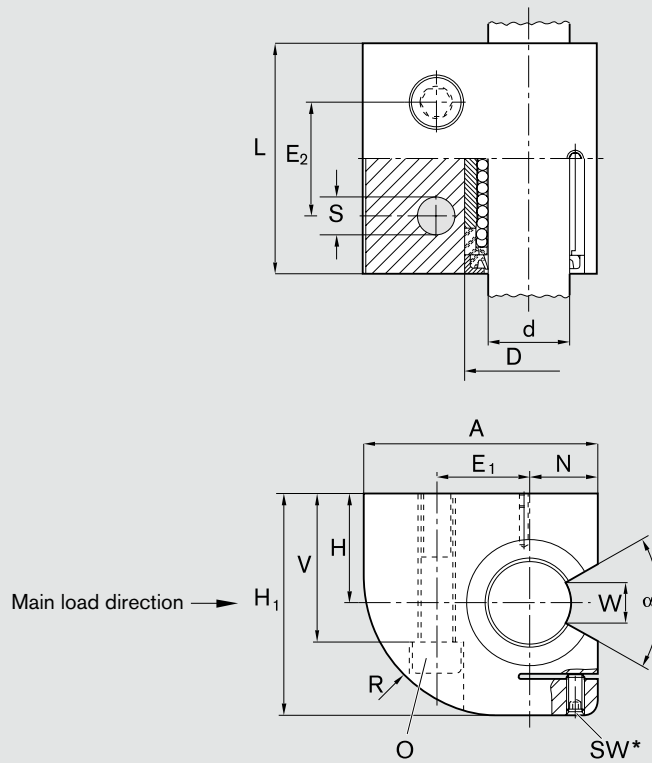
Shaft Ø d (mm)	Part numbers		Weight (kg)
	With Super Linear Bushing  With two seals	With Super Linear Bushing  With two seals	
20	R1073 620 00	R1073 820 00	1.0
25	R1073 625 00	R1073 825 00	1.9
30	R1073 630 00	R1073 830 00	2.8
40	R1073 640 00	R1073 840 00	4.8
50	R1073 650 00	R1073 850 00	8.0

With side opening, adjustable



Shaft Ø d (mm)	Part numbers		Weight (kg)
	With Super Linear Bushing  With two seals	With Super Linear Bushing  With two seals	
20	R1074 620 00	R1074 820 00	1.0
25	R1074 625 00	R1074 825 00	1.9
30	R1074 630 00	R1074 830 00	2.8
40	R1074 640 00	R1074 840 00	4.8
50	R1074 650 00	R1074 850 00	8.0

Dimensions



* SW = WAF



Dimensions (mm)

Ø d	H	H ₁ ¹⁾	L ¹⁾	A ¹⁾	E ₁	E ₂	N	D	V	S	WAF	O ²⁾	R ¹⁾	W ³⁾
20	30	60	60	60	22±0.25	30±0.25	17	32	42	9	2.5	M8x60	37	9
25	35	72	73	75	28±0.25	36±0.25	21	40	50	11	3	M10x70	45	11.5
30	40	82	85	86	34±0.5	42±0.5	25	47	55	13.5	3	M12x80	51	14
40	45	100	97	110	43±0.5	48±0.5	32	62	67	15.5	4	M14x90	66	19.5
50	50	115	125	127	50±0.5	62±0.5	38	75	78	17.5	5	M16x110	77	22.5

Ø d (mm)	Angle α (°)	Radial clearance ⁴⁾ (µm)		Tolerance for H ⁵⁾ (µm)	Load capacities ⁶⁾ (N)	
		R1073 Shaft h6	R1074		C	C ₀
20	55	+31	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	+8	2570	1180
		-2		-16		
25	57	+31		+8	4130	2250
		-2		-16		
30	57	+31		+8	5020	2880
		-2		-16		
40	56	+35		+8	7680	4480
		-3		-16		
50	54	+35		+13	12500	6620
		-3		-21		

- 1) Tolerance DIN 1685-GTB 16.
- 2) Hex socket head cap screws per ISO 4762-8.8.
- 3) Lower limit relative to Ø d.
- 4) When screwed down.
- 5) When screwed down, relative to shaft nominal dimension d.
- 6) The load capacities apply for the main direction of loading.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.



Linear Sets with Super Linear Bushings  or , cast-iron housing

Linear Sets, R1081 Flanged type

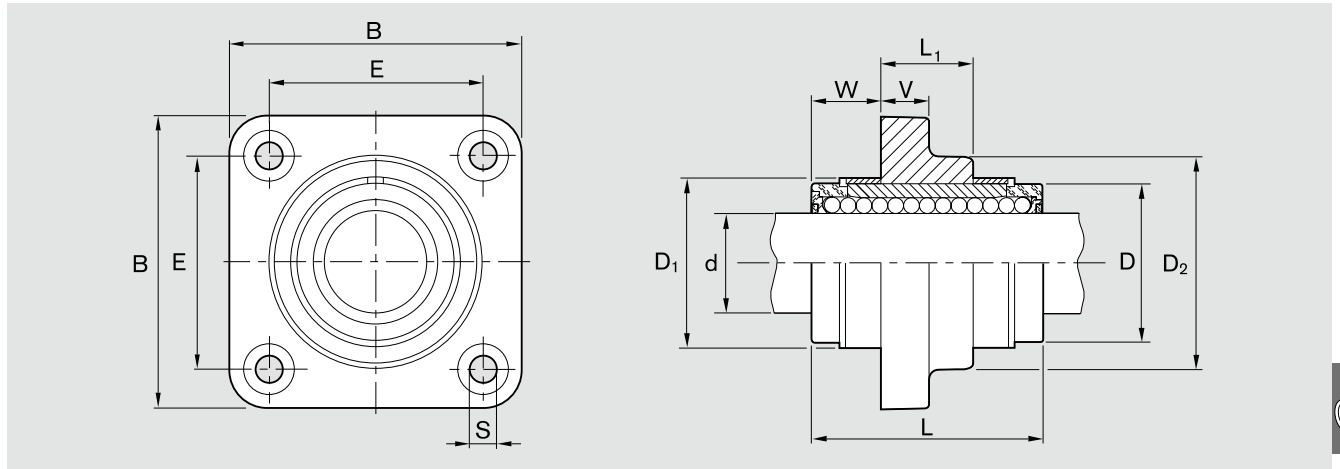
Structural design

- Precision flanged housing (lamellar graphite cast iron)
- Two retaining rings, plus two spacer rings (steel) for sizes 12 to 40
- Super Linear Bushing with or without self-alignment
- Integrated wiper seals
- Radial clearance not adjustable



Shaft Ø d (mm)	Part numbers		Weight (kg)
	With Super Linear Bushing  With two seals	With Super Linear Bushing  With two seals	
12	R1081 612 40	R1081 812 40	0.095
16	R1081 616 40	R1081 816 40	0.16
20	R1081 620 40	R1081 820 40	0.30
25	R1081 625 40	R1081 825 40	0.57
30	R1081 630 40	R1081 830 40	1.85
40	R1081 640 40	R1081 840 40	1.65
50	R1081 650 40	R1081 850 40	3.40

Dimensions



Dimensions (mm)											Radial clearance (μm)		Load capacities (N)	
$\varnothing d$	B ¹⁾	L	L ₁	D	D ₁ +0.8	D ₂ ¹⁾	E	S H13	V ¹⁾	W	Shaft h6	C	C ₀	
12	42	32	12	22	24	28	30±0.12	5.5	6	10	+38 +10	830	420	
16	50	36	15	26	28.5	34	35±0.12	5.5	8	10.5	+38 +10	1020	530	
20	60	45	18	32	35	42	42±0.15	6.6	10	13.5	+43 +11	2020	1050	
25	74	58	23	40	43	54	54±0.15	6.6	12	17.5	+43 +11	3950	2180	
30	84	68	26	47	49.5	62	60±0.25	9.0	14	21	+43 +11	4800	2790	
40	108	80	36	62	66.5	80	78±0.25	11	16	22	+50 +12	8240	4350	
50	130	100	72	75	81	98	98±0.25	11	18	14	+50 +12	12060	6470	

1) Tolerance DIN 1686-GTB 15.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Standard Linear Bushings

Product Overview

Advantages

- Rugged all-metal design with steel ball retainer for harsh environments with heavy contamination
- For use in woodworking, foundries, cement works
- Corrosion-resistant versions available for medical, chemical and food industry applications
- Many pockets acting as lubricant reservoirs for extended lubrication intervals or lubrication for life
- Pockets also whisk away any dirt that may have worked its way in and so prevent jamming of the linear bushing
- Available without seals and with steel ball retainers for temperatures well above 80 °C or vacuum applications
- Various flanged versions available
- With or without integrated wiper seals
- Linear Sets with cast-iron housing



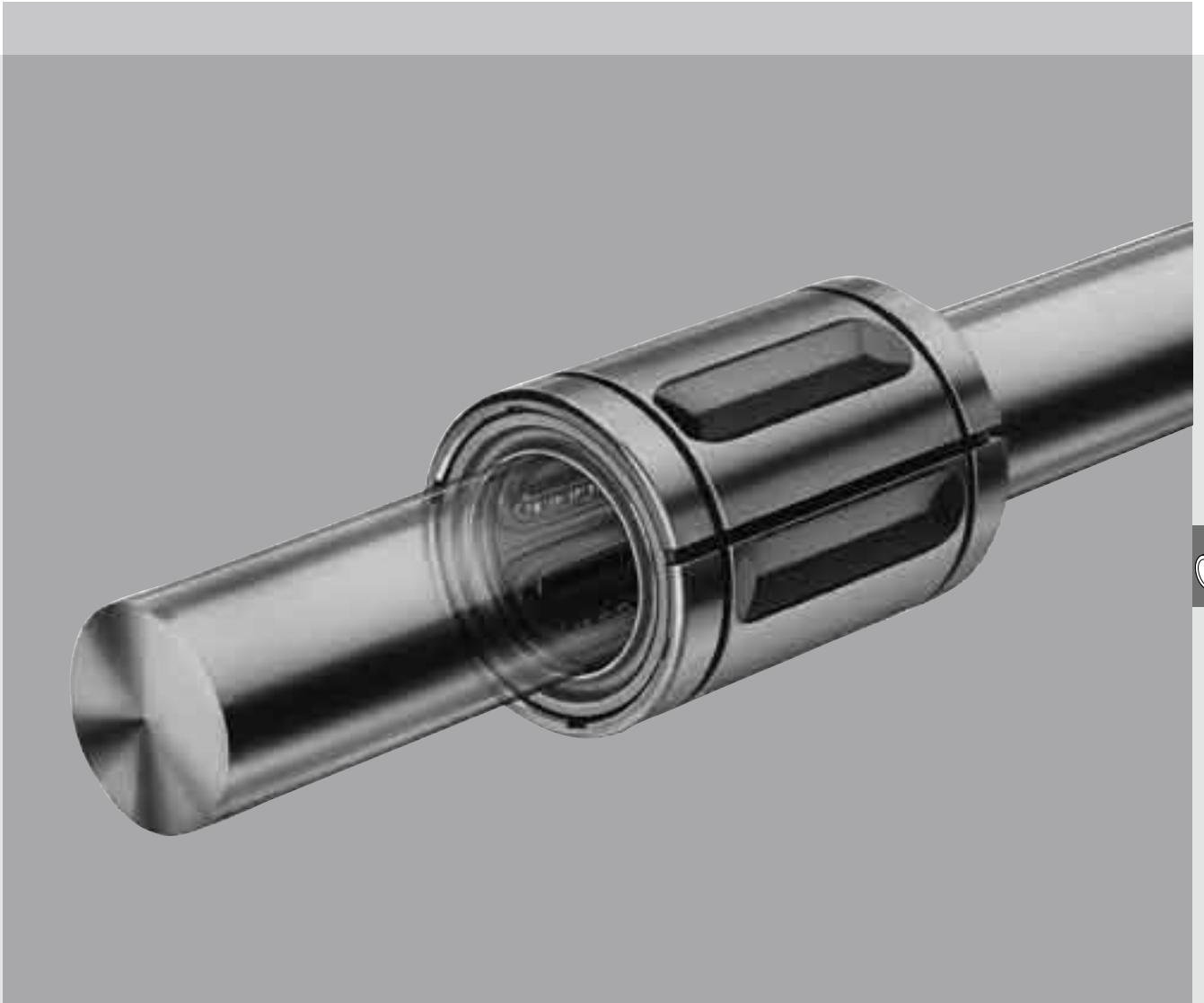
Closed type



Adjustable type



Open type



Tandem



Flanged type



With central flange

Standard Linear Bushings

Technical Data

Please also refer to the general technical principles and the lubricating and mounting instructions.

Outside dimensions/ interchangeability

Standard Linear Bushings have the same outside dimensions and are therefore interchangeable with Super Linear Bushings (caution: different retention, radial clearance, load capacities and lubrication).

Sealing

Standard Linear Bushings with shaft size 5 and up are available with seals. Open type Standard Linear Bushings in sizes 20 to 80 can also be supplied fully sealed (with side seal), though this will result in greater friction.

Friction

The friction coefficient μ of unsealed Standard Linear Bushings using oil as a lubricant lies between 0.001 and 0.004.

The friction coefficient is lowest under high load. It may, however, be greater than the stated value when only a slight load is applied.

For Standard Linear Bushings fitted with integrated wiper seals at both ends and not subject to radial loading, the frictional drag (see table below) depends on the speed and the type of lubrication.

Shaft $\varnothing d$ (mm)	Closed and adjustable types		Open type	
	Breakaway force (N) approx.	Frictional drag (N) approx.	Breakaway force (N) approx.	Frictional drag (N) approx.
5	0.8	0.4	–	–
8	1	0.5	–	–
10	2	1	–	–
12	6	2	8	3
16	9	3	12	4
20	12	4	16	6
25	14	5	19	7
30	18	6	24	8
40	24	8	32	11
50	30	10	40	14
60	36	12	48	16
80	45	15	60	20

Travel speed and acceleration

$\varnothing d$ (mm)	v_{\max} (m/s)	a_{\max} (m/s ²)
≤ 40	2.5	100
≥ 50	2	50

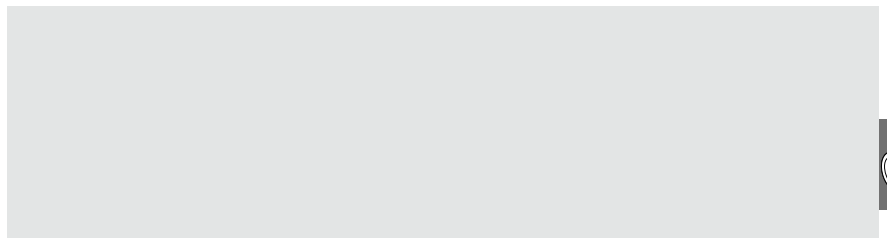
Operating temperatures

-10 °C to 80 °C

Higher temperatures are permissible for linear bushings without seals and with steel ball retainers, although this will result in reduced load capacities (see life expectancy calculation).

Direction of load and its influence on the load capacity of closed and adjustable Standard Linear Bushings

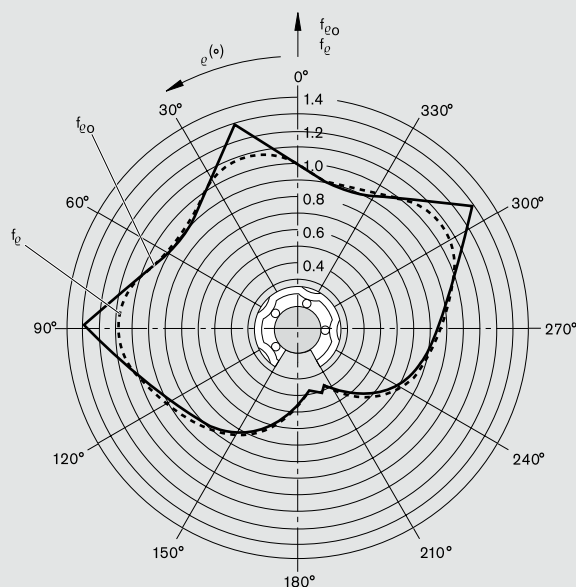
The load capacities should be selected as appropriate for installation in the "min" or "max" position, and all calculations should then be based on the selected values. In applications where the load direction is exactly known and where the Standard Linear Bushings can be mounted in the "max" position, the load capacity ratings C_{max} (dynamic load capacity) and C_{0max} (static load capacity) can be used. If aligned installation is not possible or if the direction of loading is not defined, the minimum load capacities will apply.



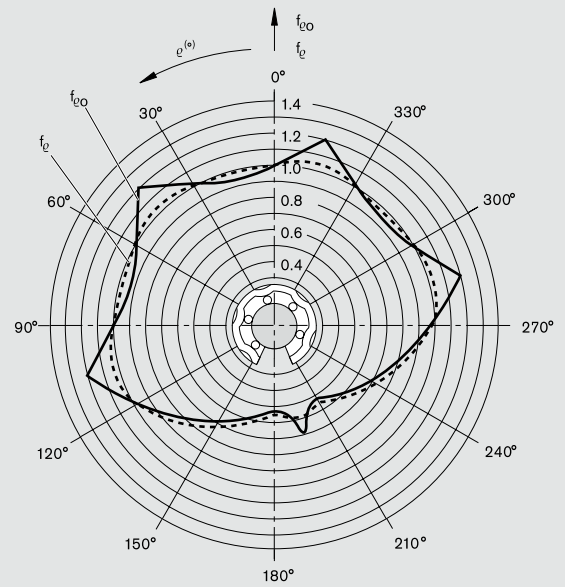
Direction of load and its influence on the load capacity of open Standard Linear Bushings

The load capacities C and C_0 apply only when the load is acting along the line $\varrho = 0^\circ$. If the load is acting in any other direction, these load capacities must be multiplied by the factor f_ϱ (dynamic load capacity C) or $f_{\varrho 0}$ (static load capacity C_0). A reduction in load capacity can be avoided by selective circumferential positioning of the Standard Linear Bushing (see Linear Set with Side Opening).

Load direction factors



Shaft diameter 20 and 25



Shaft diameter 30 to 80

Standard Linear Bushings

Customer-Built Housings

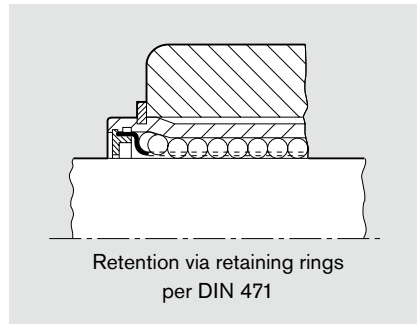
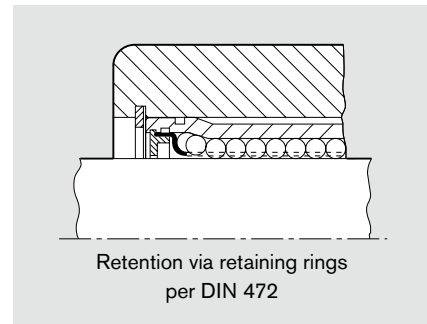
Retention

Standard Linear Bushings

Closed type

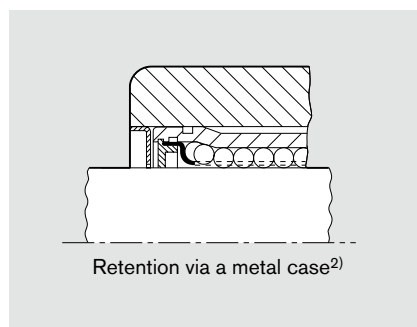
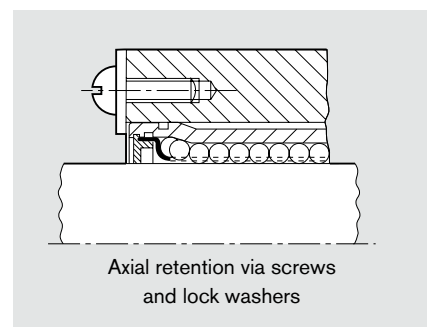


Adjustable type

- Retaining rings
- Metal case
- Special design

Retention via retaining rings
per DIN 471Retention via retaining rings
per DIN 472

Shaft Ø d (mm)	Retaining rings DIN 471		Retaining rings DIN 472	
	Part numbers	Dimensions (mm)	Part numbers	Dimensions (mm)
5	R3410 712 00	12 x 1	R3410 207 00	12 x 1
8	R3410 713 00	16 x 1	R3410 208 00	16 x 1
10	R3410 763 00	19 x 1.2	R3410 221 00	19 x 1
12	R3410 714 00	22 x 1.2	R3410 209 00	22 x 1
16	R3410 715 00	27 x 1.2 ¹⁾	R3410 210 00	26 x 1.2
20	R3410 716 00	33 x 1.5 ¹⁾	R3410 211 00	32 x 1.2
25	R3410 717 00	42 x 1.75	R3410 212 00	40 x 1.75
30	R3410 718 00	48 x 1.75	R3410 213 00	47 x 1.75
40	R3410 719 00	62 x 2	R3410 214 00	62 x 2
50	R3410 720 00	75 x 2.5	R3410 215 00	75 x 2.5
60	R3410 721 00	90 x 3	R3410 216 00	90 x 3
80	R3410 722 00	120 x 4	R3410 217 00	120 x 4

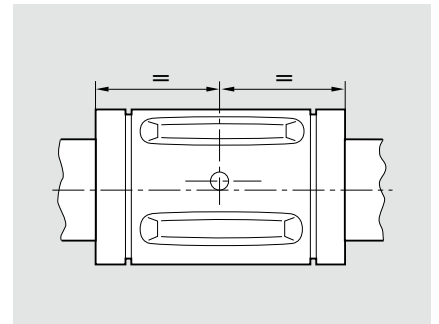
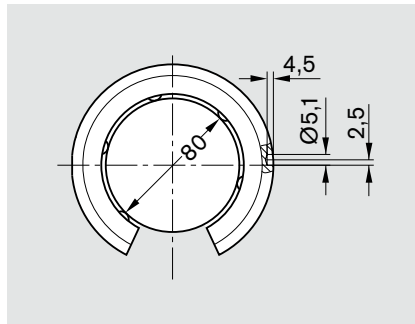
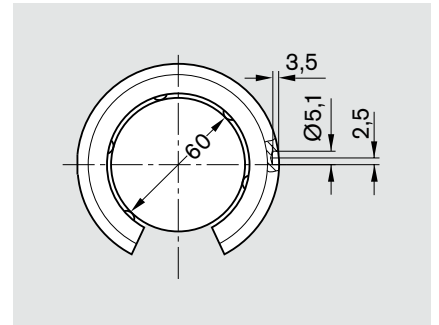
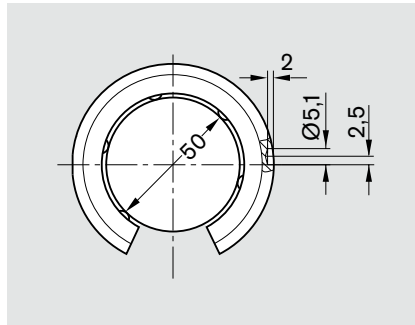
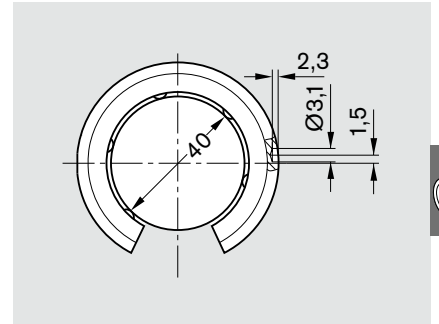
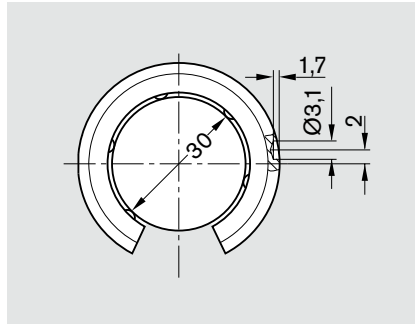
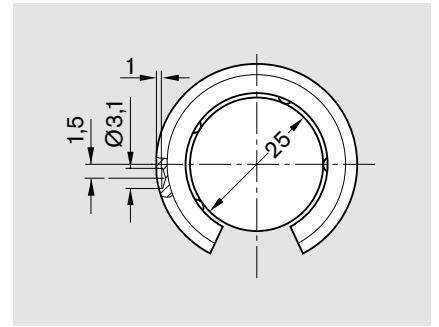
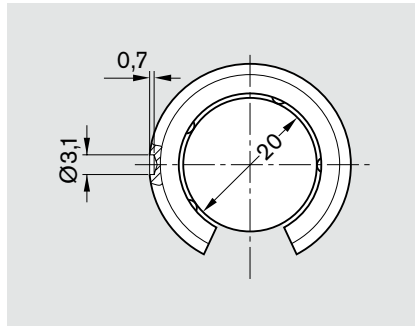
1) Not per DIN 471.

Retention via a metal case²⁾Axial retention via screws
and lock washers2) For part numbers and dimensions, see Super Linear Bushings  and , Customer-Built Housings.

Standard Linear Bushings, open type

– Dimensions of retention hole

The open type Standard Linear Bushing has been provided with a retention hole, thus allowing axial and radial securing.



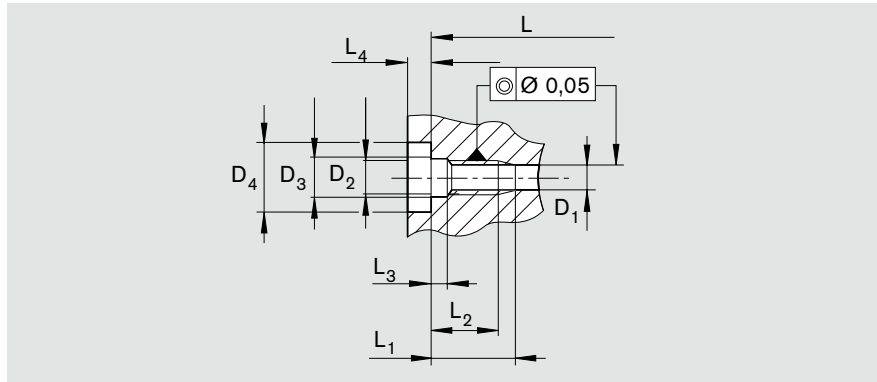
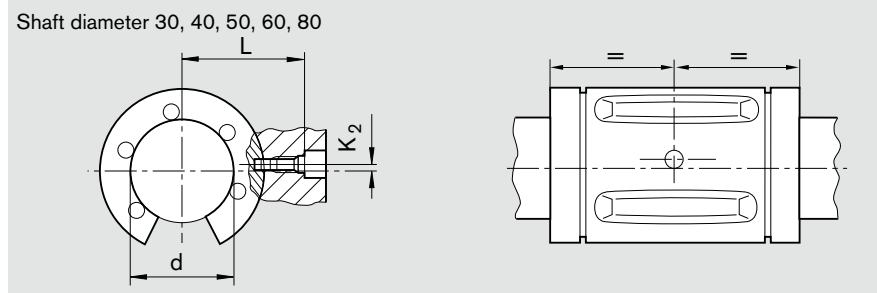
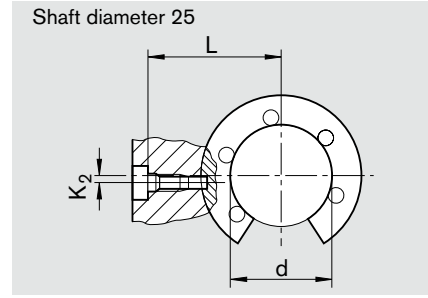
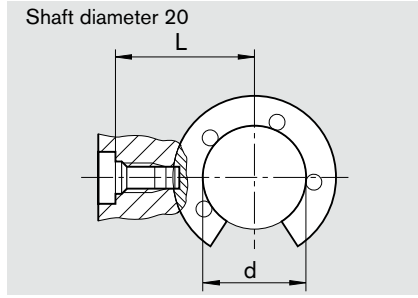
Standard Linear Bushings

Customer-Built Housings

– Retention via locating screw

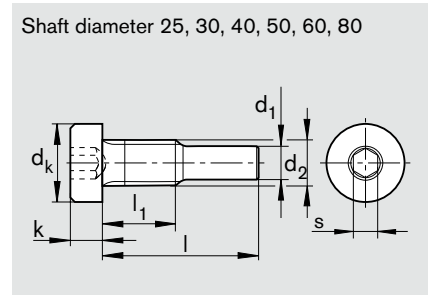
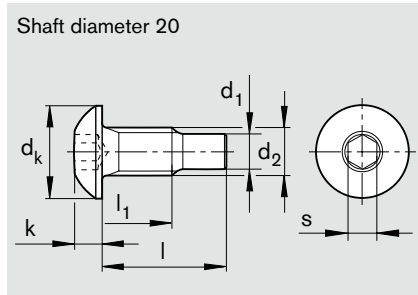
Notes for mounting:

- Open type Standard Linear Bushings have been provided with the necessary retention hole.
- On installation, the retention hole of the Linear Bushing must be aligned with the tapped hole in the housing. The screw is then inserted, screwed down to the specified depth and tightened to the specified torque.



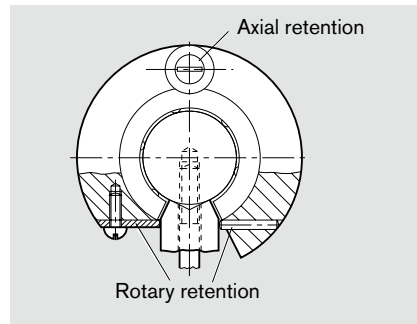
Locating screws

The locating screws are of the self-locking type.



Dimensions (mm)																	Locating screw		
Shaft Ø d	L	K ₂	L ₁	L ₂ min.	L ₃ +0.2	L ₄ min.	D ₁ +0.1	D ₂	D ₃ H13	D ₄ H13	d ₂	d _k	d ₁	l	l ₁	k	s	Part numbers	Tightening torque (Nm)
20	25.50 _{-0.10}	–	8.5 ^{+0.2}	6.5	1.3	2.5	3.1	M4	4.5	8	M4	7.6	3	10.15	5.7	2.2	2.5	R3429 009 01	1.9
25	33.05 _{-0.10}	1.5	10 ^{+0.2}	8	2	3.2	3.1	M4	4.5	8	M4	7	3	14.1	6.5	2.8	2.5	R3427 009 09	1.9
30	36.00 _{-0.15}	2.0	10 ^{+0.2}	8	2	3.2	3.1	M4	4.5	8	M4	7	3	14.1	6.5	2.8	2.5	R3427 009 09	1.9
40	42.90 _{-0.15}	1.5	10 ^{+0.2}	8	2	3.2	3.1	M4	4.5	8	M4	7	3	14.1	6.5	2.8	2.5	R3427 009 09	1.9
50	58.50 _{-0.20}	2.5	17.5 ^{+0.5}	13.5	3.7	6	5.1	M8	9	15	M8	13	5	22.8	12.5	5	5	R3427 005 09	16
60	71.50 _{-0.25}	2.5	17.5 ^{+0.5}	13.5	3.7	6	5.1	M8	9	15	M8	13	5	29.7	12.5	5	5	R3427 006 09	16
80	85.50 _{-0.25}	2.5	17.5 ^{+0.5}	13.5	3.7	6	5.1	M8	9	15	M8	13	5	29.7	12.5	5	5	R3427 006 09	16

- Axial retention via screws and lock washers; rotary retention via pins or plates



Standard Linear Bushings

**Standard Linear Bushings, R0600
Closed type, without wiper seals****Standard Linear Bushings, R0602
Closed type, with wiper seals****Structural design**

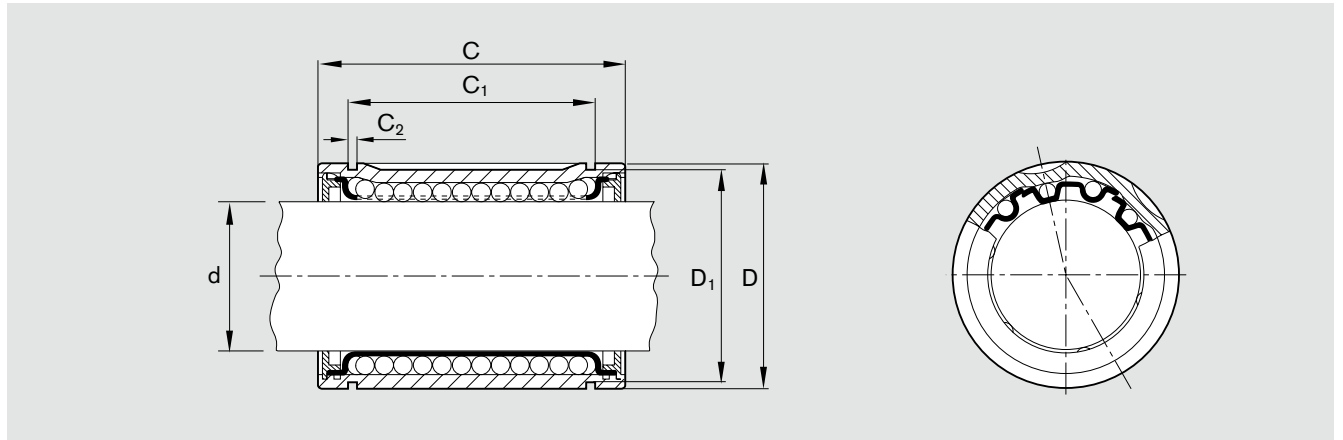
- Hardened and ground outer sleeve
- Steel ball retainer (plastic ball retainer in sizes 3 to 10)
- Balls made of anti-friction bearing steel
- Integrated steel holding rings or seals
- Closed version, for use on unsupported shafts



Shaft Ø d (mm)	Part numbers		Weight (kg)
	Without seals	With two seals	
3	R0600 303 00	–	0.001
4	R0600 304 00	–	0.002
5	R0600 305 00	R0602 305 10	0.010
8	R0600 308 00	R0602 308 10	0.020
10	R0600 310 00	R0602 310 10	0.030
12	R0600 012 00	R0602 012 10	0.040
16	R0600 016 00	R0602 016 10	0.050
20	R0600 020 00	R0602 020 10	0.100
25	R0600 025 00	R0602 025 10	0.190
30	R0600 030 00	R0602 030 10	0.320
40	R0600 040 00	R0602 040 10	0.620
50	R0600 050 00	R0602 050 10	1.140
60	R0600 060 00	R0602 060 10	2.110
80	R0600 080 00	R0602 080 10	4.700

With one integrated wiper seal: R0601 ... 10.

Dimensions



Dimensions (mm)						No. of ball circuits	Working bore diameter tolerance (μm)	Radial clearance ¹⁾ Shaft h6 (μm)	Load capacities (N)			
$\varnothing d$	D	C h12	C ₁ H13	C ₂	D ₁				min.	C max.	min.	C ₀ max.
3	7	10	-	-	-	4	+8 0	+12 +2	55	65	45	65
4	8	12	-	-	-	4	+8 0	+14 +2	70	80	60	85
5	12	22	14.2	1.1	11.1	4	+11 +1	+16 +4	180	210	140	200
8	16	25	16.2	1.1	14.7	4	+12 +2	+18 +5	320	370	240	330
10	19	29	21.6	1.3	18	4	+8 0	+18 +5	300	350	260	370
12	22	32	22.6	1.3	20.5	4	+12 +2	+20 +5	420	480	280	400
16	26	36	24.6	1.3	24.9	4	+14 +2	+22 +5	580	670	440	620
20	32	45	31.2	1.6	30.5	5	+14 +2	+23 +6	1170	1390	860	1250
25	40	58	43.7	1.85	38.5	5	+16 +2	+25 +6	2080	2480	1560	2280
30	47	68	51.7	1.85	44.5	6	+16 +2	+25 +6	2820	2980	2230	2860
40	62	80	60.3	2.15	58	6	+19 +2	+30 +7	5170	5480	3810	4880
50	75	100	77.3	2.65	71	6	+19 +2	+30 +7	8260	8740	6470	8280
60	90	125	101.3	3.15	85	6	+19 +2	+33 +7	11500	12100	9160	11730
80	120	165	133.3	4.15	114	6	+24 +2	+37 +8	21000	22200	16300	20850

1) Statistically determined from the working bore diameter and shaft tolerance. Recommended housing bore tolerance: H6 or H7.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Standard Linear Bushings

Standard Linear Bushings, R0600
Closed type, without wiper seals
Corrosion-resistant

Standard Linear Bushings, R0602
Closed type, with wiper seals
Corrosion-resistant

Structural design

- Hardened and ground outer sleeve made of corrosion-resistant steel
- Corrosion-resistant steel ball retainer
- Balls made from corrosion-resistant anti-friction bearing steel
- Integrated steel holding rings or seals
- Closed version, for use on unsupported shafts

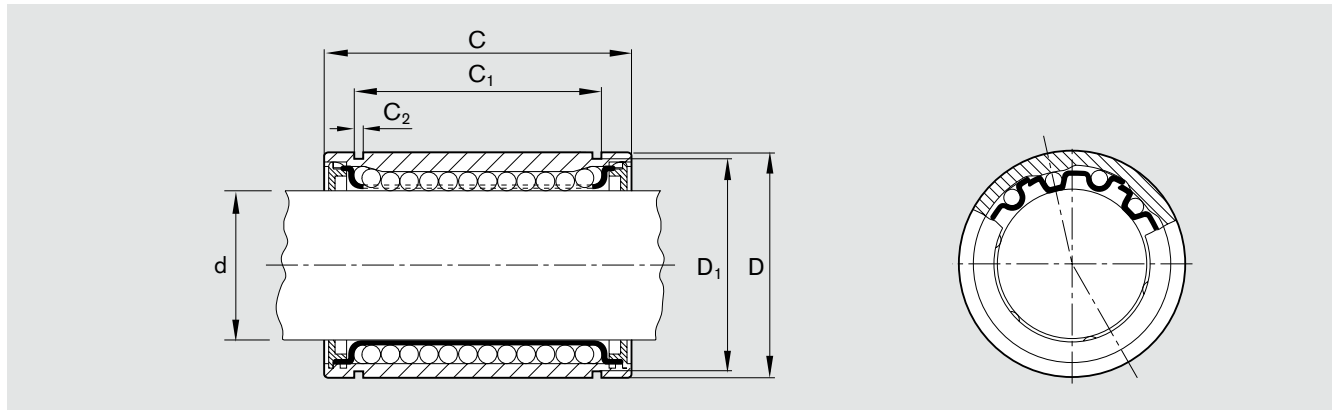


Shaft Ø d (mm)	Part numbers		Weight (kg)
	Without seals	With two seals	
3	R0600 003 30	–	0.001
4	R0600 004 30	–	0.002
5	R0600 005 30	R0602 005 30	0.011
8	R0600 008 30	R0602 008 30	0.022
10	R0600 010 30	R0602 010 30	0.036
12	R0600 012 30	R0602 012 30	0.045
16	R0600 016 30	R0602 016 30	0.060
20	R0600 020 30	R0602 020 30	0.100
25	R0600 025 30	R0602 025 30	0.235
30	R0600 030 30	R0602 030 30	0.360
40	R0600 040 30	R0602 040 30	0.770

Note

Corrosion-resistant steels are steels per ISO 683-17 / EN 10088.

Dimensions



Dimensions (mm)						No. of ball circuits	Working bore diameter tolerance (μm)	Radial clearance ¹⁾ Shaft h6 (μm)	Load capacities (N)			
$\varnothing d$	D	C h12	C ₁ H13	C ₂	D ₁				min.	C max.	min.	C ₀ max.
3	7	10	-	-	-	4	+8 0	+12 +2	55	65	45	65
4	8	12	-	-	-	4	+8 0	+14 +2	70	80	60	85
5	12	22	14.2	1.1	11.5	4	+11 +1	+16 +4	160	185	180	250
8	16	25	16.2	1.1	15.2	4	+12 +2	+18 +5	210	240	235	330
10	19	29	21.6	1.3	18	4	+8 0	+18 +5	300	350	260	370
12	22	32	22.6	1.3	21	4	+12 +2	+20 +5	400	460	420	600
16	26	36	24.6	1.3	24.9	4	+14 +2	+22 +5	460	530	440	630
20	32	45	31.2	1.6	30.3	5	+14 +2	+23 +6	680	800	860	1250
25	40	58	43.7	1.85	37.5	6	+16 +2	+25 +6	780	830	1620	2100
30	47	68	51.7	1.85	44.5	6	+16 +2	+25 +6	1250	1320	2000	2500
40	62	80	60.3	2.15	59	6	+19 +2	+30 +7	1720	1820	3300	4200

1) Statistically determined from the working bore diameter and shaft tolerance. Recommended housing bore tolerance: H6 or H7.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Standard Linear Bushings

**Standard Linear Bushings, R0610
Adjustable, without wiper seals****Standard Linear Bushings, R0612
Adjustable, with wiper seals****Structural design**

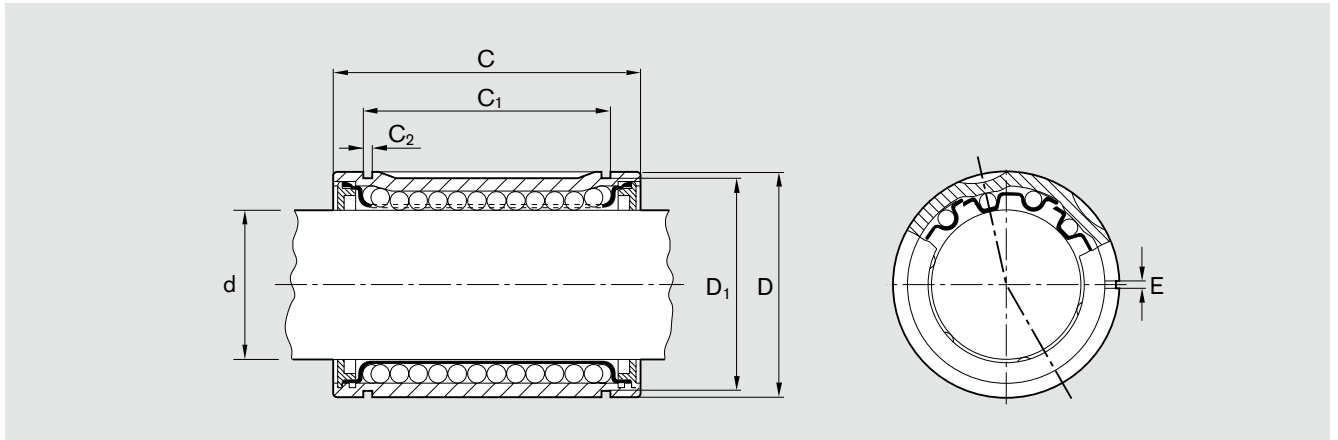
- Hardened and ground outer sleeve
- Steel ball retainer (plastic ball retainer in sizes 5 to 8)
- Balls made of anti-friction bearing steel
- Integrated steel holding rings or seals
- Radial clearance adjustable

Adjustable type

Shaft Ø d (mm)	Part numbers		Weight (kg)
	Without seals	With two seals	
5	R0610 305 00	R0612 305 10	0.01
8	R0610 308 00	R0612 308 10	0.02
12	R0610 012 00	R0612 012 10	0.04
16	R0610 016 00	R0612 016 10	0.05
20	R0610 020 00	R0612 020 10	0.10
25	R0610 025 00	R0612 025 10	0.19
30	R0610 030 00	R0612 030 10	0.32
40	R0610 040 00	R0612 040 10	0.62
50	R0610 050 00	R0612 050 10	1.14
60	R0610 060 00	R0612 060 10	2.11
80	R0610 080 00	R0612 080 10	4.70

With one integrated wiper seal: R0611 ... 10.

Dimensions



Dimensions (mm)							No. of ball circuits	Load capacities (N)				Radial clearance (µm)	
Ø d	D	C h12	C ₁ H13	C ₂	D ₁	E		min.	C max.	min.	C ₀ max.	h6/H7	h6/K7
5	12	22	14.2	1.1	11.1	1.5	4	180	210	140	200	+34 +11	+22 -1
8	16	25	16.2	1.1	14.7	1.5	4	320	370	240	330	+36 +13	+24 +1
12	22	32	22.6	1.3	20.5	1.5	4	420	480	280	400	+41 +14	+26 -1
16	26	36	24.6	1.3	24.9	1.5	4	580	670	440	620	+43 +14	+28 -1
20	32	45	31.2	1.6	30.5	2.0	5	1170	1390	860	1250	+49 +16	+31 -2
25	40	58	43.7	1.85	38.5	2.0	5	2080	2480	1560	2280	+50 +17	+32 -1
30	47	68	51.7	1.85	44.5	2.0	6	2820	2980	2230	2860	+50 +17	+32 -1
40	62	80	60.3	2.15	58	2.0	6	5170	5480	3810	4880	+60 +20	+39 -1
50	75	100	77.3	2.65	71	2.0	6	8260	8740	6470	8280	+60 +20	+39 -1
60	90	125	101.3	3.15	85	2.0	6	11500	12100	9160	11730	+68 +22	+43 -3
80	120	165	133.3	4.15	114	2.0	6	21000	22200	16300	20850	+71 +24	+46 -1

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Standard Linear Bushings

Standard Linear Bushings, R0630
Open type, without wiper seals**Standard Linear Bushings, R0632**
Open type, with wiper seals**Structural design**

- Hardened and ground outer sleeve
- Steel ball retainer
- Balls made of anti-friction bearing steel
- Integrated steel holding rings or seals
- With bore for axial and radial retention (except sizes 12 and 16)

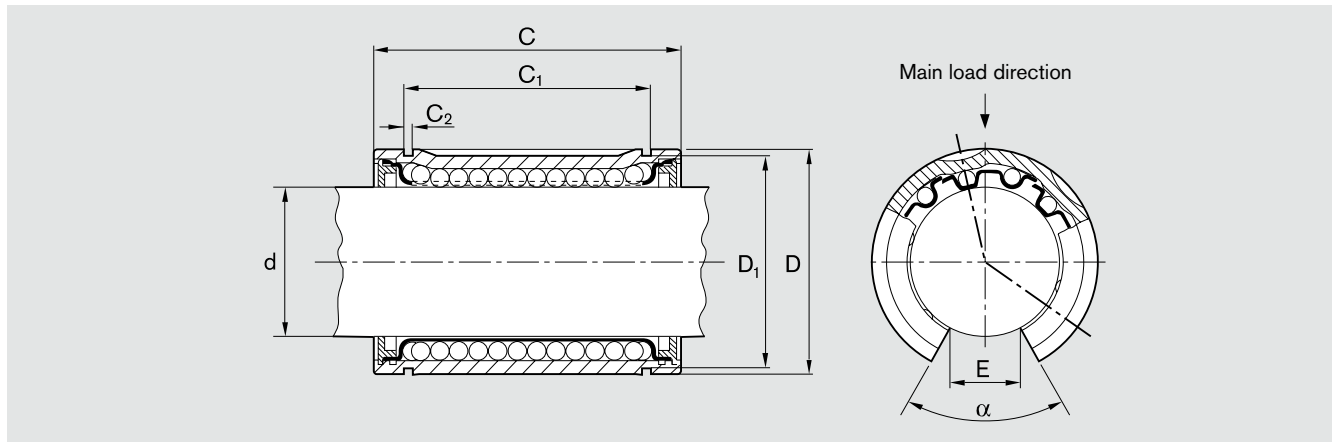


Shaft Ø d (mm)	Part numbers			Weight (kg)
	Without seals	With two seals	Fully sealed	
12 ¹⁾	R0630 012 00	R0632 012 00	–	0.03
16 ¹⁾	R0630 016 00	R0632 016 00	–	0.04
20	R0630 020 00	R0632 020 00	R0632 020 05	0.08
25	R0630 025 00	R0632 025 00	R0632 025 05	0.15
30	R0630 030 00	R0632 030 00	R0632 030 05	0.26
40	R0630 040 00	R0632 040 00	R0632 040 05	0.52
50	R0630 050 00	R0632 050 00	R0632 050 05	0.95
60	R0630 060 00	R0632 060 00	R0632 060 05	1.76
80	R0630 080 00	R0632 080 00	R0632 080 05	3.92

1) Without bore for axial and radial retention.

With one integrated wiper seal: R0631 0.. 00.

Dimensions



Dimensions (mm)							Angle α (°)	No. of ball circuits	Load capacities ²⁾ (N)		Radial clearance (μm)		
$\varnothing d$	D	C h12	C ₁ H13	C ₂	D ₁	E ¹⁾			C	C ₀	Shaft/bore		
12	22	32	22.6	1.3	20.5	7.5	78	3	430	290	h6/H7	h6/K7	
											+41	+26	
											+14	-1	
16	26	36	24.6	1.3	24.9	10.0	78	3	600	450	+43	+28	
											+14	-1	
20	32	45	31.2	1.6	30.5	10.0	60	4	1280	970	+49	+31	
											+16	-2	
25	40	58	43.7	1.85	38.5	12.5	60	4	2270	1750	+50	+32	
											+17	-1	
30	47	68	51.7	1.85	44.5	12.5	50	5	2890	2390	+50	+32	
											+17	-1	
40	62	80	60.3	2.15	58	16.8	50	5	5280	4000	+60	+39	
											+20	-1	
50	75	100	77.3	2.65	71	21.0	50	5	8470	6900	+60	+39	
											+20	-1	
60	90	125	101.3	3.15	85	27.2	54	5	11800	9780	+68	+43	
											+22	-3	
80	120	165	133.3	4.15	114	36.3	54	5	21500	17400	+71	+46	
											+24	-1	

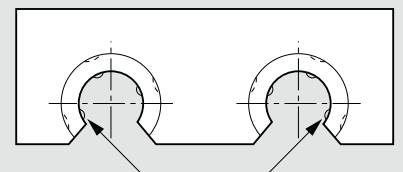
1) Lower limit relative to $\varnothing d$.

2) The load capacities C and C₀ apply for the main direction of loading.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Sizes 12 and 16 must be mounted as shown here (mirror-symmetrically) to prevent them lifting off from the shaft. It is not possible to adjust a single linear bushing (with slotted housing adjustable via adjusting screw) to zero-clearance.



Standard Linear Bushings

Standard Linear Bushings, R0650 Tandem, with wiper seals Normal

Structural design

- Hardened and ground outer sleeve
- Plastic ball retainer
- Balls made of anti-friction bearing steel
- Integrated wiper seals

Standard Linear Bushings, R0650 Tandem, with wiper seals Corrosion-resistant

Structural design

- Hardened and ground outer sleeve made of corrosion-resistant steel
- Corrosion-resistant steel ball retainer
- Balls made from corrosion-resistant anti-friction bearing steel
- Integrated wiper seals

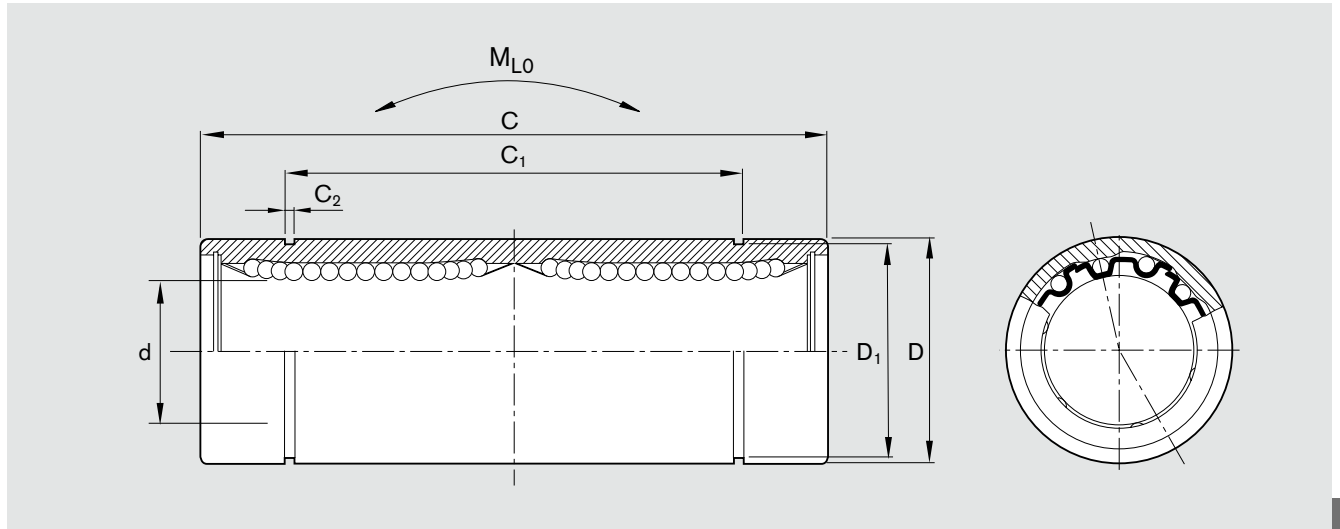


Shaft Ø d (mm)	Part numbers		Weight (kg)
	Normal	Corrosion-resistant	
8	R0650 508 00	R0650 208 30	0.04
12	R0650 512 00	R0650 212 30	0.08
16	R0650 516 00	R0650 216 30	0.12
20	R0650 520 00	R0650 220 30	0.18
25	R0650 525 00	R0650 225 30	0.43
30	R0650 530 00	R0650 230 30	0.62
40	R0650 540 00	R0650 240 30	1.40

Note

Corrosion-resistant steels are steels per ISO 683-17 / EN 10088.

Dimensions



Dimensions (mm)						No. of ball circuits	Working bore diameter tolerance	Radial clearance ¹⁾ Shaft h6	Load capacities (N)				Tipping moment M_{L0} (Nm)
$\varnothing d$	D	C	C_1	C_2	D_1				min.	C max.	min.	C_0 max.	
8	16	46 _{-0.3}	33 _{-0.3}	1.10	15.2	4	+9 -1	+15 +2	340	390	470	660	4.5
12	22	61 _{-0.3}	45.8 _{-0.3}	1.30	21.0	4	+9 -1	+17 +2	650	750	840	1200	11,0
16	26	68 _{-0.3}	49.8 _{-0.3}	1.30	24.9	4	+11 -1	+19 +2	750	860	880	1260	13,0
20	32	80 _{-0.3}	61 _{-0.3}	1.60	30.5	5	+11 -1	+20 +3	1100	1300	1720	2500	26,0
25	40	112 _{-0.4}	82 _{-0.4}	1.85	38.0	6	+13 -2	+22 +2	1250	1350	3240	4200	61,0
30	47	123 _{-0.4}	104.2 _{-0.4}	1.85	44.5	6	+13 -2	+22 +2	2000	2150	4000	5000	82,0
40	62	151 _{-0.4}	121.2 _{-0.4}	2.15	59.0	6	+16 -4	+27 +1	2800	3000	6600	8400	165,0

1) Statistically determined from the working bore diameter and shaft tolerance. Recommended housing bore tolerance: H6 or H7.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.
Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Standard Linear Bushings

Standard Linear Bushings, R0740 Flanged type Normal

Structural design

- Hardened and ground outer sleeve
- Plastic ball retainer
- Balls made of anti-friction bearing steel
- Integrated wiper seals

Standard Linear Bushings, R0740 Flanged type Corrosion-resistant

Structural design

- Hardened and ground outer sleeve made of corrosion-resistant steel
- Corrosion-resistant steel ball retainer (size 5 with plastic ball retainer)
- Balls made from corrosion-resistant anti-friction bearing steel
- Integrated wiper seals

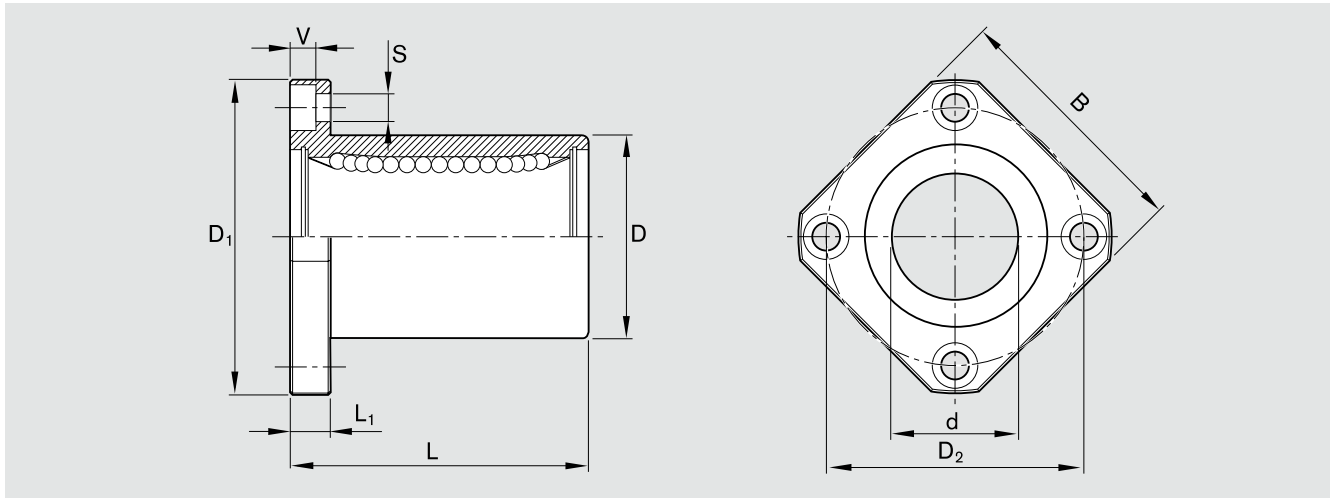


Shaft Ø d (mm)	Part numbers		Weight (kg)
	Normal	Corrosion-resistant	
5	R0740 505 00	R0740 505 30	0.020
8	R0740 508 00	R0740 208 30	0.033
12	R0740 512 00	R0740 212 30	0.064
16	R0740 516 00	R0740 216 30	0.090
20	R0740 520 00	R0740 220 30	0.150
25	R0740 525 00	R0740 225 30	0.300
30	R0740 530 00	R0740 230 30	0.470
40	R0740 540 00	R0740 240 30	0.980

Note

Corrosion-resistant steels are steels per ISO 683-17 / EN 10088.

Dimensions



Dimensions (mm)										No. of ball circuits	Working bore diameter tolerance (μm)	Radial clearance ¹⁾ Shaft h6 (μm)	Load capacities (N)			
$\varnothing d$	D	D ₁	D ₂	B	L ± 0.3	L ₁	V	S	C				C ₀			
5	12 _{-0,013}	28	20	22	22	5	3.1	3.5	4	+8 +0	+14 +2	160	185	180	250	
8	16 _{-0,013}	32	24	25	25	5	3.1	3.5	4	+8 +0	+15 +2	210	240	235	330	
12	22 _{-0,016}	42	32	32	32	6	4.1	4.5	4	+8 +0	+16 +3	400	460	420	600	
16	26 _{-0,016}	46	36	35	36	6	4.1	4.5	4	+9 -1	+17 +2	460	530	440	630	
20	32 _{-0,019}	54	43	42	45	8	5.1	5.5	5	+9 -1	+19 +2	680	800	860	1250	
25	40 _{-0,019}	62	51	50	58	8	5.1	5.5	6	+11 -1	+20 +3	780	830	1620	2100	
30	47 _{-0,019}	76	62	60	68	10	6.1	6.6	6	+11 -1	+20 +3	1250	1320	2000	2500	
40	62 _{-0,022}	98	80	75	80	13	8.1	9	6	+13 -2	+24 +3	1720	1820	3300	4200	

1) Statistically determined from the working bore diameter and shaft tolerance. Recommended housing bore tolerance: H6 or H7.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.
Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Standard Linear Bushings

Standard Linear Bushings, R0741 Flanged, tandem Normal

Structural design

- Hardened and ground outer sleeve
- Plastic ball retainer
- Balls made of anti-friction bearing steel
- Integrated wiper seals

Standard Linear Bushings, R0741 Flanged, tandem Corrosion-resistant

Structural design

- Hardened and ground outer sleeve made of corrosion-resistant steel
- Corrosion-resistant steel ball retainer
- Balls made from corrosion-resistant anti-friction bearing steel
- Integrated wiper seals

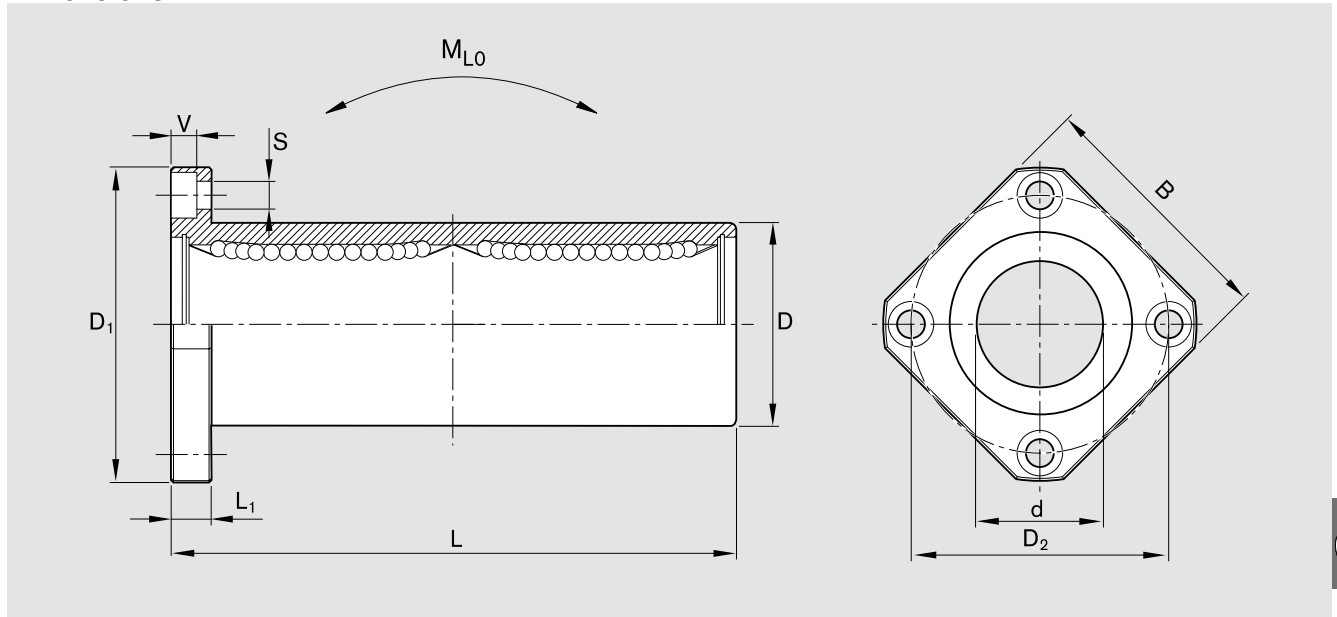


Shaft Ø d (mm)	Part numbers		Weight (kg)
	Normal	Corrosion-resistant	
8	R0741 508 00	R0741 208 30	0.05
12	R0741 512 00	R0741 212 30	0.09
16	R0741 516 00	R0741 216 30	0.14
20	R0741 520 00	R0741 220 30	0.23
25	R0741 525 00	R0741 225 30	0.50
30	R0741 530 00	R0741 230 30	0.72
40	R0741 540 00	R0741 240 30	1.60

Note

Corrosion-resistant steels are steels per ISO 683-17 / EN 10088.

Dimensions



Dimensions (mm)										No. of ball circuits	Working bore diameter tolerance	Radial clearance ¹⁾ Shaft h6	Load capacities (N)				Tipping moment M_{L0} (Nm)
$\varnothing d$	D	D ₁	D ₂	B	L ± 0.3	L ₁	V	S					min.	max.	min.	max.	
8	16 _{-0.013}	32	24	25	46	5	3.1	3.5	4	+9 -1	+15 +2	340	390	470	660	4.5	
12	22 _{-0.016}	42	32	32	61	6	4.1	4.5	4	+9 -1	+17 +2	650	750	840	1200	11	
16	26 _{-0.016}	46	36	35	68	6	4.1	4.5	4	+11 -1	+19 +2	750	860	880	1260	13	
20	32 _{-0.019}	54	43	42	80	8	5.1	5.5	5	+11 -1	+20 +3	1100	1300	1720	2500	26	
25	40 _{-0.019}	62	51	50	112	8	5.1	5.5	6	+13 -2	+22 +2	1250	1350	3240	4200	61	
30	47 _{-0.019}	76	62	60	123	10	6.1	6.6	6	+13 -2	+22 +2	2000	2150	4000	5000	82	
40	62 _{-0.022}	98	80	75	151	13	8.1	9	6	+16 -4	+27 +1	2800	3000	6600	8400	165	

1) Statistically determined from the working bore diameter and shaft tolerance. Recommended housing bore tolerance: H6 or H7.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Standard Linear Bushings

Standard Linear Bushings, R0742 With central flange Normal

Structural design

- Hardened and ground outer sleeve
- Plastic ball retainer
- Balls made of anti-friction bearing steel
- Integrated wiper seals

Standard Linear Bushings, R0742 With central flange Corrosion-resistant

Structural design

- Hardened and ground outer sleeve made of corrosion-resistant steel
- Corrosion-resistant steel ball retainer
- Balls made from corrosion-resistant anti-friction bearing steel
- Integrated wiper seals

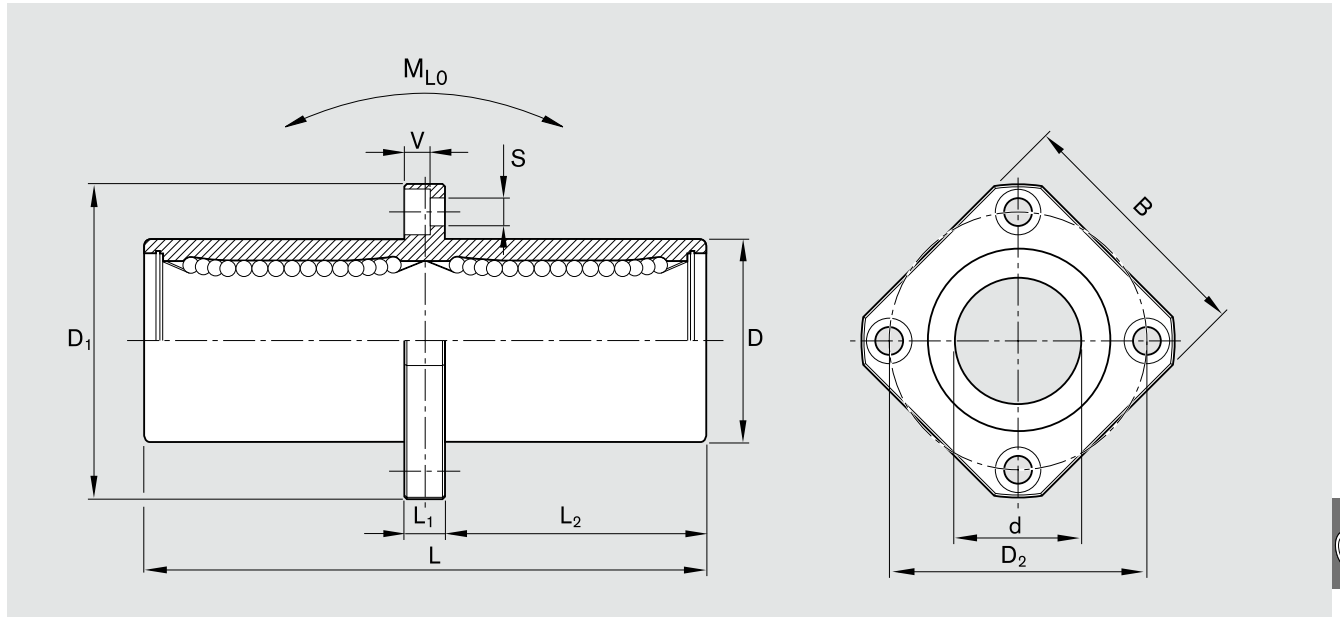


Shaft Ø d (mm)	Part numbers		Weight (kg)
	Normal	Corrosion-resistant	
8	R0742 508 00	R0742 208 30	0.05
12	R0742 512 00	R0742 212 30	0.09
16	R0742 516 00	R0742 216 30	0.14
20	R0742 520 00	R0742 220 30	0.23
25	R0742 525 00	R0742 225 30	0.50
30	R0742 530 00	R0742 230 30	0.72
40	R0742 540 00	R0742 240 30	1.60

Note

Corrosion-resistant steels are steels per ISO 683-17 / EN 10088.

Dimensions



Dimensions (mm)										No. of ball circuits	Working bore diameter tolerance	Radial clearance ¹⁾ Shaft h6	Load capacities (N)				Tipping moment M_{L0} (Nm)
$\varnothing d$	D	D ₁	D ₂	B	L ± 0.3	L ₁	L ₂	V	S				min.	C max.	min.	C ₀ max.	
8	16 _{-0.013}	32	24	25	46	5	20.5	3.1	3.5	4	+9 -1	+15 +2	340	390	470	660	4.5
12	22 _{-0.016}	42	32	32	61	6	27.5	4.1	4.5	4	+9 -1	+17 +2	650	750	840	1200	11
16	26 _{-0.016}	46	36	35	68	6	31.0	4.1	4.5	4	+11 -1	+19 +2	750	860	880	1260	13
20	32 _{-0.019}	54	43	42	80	8	36.0	5.1	5.5	5	+11 -1	+20 +3	1100	1300	1720	2500	26
25	40 _{-0.019}	62	51	50	112	8	52.0	5.1	5.5	6	+13 -2	+22 +2	1250	1350	3240	4200	61
30	47 _{-0.019}	76	62	60	123	10	56.5	6.1	6.6	6	+13 -2	+22 +2	2000	2150	4000	5000	82
40	62 _{-0.022}	98	80	75	151	13	69.0	8.1	9	6	+16 -4	+27 +1	2800	3000	6600	8400	165

1) Statistically determined from the working bore diameter and shaft tolerance. Recommended housing bore tolerance: H6 or H7.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Linear Sets with Standard Linear Bushings

Overview

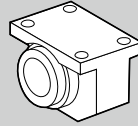
Linear Sets

Closed type

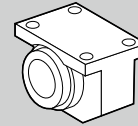
Standard type with fixed working bore diameter.

Adjustable type

For use when zero-clearance or preload is required.



R1065 ...



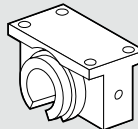
R1066 ...

Open type

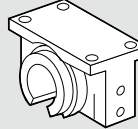
For long guideways when the shafts must be supported and high rigidity is required.

Open type, adjustable

For use when zero-clearance or preload is required.



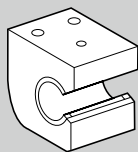
R1067 ...



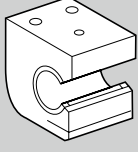
R1068 ...

With side opening

The load carrying capacity of open linear bushings is reduced when the load is applied to the "open" portion of the bushing. The Linear Set with Side Opening has been developed to overcome this disadvantage and to permit selective circumferential positioning of the open linear bushing.



R1073 ...



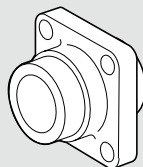
R1074 ...

With side opening, adjustable

For use when zero-clearance or preload is required.

Flanged type

This element was developed as a complement to our Linear Set series for use in applications requiring the shaft to be arranged at right angles to the mounting base.



R1081 ...

Advantages / Technical Data / Notes for Mounting

Advantages

- Thanks to their special material and sturdy wall thickness, precision housings offer very high rigidity irrespective of the load direction, even when the load carrying capacity of the assembly is exploited to the full.
- The housings are easy to align during mounting, so that no adverse stress is exerted on the linear bushing.
- The high precision ensures the linear bushings' operational reliability and makes the units fully interchangeable.
- Since our housings are produced in large numbers, they offer the same high quality as the user's own design at a price that no in-house design can match for economy.

Technical Data

Operating temperatures

–10 °C to 80 °C

Notes for Mounting

Radial clearance

The radial clearance values given in the tables have been obtained by statistical methods and are representative of the clearances to be expected in actual practice. The Linear Sets R1066, R1068 and R1074 are adjusted to zero-clearance (when screwed down) on a shaft of diameter accurate to a tolerance of h5 (lower limit) before leaving the factory.

Vertical dimensions

The tables for Linear Sets contain tolerance values for the height dimension "H". These tolerance values have been obtained by statistical methods and are representative of the values to be expected in actual practice.

Screws

We recommend screws per ISO 4762-8.8 for mounting Linear Sets.



Linear Sets with Standard Linear Bushings

**Linear Sets, R1065
Closed type****Linear Sets, R1066
Adjustable type****Structural design**

- Precision housing (lamellar graphite cast iron)
- Standard Linear Bushing with wiper seals
- Two retaining rings

Closed type

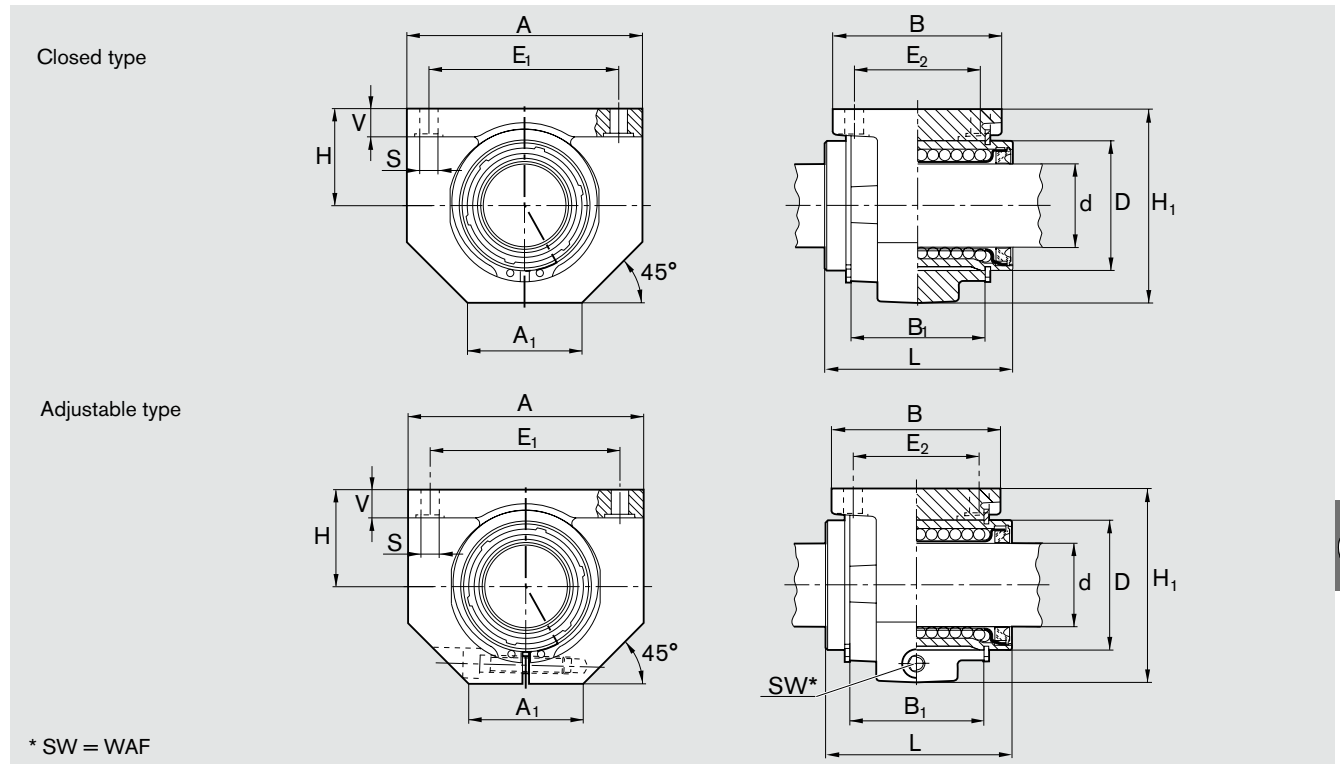
Shaft $\varnothing d$ (mm)	Part numbers With two seals	Weight
		(kg)
8	R1065 208 00	0.09
12	R1065 212 00	0.16
16	R1065 216 00	0.27
20	R1065 220 00	0.45
25	R1065 225 00	0.89
30	R1065 230 00	1.33
40	R1065 240 00	2.51
50	R1065 250 00	3.68
60	R1065 260 00	6.73
80	R1065 280 00	15.32

Adjustable type

Shaft $\varnothing d$ (mm)	Part numbers With two seals	Weight
		(kg)
8	R1066 208 00	0.09
12	R1066 212 00	0.16
16	R1066 216 00	0.27
20	R1066 220 00	0.45
25	R1066 225 00	0.89
30	R1066 230 00	1.33
40	R1066 240 00	2.51
50	R1066 250 00	3.68
60	R1066 260 00	6.73
80	R1066 280 00	15.32

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Dimensions



Dimensions (mm)														Radial clearance ²⁾ (µm)		Tolerance for H ³⁾ (µm)	Load capacities ⁴⁾ (N)	
Ø d	D	H	H ₁ ¹⁾	L	A ¹⁾	A ₁ ¹⁾	B ¹⁾	B ₁	E ₁	E ₂	S	V ¹⁾	WAF	R1065 Shaft h6	R1066		C	C ₀
8	16	15	28	25	32	16	28	14	25±0.15	20±0.15	3.4	5	2	+18 +5	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	+6 -17	320	240
12	22	18	35	32	42	21	32	20	32±0.15	23±0.15	4.5	5.5	2.5	+20 +5		+6 -17	420	280
16	26	22	42	36	50	26	35	22	40±0.15	26±0.15	4.5	6.5	3	+22 +5		+5 -18	580	440
20	32	25	50	45	60	28	42	28	45±0.15	32±0.15	4.5	8	3	+23 +6		+5 -19	1170	860
25	40	30	60	58	74	38	54	40	60±0.15	40±0.15	5.5	9	5	+25 +6		+5 -19	2080	1560
30	47	35	70	68	84	41	60	48	68±0.20	45±0.20	6.6	10	5	+25 +6		+5 -19	2820	2230
40	62	45	90	80	108	51	78	56	86±0.20	58±0.20	9	12	6	+30 +7		+4 -21	5170	3810
50	75	50	105	100	130	57	70	72	108±0.20	50±0.20	9	14	8	+30 +7		+8 -25	8260	6470
60	90	60	125	125	160	70	92	95	132±0.25	65±0.25	11	15	10	+33 +7		+8 -26	11500	9160
80	120	80	170	165	200	85	122	125	170±0.50	90±0.50	13.5	22	14	+37 +8		+7 -28	21000	16300

- 1) Tolerance DIN 1686-GTB 15.
- 2) Statistically determined from the working bore diameter and shaft tolerance. Taking the Linear Bushing outside diameter and the housing bore into consideration, the radial clearance values for shaft h6 are similar to those given for the Standard Linear Bushing R0610 in the h6/H7 column under the heading "Radial clearance."
- 3) When screwed down, relative to shaft nominal dimension Ø d.
- 4) The load capacities stated are minimal values as the orientation and direction of load cannot always be precisely defined.

Linear Sets with Standard Linear Bushings

Linear Sets, R1067 Open type

Linear Sets, R1068 Open type, adjustable

Structural design

- Precision housing (spheroidal graphite cast iron)
- Retention via locating screw
- Standard Linear Bushing with wiper seals

Open type



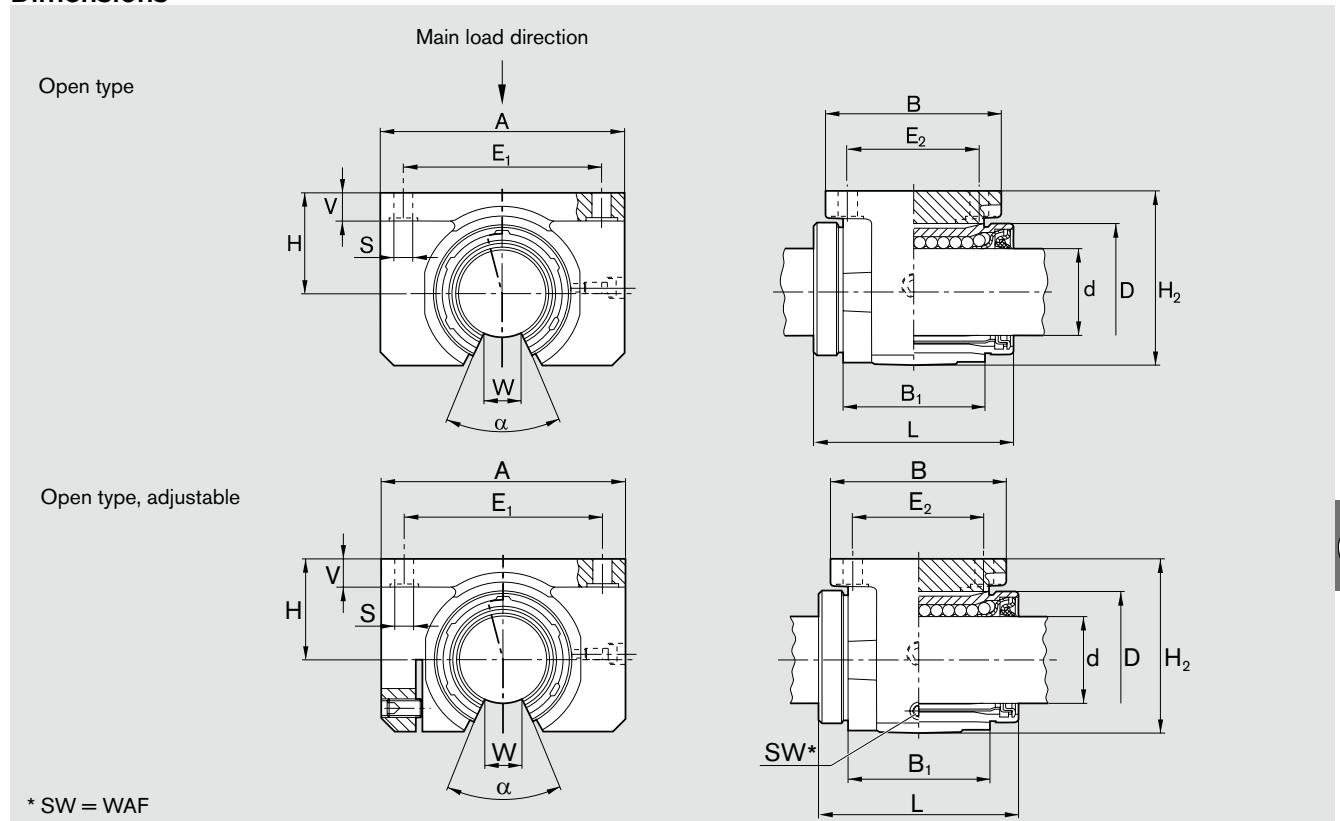
Shaft Ø d (mm)	Part numbers With two seals	Weight
		(kg)
20	R1067 220 00	0.39
25	R1067 225 00	0.74
30	R1067 230 00	1.14
40	R1067 240 00	2.25
50	R1067 250 00	3.13
60	R1067 260 00	5.78
80	R1067 280 00	13.15

Open type, adjustable



Shaft Ø d (mm)	Part numbers With two seals	Weight
		(kg)
20	R1068 220 00	0.38
25	R1068 225 00	0.74
30	R1068 230 00	1.12
40	R1068 240 00	2.20
50	R1068 250 00	3.11
60	R1068 260 00	5.72
80	R1068 280 00	13.09

Dimensions



Dimensions (mm)															Angle	Radial clearance (µm)		Tolerance for H ³⁾	Load capacities ⁴⁾ (N)	
Ø d	D	H	H ₂ ¹⁾	L	A ¹⁾	B ¹⁾	B ₁	E ₁	E ₂	S	V ¹⁾	W ²⁾	WAF	α (°)	R1067 Shaft h6	R1068	(µm)	C	C ₀	
20	32	25	42	45	60	42	28	45±0.15	32±0.15	4.5	8	10	2,5	60	+36 +4	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	+5 -19	1280	970	
25	40	30	51	58	74	54	40	60±0.15	40±0.15	5.5	9	12.5	3	60	+38 +4		+5 -19	2270	1750	
30	47	35	60	68	84	60	48	68±0.20	45±0.20	6.6	10	12.5	3	50	+38 +4		+5 -19	2890	2390	
40	62	45	77	80	108	78	56	86±0.20	58±0.20	9	12	16.8	4	50	+45 +5		+4 -21	5280	4000	
50	75	50	88	100	130	70	72	108±0.20	50±0.20	9	14	21	5	50	+45 +5		+8 -25	8470	6900	
60	90	60	105	125	160	92	95	132±0.25	65±0.25	11	15	27.2	6	54	+50 +5		+8 -26	11800	9780	
80	120	80	140	165	200	122	125	170±0.50	90±0.25	13.5	22	36.3	8	54	+54 +6	+7 -28	21500	17400		

- 1) Tolerance DIN 1685-GTB 16.
- 2) Lower limit relative to Ø d.
- 3) When screwed down, relative to shaft nominal dimension Ø d.
- 4) The load capacities apply for the main direction of loading.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Linear Sets with Standard Linear Bushings

Linear Sets, R1073 With side opening

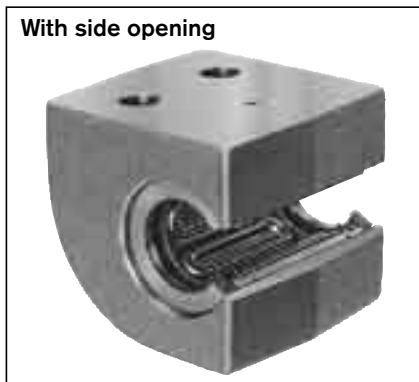
Linear Sets, R1074 With side opening, adjustable

Structural design

- Housing with side opening (spheroidal graphite cast iron)
- Retention via grooved taper pin
- Standard Linear Bushing
- External seals

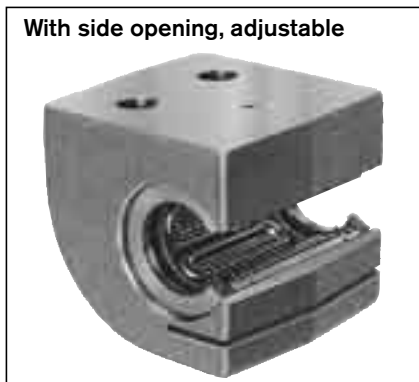
The load carrying capacity of open linear bushings is considerably reduced when the load is applied to the "open" portion of the bushing. The Linear Set with Side Opening has been developed to overcome this disadvantage and to permit selective circumferential positioning of the open linear bushing.

With side opening



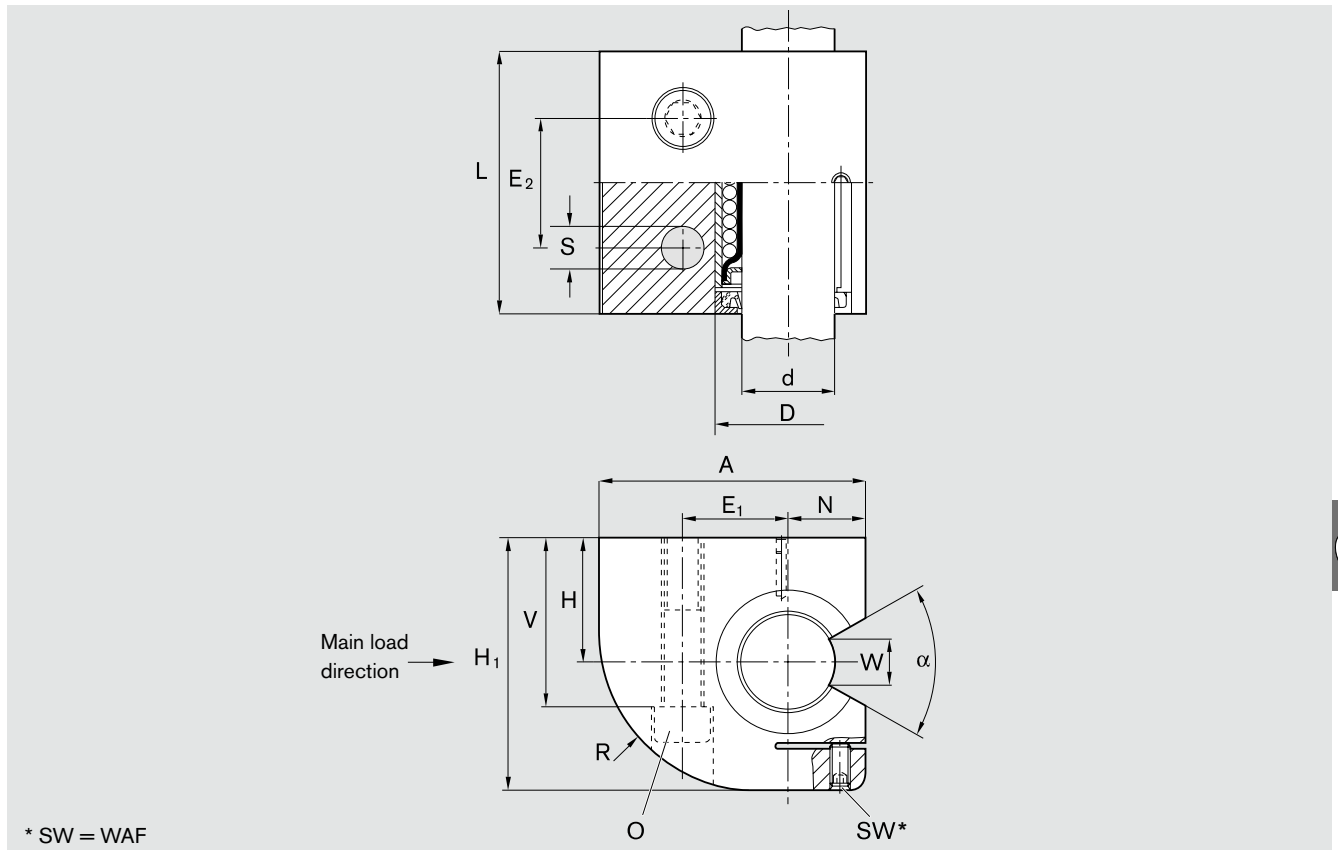
Shaft Ø d (mm)	Part numbers With two seals	Weight (kg)
20	R1073 220 00	1.0
25	R1073 225 00	1.9
30	R1073 230 00	2.8
40	R1073 240 00	4.8
50	R1073 250 00	8.0

With side opening, adjustable



Shaft Ø d (mm)	Part numbers With two seals	Weight (kg)
20	R1074 220 00	1.0
25	R1074 225 00	1.9
30	R1074 230 00	2.8
40	R1074 240 00	4.8
50	R1074 250 00	8.0

Dimensions



Dimensions (mm)															Angle α (°)	Radial clearance ⁴⁾ (μm)		Tolerance for H ⁵⁾ (μm)	Load capacities ⁶⁾ (N)	
$\varnothing d$	H	H ₁ ¹⁾	L ¹⁾	A ¹⁾	E ₁	E ₂	N	D	V	S	WAF	O ²⁾	W ³⁾	R ¹⁾		R1073 Shaft h6	R1074		C	C ₀
20	30	60	60	60	22±0.25	30±0.25	17	32	42	9	2.5	M8x60	10	37	60	+36 +4	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	+5 -19	1280	970
25	35	72	73	75	28±0.25	36±0.25	21	40	50	11	3	M10x70	12.5	45	60	+38 +4		+5 -19	2270	1750
30	40	82	85	86	34±0.50	42±0.50	25	47	55	13.5	3	M12x80	12.5	51	50	+38 +4		+5 -19	2890	2390
40	45	100	97	110	43±0.50	48±0.50	32	62	67	15.5	4	M14x90	16.8	66	50	+45 +5		+4 -21	5280	4000
50	50	115	125	127	50±0.50	62±0.50	38	75	78	17.5	5	M16x110	21	77	50	+45 +5		+8 -25	8470	6900

1) Tolerance DIN 1685-GTB 16.

2) Hex socket head cap screws per ISO 4762-8.8.

3) Lower limit relative to $\varnothing d$.

4) When screwed down.

5) When screwed down, relative to shaft nominal dimension $\varnothing d$.

6) The load capacities apply for the main direction of loading.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Linear Sets with Standard Linear Bushings

Linear Sets, R1081

Flanged type

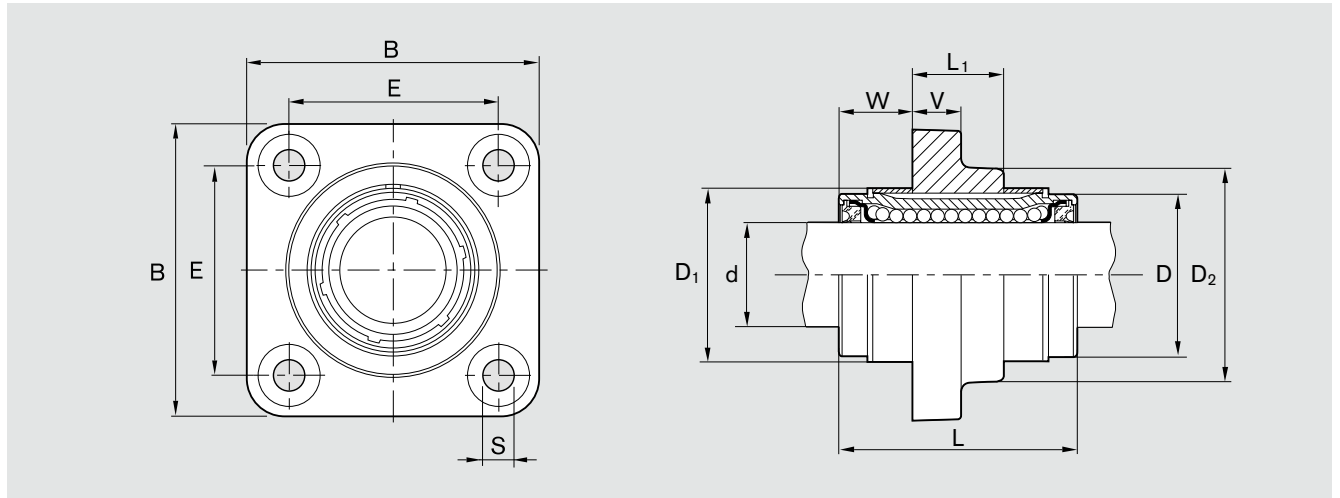
Structural design

- Flanged housing (lamellar graphite cast iron)
- Two retaining rings, plus two spacer rings (steel) for sizes 12 to 40
- Standard Linear Bushing with wiper seals
- Radial clearance not adjustable



Shaft $\varnothing d$ (mm)	Part numbers With two seals	Weight (kg)
12	R1081 212 00	0.11
16	R1081 216 00	0.18
20	R1081 220 00	0.33
25	R1081 225 00	0.63
30	R1081 230 00	1.00
40	R1081 240 00	1.90
50	R1081 250 00	4.00
60	R1081 260 00	7.40
80	R1081 280 00	14.70

Dimensions



Dimensions (mm)											Radial clearance ²⁾		Load capacities ³⁾ (N)	
Ø d	B ¹⁾	L	L ₁	D	D ₁ +0.8	D ₂ ¹⁾	E	S H13	V ¹⁾	W	Shaft h6 (µm)	C	C ₀	
12	42	32	12	22	24	28	30±0.12	5.5	6	10	+20 +5	420	280	
16	50	36	15	26	28.5	34	35±0.12	5.5	8	10.5	+22 +5	580	440	
20	60	45	18	32	35	42	42±0.15	6.6	10	13.5	+23 +6	1170	860	
25	74	58	23	40	43	54	54±0.15	6.6	12	17.5	+25 +6	2080	1560	
30	84	68	26	47	49.5	62	60±0.25	9.0	14	21	+25 +6	2820	2230	
40	108	80	36	62	66.5	80	78±0.25	11	16	22	+30 +7	5170	3810	
50	130	100	72	75	81	98	98±0.25	11	18	14	+30 +7	8260	6470	
60	160	125	95	90	96	115	120±0.50	14	22	15	+33 +7	11500	9160	
80	200	165	125	120	129	150	155±0.50	14	26	20	+37 +8	21000	16300	

1) Tolerance DIN 1686-GTB 15.

2) Statistically determined from the working bore diameter and shaft tolerance. Taking the Linear Bushing outside diameter and the housing bore into consideration, the radial clearance values for shaft h6 are similar to those given for the Standard Linear Bushing R0610 in the h6/H7 column under the heading "Radial clearance."

3) The load capacities stated are minimal values as the orientation and direction of load cannot always be precisely defined.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Segmental Linear Bushings

Product Overview

Advantages

- As Linear Sets with reinforced plastic housings they represent a lightweight, sturdy and low-cost solution
- Excellent choice for general requirements
- Corrosion-resistant versions available for medical, chemical and food industry applications
- Separate seals as an option



Segmental Linear Bushings

Technical Data

Please also refer to the general technical principles and the lubricating and mounting instructions.

Friction

The friction coefficient μ of unsealed Segmental Linear Bushings using oil as a lubricant lies between 0.001 and 0.004. The friction is lowest under high load. It may, however, be greater than the stated value when only a slight load is applied. For Linear Bushings fitted with seals at both ends and not subject to radial loading, the frictional drag (see table below) depends on the speed and the type of lubrication.

Shaft \varnothing d (mm)	Breakaway force (N) approx.	Frictional drag (N) approx.
12	3	1.5
16	4.5	2
20	5	2.5
25	7	3
30	9	4
40	12	5

Travel speed

$$v_{\max} = 3 \text{ m/s}$$

Acceleration

$$a_{\max} = 150 \text{ m/s}^2$$

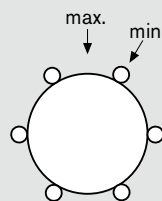
Operating temperature

-10 °C to 80 °C (normal version)

-10 °C to 65 °C (corrosion-resistant version)

Direction of loading and its influence on the load capacity

The load capacities should be selected as appropriate for installation in the "min" or "max" position, and all calculations should then be based on the selected values. In applications where the load direction is exactly known and where the Segmental Linear Bushings can be mounted in the "max" position, the load capacity ratings C_{\max} (dynamic load capacity) and $C_{0 \max}$ (static load capacity) can be used. If aligned installation is not possible or if the direction of loading is not defined, the minimum load capacities will apply.

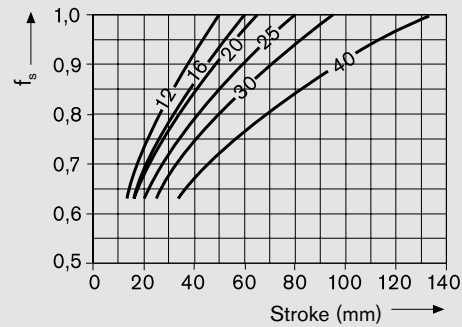


Mounting / Retention

Reduced load capacity in short-stroke applications

In short-stroke applications, the service life of the shafts is shorter than that of the Segmental Linear Bushings.

In such cases, the load capacities C given in the table must be multiplied by the factor f_s .



Operation under difficult conditions

In permanently humid or wet environments, due for instance to water-based coolants/lubricants, we recommend the use of corrosion-resistant linear bushing models with steel parts made from corrosion-resistant steels per ISO 683-17 / EN 10088.

Notes for mounting

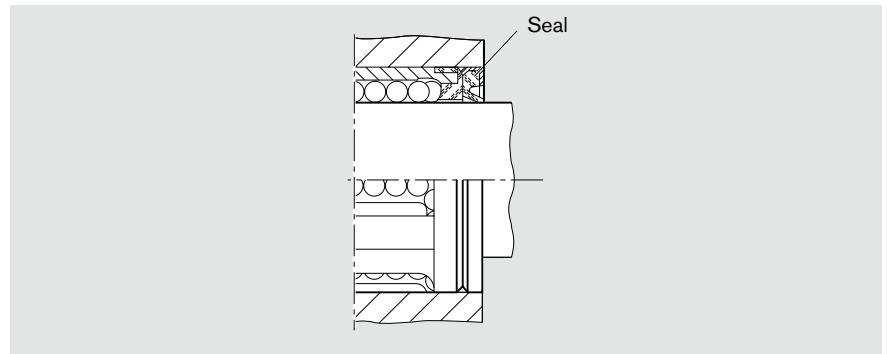
Use of an arbor is recommended for installation of Segmental Linear Bushings into the housing bore (see "Mounting Instructions").

When Segmental Linear Bushings are mounted in an adjustable housing we recommend installing the linear bushing with one of its load bearing plates covering the slot in the housing; this will prevent dirt from entering the linear bushing.

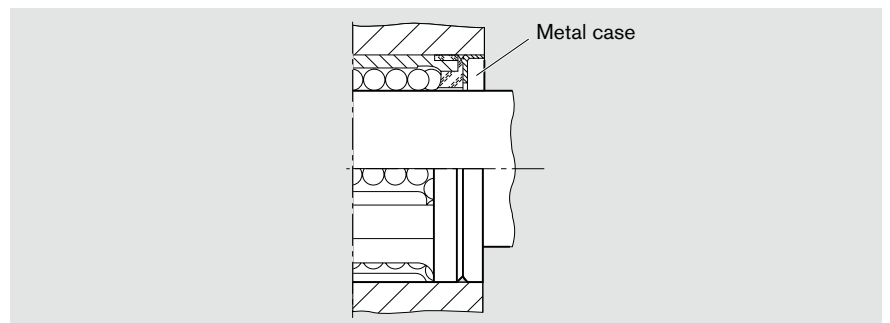


Retention

Retention by means of seal



Retention by means of a metal case



Segmental Linear Bushings

**Segmental Linear Bushings,
R0668****Normal****Structural design**

- Balls made of anti-friction bearing steel
- Hardened steel segmental load bearing plates
- Ball retainer made of polyamide

**Corrosion-resistant****Structural design**

- Balls made of corrosion-resistant anti-friction bearing steel (per ISO 683-17 / EN 10088)
- Corrosion-resistant segmental load bearing plates
- Ball retainer made of polyamide 11

Shaft Ø d (mm)	Part numbers		Weight (kg)
	Normal	Corrosion-resistant	
12	R0668 012 00	R0668 012 30	0.013
16	R0668 016 00	R0668 016 30	0.020
20	R0668 020 00	R0668 020 30	0.031
25	R0668 025 00	R0668 025 30	0.057
30	R0668 030 00	R0668 030 30	0.096
40	R0668 040 00	R0668 040 30	0.170

Seal

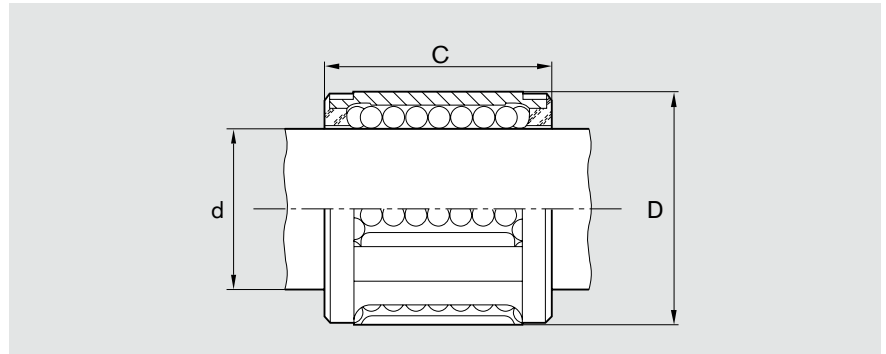
Shaft Ø d (mm)	Part numbers	
	Normal seal ¹⁾	Corrosion-resistant seal ¹⁾
12	R1331 512 00	R1331 512 30
16	R1331 516 00	R1331 516 30
20	R1331 520 00	R1331 520 30
25	R1331 525 00	R1331 525 30
30	R1331 530 00	R1331 530 30
40	R1331 540 00	R1331 540 30

Metal case

Shaft Ø d (mm)	Part numbers	
	Normal metal case ¹⁾	Corrosion-resistant metal case ¹⁾
12	R1331 043 00	R1331 043 30
16	R1331 044 00	R1331 044 30
20	R1331 045 00	R1331 045 30
25	R1331 046 00	R1331 046 30
30	R1331 047 00	R1331 047 30
40	R1331 048 00	R1331 048 30

1) For axial retention.

Dimensions



Dimensions (mm)			No. of ball circuits	Radial clearance (μm)		Load capacities (N)				Corrosion-resistant			
$\varnothing d$	D	C js14		Shaft/bore		Normal		C_0		C		C_0	
				h6/H7	h6/K7	min.	max.	min.	max.	min.	max.	min.	max.
12	20	24	5	+32 0	+17 -15	480	570	420	620	240	290	330	490
16	25	28	5	+32 0	+17 -15	720	860	620	910	360	430	490	730
20	30	30	6	+33 -1	+18 -16	1020	1080	870	1120	510	540	690	890
25	37	37	6	+36 0	+18 -18	1630	1730	1360	1750	820	870	1090	1400
30	44	44	6	+36 0	+18 -18	2390	2530	1960	2510	1200	1270	1570	2000
40	56	56	6	+42 -1	+21 -22	3870	4100	3270	4180	1940	2050	2610	3340

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Seal

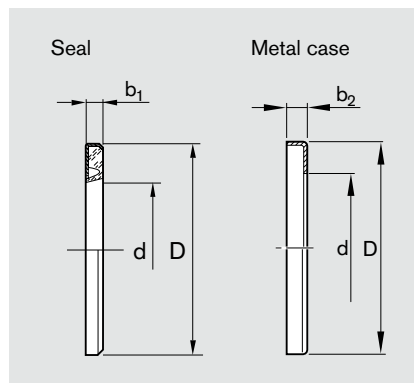
Structural design

- Metal case
- Elastomer seal

Metal case

Material:

- Steel, normal or corrosion-resistant



Dimensions (mm)			
$\varnothing d$	D ¹⁾	b ₁	b ₂
12	20	+0.3 3	3
16	25	3	3
20	30	4	4
25	37	4	4
30	44	5	5
40	56	5	5

- 1) The outside diameter D is oversized by approx. 0.1 mm. No additional retention is needed.

Linear Sets with Segmental Linear Bushings

Linear Sets, R1060

Adjustable type

Normal or corrosion-resistant

Structural design

- Pillow block housing made of reinforced polyamide
- Lightweight, sturdy and low-cost
- With Segmental Linear Bushing
- Two interchangeable seals
- Radial clearance adjustable

Adjustable type

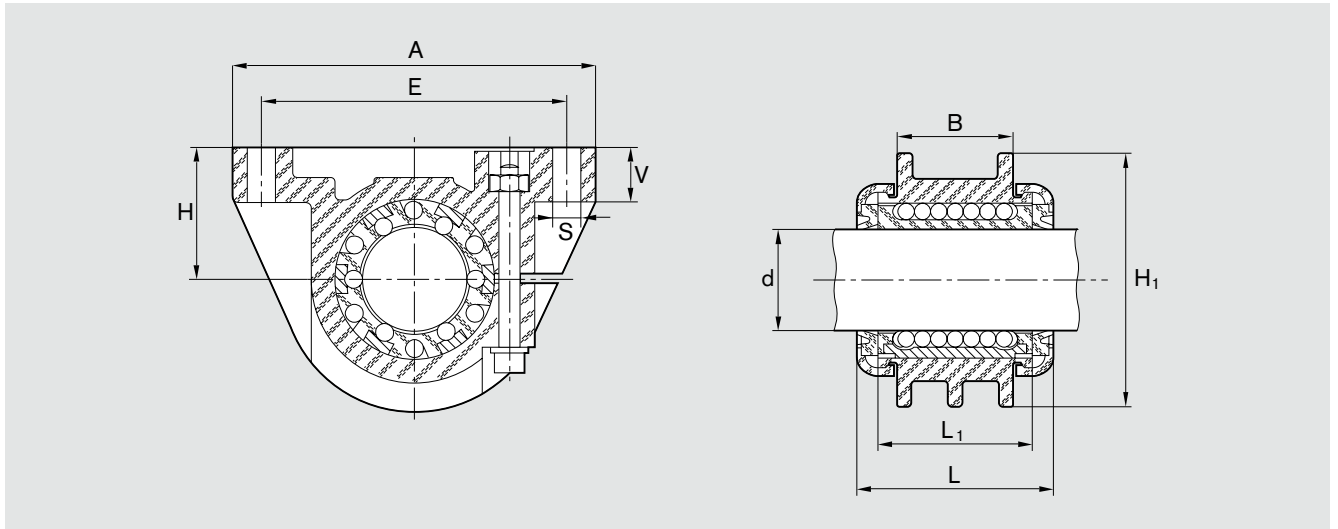


Shaft Ø d (mm)	Part numbers		Weight (kg)
	Normal	Corrosion-resistant ¹⁾	
12	R1060 212 00	R1060 212 20	0.041
16	R1060 216 00	R1060 216 20	0.063
20	R1060 220 00	R1060 220 20	0.077
25	R1060 225 00	R1060 225 20	0.158
30	R1060 230 00	R1060 230 20	0.277
40	R1060 240 00	R1060 240 20	0.470

1) Linear Bushing, corrosion-resistant type (anti-friction bearing steel per ISO 683-17 / EN 10088).

Screw, washer, nut made of corrosion-resistant material (A2).

Dimensions



Dimensions (mm)										Radial clearance (μm)	Load capacities ²⁾ (N)			
$\varnothing d$	$H^{1)}$ ± 0.05	H_1	L	L_1	A	B	E	S	V		Normal C	C_0	Corrosion-resistant C	C_0
12	18	35	31	24	55	20	43 ± 0.1	4.4	8	Adjusted prior to delivery to zero- clearance on h5 shaft (lower limit) when screwed down	480	420	240	330
16	22	42	35	28	66	22	53 ± 0.15	5.5	9.5		720	620	360	490
20	25	50	38	30	69	23	58 ± 0.15	5.5	10.5		1020	870	510	690
25	30	60	46	37	87	30	72 ± 0.2	6.6	11.5		1630	1360	820	1090
30	35	70	55	44	97	36	80 ± 0.2	6.6	13		2390	1960	1200	1570
40	45	90	67	56	124	48	103 ± 0.2	8.6	17		3870	3270	1940	2610

1) Relative to shaft nominal dimension d.

2) The load capacities stated are minimal values as the orientation and direction of load cannot always be precisely defined.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.



Torque-Resistant Linear Bushings

Product Overview

Advantages

- For axially and radially true linear motion with only one shaft
- With 1, 2 or 4 ball guide grooves for torque transfer
- Large choice of formats
- Torque-Resistant Linear Bushings with adjustment screw set to zero-clearance before delivery
- Appropriate shaft profiles with ground ball guide grooves
- Shafts machined to customer specifications
- With separate seals or without seals
- Various flanged versions available
- With steel or aluminum housings in various formats



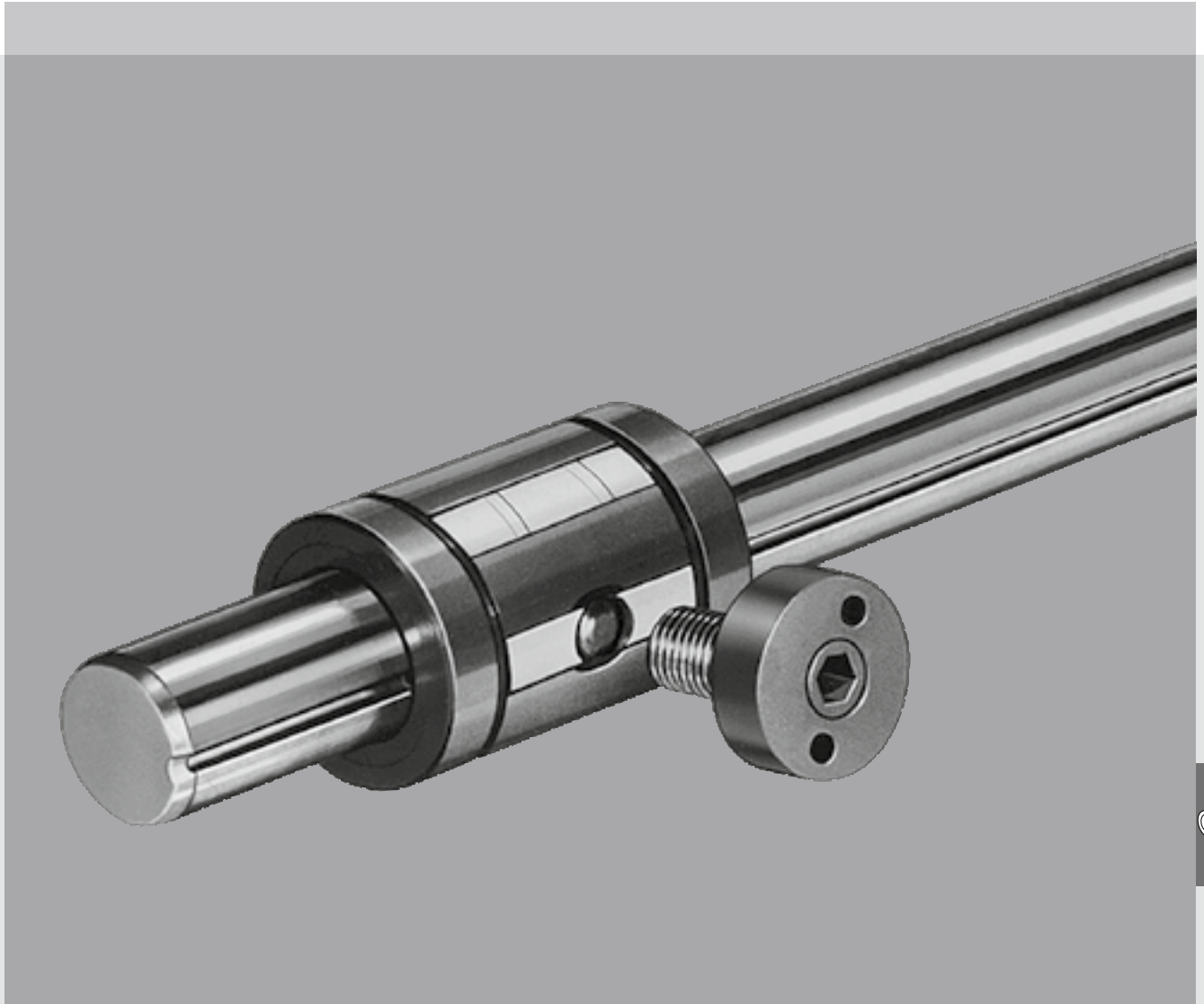
**Torque-Resistant Linear Bushing,
Type 1, with one ball guide groove**



**Torque-Resistant Linear Bushing,
Type 2, with two ball guide grooves**



**Torque-Resistant Compact Linear
Bushing**



**Torque-Resistant Linear Bushing
with four ball guide grooves**



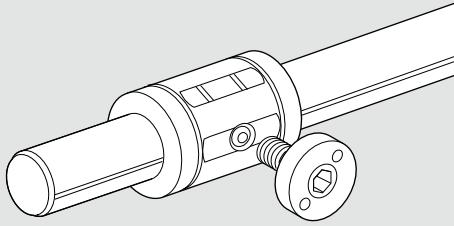
**Precision Steel Shaft
with four ball guide grooves**

Torque-Resistant Linear Bushings

Overview

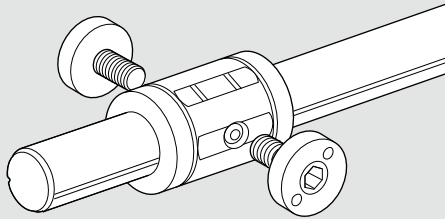
Torque-Resistant Linear Bushings

Type 1



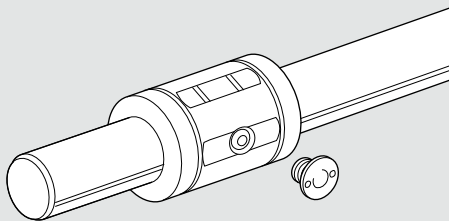
one ball guide groove

Type 2



two ball guide grooves

Torque-Resistant Compact Linear Bushings



Technical Data

Please also refer to the general technical principles and the lubricating and mounting instructions.

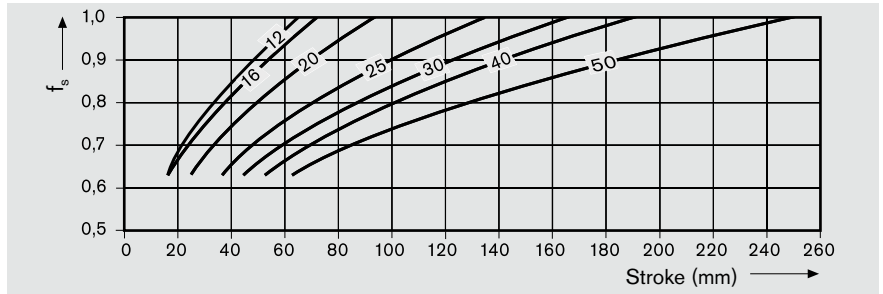
Operating temperature

-10 °C to 80 °C

Reduced load capacity in short-stroke applications

In short-stroke applications, the service life of the shafts is shorter than that of the Torque-Resistant Linear Bushings.

In such cases, the load capacities C given in the table must be multiplied by the factor f_s .



Load capacity and service life

If the bushing is simultaneously subjected to a radial load and a torque, the equivalent total load must first be calculated for use in the life expectancy calculation.

$$F_{comb} = F_{res} + C \cdot \frac{M_x}{M_t}$$

$$L = \left(\frac{C}{F_{comb}} \right)^3 \cdot 10^5 \text{ m}$$

- F_{comb} = combined equivalent load on bearing (N)
- F_{res} = resultant radial load (N)
- C = dynamic load capacity (N)
- M_x = dynamic torsional moment about the x-axis (Nm)
- M_t = dynamic torsional moment load capacity (Nm)
- L = nominal life (m)



In the case of purely torque loads, the life is calculated as follows:

$$M_m = \sqrt[3]{|M_1|^3 \cdot \frac{q_{s1}}{100\%} + |M_2|^3 \cdot \frac{q_{s2}}{100\%} + \dots + |M_n|^3 \cdot \frac{q_{sn}}{100\%}}$$

$$L = \left(\frac{M_t}{M_m} \right)^3 \cdot 10^5 \text{ m}$$

- $q_1, q_2 \dots q_n$ = discrete travel steps for $M_1, M_2 \dots M_n$ (%)
- $M_1, M_2 \dots M_n$ = discrete dynamic moment load steps in phases (Nm)
- M_n = 1 ... n (Nm)
- M_t = dynamic torsional moment load capacity (Nm)
- M_m = equivalent dynamic torque (Nm)
- n = number of phases (-)
- L = nominal life (m)

Straightness of shaft

- up to 1200 mm length: 0.1 mm
- up to 2000 mm length: 0.2 mm

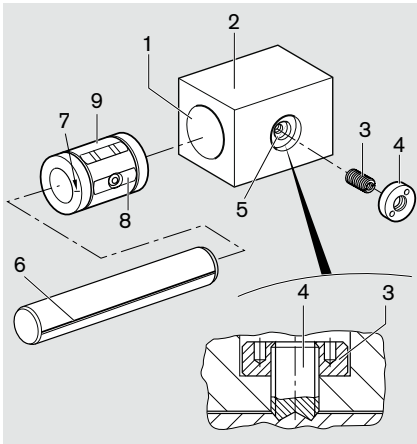
Stability against cocking loads

To ensure stability against cocking loads, it is necessary to install two Torque-Resistant Linear Bushings. In the case of Linear Sets, we recommend the Tandem version (with two Torque-Resistant Linear Bushings).

Torque-Resistant Linear Bushings

Mounting of Torque-Resistant Linear Bushings

Mounting procedure



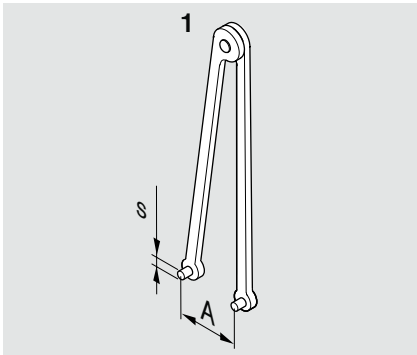
⚠ Linear Sets are pre-assembled and adjusted to zero-clearance. If the shaft has been removed, it is necessary to loosen the adjusting screws and re-adjust the Torque-Resistant Linear Bushing.

- Chamfer and clean the bore (1) in the housing (2).
- Oil the adjusting screw (3).
- Check the lock nut (4) on the adjusting screw (3) for ease of movement.
- Check the adjusting screw (3) in the tapped hole (5) for ease of movement. Deburr thread runout, if necessary.
- Remove transport packing from the linear bushing.

⚠ Do not drive in linear bushings with a hammer!

- Insert linear bushing (9) in the housing (2) by hand.
- Align countersunk steel bearing plate (8) with the tapped hole (5) in the housing.
- Align one ball guide groove (6) with the marking (7) on the identification block of the linear bushing.
- Insert shaft, **taking care not to tilt it!**

Adjustment of adjusting screws



- Screw in adjusting screw until it meets with initial resistance.
- Move shaft back and forth, while simultaneously attempting to turn it in both directions. Tighten the adjusting screw using a hex wrench.
- For Type 1 (one ball guide groove), tighten adjusting screw to M_{GA} .
- For Type 2 (two ball guide grooves), first tighten one adjusting screw to $0.5 \cdot M_{GA}$, then the other to M_{GA} .
- Secure adjusting screw with lock nut. Use face wrench (1) to do this. The adjusting screw must not turn when being secured with the lock nut. Tightening torque = M_{GK} .
- After mounting, the frictional drag F_R should be as shown in the table. If the frictional drag varies significantly from the specified value, loosen and re-adjust adjusting screws!
- **Do not remove shaft again!**

Shaft Ø d (mm)	Face wrench (1) (mm)		Tightening torque (Ncm) ¹⁾			Frictional drag F_R approx. (one linear bushing) (N)
	s	A	Adjusting screw M_{GA}	Lock nut M_{GK}		
12	2.5	10	8	400	1.5	
16	2.5	10	11	400	2	
20	3	15	30	1500	3	
25	3	15	45	1500	4.5	
30	3	19.5	70	2000	6	
40	3	19.5	100	2000	8	
50	3	25	180	3000	12	

1) Tightening torque for friction factor 0.125

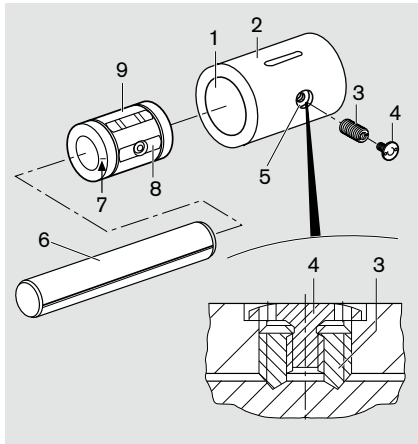
Installation of seal

- Push seal onto the shaft, aligning the lip with the groove.
- Press seal into the mounting bore.

With each installed seal the frictional drag rises higher than the value F_R . If two seals are installed, it increases to roughly three times the value stated in the table.

Mounting of Torque-Resistant Compact Linear Bushings

Mounting procedure



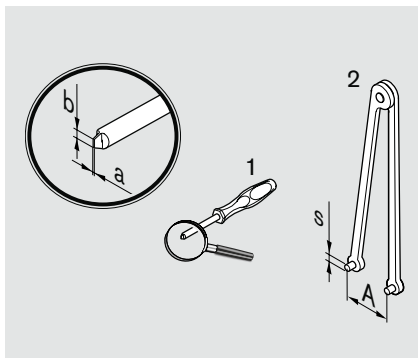
⚠ Linear Sets are pre-assembled and adjusted to zero-clearance. If the shaft has been removed, it is necessary to loosen the adjusting screws and re-adjust the Torque-Resistant Compact Linear Bushing.

- Chamfer and clean the bore (1) in the housing (2).
- Oil the adjusting screw (3) and lock screw (4).
- Check the lock screw (4) on the adjusting screw (3) for ease of movement.
- Check the adjusting screw (3) in the tapped hole (5) for ease of movement. Deburr thread runout, if necessary.
- Remove transport packing from the linear bushing.

⚠ Do not drive in linear bushings with a hammer!

- Insert linear bushing (9) in the housing (2) by hand.
- Align countersunk steel bearing plate (8) with the tapped hole (5) in the housing.
- Align one ball guide groove (6) with the marking (7) on the identification block of the linear bushing.
- Insert shaft, **taking care not to tilt it!**

Adjustment of adjusting screws



- Screw in adjusting screw until it meets with initial resistance.
- Move shaft back and forth, while simultaneously attempting to turn it in both directions. Tighten the adjusting screw using a screwdriver (1).
- For shaft diameters 12 and 16, tighten adjusting screw to M_{GA} .
- For shaft diameters 20 to 50, first tighten one adjusting screw to $0.5 \cdot M_{GA}$, then the other to M_{GA} .
- Using a face wrench (2), insert lock screw into the adjusting screw and tighten to tightening torque M_{GK} .
- After mounting, the frictional drag F_R should be as shown in the table. If the frictional drag varies significantly from the specified value, loosen and re-adjust adjusting screws!
- **Do not remove shaft again!**

Shaft $\varnothing d$ (mm)	Screwdriver (1) (mm)		Face wrench (2) (mm)		Tightening torque (Ncm) ¹⁾		Frictional drag F_R approx. (one linear bushing) (N)
	a	b	s	A	Adjusting screw M_{GA}	Lock screw M_{GK}	
12	0.8	5	1.5	5.5	8	110	1.5
16	0.8	5	1.5	5.5	11	110	2
20	1	8	2	8	30	180	3.8
25	1	8	2	8	45	380	5.6
30	1.2	10	2.5	10	70	800	7.5
40	1.2	10	2.5	10	100	800	10
50	1.6	14	3	13	180	1300	15

1) Tightening torque for friction factor 0.125.

Installation of seal

- Push seal onto the shaft, aligning the lip with the groove.
- Press seal into the mounting bore.

With each installed seal the frictional drag rises higher than the value F_R . If two seals are installed, it increases to roughly three times the value stated in the table.

Torque-Resistant Linear Bushings

Torque-Resistant Linear Bushings, R0696 0..
Type 1: one ball guide groove

Torque-Resistant Linear Bushings, R0696 3..
Type 2: two ball guide grooves

Structural design

- Plastic ball retainer and outer sleeve
- Hardened steel load bearing plates
- Balls made of anti-friction bearing steel
- Precision Steel Shaft with ball guide groove
- Hardened steel adjusting screw
- Steel lock nut



Shaft Ø d (mm)	Part numbers Torque-Resistant Linear Bushings with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
12	R0696 012 80	R0696 012 89	R0696 012 86
16	R0696 016 80	R0696 016 89	R0696 016 86
20	R0696 020 80	R0696 020 89	R0696 020 86
25	R0696 025 80	R0696 025 89	R0696 025 86
30	R0696 030 80	R0696 030 89	R0696 030 86
40	R0696 040 80	R0696 040 89	R0696 040 86
50	R0696 050 80	R0696 050 89	R0696 050 86

- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

Part number Torque-Resistant Linear Bushings without shaft: R0696 0.. 00

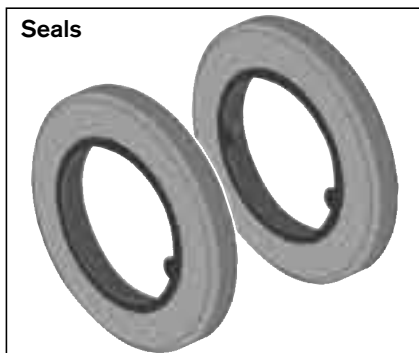


Shaft Ø d (mm)	Part numbers Torque-Resistant Linear Bushings with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
20	R0696 320 80	R0696 320 89	R0696 320 86
25	R0696 325 80	R0696 325 89	R0696 325 86
30	R0696 330 80	R0696 330 89	R0696 330 86
40	R0696 340 80	R0696 340 89	R0696 340 86
50	R0696 350 80	R0696 350 89	R0696 350 86

- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

Part number Torque-Resistant Linear Bushings without shaft: R0696 3.. 00

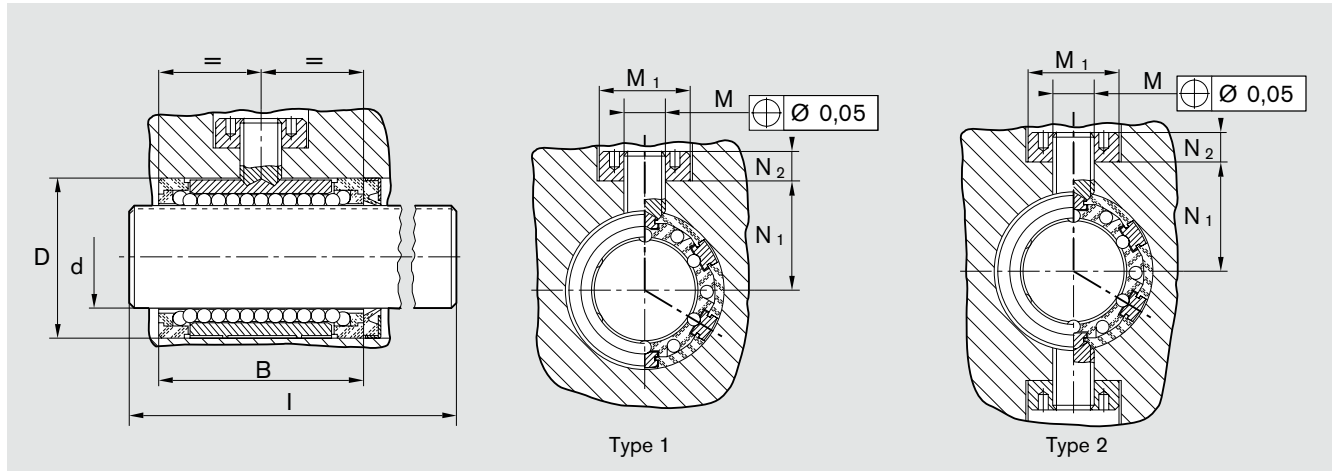
1) Also partly available with tubular shaft from shaft diameter 25: R0696 ... 69 or with corrosion-resistant steel shaft per ISO 683-17 / EN 10088: R0696 ... 79.



Shaft Ø d (mm)	Part numbers Seals	
	Type 1	Type 2
12	R1331 112 00	-
16	R1331 116 00	-
20	R1331 120 00	R1331 320 00
25	R1331 125 00	R1331 325 00
30	R1331 130 00	R1331 330 00
40	R1331 140 00	R1331 340 00
50	R1331 150 00	R1331 350 00

Seals must be ordered separately.

Dimensions



Dimensions (mm)		Standard length						Torque capacity M_t (Nm)		Load capacities ²⁾ (N)		Weight		
$\varnothing d$	Type	$D^{1)}$	B	M	M_1 +0.1	N_1	N_2	l	Type 1	Type 2	C	C_0	Linear Bushing (kg)	Shaft (kg/m)
12	Type 1	22	32	M6x0.5	14	15.5	5	400	2	-	640	420	0.026	0.89
16	Type 1	26	36	M6x0.5	14	19.5	5	400	3.3	-	780	530	0.032	1.57
20	Type 2	32	45	M10x1	22	21.5	8	500	7.5	12	1550	1050	0.064	2.45
25	Type 2	40	58	M10x1	22	28.5	8	500	15	24	3030	2180	0.135	3.80
30	Type 2	47	68	M12x1	26	32	9.5	600	23	37	3680	2790	0.210	5.50
40	Type 2	62	80	M12x1	26	44	9.5	600	53	86	6320	4350	0.390	9.80
50	Type 2	75	100	M16x1.5	34	52	12.5	600	103	167	9250	6470	0.680	15.30

1) Recommended mounting bore: D^{1S7} .

2) The load capacities stated are minimum values as the direction of load cannot always be precisely defined.

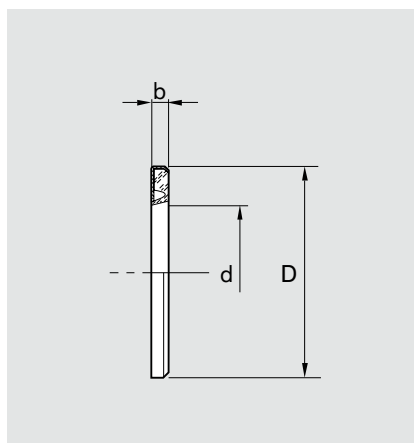
Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Seal

Structural design

- Metal case
- Elastomer seal



Dimensions (mm)		
$\varnothing d$	$D^{3)}$	b +0.3
12	22	3
16	26	3
20	32	4
25	40	4
30	47	5
40	62	5
50	75	6

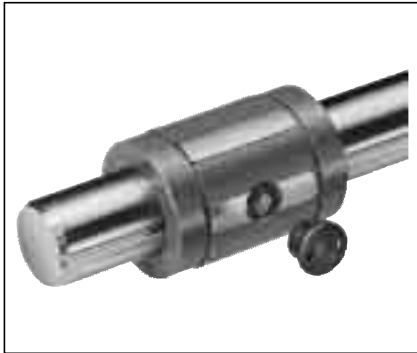
3) The outside diameter D is oversized by approx. 0.1 mm. No additional retention is needed.

Torque-Resistant Compact Linear Bushings

Torque-Resistant Compact Linear Bushings, R0720

Structural design

- Plastic ball retainer and outer sleeve
 - Hardened steel load bearing plates
 - Balls made of anti-friction bearing steel
 - Precision Steel Shaft with ball guide groove
 - Hardened steel adjusting screw
 - Steel lock screw
- One ball guide groove for shaft diameter 12 and 16 mm
- Two ball guide grooves for shaft diameter 20 mm and up



Shaft Ø d (mm)	Part numbers Torque-Resistant Compact Linear Bushings with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
12	R0720 012 80	R0720 012 89	R0720 012 86
16	R0720 016 80	R0720 016 89	R0720 016 86
20	R0720 320 80	R0720 320 89	R0720 320 86
25	R0720 325 80	R0720 325 89	R0720 325 86
30	R0720 330 80	R0720 330 89	R0720 330 86
40	R0720 340 80	R0720 340 89	R0720 340 86
50	R0720 350 80	R0720 350 89	R0720 350 86

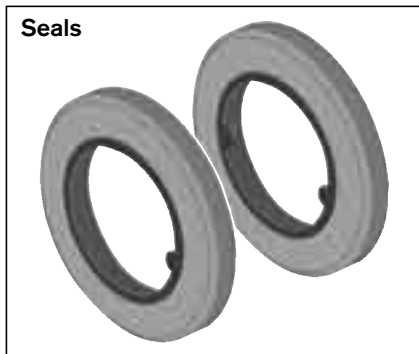
- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

Part number Torque-Resistant Compact Linear Bushings without shaft:

Shaft diameter 12 and 16: R0720 0.. 00

Shaft diameter 20 to 50: R0720 3.. 00

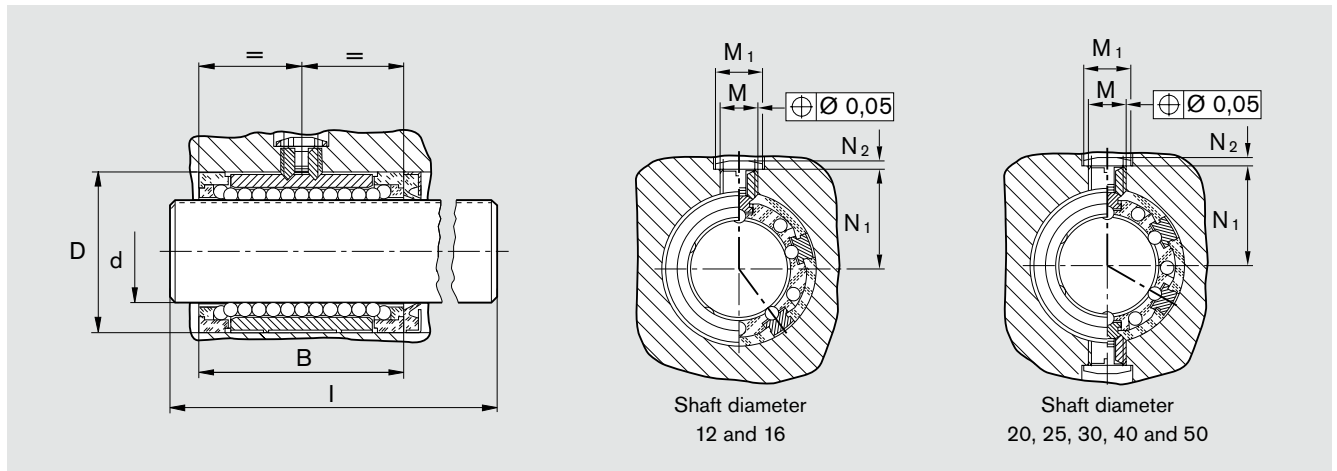
1) Also partly available with tubular shaft from shaft diameter 25: R0720 ... 69, or with corrosion-resistant steel shaft per ISO 683-17 / EN 10088: R0720 ... 79.



Shaft Ø d (mm)	Part numbers Seals
12	R1331 112 00
16	R1331 116 00
20	R1331 320 00
25	R1331 325 00
30	R1331 330 00
40	R1331 340 00
50	R1331 350 00

Seals must be ordered separately.

Dimensions



Dimensions (mm)							Standard length l (mm)	Torque capacity M _t (Nm)	Load capacities ²⁾ (N)		Weight	
Ø d	D ¹⁾	B	M	M ₁	N ₁ +0.1	N ₂			C	C ₀	Linear Bushing (kg)	Shaft (kg/m)
12	22	32	M6x0.5	8	14.4	1.3	400	2	640	420	0.026	0.89
16	26	36	M6x0.5	8	16.4	1.3	400	3.3	780	530	0.032	1.57
20	32	45	M10x1	12.5	21.8	1.9	500	12	1550	1050	0.071	2.45
25	40	58	M10x1	12.5	25.8	1.9	500	24	3030	2180	0.130	3.80
30	47	68	M12x1	15	29.7	2.5	600	37	3680	2790	0.200	5.50
40	62	80	M12x1	15	37.2	2.5	600	86	6320	4350	0.380	9.80
50	75	100	M16x1.5	20	46.7	3	600	167	9250	6470	0.620	15.30

1) Recommended mounting bore: D^{K6}.

2) The load capacities stated are minimum values as the direction of load cannot always be precisely defined.

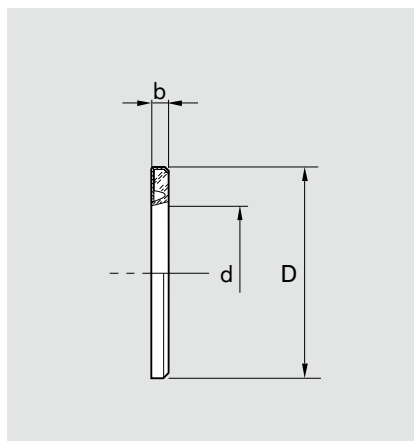
Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Seal

Structural design

- Metal case
- Elastomer seal



Dimensions (mm)		
Ø d	D ³⁾	b +0.3
12	22	3
16	26	3
20	32	4
25	40	4
30	47	5
40	62	5
50	75	6

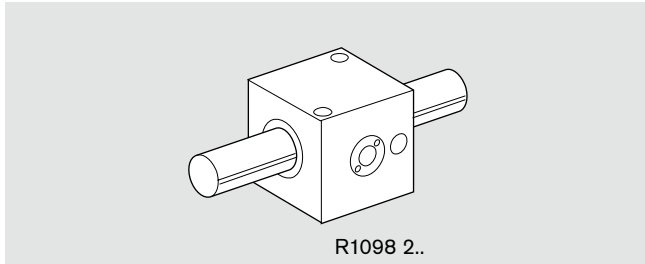
3) The outside diameter D is oversized by approx. 0.1 mm. No additional retention is needed.

Linear Sets with Torque-Resistant Linear Bushings

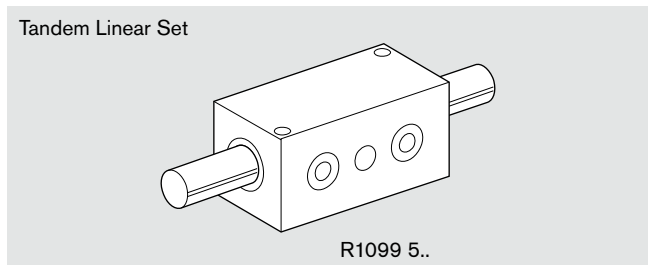
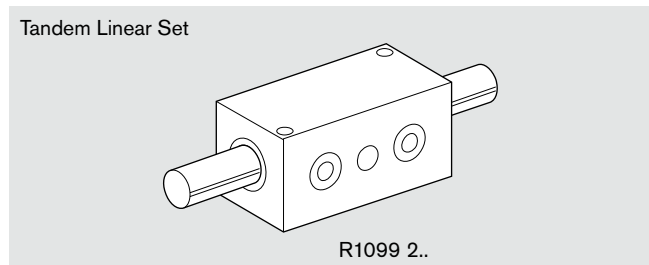
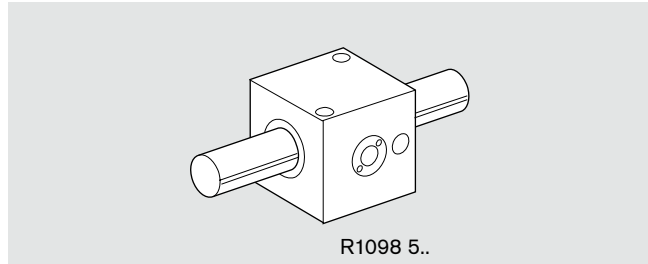
Overview, Mounting Instructions

Linear Sets with Torque-Resistant Linear Bushings, aluminum housing

Type 1: one ball guide groove

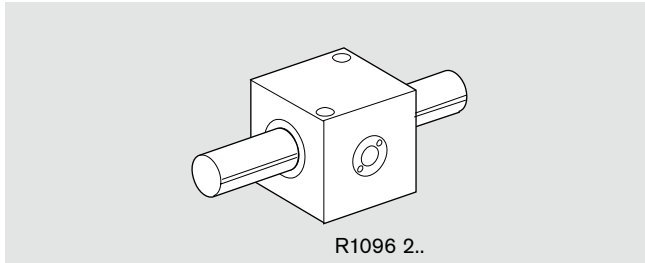


Type 2: two ball guide grooves

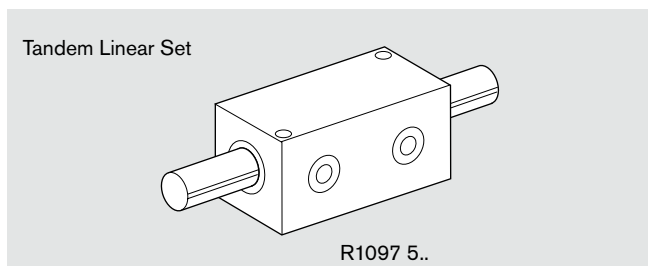
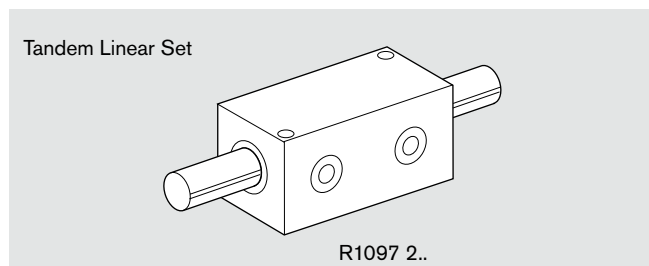
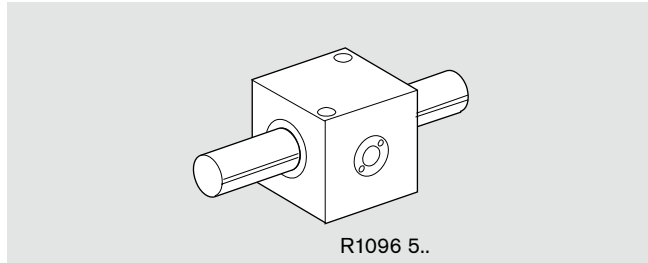


Linear Sets with Torque-Resistant Linear Bushings, steel housing

Type 1: one ball guide groove



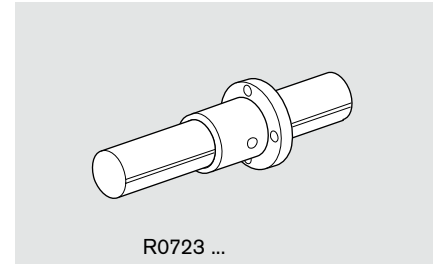
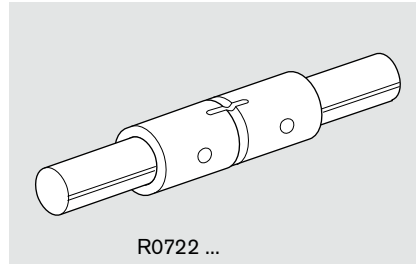
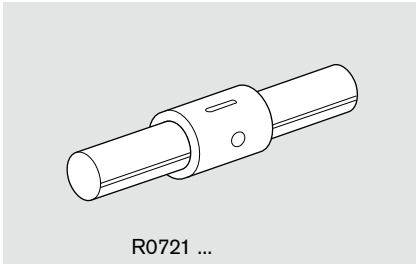
Type 2: two ball guide grooves



Mounting procedure

⚠ Linear Sets are pre-assembled and adjusted to zero-clearance. If the shaft has been removed, it is necessary to loosen the adjusting screws and re-adjust the Torque-Resistant Linear Bushing.

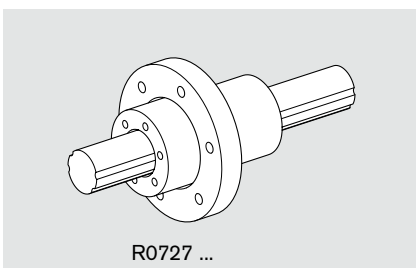
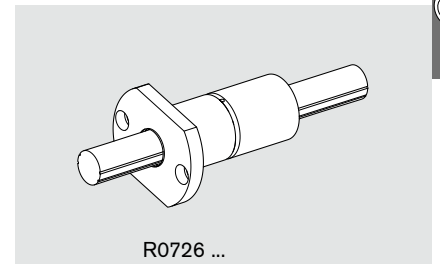
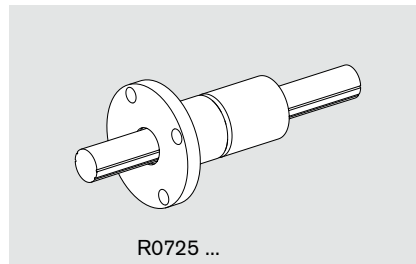
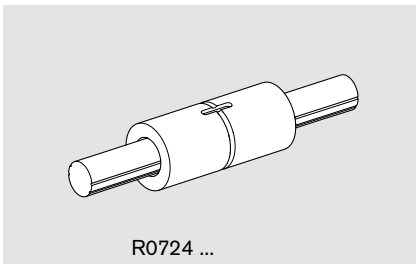
Linear Sets with Torque-Resistant Compact Linear Bushings, sleeve design



Mounting procedure

⚠ Linear Sets (sleeve design) are pre-assembled and adjusted to zero-clearance. If the shaft has been removed, it is necessary to loosen the adjusting screws and re-adjust the Torque-Resistant Linear Bushing.

Torque-Resistant Linear Bushings with four ball guide grooves



Mounting procedure

⚠ With Torque-Resistant Linear Bushings with four ball guide grooves, the Linear Bushing and Shaft are delivered separately. When inserting the shaft ensure that the grooves align and do not tilt the shaft!

Linear Sets with Torque-Resistant Linear Bushings, aluminum housing

Linear Sets, R1098 2.. Type 1: one ball guide groove

Linear Sets, R1098 5.. Type 2: two ball guide grooves

Structural design

- Precision housing, lightweight series (aluminum)
- Torque-Resistant Linear Bushing
- Precision Steel Shaft with ball guide groove
- Torque-transmitting steel load bearing plates adjusted to zero-clearance before delivery
- External seals
- Stability against cocking loads: see Linear Sets, Tandem version
- Relubricatable

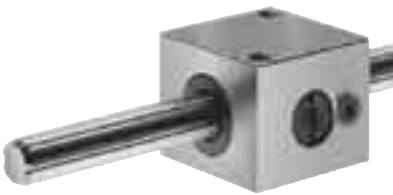
Type 1: one ball guide groove



Shaft Ø d (mm)	Part numbers Linear Set with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
12	R1098 212 80	R1098 212 89	R1098 212 86
16	R1098 216 80	R1098 216 89	R1098 216 86
20	R1098 220 80	R1098 220 89	R1098 220 86
25	R1098 225 80	R1098 225 89	R1098 225 86
30	R1098 230 80	R1098 230 89	R1098 230 86
40	R1098 240 80	R1098 240 89	R1098 240 86
50	R1098 250 80	R1098 250 89	R1098 250 86

- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

Type 2: two ball guide grooves

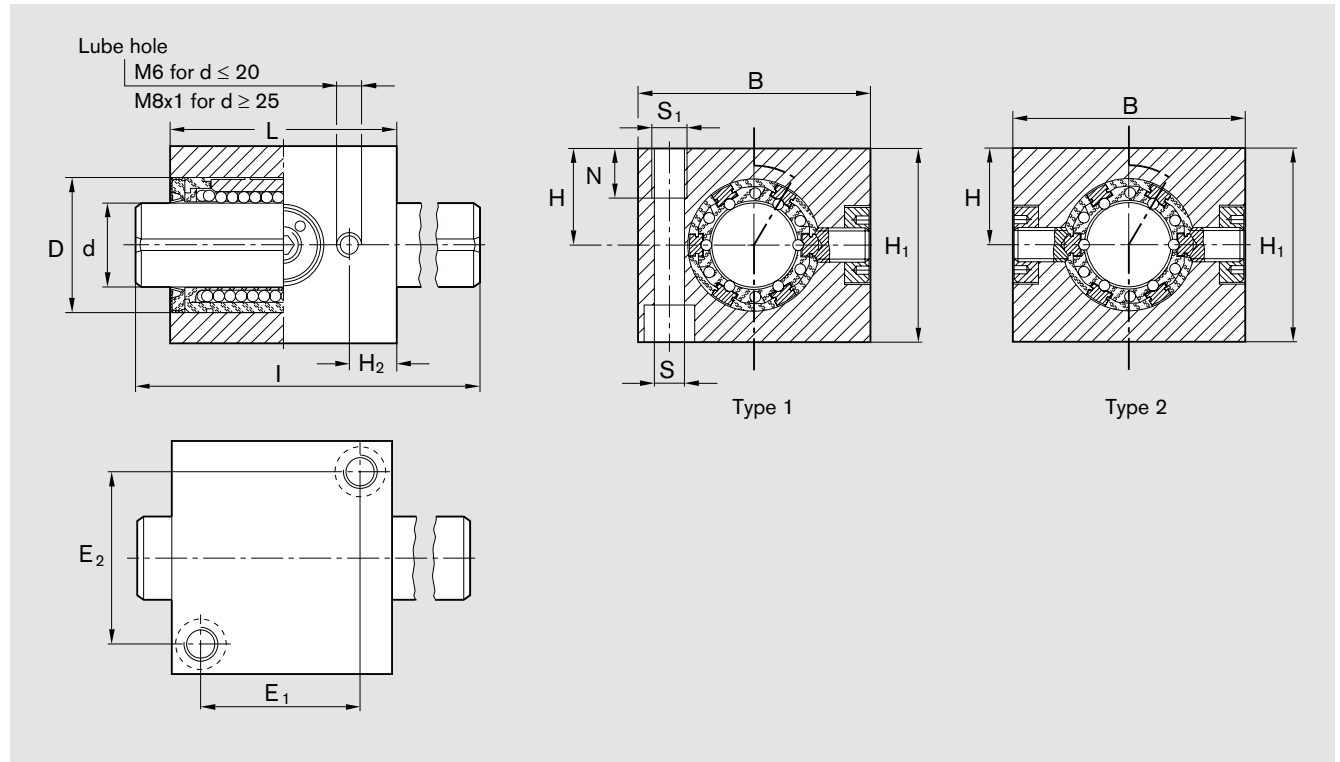


Shaft Ø d (mm)	Part numbers Linear Set with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
20	R1098 520 80	R1098 520 89	R1098 520 86
25	R1098 525 80	R1098 525 89	R1098 525 86
30	R1098 530 80	R1098 530 89	R1098 530 86
40	R1098 540 80	R1098 540 89	R1098 540 86
50	R1098 550 80	R1098 550 89	R1098 550 86

- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

1) Also partly available with tubular shaft from shaft diameter 25: R1098 ... 69, or with corrosion-resistant steel shaft per ISO 683-17 / EN 10088: R1098 ... 79.

Dimensions



Dimensions (mm)													Standard length I (mm)	Torque capacity M_t (Nm)		Load capacities ³⁾ (N)		Weight	
Type 1	Type 2	B	H ₁	H ¹⁾ +0.013 -0.022	H ₂	L	D	E ₁	E ₂	S ²⁾	S ₁	N		Type 1	Type 2	C	C ₀	Linear Set (kg)	Shaft (kg/m)
12	-	42	35	18	8.5	40	22	28	30	5.3	M6	12	400	2	-	640	420	0.15	0.89
16	-	50	42	22	10	44	26	30	36	5.3	M6	12	400	3.3	-	780	530	0.22	1.57
20	20	60	50	25	11	55	32	39	44	6.6	M8	12	500	7.5	12	1550	1050	0.42	2.45
25	25	74	60	30	15.5	68	40	48	54	8.4	M10	15	500	15	24	3030	2180	0.7	3.80
30	30	84	70	35	16.5	80	47	58	62	10.5	M12	18	600	23	37	3680	2790	1.1	5.50
40	40	108	90	45	18.5	92	62	64	80	13.5	M16	20	600	53	86	6320	4350	2.1	9.80
50	50	130	105	50	22.5	114	75	84	100	13.5	M16	20	600	103	167	9250	6470	3.5	15.30

- 1) If two or more Linear Sets are mounted on the same shaft, they are leveled to the same dimension H by grinding after mounting. Dimension H is then 0.5 mm smaller.
- 2) Mounting screws ISO 4762-8.8.
- 3) The load capacities stated are minimum values as the direction of load cannot always be precisely defined.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Note on lubrication: Lubricate only when shaft inserted; add lubricant through lube hole until excess emerges.

Linear Sets with Torque-Resistant Linear Bushings, aluminum housing

Tandem

Linear Sets, R1099 2..

Type 1: one ball guide groove

Linear Sets, R1099 5..

Type 2: two ball guide grooves

Structural design

- Precision tandem housing, lightweight series (aluminum)
- Two Torque-Resistant Linear Bushings
- Precision Steel Shaft with ball guide groove
- Torque-transmitting steel load bearing plates adjusted to zero-clearance before delivery
- External seals
- Stability against cocking loads
- Relubricatable

Type 1: one ball guide groove



Shaft Ø d (mm)	Part numbers Linear Set with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
12	R1099 212 80	R1099 212 89	R1099 212 86
16	R1099 216 80	R1099 216 89	R1099 216 86
20	R1099 220 80	R1099 220 89	R1099 220 86
25	R1099 225 80	R1099 225 89	R1099 225 86
30	R1099 230 80	R1099 230 89	R1099 230 86
40	R1099 240 80	R1099 240 89	R1099 240 86
50	R1099 250 80	R1099 250 89	R1099 250 86

- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

Type 2: two ball guide grooves

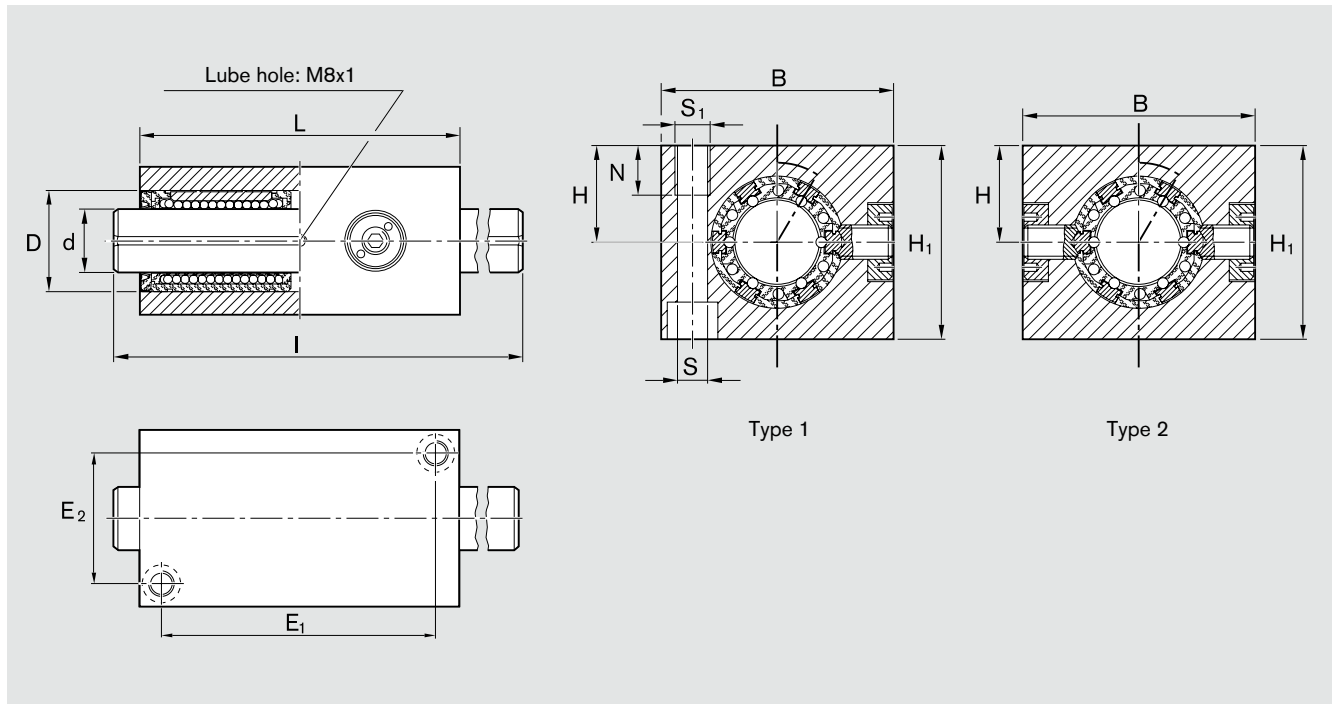


Shaft Ø d (mm)	Part numbers Linear Set with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
20	R1099 520 80	R1099 520 89	R1099 520 86
25	R1099 525 80	R1099 525 89	R1099 525 86
30	R1099 530 80	R1099 530 89	R1099 530 86
40	R1099 540 80	R1099 540 89	R1099 540 86
50	R1099 550 80	R1099 550 89	R1099 550 86

- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

1) Also partly available with tubular shaft from shaft diameter 25: R1099 ... 69, or with corrosion-resistant steel shaft per ISO 683-17 / EN 10088: R1099 ... 79.

Dimensions



Dimensions (mm)													Standard length l	Torque capacity M_t (Nm)		Load capacities ³⁾ (N)		Weight Linear Set (kg)	Shaft (kg/m)
Type 1	$\varnothing d$ Type 2	B	H_1	$H^{1)}$ +0.013 -0.022	L	D	E_1	E_2	$S^2)$	S_1	N	Type 1		Type 2	C	C_0	Linear Set		
12	-	42	35	18	76	22	64	30	5.3	M6	12	400	3.2	-	1040	840	0.29	0.89	
16	-	50	42	22	84	26	70	36	5.3	M6	12	400	5.5	-	1260	1060	0.43	1.57	
20	20	60	50	25	104	32	88	44	6.6	M8	12	500	12	20	2500	2100	0.8	2.45	
25	25	74	60	30	130	40	110	54	8.4	M10	15	500	24	40	4900	4360	1.5	3.80	
30	30	84	70	35	152	47	130	62	10.5	M12	18	600	37	60	6000	5580	2.2	5.50	
40	40	108	90	45	176	62	148	80	13.5	M16	20	600	86	140	10200	8700	4.0	9.80	
50	50	130	105	50	224	75	194	100	13.5	M16	20	600	167	272	15000	12940	6.9	15.30	

- 1) If two or more Linear Sets are mounted on the same shaft, they are leveled to the same dimension H by grinding after mounting. Dimension H is then 0.5 mm smaller.
- 2) Mounting screws ISO 4762-8.8.
- 3) Load capacity when both Linear Bushings are equally loaded.
The load capacities stated are minimum values as the direction of load cannot always be precisely defined.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.
Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Note on lubrication: Lubricate only when shaft inserted; add lubricant through lube hole until excess emerges.



Linear Sets with Torque-Resistant Linear Bushings, steel housing

Linear Sets, R1096 2.. Type 1: one ball guide groove

Linear Sets, R1096 5.. Type 2: two ball guide grooves

Structural design

- Precision steel housing
- Torque-Resistant Linear Bushing
- Precision Steel Shaft with ball guide groove
- Torque-transmitting steel load bearing plates adjusted to zero-clearance before delivery
- External seals
- Stability against cocking loads: see Linear Sets, Tandem version

Type 1: one ball guide groove



Shaft Ø d (mm)	Part numbers Linear Set with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
12	R1096 212 80	R1096 212 89	R1096 212 86
16	R1096 216 80	R1096 216 89	R1096 216 86
20	R1096 220 80	R1096 220 89	R1096 220 86
25	R1096 225 80	R1096 225 89	R1096 225 86
30	R1096 230 80	R1096 230 89	R1096 230 86
40	R1096 240 80	R1096 240 89	R1096 240 86
50	R1096 250 80	R1096 250 89	R1096 250 86

- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

Type 2: two ball guide grooves

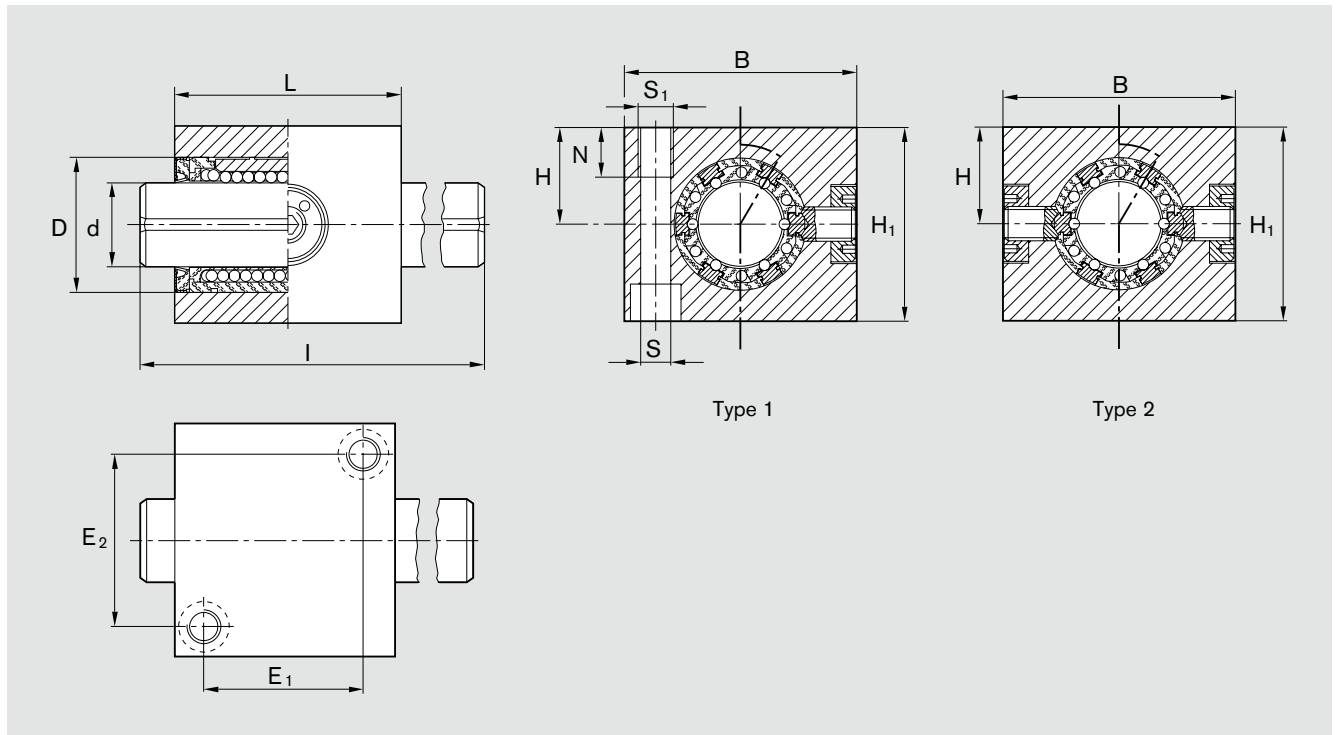


Shaft Ø d (mm)	Part numbers Linear Set with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
20	R1096 520 80	R1096 520 89	R1096 520 86
25	R1096 525 80	R1096 525 89	R1096 525 86
30	R1096 530 80	R1096 530 89	R1096 530 86
40	R1096 540 80	R1096 540 89	R1096 540 86
50	R1096 550 80	R1096 550 89	R1096 550 86

- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

1) Also partly available with tubular shaft from shaft diameter 25: R1096 ... 69, or with corrosion-resistant steel shaft per ISO 683-17 / EN 10088: R1096 ... 79.

Dimensions



Dimensions (mm)												Standard length I (mm)	Torque capacity M_t (Nm)		Load capacities ³⁾ (N)		Weight Linear Set (kg)	Shaft (kg/m)	
Type 1	Type 2	$\varnothing d$	B	H_1	$H^{1)}$ +0.013 -0.022	L	D	E_1	E_2	$S^2)$	S_1		N	Type 1	Type 2	C			C_0
12	-	12	42	35	18	40	22	28	30	5.3	M6	12	400	2	-	640	420	0.35	0.89
16	-	16	50	42	22	44	26	30	36	5.3	M6	12	400	3.3	-	780	530	0.55	1.57
20	20	20	60	50	25	55	32	39	44	6.6	M8	12	500	7.5	12	1550	1050	1.00	2.45
25	25	25	74	60	30	68	40	48	54	8.4	M10	15	500	15	24	3030	2180	1.50	3.80
30	30	30	84	70	35	80	47	58	62	10.5	M12	18	600	23	37	3680	2790	2.70	5.50
40	40	40	108	90	45	92	62	64	80	13.5	M16	20	600	53	86	6320	4350	5.00	9.80
50	50	50	130	105	50	114	75	84	100	13.5	M16	20	600	103	167	9250	6470	8.70	15.30

1) If two or more Linear Sets are mounted on the same shaft, they are leveled to the same dimension H by grinding after mounting. Dimension H is then 0.5 mm smaller.

2) Mounting screws ISO 4762-8.8.

3) The load capacities stated are minimum values as the direction of load cannot always be precisely defined.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.



Linear Sets with Torque-Resistant Linear Bushings, steel housing

Tandem

Linear Sets, R1097 2..

Type 1: one ball guide groove

Linear Sets, R1097 5..

Type 2: two ball guide grooves

Structural design

- Precision tandem steel housing
- Two Torque-Resistant Linear Bushings
- Precision Steel Shaft with ball guide groove
- Torque-transmitting steel load bearing plates adjusted to zero-clearance before delivery
- External seals
- Stability against cocking loads

Type 1: one ball guide groove



Shaft Ø d (mm)	Part numbers Linear Set with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
12	R1097 212 80	R1097 212 89	R1097 212 86
16	R1097 216 80	R1097 216 89	R1097 216 86
20	R1097 220 80	R1097 220 89	R1097 220 86
25	R1097 225 80	R1097 225 89	R1097 225 86
30	R1097 230 80	R1097 230 89	R1097 230 86
40	R1097 240 80	R1097 240 89	R1097 240 86
50	R1097 250 80	R1097 250 89	R1097 250 86

- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

Type 2: two ball guide grooves

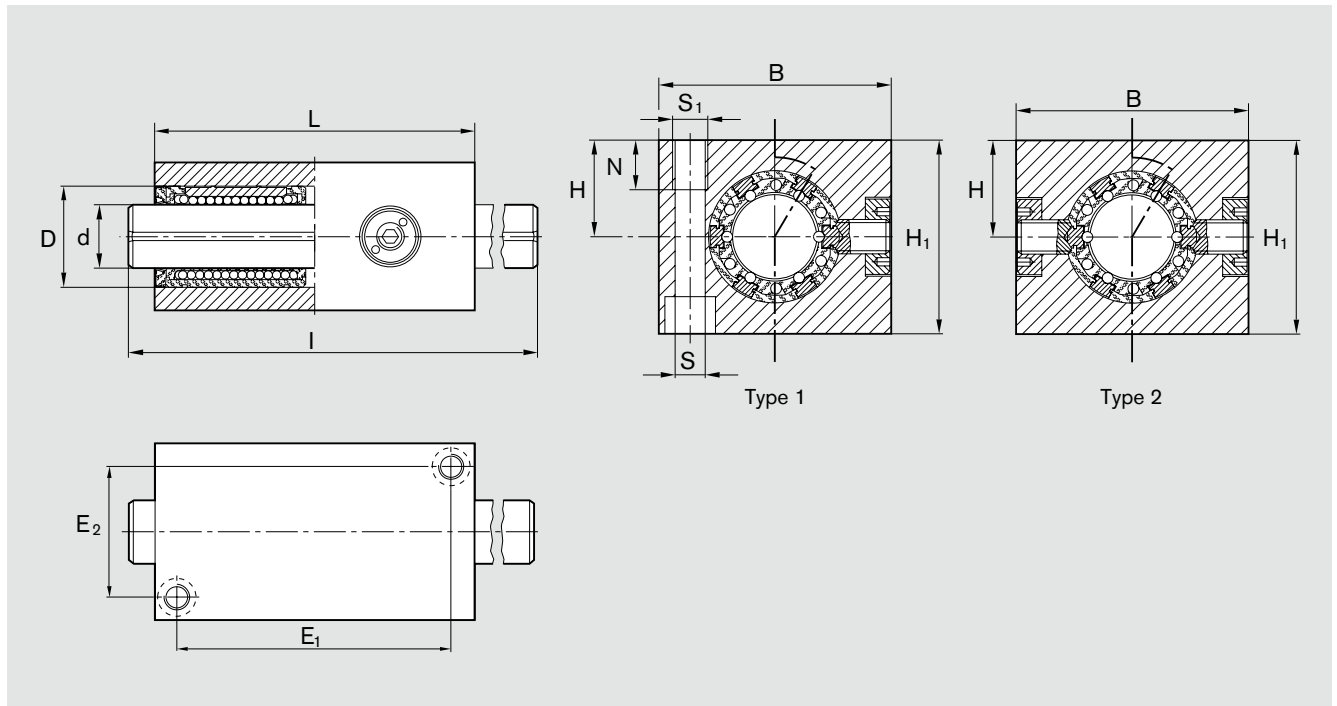


Shaft Ø d (mm)	Part numbers Linear Set with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
20	R1097 520 80	R1097 520 89	R1097 520 86
25	R1097 525 80	R1097 525 89	R1097 525 86
30	R1097 530 80	R1097 530 89	R1097 530 86
40	R1097 540 80	R1097 540 89	R1097 540 86
50	R1097 550 80	R1097 550 89	R1097 550 86

- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

1) Also partly available with tubular shaft from shaft diameter 25: R1097 ... 69, or with corrosion-resistant steel shaft per ISO 683-17 / EN 10088: R1097 ... 79.

Dimensions



Dimensions (mm)												Standard length l (mm)	Torque capacity M_t (Nm)		Load capacities ³⁾ (N)		Weight Linear Set (kg)	Shaft (kg/m)
Type 1	$\varnothing d$ Type 2	B	H ₁	H ¹⁾ +0.013 -0.022	L	D	E ₁	E ₂	S ²⁾	S ₁	N		Type 1	Type 2	C	C ₀		
12	-	42	35	18	76	22	64	30	5.3	M6	12	400	3.2	-	1040	840	0.7	0.89
16	-	50	42	22	84	26	70	36	5.3	M6	12	400	5.5	-	1260	1060	1.0	1.57
20	20	60	50	25	104	32	88	44	6.6	M8	12	500	12	20	2500	2100	1.9	2.45
25	25	74	60	30	130	40	110	54	8.4	M10	15	500	24	40	4900	4360	3.5	3.80
30	30	84	70	35	152	47	130	62	10.5	M12	18	600	37	60	6000	5580	5.2	5.50
40	40	108	90	45	176	62	148	80	13.5	M16	20	600	86	140	10200	8700	9.8	9.80
50	50	130	105	50	224	75	194	100	13.5	M16	20	600	167	272	15000	12940	17.0	15.30

- 1) If two or more Linear Sets are mounted on the same shaft, they are leveled to the same dimension H by grinding after mounting. Dimension H is then 0.5 mm smaller.
- 2) Mounting screws ISO 4762-8.8.
- 3) Load capacity when both Linear Bushings are equally loaded.
The load capacities stated are minimum values as the direction of load cannot always be precisely defined.

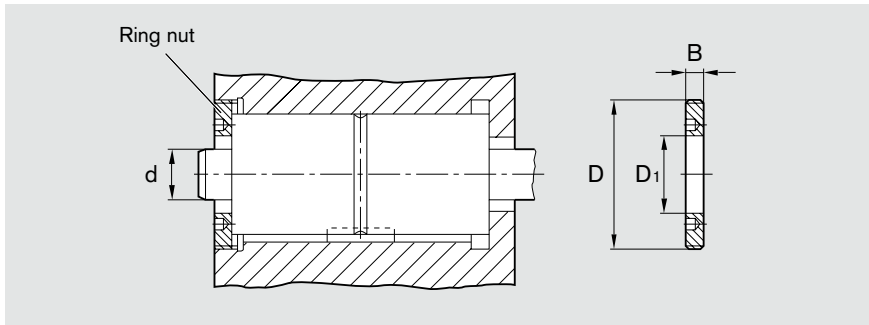
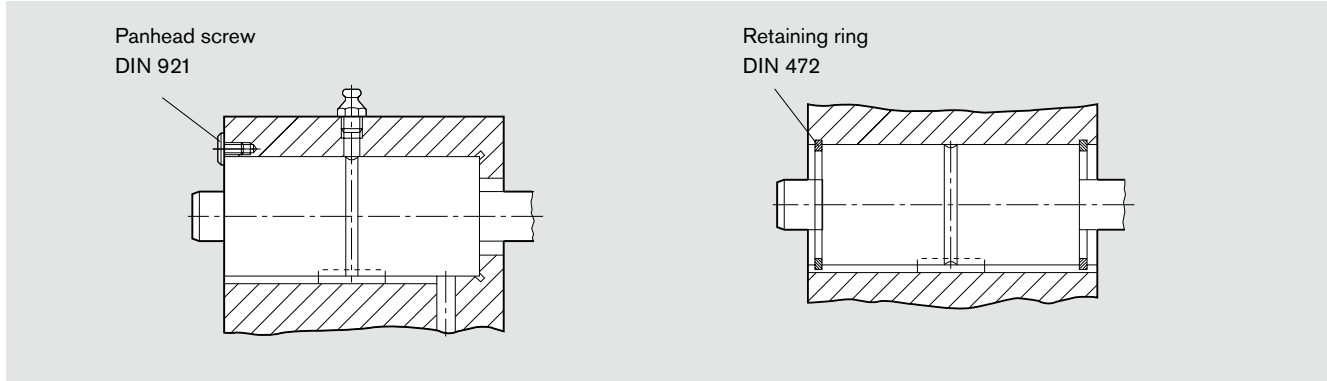
Determination of the dynamic load capacities is based on a travel life of 100,000 m.
Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.



Linear Sets with Torque-Resistant Compact Linear Bushings

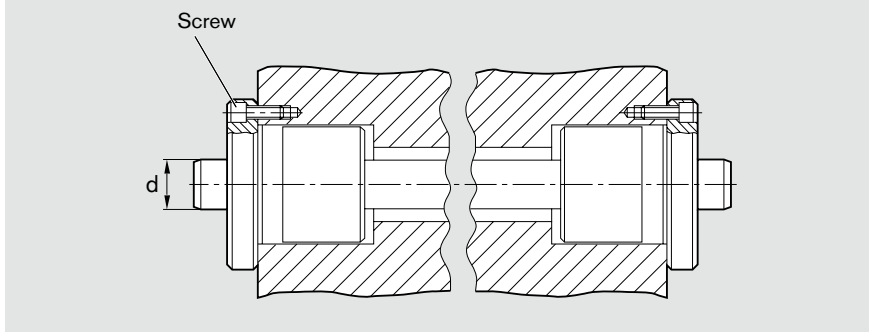
Mounting Instructions

- Recommendations for mounting, arrangement of lubrication channels and bores as well as retention
- Recommended mounting bore: D^{H6} (D^{J6})



Shaft Ø d (mm)	Ring nut Part numbers	Dimensions (mm)		
		D	D ₁	B
12	R1507 1 4003	M40x1.5	22	8
16	R1507 2 4004	M45x1.5	28	8
20	R1507 3 4005	M55x1.5	34	10
25	R1507 4 4006	M70x1.5	42	12
30	R1507 5 4007	M78x2	52	15
40	R1507 6 4009	M92x2	65	16
50	R1507 7 4011	M112x2	82	18

Linear Set with Flange



Shaft Ø d (mm)	Screw ISO 4762-8.8
	12
16	M4x16
20	M5x16
25	M6x20
30	M8x25
40	M8x25
50	M10x30

Lubrication

- Lubrication for Linear Set with one Torque-Resistant Compact Linear Bushing:
Lubricate only when shaft inserted. Add lubricant through lube hole diam. 3.9 until excess emerges.
- Lubrication for Tandem Linear Set:
Lubricate only when shaft inserted. Add lubricant through the centrally located lube groove on the outer diameter until excess emerges.
- Lubrication for Flanged Linear Set:
Lubricate only when shaft inserted. Add lubricant through the recessed funnel-shaped lube nipple on the end face until excess emerges.



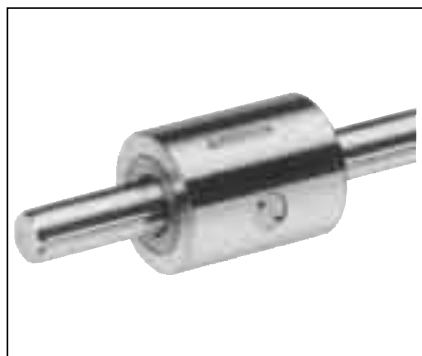
Linear Sets with Torque-Resistant Compact Linear Bushings

Linear Sets, R0721**Structural design**

- Space-saving steel sleeve
- Torque-Resistant Compact Linear Bushing
- Precision Steel Shaft with ball guide groove
- Torque-transmitting steel load bearing plates adjusted to zero-clearance before delivery
- External seals
- Stability against cocking loads: see Linear Sets, Tandem version
- Keyway for torque transmission
- Relubricatable

One ball guide groove
for shaft diameter 12 and 16 mm

Two ball guide grooves
for shaft diameter 20 mm and up

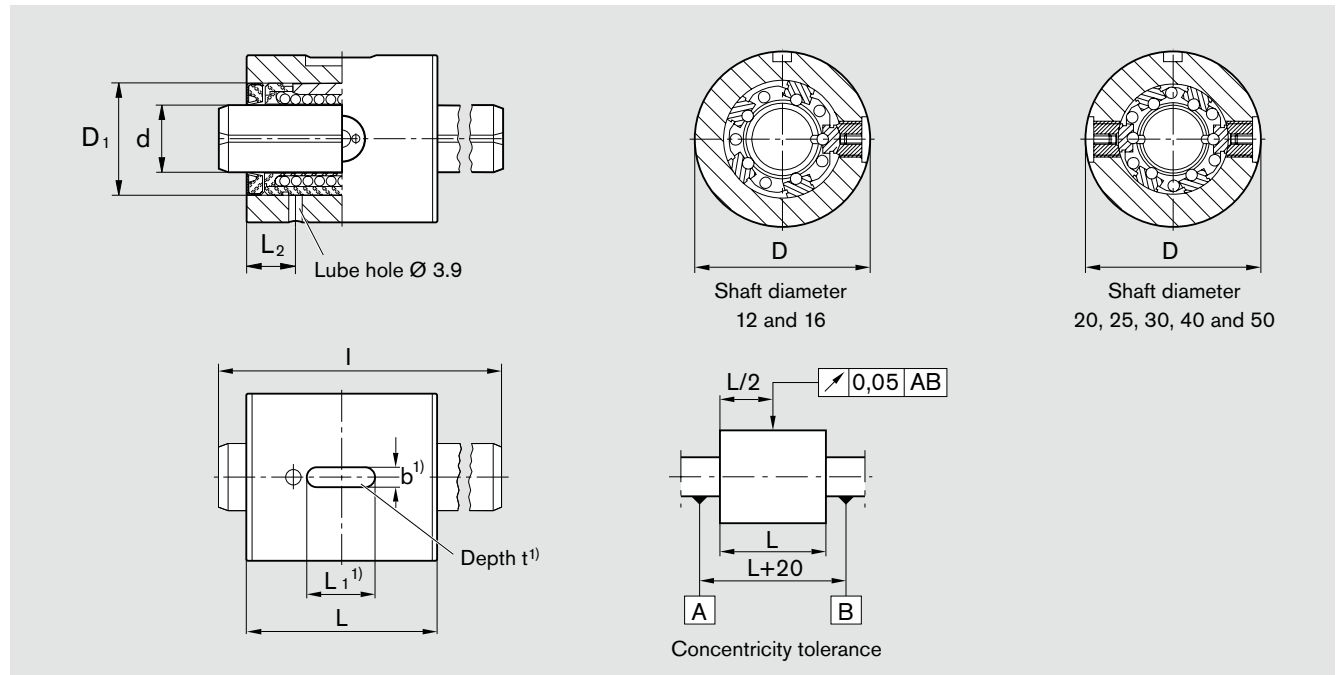


Shaft Ø d (mm)	Part numbers Linear Set with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
12	R0721 212 80	R0721 212 89	R0721 212 86
16	R0721 216 80	R0721 216 89	R0721 216 86
20	R0721 520 80	R0721 520 89	R0721 520 86
25	R0721 525 80	R0721 525 89	R0721 525 86
30	R0721 530 80	R0721 530 89	R0721 530 86
40	R0721 540 80	R0721 540 89	R0721 540 86
50	R0721 550 80	R0721 550 89	R0721 550 86

- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

1) Also available with tubular shaft from shaft diameter 25: R0721 ... 69, or
with corrosion-resistant steel shaft per ISO 683-17 / EN 10088: R0721 ... 79.

Dimensions



1) For key A... DIN 6885.

Dimensions (mm)									Standard length l (mm)	Torque capacity M_t (Nm)	Load capacities ²⁾ (N)		Weight	
$\text{Ø } d$	D h6	L h11	D_1	L_1	b P9	t	L_2	C			C_0	Linear Set (kg)	Shaft (kg/m)	
12	32	40	22	14	5	3	11	400	2	640	420	0.16	0.89	
16	36	44	26	16	5	3	12	400	3.3	780	530	0.20	1.57	
20	48	55	32	20	5	3	14	500	12	1550	1050	0.50	2.45	
25	56	68	40	25	6	3.5	15.5	500	24	3030	2180	0.80	3.80	
30	65	80	47	28	6	3.5	16.5	600	37	3680	2790	1.20	5.50	
40	80	92	62	32	8	4	18.5	600	86	6320	4350	1.80	9.80	
50	100	114	75	40	8	4	22.5	600	167	9250	6470	3.70	15.30	

2) The load capacities stated are minimum values as the direction of load cannot always be precisely defined.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.



Linear Sets with Torque-Resistant Compact Linear Bushings

Tandem

Linear Sets, R0722

Structural design

- Space-saving steel sleeve
- Two Torque-Resistant Compact Linear Bushings
- Precision Steel Shaft with ball guide groove
- Torque-transmitting steel load bearing plates adjusted to zero-clearance before delivery
- External seals
- Stability against cocking loads
- Keyway for torque transmission
- Relubricatable

One ball guide groove
for shaft diameter 12 and 16 mm

Two ball guide grooves
for shaft diameter 20 mm and up

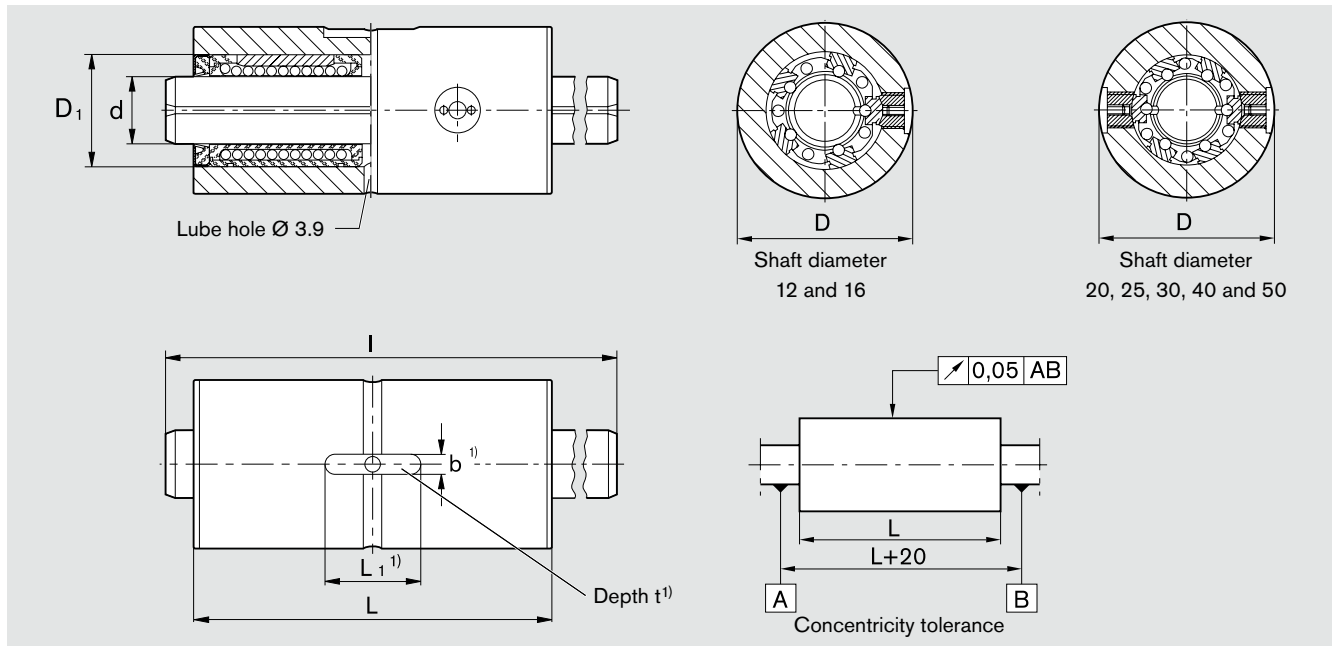


Shaft Ø d (mm)	Part numbers Linear Set with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
12	R0722 212 80	R0722 212 89	R0722 212 86
16	R0722 216 80	R0722 216 89	R0722 216 86
20	R0722 520 80	R0722 520 89	R0722 520 86
25	R0722 525 80	R0722 525 89	R0722 525 86
30	R0722 530 80	R0722 530 89	R0722 530 86
40	R0722 540 80	R0722 540 89	R0722 540 86
50	R0722 550 80	R0722 550 89	R0722 550 86

- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

1) Also available with tubular shaft from shaft diameter 25: R0722 ... 69, or with corrosion-resistant steel shaft per ISO 683-17 / EN 10088: R0722 ... 79.

Dimensions



1) For key A... DIN 6885.

Dimensions (mm)							Standard length l (mm)	Torque capacity M_t (Nm)	Load capacities ²⁾ (N)		Weight	
$\text{Ø } d$	D h6	L h11	D_1	L_1	b P9	t			C	C_0	Linear Set (kg)	Shaft (kg/m)
12	32	76	22	20	5	3	400	3.2	1040	840	0.32	0.89
16	36	84	26	22	5	3	400	5.5	1260	1060	0.40	1.57
20	48	104	32	28	5	3	500	20	2500	2100	0.95	2.45
25	56	130	40	36	6	3.5	500	40	4900	4360	1.50	3.80
30	65	152	47	40	6	3.5	600	60	6000	5580	2.30	5.50
40	80	176	62	45	8	4	600	140	10200	8700	3.50	9.80
50	100	224	75	63	8	4	600	272	15000	12940	7.30	15.30

2) Load capacity when both Linear Bushings are equally loaded.

The load capacities stated are minimum values as the direction of load cannot always be precisely defined.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Linear Sets with Torque-Resistant Compact Linear Bushings

Flanged

Linear Sets, R0723

Structural design

- Flanged steel sleeve
- Torque-Resistant Compact Linear Bushing
- Precision Steel Shaft with ball guide groove
- Torque-transmitting steel load bearing plates adjusted to zero-clearance before delivery
- External seals
- Stability against cocking loads: Installation of two Linear Sets, see Mounting Instructions for Linear Sets with Torque-Resistant Linear Bushings
- Relubricatable

One ball guide groove
for shaft diameter 12 and 16 mm

Two ball guide grooves
for shaft diameter 20 mm and up

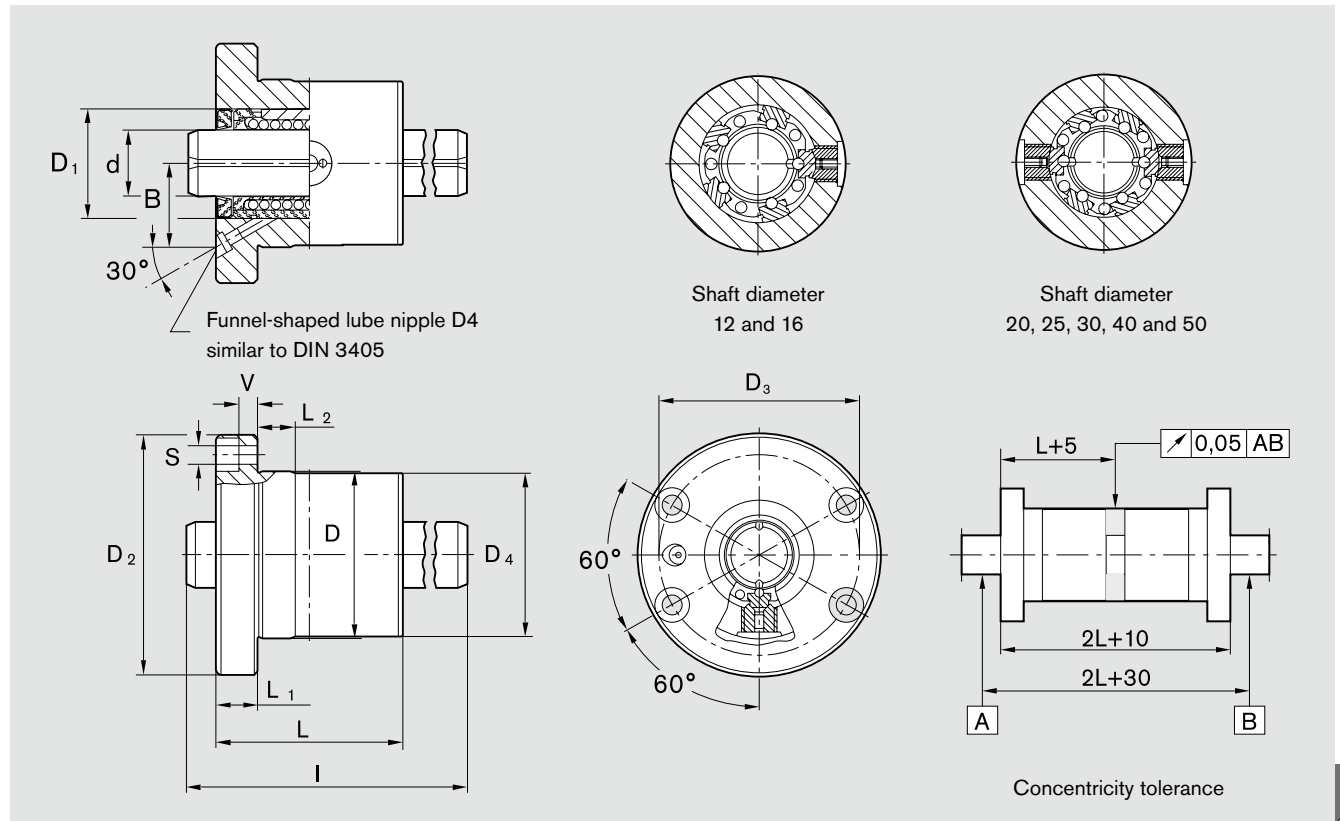


Shaft Ø d (mm)	Part numbers Linear Set with shaft		
	Standard length per table	Shaft to specified length ¹⁾	Customized shaft
12	R0723 212 80	R0723 212 89	R0723 212 86
16	R0723 216 80	R0723 216 89	R0723 216 86
20	R0723 520 80	R0723 520 89	R0723 520 86
25	R0723 525 80	R0723 525 89	R0723 525 86
30	R0723 530 80	R0723 530 89	R0723 530 86
40	R0723 540 80	R0723 540 89	R0723 540 86
50	R0723 550 80	R0723 550 89	R0723 550 86

- 85 Shaft length 900 mm
- 87 Shaft length 1200 mm
- 88 Shaft length 2000 mm

1) Also available with tubular shaft from shaft diameter 25: R0723 ... 69, or with corrosion-resistant steel shaft per ISO 683-17 / EN 10088: R0723 ... 79.

Dimensions



Dimensions (mm)													Standard length I (mm)	Torque capacity M_t (Nm)	Load capacities ²⁾ (N)		Weight	
$\varnothing d$	D h6	D ₄ -0.1 -0.3	D ₁	D ₂	L h11	L ₁ -0.2	L ₂	D ₃	S ¹⁾	V	B	C			C ₀	Linear Set (kg)	Shaft (kg/m)	
12	32	32	22	50	40	10	10	40	4.5	4.5	17.4	400	2	640	420	0.25	0.89	
16	36	36	26	54	44	10	10	44	4.5	4.5	20	400	3.3	780	530	0.30	1.57	
20	48	48	32	70	55	12	10	58	5.5	5	24	500	12	1550	1050	0.70	2.45	
25	56	56	40	82	68	14	10	68	6.6	5.5	29	500	24	3030	2180	1.10	3.80	
30	65	65	47	98	80	18	10	80	9	7	33	600	37	3680	2790	1.75	5.50	
40	80	80	62	114	92	18	16	95	9	7	41.7	600	86	6320	4350	2.50	9.80	
50	100	100	75	140	114	22	16	118	11	8.5	50.5	600	167	9250	6470	4.85	15.30	

1) Mounting screws ISO 4762-8.8.

2) The load capacities stated are minimum values as the direction of load cannot always be precisely defined.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Torque-Resistant Linear Bushings with four ball guide grooves

Torque-Resistant Linear Bushing, R0724 2 with four ball guide grooves

Structural design

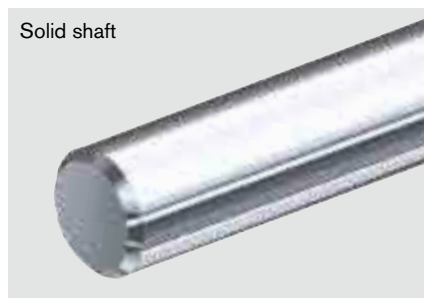
- Hardened and ground outer sleeve
- Plastic ball retainer
- Balls made of anti-friction bearing steel
- Integrated wiper seals
- Keyway for torque transmission
- Relubricatable



Size	Part numbers	Weight (kg)
4	R0724 204 00	0.0065
6	R0724 206 00	0.019
8	R0724 208 00	0.023
10	R0724 210 00	0.054
13	R0724 213 00	0.07
16	R0724 216 00	0.15
20	R0724 220 00	0.20
25	R0724 225 00	0.22
30	R0724 230 00	0.35
40	R0724 240 00	0.81
50	R0724 250 00	1.50

Precision Steel Shafts R0724 0 with four ball guide grooves

For Torque-Resistant Linear Bushings R0724, Flanged R0725, Miniature Flange R0726 and Rotational Flange R0727



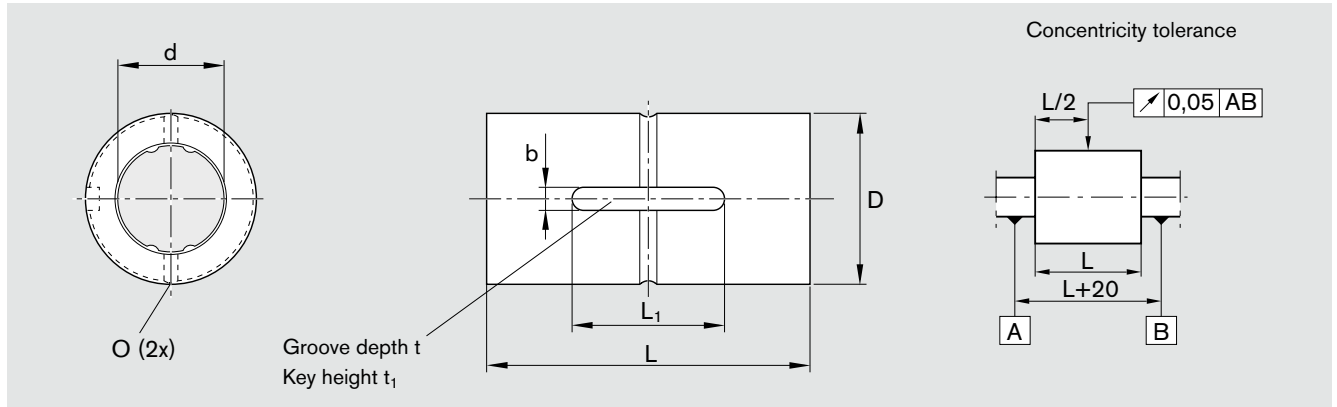
Size	Part numbers Solid shaft			Weight (kg/m)
	Shaft length l max.	Shaft to specified length	Customized shaft	
4	R0724 004 02	R0724 004 89	R0724 004 86	0.10
6	R0724 006 02	R0724 006 89	R0724 006 86	0.21
8	R0724 008 02	R0724 008 89	R0724 008 86	0.38
10	R0724 010 02	R0724 010 89	R0724 010 86	0.60
13	R0724 013 02	R0724 013 89	R0724 013 86	1.00
16	R0724 016 02	R0724 016 89	R0724 016 86	1.50
20	R0724 020 02	R0724 020 89	R0724 020 86	2.00
25	R0724 025 02	R0724 025 89	R0724 025 86	3.10
30	R0724 030 02	R0724 030 89	R0724 030 86	4.80
40	R0724 040 02	R0724 040 89	R0724 040 86	8.60
50	R0724 050 02	R0724 050 89	R0724 050 86	13.10



Size ¹⁾	Part numbers Tubular shaft			Weight (kg/m)
	Shaft length l max.	Shaft to specified length	Customized shaft	
4	R0724 004 32	R0724 004 69	R0724 004 66	0.082
6	R0724 006 32	R0724 006 69	R0724 006 66	0.195
8	R0724 008 32	R0724 008 69	R0724 008 66	0.34
10	R0724 010 32	R0724 010 69	R0724 010 66	0.51
13	R0724 013 32	R0724 013 69	R0724 013 66	0.80
16	R0724 016 32	R0724 016 69	R0724 016 66	1.20

1) Sizes 20 to 50 on request.

Dimensions R0724 2



Size	Dimensions (mm)								Torque capacity (Nm)		Load capacities ¹⁾ (N)	
	$\varnothing d$	D h6	L	L ₁	O	t	t ₁	b	M _t	M ₁₀	C	C ₀
4	4	10	16 _{-0,2}	6	–	1.2	2	2	0.59	1.05	680	1220
6	6	14	25 _{-0,2}	10.5	1	1.2	2.5	2.5	1.20	2.40	970	2280
8	8	16	25 _{-0,2}	10.5	1.5	1.2	2.5	2.5	1.70	3.70	1150	2870
10	10	21	33 _{-0,2}	13	1.5	1.5	3	3	3.50	8.20	2170	5070
13	13	24	36 _{-0,2}	15	1.5	1.5	3	3	16.70	39.20	2120	4890
16	16	31	50 _{-0,2}	17.5	2	2	3.5	3.5	48	110	4860	11200
20	18,2	32	60 _{-0,2}	26	2	2.5	4	4	66	133	6200	11300
25	23	37	70 _{-0,3}	33	3	3	5	5	129	239	9800	16100
30	28	45	80 _{-0,3}	41	3	4	7	7	229	412	14800	23200
40	37,4	60	100 _{-0,3}	55	4	4.5	8	10	500	882	24400	37500
50	47	75	112 _{-0,3}	60	4	5	10	15	1100	3180	36600	74200

1) The load capacities stated are minimum values as the direction of load cannot always be precisely defined.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

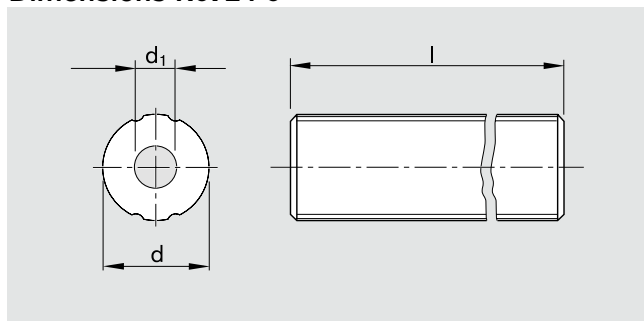
Notes for mounting:

Recommended housing bore tolerance: H6 or H7.

Radial clearance: approx. $\pm 5 \mu\text{m}$; with preload upon request.

When inserting the shaft ensure that the grooves and the seals are aligned and do not tilt the shaft!

Dimensions R0724 0



Size	Dimensions (mm)		
	$\varnothing d$ h7	d ₁	Shaft length l _{max}
4	4	1.5	300
6	6	2	600
8	8	3	600
10	10	4	600
13	13	6	600
16	16	8	600
20	18.2	–	1500
25	23	–	1500
30	28	–	1500
40	37.4	–	1800
50	47	–	1800

Torque-Resistant Linear Bushings with four ball guide grooves

**Torque-Resistant Linear Bushing,
R0725
Flanged, with four ball guide
grooves**

**Torque-Resistant Linear Bushing,
R0726
Miniature Flanged, with four ball
guide grooves**

Structural design

- Hardened and ground outer sleeve
- Plastic ball retainer
- Balls made of anti-friction bearing steel
- Integrated wiper seals
- Relubricatable



Size	Part numbers	Weight (kg)
6	R0725 206 00	0.037
8	R0725 208 00	0.042
10	R0725 210 00	0.094
13	R0725 213 00	0.10
16	R0725 216 00	0.20
20	R0725 220 00	0.22
25	R0725 225 00	0.32
30	R0725 230 00	0.51
40	R0725 240 00	1.15
50	R0725 250 00	2.10



Size	Part numbers	Weight (kg)
6	R0726 206 00	0.029
8	R0726 208 00	0.035
10	R0726 210 00	0.075

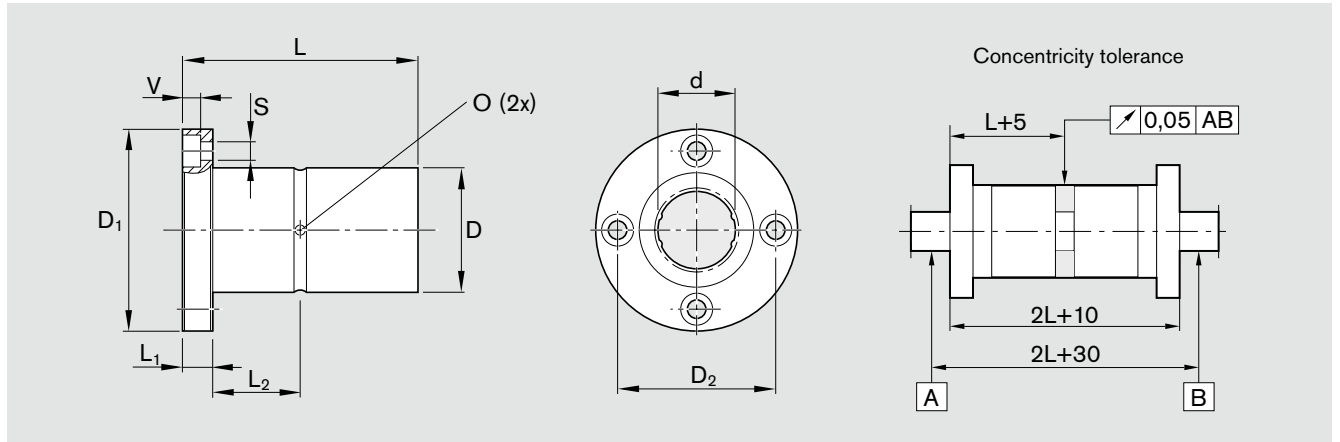
Note: For suitable shafts see "Precision Steel Shafts R0724 0 with four ball guide grooves."

Determination of the dynamic load capacities is based on a travel life of 100,000 m.
Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Notes for mounting:

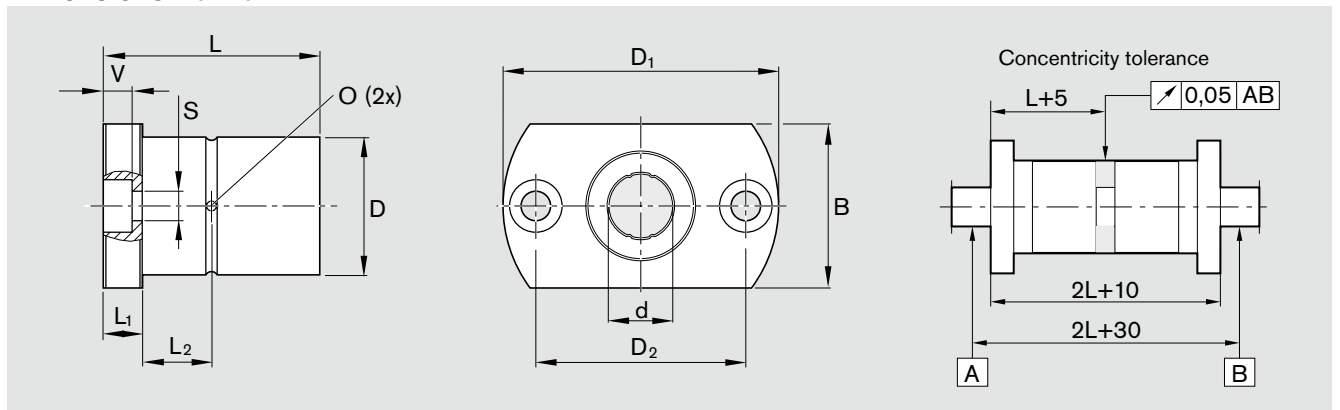
Recommended housing bore tolerance: H6 or H7.
Radial clearance: approx. $\pm 5 \mu\text{m}$; with preload upon request.
When inserting the shaft ensure that the grooves and the seals are aligned and do not tilt the shaft!

Dimensions R0725



Size	Dimensions (mm)										Torque capacity (Nm)		Load capacities ¹⁾ (N)	
	∅ d	D h6	D ₁	D ₂	L	L ₁	L ₂	V	S ²⁾	O	M _t	M _{t0}	C	C ₀
6	6	14	30	22	25 _{-0.2}	5	7.5	3.3	3.4	1	1.2	2.4	970	2280
8	8	16	32	24	25 _{-0.2}	5	7.5	3.3	3.4	1.5	1.7	3.7	1150	2870
10	10	21	42	32	33 _{-0.2}	6	10.5	4.4	4.5	1.5	3.5	8.2	2170	5070
13	13	24	43	33	36 _{-0.2}	7	11	4.4	4.5	1.5	16.7	39.2	2120	4890
16	16	31	50	40	50 _{-0.2}	7	18	4.4	4.5	2	48	110	4860	11200
20	18.2	32	51	40	60 _{-0.2}	7	23	4.4	4.5	2	66	133	6200	11300
25	23	37	60	47	70 _{-0.3}	9	26	5.4	5.5	3	129	239	9800	16100
30	28	45	70	54	80 _{-0.3}	10	30	6.5	6.6	3	229	412	14800	23200
40	37.4	60	90	72	100 _{-0.3}	14	36	8.6	9	4	500	882	24400	37500
50	47	75	113	91	112 _{-0.3}	16	40	11	11	4	1100	3180	36600	74200

Dimensions R0726



Size	Dimensions (mm)										Torque capacity (Nm)		Load capacities ¹⁾ (N)		
	∅ d	D h6	D ₁	D ₂	B	L -0.2	L ₁	L ₂	V	S ²⁾	O	M _t	M _{t0}	C	C ₀
6	6	14	30	22	18	25	5	7.5	3.3	3.4	1	1.2	2.4	970	2280
8	8	16	32	24	21	25	5	7.5	3.3	3.4	1.5	1.7	3.7	1150	2870
10	10	21	42	32	25	33	6	10.5	4.4	4.5	1.5	3.5	8.2	2170	5070

1) The load capacities stated are minimum values as the direction of load cannot always be precisely defined.
 2) Mounting screws ISO 4762-8.8.

Torque-Resistant Linear Bushings with four ball guide grooves

Torque-Resistant Linear Bushing, R0727 Rotational flanged, with four ball guide grooves

Structural design

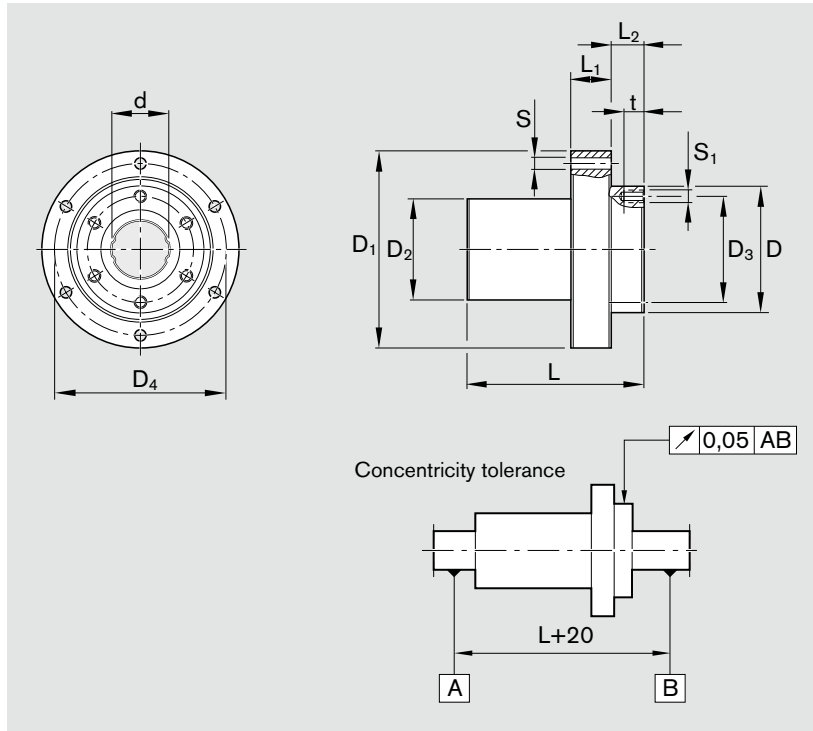
- Hardened and ground outer sleeve
- Plastic ball retainer
- Balls made of anti-friction bearing steel
- Integrated wiper seals
- Integrated cross-roller bearing



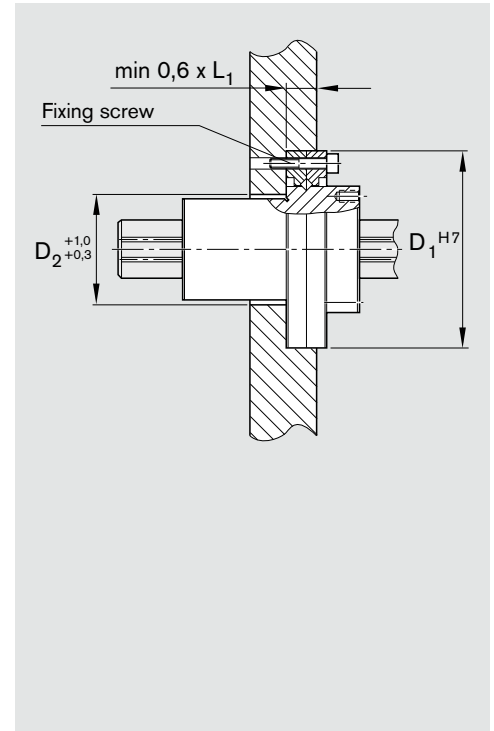
Size	Part numbers	Weight (kg)
20	R0727 220 00	0.45
25	R0727 225 00	0.75
30	R0727 230 00	1.25
40	R0727 240 00	2.30

Note: For suitable shafts see "Precision Steel Shafts R0724 0 with four ball guide grooves."

Dimensions



Installation recommendation



Size	Dimensions (mm)												
	Ø d	D h7	D ₁ h7	D ₂	D ₃	D ₄	L	L ₁	L ₂	S	S ₁	t	
20	18.2	40	66	34	34	56	60 _{-0.2}	13	12	4.5	M4	7	
25	23	50	78	40	42	68	70 _{-0.3}	16	13	4.5	M5	8	
30	28	61	100	47	52	86	80 _{-0.3}	17	17	6.6	M6	10	
40	37.4	76	120	62	64	104	100 _{-0.3}	20	23	9	M6	10	

Size	Torque-Resistant Linear Bushing				Cross-roller bearing			Tightening torque ²⁾	
	Torque capacity (Nm)		Load capacities ¹⁾ (N)		Load capacities (N)		Speed limit (min ⁻¹)	Fixing screw	(Nm)
	M _t	M _{to}	C	C ₀	C	C ₀			
20	66	133	6200	11300	5900	7350	1200	M4	3.9
25	129	239	9800	16100	9110	11500	1000	M4	3.9
30	229	412	14800	23200	13200	18000	800	M6	12.7
40	500	882	24400	37500	22800	32300	600	M8	29.4

1) The load capacities stated are minimal values as the orientation and direction of load cannot always be precisely defined.
 2) Tightening torque for friction factor 0.125

Determination of the dynamic load capacities is based on a travel life of 100,000 m.
 Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Notes for mounting:

Radial clearance: approx. ± 5 µm; with preload upon request.
 When inserting the shaft ensure that the grooves and the seals are aligned and do not tilt the shaft!

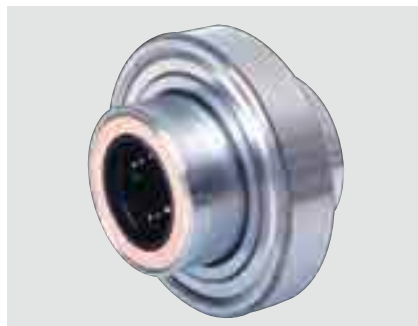
⚠ Do not loosen the flange connection (cross-roller bearing). Tighten the fixing screw step by step until the value specified in the table is reached.

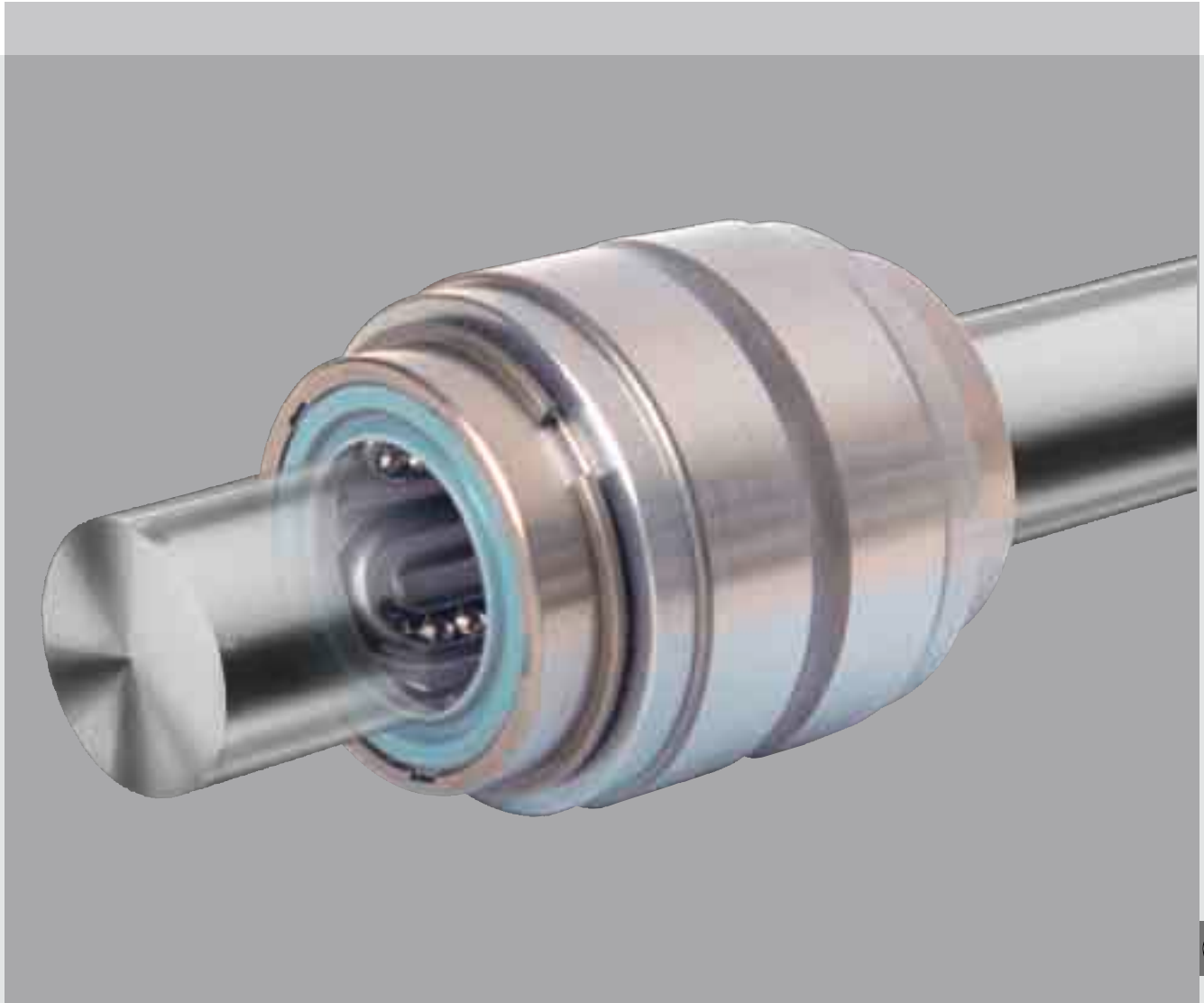
Linear Bushings for Combined Linear and Rotary Motion

Product Overview

Advantages

- Linear Bushings with deep-groove ball bearings or needle bearings
- Precise guidance with high load capacities
- High rotational speed and low friction
- For linear applications with additional rotary motion
- For grip and swivel functions
- For winding applications





Linear Bushings for Combined Linear and Rotary Motion

Linear Bushings for Combined Linear and Rotary Motion, R0663 with deep-groove ball bearings, Series 618

Linear Bushings for Combined Linear and Rotary Motion, R0664 with deep-groove ball bearings, Series 60

Structural design

- Maintenance-free and sealed with shields (Series 60)

Shaft diameter 12 to 40

- Segmental Linear Bushing
- Steel sleeve
- External seals
- Pressed-on deep-groove ball bearing

Shaft diameter 5, 8, 50, 60 and 80

- Standard Linear Bushing
- Integrated wiper seals
- Pressed-on deep-groove ball bearing



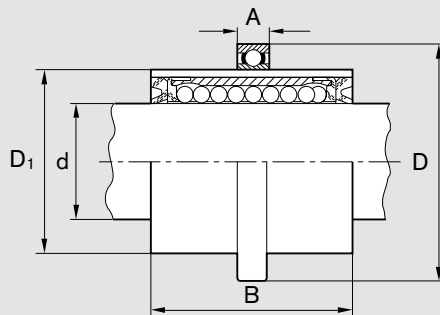
Shaft Ø d (mm)	Part numbers With deep-groove ball bearing, series 618	Weight (kg)
5	R0663 205 00	0.02
8	R0663 208 00	0.06
12	R0663 212 00	0.08
16	R0663 216 00	0.11
20	R0663 220 00	0.15
25	R0663 225 00	0.17
30	R0663 230 00	0.35
40	R0663 240 00	0.49
50	R0663 250 00	1.29
60	R0663 260 00	2.39
80	R0663 280 00	5.35



Shaft Ø d (mm)	Part numbers With deep-groove ball bearing, series 60	Weight (kg)
5	R0664 205 00	0.03
8	R0664 208 00	0.11
12	R0664 212 00	0.14
16	R0664 216 00	0.20
20	R0664 220 00	0.27
25	R0664 225 00	0.32
30	R0664 230 00	0.56
40	R0664 240 00	0.87
50	R0664 250 00	1.78
60	R0664 260 00	3.26

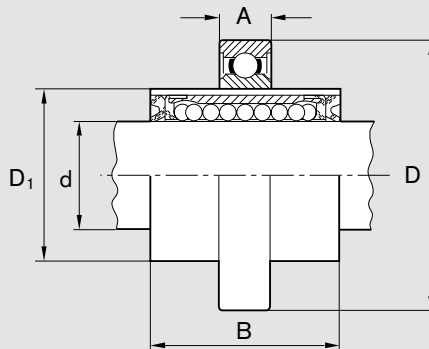
Dimensions

With deep-groove ball bearing, series 618



Dimensions (mm)					Load capacities ³⁾ (N)	
$\varnothing d$	D	D ₁	A	B	C	C ₀
5	21	12 ¹⁾	5	22	180	140
8 ²⁾	32	20	7	25	320	240
12	37	25	7	30	480	420
16	42	30	7	34	720	620
20	47	35	7	38	1020	870
25	52	40	7	45	1630	1360
30	65	50	7	54	2390	1960
40	78	60	10	66	3870	3270
50	95	75 ¹⁾	10	100	8260	6470
60	115	90 ¹⁾	13	125	11500	9160
80	150	120 ¹⁾	16	165	21000	16300

With deep-groove ball bearing, series 60



Dimensions (mm)					Load capacities ³⁾ (N)	
$\varnothing d$	D	D ₁	A	B	C	C ₀
5	28	12 ¹⁾	8	22	180	140
8 ²⁾	42	20	12	25	320	240
12	47	25	12	30	480	420
16	55	30	13	34	720	620
20	62	35	14	38	1020	870
25	68	40	15	45	1630	1360
30	80	50	16	54	2390	1960
40	95	60	18	66	3870	3270
50	115	75 ¹⁾	20	100	8260	6470
60	140	90 ¹⁾	24	125	11500	9160

1) Oversized.

2) A spacer sleeve is located between the ball bearing and the Standard Linear Bushing.

3) The load capacities stated are minimal values as the orientation and direction of load cannot always be precisely defined.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Sealing:

The Linear Bushings are sealed at both ends.

Series R0663: If the deep-groove ball bearings are to be sealed with shaft seals, please request our specification table TB06-060-00.

Series R0664: In all sizes the deep-groove ball bearings are maintenance-free with shields at both ends.

Recommended tolerances

Series R0663 and R0664: Shaft: d_{h6}
Housing bore: D^{K6} or D^{K7}

Other tolerance zones may be selected for special purposes (refer to the rotary bearing manufacturer's mounting recommendations).

Operating temperatures

-10 °C to 80 °C



Linear Bushings for Combined Linear and Rotary Motion

**Linear Bushings for Combined
Linear and Rotary Motion, R0665
with needle bearings,
without wiper seals**

**Linear Bushings for Combined
Linear and Rotary Motion, R0667
with needle bearings,
with wiper seals**

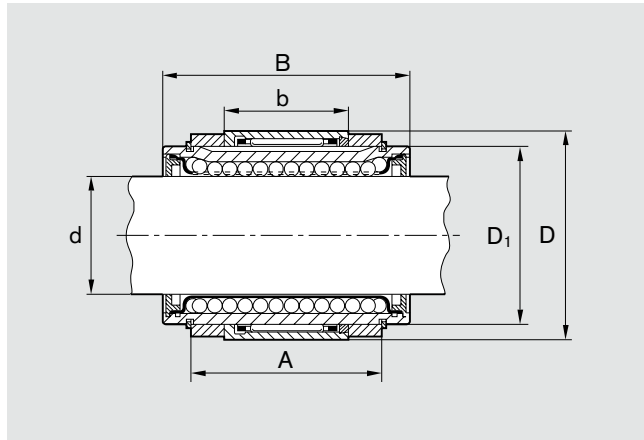
Structural design

- Standard Linear Bushing
(closed type)
- Needle bearing
- Steel spacer rings
- Retaining rings

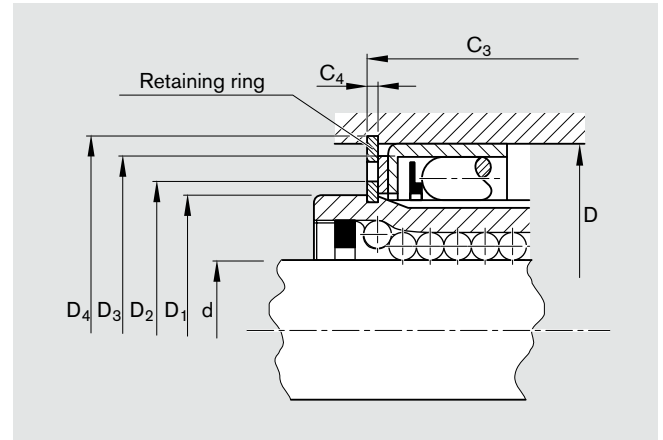


Shaft Ø d (mm)	Part numbers		Weight (kg)
	With two seals	Without seals	
5	R0667 005 00	R0665 005 00	0.02
8	R0667 008 00	R0665 008 00	0.04
12	R0667 012 00	R0665 012 00	0.08
16	R0667 016 00	R0665 016 00	0.10
20	R0667 020 00	R0665 020 00	0.20
25	R0667 025 00	R0665 025 00	0.34
30	R0667 030 00	R0665 030 00	0.56
40	R0667 040 00	R0665 040 00	1.39
50	R0667 050 00	R0665 050 00	2.18
60	R0667 060 00	R0665 060 00	4.14
80	R0667 080 00	R0665 080 00	7.11

Dimensions



Installation recommendation



Dimensions (mm)											Retaining ring ³⁾	Load capacities ⁴⁾ (N)	
Ø d	D	D ₁	b	A	B	D ₂	D ₃	D ₄ H11	C ₃ H12	C ₄ H13		C	C ₀
5	19	12	12	12	22	13.8	–	19.5	14.6	1.3	SB19	180	140
8	24	16	13	14.1	25	19.3	23	24.8	16.5	1.3	SB24	320	240
12	30	22	16	20	32	24.2	28	31	23.2	1.6	SB30	420	280
16	34	26	20	22.1	36	28.4	32	35	25.3	1.6	SB34	580	440
20	42	32	20	28	45	35.1	40	43.2	31.2	1.6	SB42	1170	860
25	50	40	30	40	58	43.1	48	51.2	43.2	1.6	SB50	2080	1560
30	57	47	30	48	68	49.1	55	58.5	51.2	1.6	SB57	2820	2230
40 ¹⁾	80	62.2 ²⁾	56	56	80	74.2	–	81.8	60.2	2.2	SB80	5170	3810
50 ¹⁾	92	75	70	73.1	100	80.6	90	94	78.3	2.7	SB92	8260	6470
60 ¹⁾	110	90	70	95	125	95	108	112.3	100.2	2.7	SB110	11500	9160
80 ¹⁾	140	120	81.6	125	165	128	138	142.6	130.2	2.7	SB140	21000	16300

1) Contrary to the illustration, these sizes have two needle bearings.

2) The basic body is a special version of the closed Standard Linear Bushing.

3) Seeger-Orbis GmbH.

4) The load capacities stated are minimal values as the orientation and direction of load cannot always be precisely defined.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Recommended tolerances

Shaft: d_{h6}

Housing bore: D^{K6} or D^{K7}

Other tolerance zones may be selected for special purposes (refer to the rotary bearing manufacturer's mounting recommendations).

For axial retention of the needle bearing in the housing, see installation recommendation.

Installation of the needle bearing in the housing without additional axial retention is sufficient for many applications.

Operating temperatures

–10 °C to 80 °C

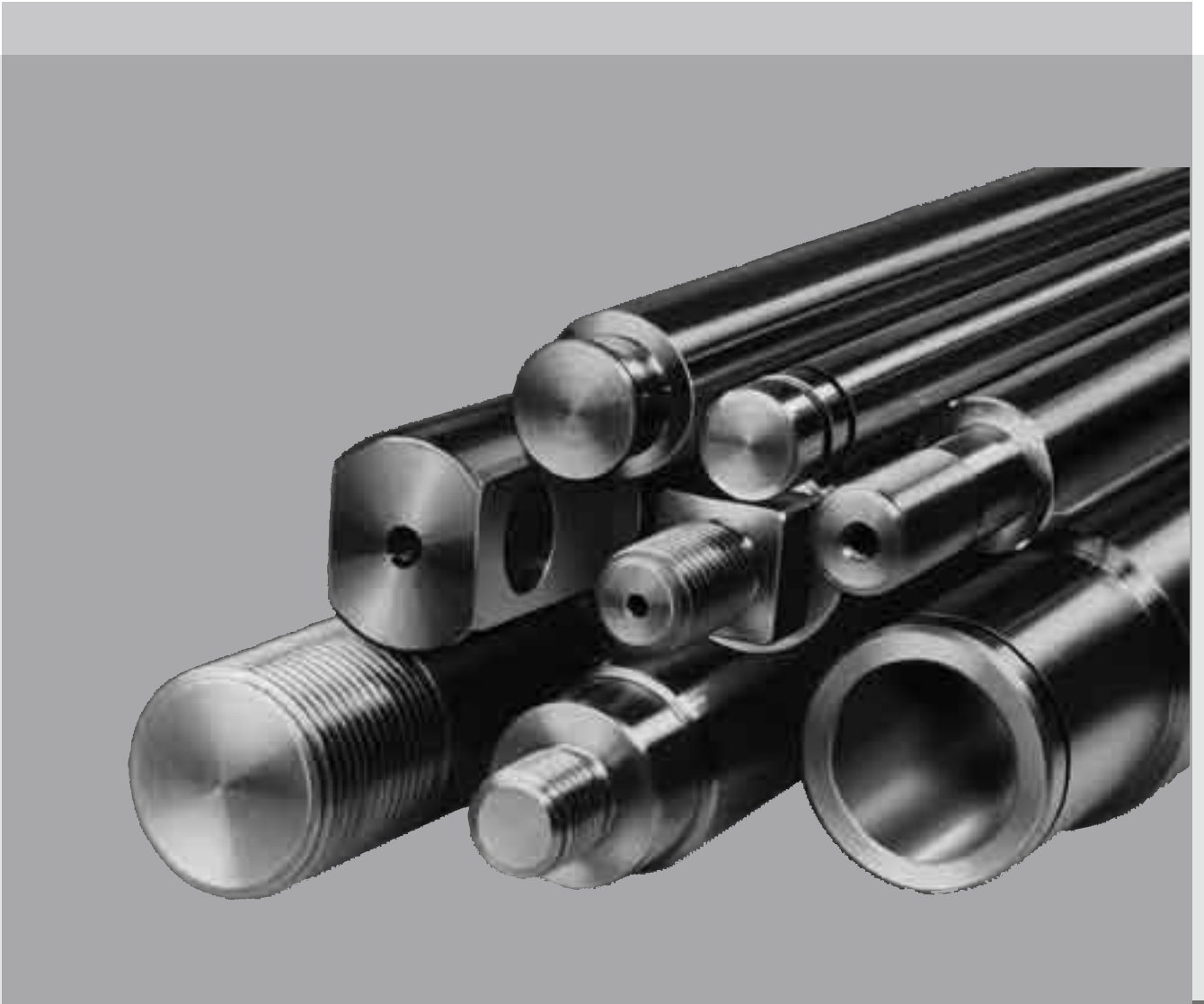


Precision Steel Shafts

Product Overview

Advantages

- Induction hardened and ground
- Solid or tubular shafts
- Available in various tolerances
- Available in heat-treated steel, corrosion-resistant steel or hard chrome plated steel
- Cut to customer specified lengths
- With chamfers to protect the Linear Bushing seal
- Machined to customer drawing
- As a guidance shaft for Linear Bushings
- As rollers, pistons and axles



Precision Steel Shafts

Overview

Size tables

Shaft Ø d (mm)	Part numbers					
	Solid shafts					
	Heat-treated steel		X46Cr13		X90CrMoV18	
	h6	h7	h6	h7	h6	h7
3	R1000 003 00				R1000 003 20	
4	R1000 004 00	R1000 004 01	R1000 004 30	R1000 004 31		
5	R1000 005 00	R1000 005 01	R1000 005 30	R1000 005 31		
6	R1000 006 00	R1000 006 01	R1000 006 30	R1000 006 31		
8	R1000 008 00	R1000 008 01	R1000 008 30	R1000 008 31		
10	R1000 010 00	R1000 010 01	R1000 010 30	R1000 010 31		
12	R1000 012 00	R1000 012 01	R1000 012 30	R1000 012 31	R1000 012 20	R1000 012 21
14	R1000 014 00	R1000 014 01	R1000 014 30	R1000 014 31		
15	R1000 015 00	R1000 015 01				
16	R1000 016 00	R1000 016 01	R1000 016 30	R1000 016 31	R1000 016 20	R1000 016 21
18	R1000 018 00	R1000 018 01				
20	R1000 020 00	R1000 020 01	R1000 020 30	R1000 020 31	R1000 020 20	R1000 020 21
22	R1000 022 00	R1000 022 01				
24	R1000 024 00	R1000 024 01				
25	R1000 025 00	R1000 025 01	R1000 025 30	R1000 025 31	R1000 025 20	R1000 025 21
30	R1000 030 00	R1000 030 01	R1000 030 30	R1000 030 31	R1000 030 20	R1000 030 21
32	R1000 032 00	R1000 032 01				
35	R1000 035 00	R1000 035 01				
38	R1000 038 00	R1000 038 01				
40	R1000 040 00	R1000 040 01	R1000 040 30	R1000 040 31	R1000 040 20	R1000 040 21
45	R1000 045 00	R1000 045 01				
50	R1000 050 00	R1000 050 01	R1000 050 30	R1000 050 31	R1000 050 20	R1000 050 21
55	R1000 055 00	R1000 055 01				
60	R1000 060 00	R1000 060 01	R1000 060 30	R1000 060 31	R1000 060 20	R1000 060 21
70	R1000 070 00	R1000 070 01				
80	R1000 080 00	R1000 080 01	R1000 080 30	R1000 080 31	R1000 080 20	R1000 080 21
100	R1000 100 00	R1000 100 01				
110	R1000 110 00	R1000 110 01				

Shaft Ø d (mm)	Part numbers				
	Solid shafts Hard chrome plated		Tubular shafts Heat-treated steel		Hard chrome plated h7
	h6	h7	h6	h7	
3					
4					
5					
6					
8			R1001 008 10		
10			R1001 010 10		
12	R1000 012 60	R1000 012 61	R1001 012 10	R1001 012 11	
14					
15					
16	R1000 016 60	R1000 016 61	R1001 016 10		
18					
20	R1000 020 60	R1000 020 61	R1001 020 10	R1001 020 11	
22					
24					
25	R1000 025 60	R1000 025 61	R1001 025 10	R1001 025 11	R1001 025 41
30	R1000 030 60	R1000 030 61	R1001 030 10	R1001 030 11	R1001 030 41
32					
35					
38					
40	R1000 040 60	R1000 040 61	R1001 040 10	R1001 040 11	R1001 040 41
45					
50	R1000 050 60	R1000 050 61	R1001 050 10	R1001 050 11	R1001 050 41
55					
60	R1000 060 60	R1000 060 61	R1001 060 10	R1001 060 11	R1001 060 41
70					
80	R1000 080 60	R1000 080 61	R1001 080 10	R1001 080 11	R1001 080 41
100			R1001 100 10	R1001 100 11	
110					

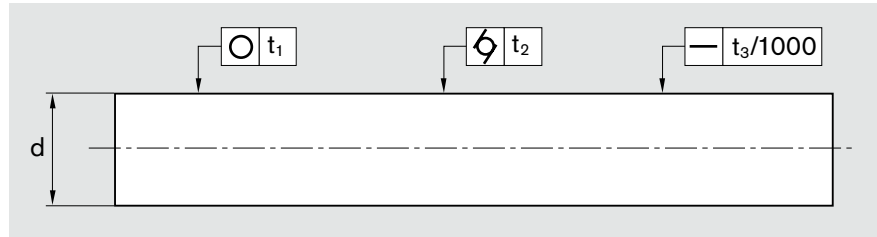


Precision Steel Shafts

Technical Data

Dimensional accuracy and tolerance zones

The diameters of Precision Steel Shafts are accurate to within the tolerance zones h6 and h7. Details of the dimensional accuracy of the shafts are compiled in the table at right. The tolerance for the diameter of soft-annealed shaft sections may go slightly beyond the tolerance zones quoted.



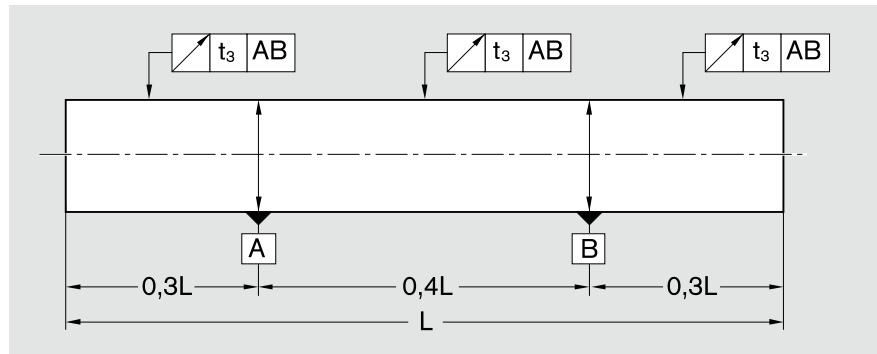
Nominal diameter d (mm)	over up to									
		1	3	6	10	18	30	50	80	120
Diameter tolerance (µm)	h6	0	0	0	0	0	0	0	0	0
		-6	-8	-9	-11	-13	-16	-19	-22	
	h7	0	0	0	0	0	0	0	0	0
Roundness t ₁ (µm)	h6	3	4	4	5	6	7	8	10	
	h7	4	5	6	8	9	11	13	15	
Cylindricity t ₂ ¹⁾ (µm)	h6	4	5	6	8	9	11	13	15	
	h7	6	8	9	11	13	16	19	22	
Straightness t ₃ ²⁾ (µm/m)		150	150	120	100	100	100	100	100	
Surface roughness C.L.A. (Ra)		0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	

1) Measurement of differences in diameter.

2) For lengths of less than 1 m the lowest possible value is 40 µm. Straightness is measured as specified in ISO 13012.

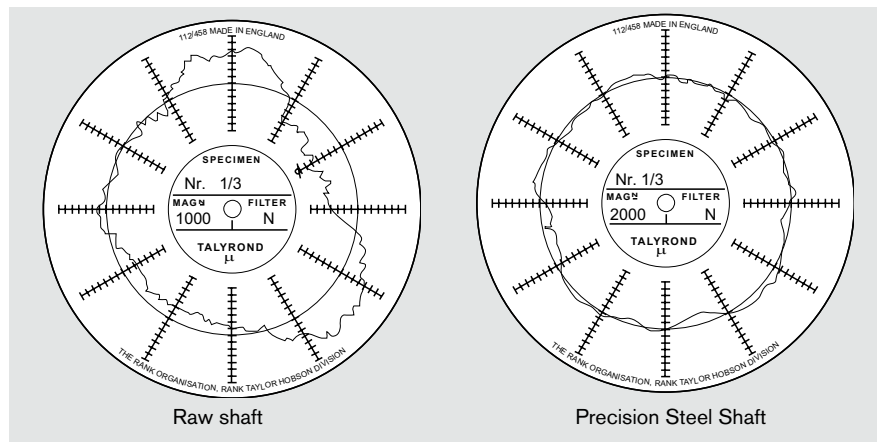
Measurement of straightness per ISO 13012

Measurements are performed at points equidistant between the support points and the overhanging ends of the shaft. The measured values are half the gage measurement when the shaft is rotated through 360°.



Measurement of roundness

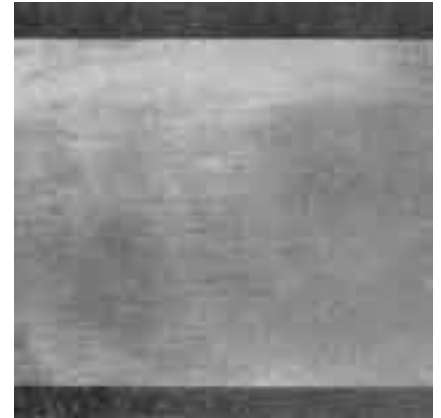
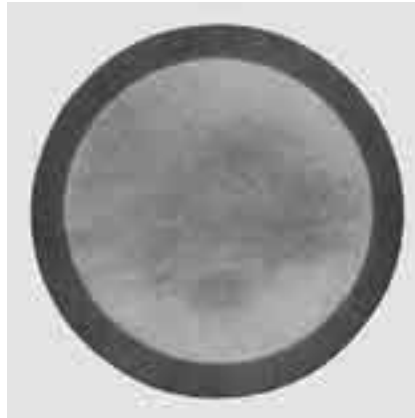
The illustration shows the roundness of a raw shaft in comparison to a Precision Steel Shaft.



Shaft hardness

The surface of the shaft is induction-hardened to a depth of at least 0.4 up to 3.2 mm depending on the shaft diameter. The surface hardness and depth of hardness are extremely uniform, both in the axial and in the circumferential direction. This is the reason for the excellent dimensional consistency and the long service life of Precision Steel Shafts.

The photographs opposite show a cross-section and a longitudinal section through a hardened and ground Precision Steel Shaft. The hardened surface zone has been made visible by caustic etching.



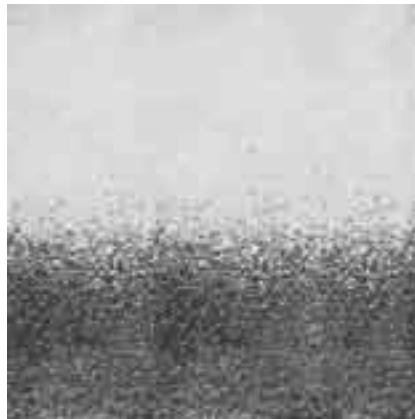
Shaft Ø d (mm)	over	1	3	10	18	30	50	80
	up to	3	10	18	30	50	80	120
Hardness depth (mm)	min.	0.4	0.4	0.6	0.9	1.5	2.2	3.2

Minimum hardness

Heat-treated steel → HRC 60

Corrosion-resistant steel shafts per ISO 683-17 / EN 10088 → HRC 54

The illustration shows the microstructure in the surface zone of a shaft cross-section (magnification approx. 10x). The hardened outer layer of martensite and the smooth transition to the tough inner core structure are clearly visible.



Induction hardened surface zone
Structure: martensite
HRC 60

Transitional structure:
martensite
troostite
pearlite

Core structure:
pearlite and ferrite

Materials

	Short name	Material number
Heat-treated steel	Cf53	1.1213
	Cf60	1.1228/1.1219
	Ck55	1.1203
	Ck60	1.1221
	Ck67	1.1231
Corrosion-resistant steel per ISO 683-17 / EN 10088	X 46 Cr 13	1.4034
	X 90 CrMoV 18	1.4112

Precision Steel Shafts

Technical Data

Shaft deflection

When steel shafts are used as guideways for linear bushings it is important that the shaft deflection occurring under load is kept within certain limits, as otherwise the proper functioning and the service life of the assembly could be impaired.¹⁾ To facilitate the determination of shaft deflection by calculation, we have compiled the most common load cases together with the associated deflection equations in the table below.

The equations for calculation of the inclination of the shaft in the linear bushing (tan α) can also be taken from this table.

Case no.	Loading conditions	Deflection equation	Shaft inclination in the linear bushing
1		$f_1 = \frac{F \cdot a^3}{6 \cdot E \cdot I} \cdot \left(2 - \frac{3 \cdot a}{L}\right)$ $f_{m1} = \frac{F \cdot a^2}{24 \cdot E \cdot I} \cdot (3 \cdot L - 4a)$	$\tan \alpha_{(x=a)} = \frac{F \cdot a^2 \cdot b}{2 \cdot E \cdot I \cdot L}$
2		$f_2 = \frac{F \cdot L \cdot a^2}{2 \cdot E \cdot I} \cdot \left(1 - \frac{4}{3} \cdot \frac{a}{L}\right)$ $f_{m2} = \frac{F \cdot L^2 \cdot a}{8 \cdot E \cdot I} \cdot \left(1 - \frac{4}{3} \cdot \frac{a^2}{L^2}\right)$	$\tan \alpha_{(x=a)} = \frac{F \cdot a \cdot b}{2 \cdot E \cdot I}$
3		$f_3 = \frac{F \cdot a^3 \cdot b^3}{3 \cdot E \cdot I \cdot L^3}$ $f_{m3} = \frac{2 \cdot F \cdot a^3 \cdot b^2}{3 \cdot E \cdot I \cdot L^2} \cdot \left(\frac{L}{L + 2 \cdot a}\right)^2$	$\tan \alpha_{(x=b)} = \frac{F \cdot a^2 \cdot b^2}{2 \cdot E \cdot I \cdot L^2} \cdot \left(1 - \frac{2 \cdot b}{L}\right)$
4		$f_4 = \frac{F \cdot a^2 \cdot b^2}{3 \cdot E \cdot I \cdot L}$ $f_{m4} = f_4 \cdot \frac{L + b}{3 \cdot b} \cdot \sqrt{\frac{L + b}{3 \cdot a}}$	$\tan \alpha_{(x=b)} = \frac{F \cdot a}{6 \cdot E \cdot I \cdot L} \cdot (3 \cdot b^2 - L^2 + a^2)$
5		$f_{m5} = \frac{5 \cdot F \cdot L^3}{384 \cdot E \cdot I}$	$\tan \alpha_{(x=0)} = \frac{F \cdot L^2}{24 \cdot E \cdot I}$

1) There will be no reduction in load-carrying capacity or service life in Super Linear Bushings and provided the shaft inclination does not exceed 30° (tan 30° = 0.0087).

- | | | | | | |
|---|-------------------------|----------------------|-----------------------------------|--|--------------------|
| F | = load | (N) | I | = planar moment of inertia | (mm ⁴) |
| a | = distance | (mm) | f _{1... f₄} | = deflection at the point of force application | (mm) |
| b | = distance | (mm) | f _{m1... f_{m5}} | = maximum deflection | (mm) |
| L | = shaft length | (mm) | α | = shaft inclination in the linear bushing | (°) |
| E | = modulus of elasticity | (N/mm ²) | | | |

The table gives the values for the maximum permissible shaft inclination ($\tan \alpha_{\max}$) for each size of Standard Linear Bushings.

At $\tan \alpha = \tan \alpha_{\max}$ the permissible static load capacity is approx. $0.4 C_0$.

Shaft $\varnothing d$ (mm)	$\tan \alpha_{\max}$
5	$12.3 \cdot 10^{-4}$
8	$10.0 \cdot 10^{-4}$
12	$10.1 \cdot 10^{-4}$
16	$8.5 \cdot 10^{-4}$
20	$8.5 \cdot 10^{-4}$
25	$7.2 \cdot 10^{-4}$
30	$6.4 \cdot 10^{-4}$
40	$7.3 \cdot 10^{-4}$
50	$6.3 \cdot 10^{-4}$
60	$5.7 \cdot 10^{-4}$
80	$5.7 \cdot 10^{-4}$

Values $E \cdot I$ and weights for steel shafts

Solid shafts		
$\varnothing d$ (mm)	$E \cdot I$ ($N \cdot mm^2$)	Weight (kg/m)
3	$8.35 \cdot 10^5$	0.06
4	$2.64 \cdot 10^6$	0.10
5	$6.44 \cdot 10^6$	0.15
8	$4.22 \cdot 10^7$	0.39
10	$1.03 \cdot 10^8$	0.61
12	$2.14 \cdot 10^8$	0.88
14	$3.96 \cdot 10^8$	1.20
16	$6.76 \cdot 10^8$	1.57
20	$1.65 \cdot 10^9$	2.45
25	$4.03 \cdot 10^9$	3.83
30	$8.35 \cdot 10^9$	5.51
40	$2.64 \cdot 10^{10}$	9.80
50	$6.44 \cdot 10^{10}$	15.32
60	$1.34 \cdot 10^{11}$	22.05
80	$4.22 \cdot 10^{11}$	39.21

Tubular shafts			
Shaft diameter		$E \cdot I$	Weight
Outside (mm)	Inside (mm)	($N \cdot mm^2$)	(kg/m)
8	3	$4.14 \cdot 10^7$	0.34
10	4	$1.00 \cdot 10^8$	0.51
12	3.4	$2.12 \cdot 10^8$	0.81
16	8	$6.33 \cdot 10^8$	1.18
20	14	$1.25 \cdot 10^9$	1.25
25	14	$3.63 \cdot 10^9$	2.63
30	19	$7.01 \cdot 10^9$	3.30
40	26.5	$2.13 \cdot 10^{10}$	5.50
50	29.6	$5.65 \cdot 10^{10}$	9.95
60	36.5	$1.15 \cdot 10^{11}$	13.89
80	57.4	$3.10 \cdot 10^{11}$	19.02

Calculation values:

Modulus of elasticity = $2.1 \cdot 10^5 N/mm^2$

Density = $7.8 g/cm^3$



Precision Steel Shafts

Technical Data

Mill-cut lengths

Type of shaft	Diameter (mm)	Mill-cut length ¹⁾ (m)
Solid shafts²⁾	3	0.4
	4	3.6
	5 and 6	5.8
	from 8	6.1
Tubular shafts	8 and 10	1
	16	2
	12 and from 20	6.1
Corrosion-resistant solid steel shafts	3	0.4
	4 to 10	3.6
	from 12	6.1

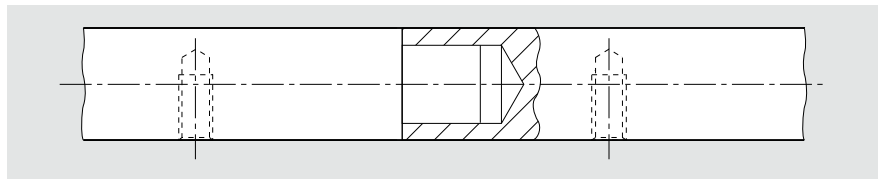
1) The first 50 mm at each end of mill-cut lengths (shaft diameter 12 to approx. 100 mm) may deviate slightly in terms of geometry and hardness.

2) Solid shafts of lengths up to 8 m with Ø 20 and over are available upon request.

Composite shafts

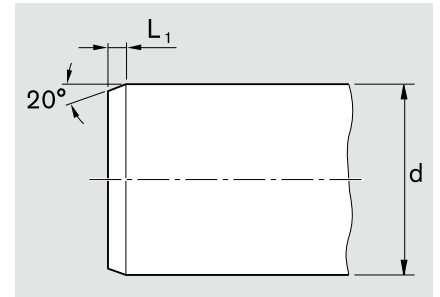
We can supply composite shafts for applications requiring a shaft longer than the mill-cut lengths available. The shaft sections are joined together by a spigot-and-recess arrangement, one section having a locating plug and the other a mating hole (see figure below). The joined shaft must rest on a full-length, continuous support rail or must at least be supported at regular intervals with one of the supports located at the joint between the shaft sections (see "Shaft Support Rails").

The shafts must be axially tensioned against each other at the time the shaft assembly is screwed to the shaft support rail. This is to prevent a gap opening at the joint when the shaft assembly is loaded in service.



Chamfers

Steel shafts intended for use as round guideways for linear bushings must be chamfered at the ends to prevent damage to the ball retainers or wiper seals when the linear bushing is being pushed onto the shaft. The figure and the table give the dimensions of the chamfers required. Linear bushings with seals must not be pushed over sharp edges on the shaft (e.g. retaining ring grooves) as this would damage the seal lips.



Shaft Ø d (mm)	3	4	5	8	10	12	14	16	20	25	30	40	50	60	80
Length of chamfer L ₁ (mm)	1	1	1.5	1.5	1.5	2	2	2	2	2	2	3	3	3	3

Machining

Hardened and ground steel shafts in mill-cut lengths are always in stock. These can be cut to any desired length and machined to have any of the following characteristics:

- Reduced-diameter ends
- Male or female threads
- Recesses
- Radial or axial holes
- Countersinks
- or any other specially machined features

Annealing of machined sections

Machined shafts may have to be annealed due to the hardened outer zone (slight dimensional changes possible).

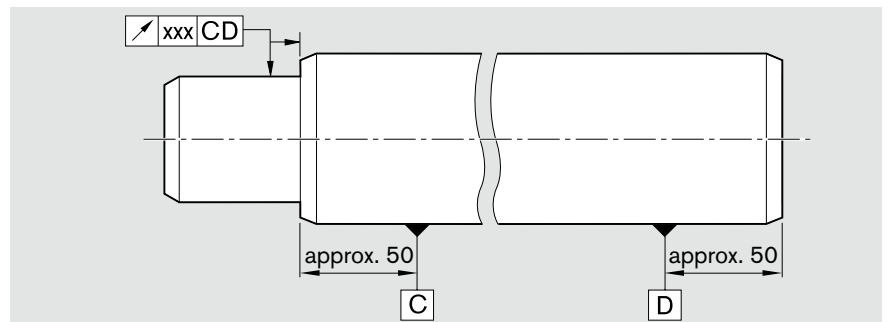
Length tolerances for cut-to-size shafts

Dimensions (mm)	Tolerance
Length up to 400	±0.5
over 400	±0.8
up to 1000	
over 1000	±1.2
up to 2000	
over 2000	±2.0
up to 4000	
over 4000	±3.0
up to 6000	
over 6000	±3.5
up to 8000	

Steel shafts with closer length tolerances can also be supplied at a surcharge.

Axial and radial runout of reduced-diameter ends

Customers can request performance of measurements according to the principle shown below. Values xxx < 0.02 upon request.



Precision Steel Shafts

Shaft Machining Options

Advantages

- Many processing options
- Fast delivery
- Low costs

Ordering procedure

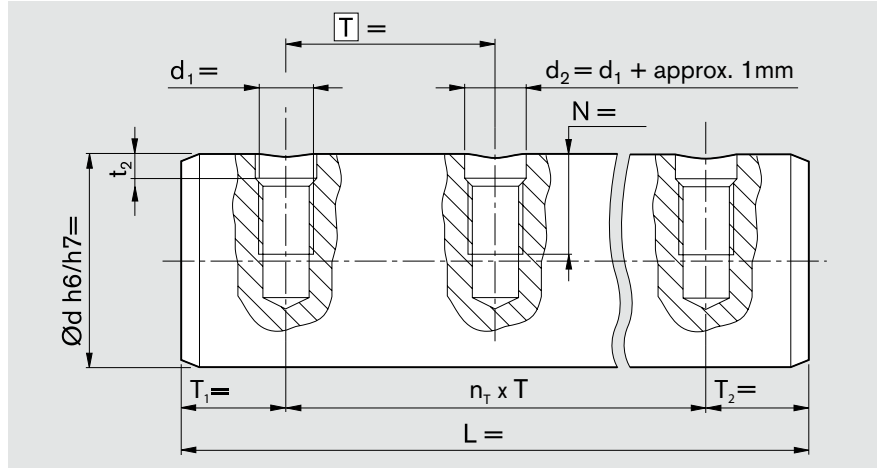
- Submit inquiry with customer drawing attached or
- Copy appropriate template
- Enter dimensions and tolerances
- Avoid overdetermination of tolerances
- Specify machining at one or both ends

Shafts with radial holes, drilled or drilled and tapped

Shafts that have to be supported require radial holes for attachment of the shaft supports. The radial holes are drilled into the steel shafts after hardening and grinding.

The diameter, depth and spacing of the holes depend on the diameter of the shaft.

For recommended values, refer to the tables in the section on "Steel Shafts with ready-mounted Shaft Support Rails."



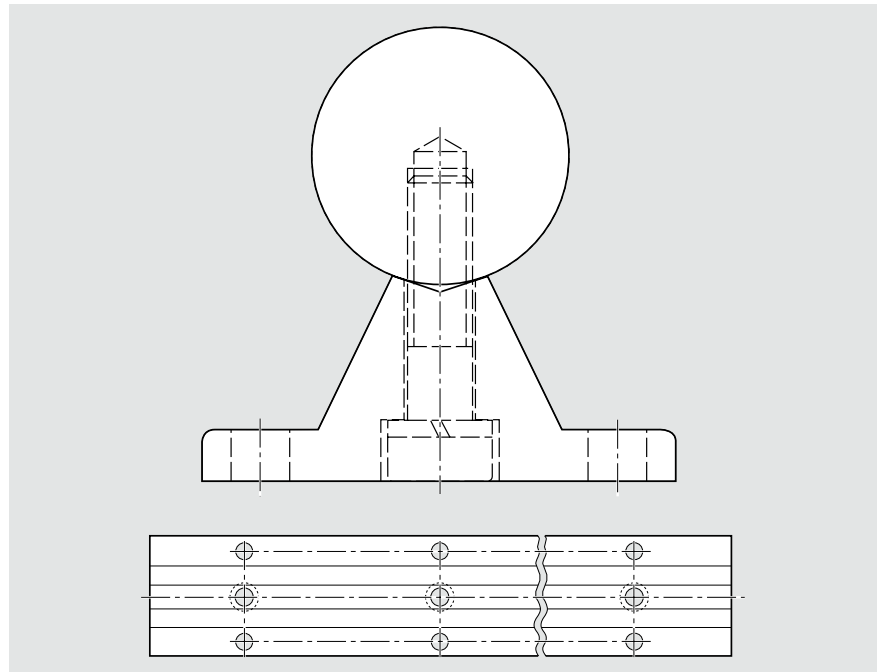
Recommended values for boring of clearing holes in the hardened surface zone

Dimensions (mm)		
$\varnothing d$	d_1	t_2
12	M4	2.5
16	M5	2.5
20	M6	3.0
25	M8	3.0
30	M10	3.5
40	M10	4.0
40	M12	4.5

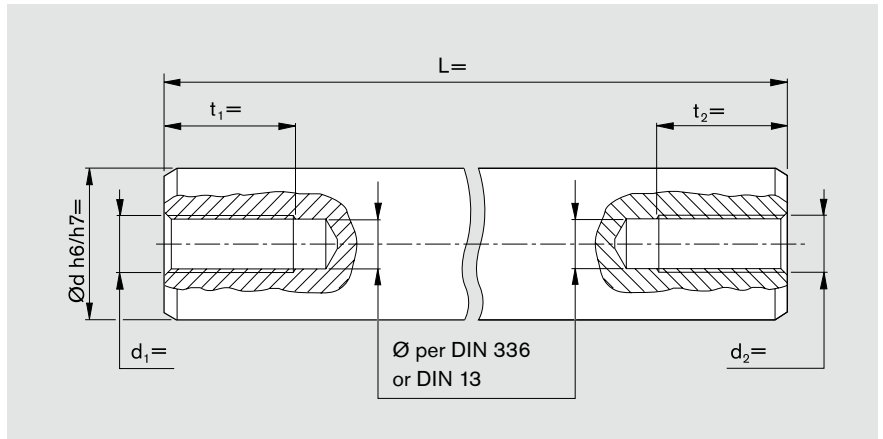
Dimensions (mm)		
$\varnothing d$	d_1	t_2
50	M12	4.0
50	M14	4.5
50	M16	5.0
60	M14	5.5
60	M20	6.5
80	M16	5.5
80	M24	6.5

Values for corrosion-resistant steel shafts upon request.

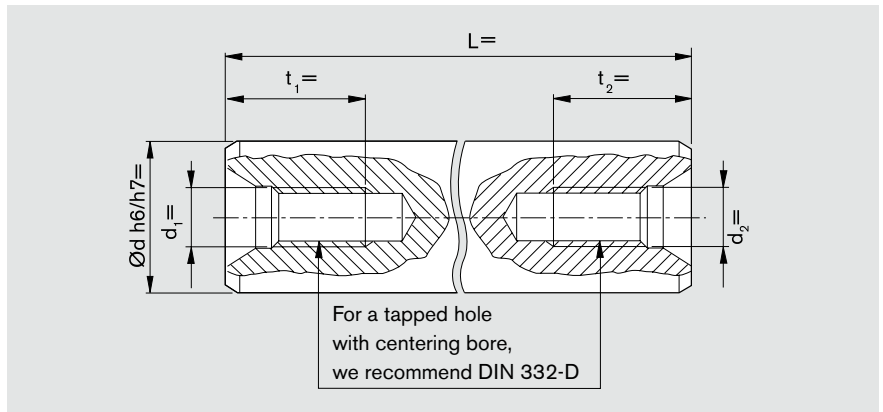
For matching Shaft Support Rails, see section on "Steel Shafts with ready-mounted Shaft Support Rails."



Tapped hole



Tapped hole and centering bore per DIN 332-D



Recommended dimension for shaft ends with tapped hole and centering bore

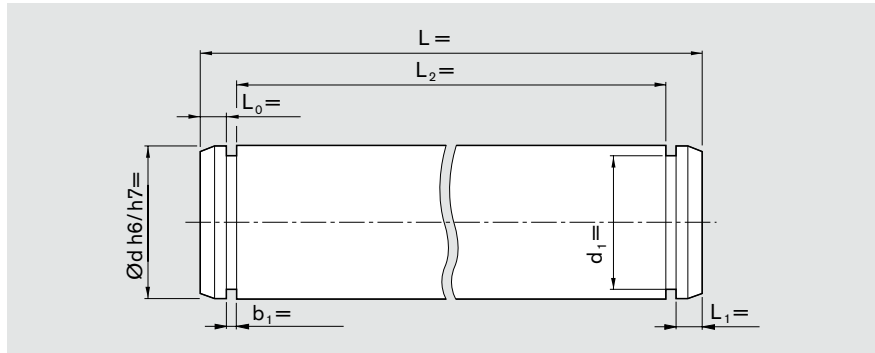
Dimensions (mm)			
Ø d	Thread d ₁ /d ₂	Depth	
			t ₁ /t ₂
8	M4		10
10	M4		10
12	M5		12.5
14	M5		12.5
16	M6		16
20	M8		19
25	M10		22
30	M12		28
40	M12		28
50	M16		36
60	M20		42
80	M24		50



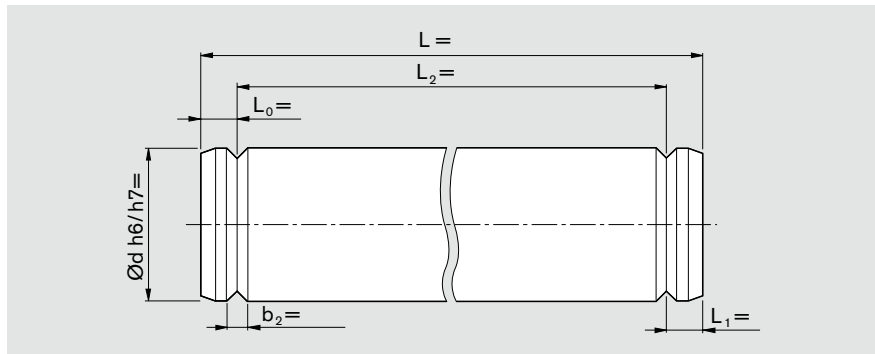
Precision Steel Shafts

Shaft Machining Options

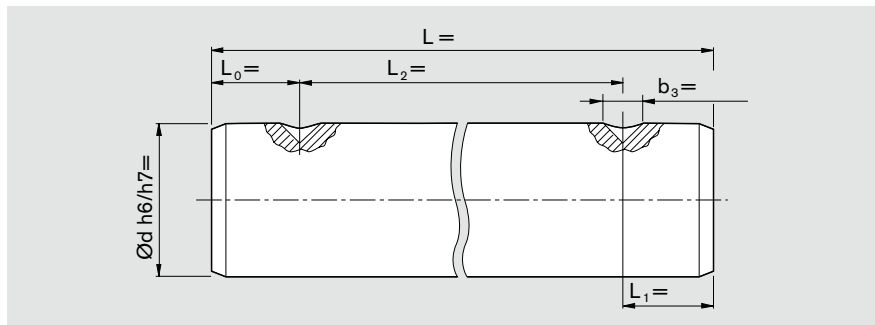
Retaining ring groove per DIN 471



90° cutout



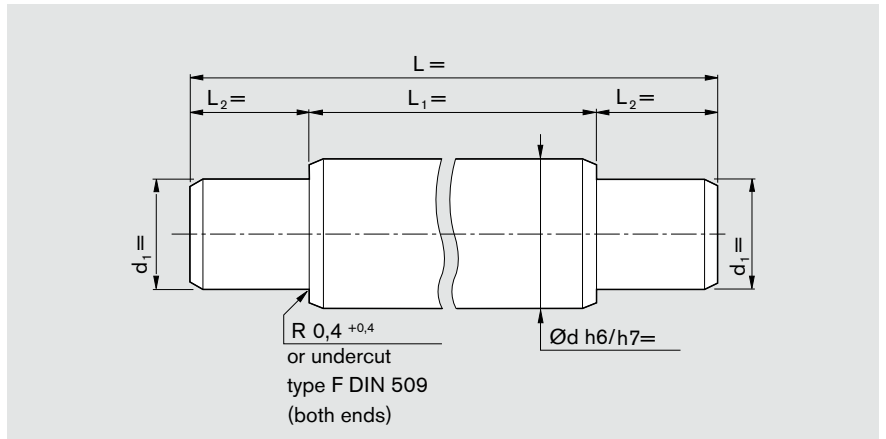
90° countersink



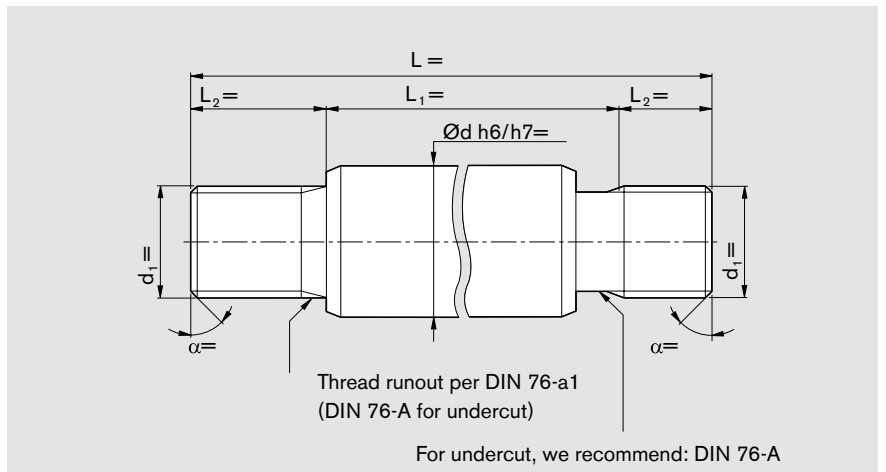
Recommended dimensions

Dimensions (mm)					Retaining ring DIN 471-	
Ød	b ₁ +0.1	d ₁	b ₂	b ₃	Dimensions (mm)	Part number
4	0.5	3.8 -0.04	-	-	4x0.4	R3410 765 00
5	0.7	4.8 -0.04	2	3	5x0.6	R3410 742 00
8	0.9	7.6 -0.06	2	4	8x0.8	R3410 737 00
10	1.1	9.6 -0.11	2	5	10x1	R3410 745 00
12	1.1	11.5 -0.11	2.5	5	12x1	R3410 712 00
14	1.1	13.4 -0.11	2.5	5	14x1	R3410 747 00
16	1.1	15.2 -0.11	3	5	16x1	R3410 713 00
20	1.3	19 -0.13	3	5	20x1.2	R3410 735 00
25	1.3	23.9 -0.21	4	6	25x1.2	R3410 750 00
30	1.6	28.6 -0.21	4	6	30x1.5	R3410 724 00
40	1.85	37.5 -0.25	5	8	40x1.75	R3410 726 00
50	2.15	47.0 -0.25	5	8	50x2	R3410 727 00
60	2.15	57.0 -0.3	6	8	60x2	R3410 764 00
80	2.65	76.5 -0.3	6	10	80x2.5	-

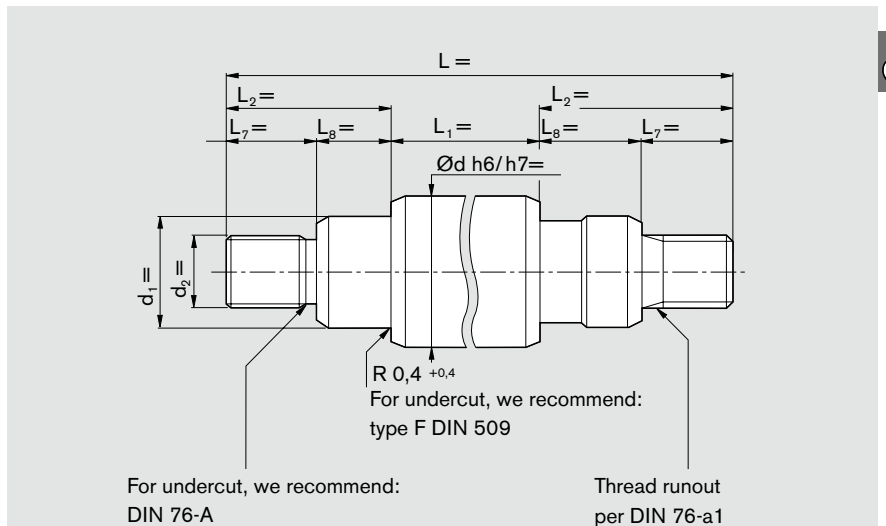
Spigot



Threaded spigot



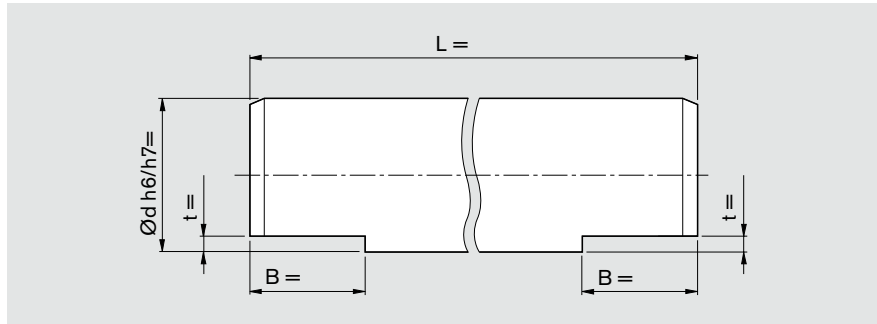
Spigot and threaded spigot



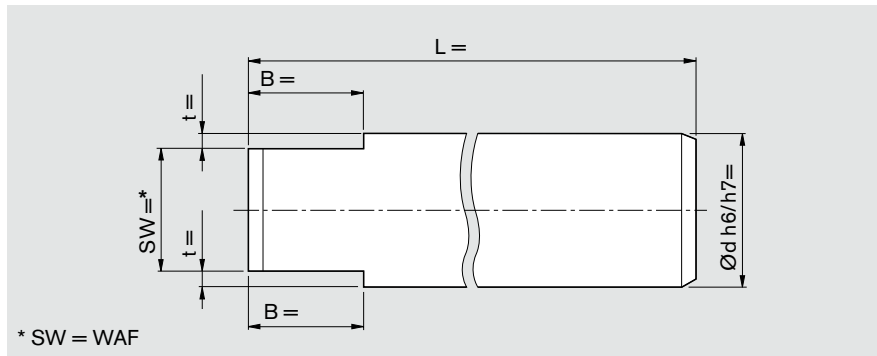
Precision Steel Shafts

Shaft Machining Options

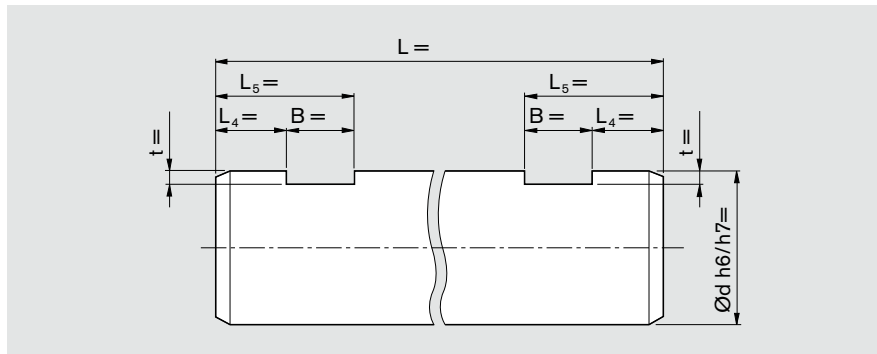
Single flat



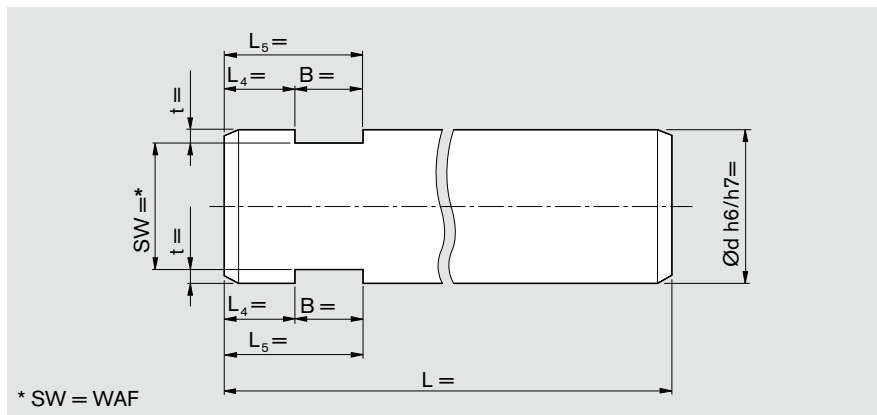
Outer flats



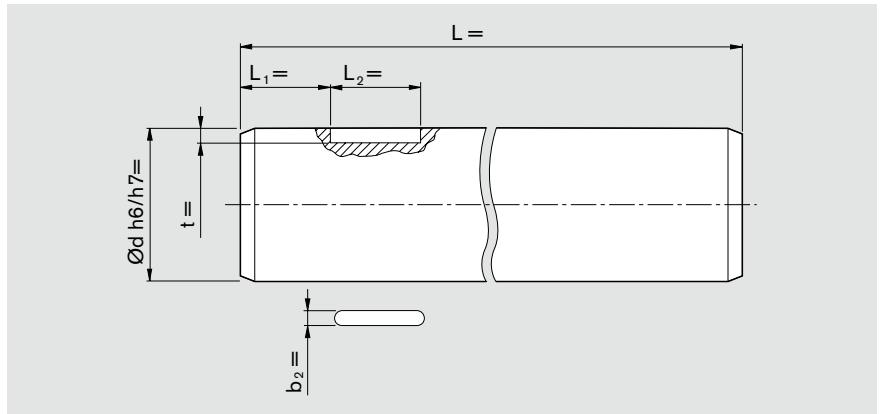
Groove



Inner flats



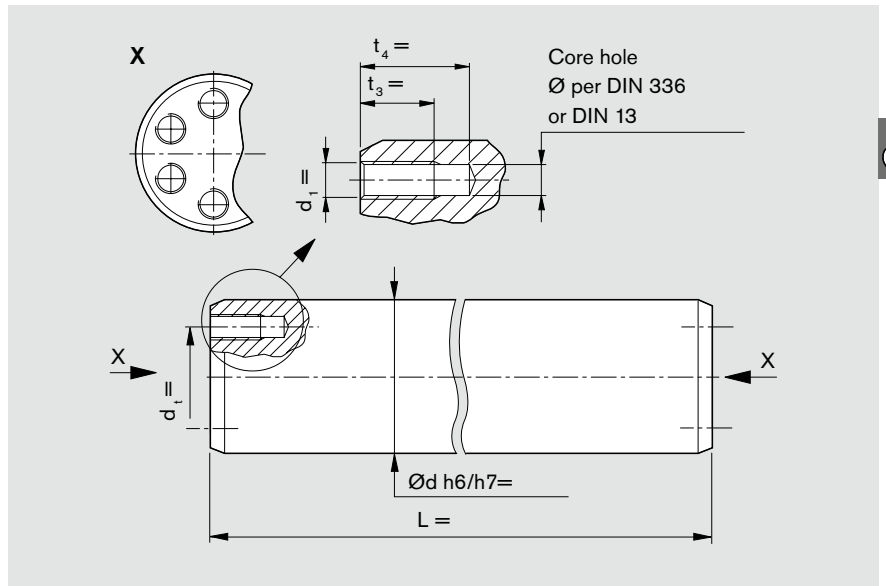
Keyway per DIN 6885-1



Recommended dimensions

Dimensions (mm)			
Shaft $\varnothing d$	b_2 P9	t	
8	2	1.2 +0.1	
10	3	1.8 +0.1	
12	4	2.5 +0.1	
14	5	3 +0.1	
16	5	3 +0.1	
20	6	3.5 +0.1	
25	8	4 +0.2	
30	8	4 +0.2	
40	12	5 +0.2	
50	14	5.5 +0.2	
60	18	7 +0.2	
80	22	9 +0.2	

Holes tapped to pitch circle



Precision Steel Shafts

Ordering Data

Solid shafts made of heat-treated steel

When a shaft forms an integral part of an anti-friction bearing system, the materials used have to satisfy exacting requirements.

We offer the optimum shaft material for each diameter range.

The exceptionally uniform surface hardness and hardening depth of the shafts, combined with an excellent degree of purity, homogeneous microstructure and defined grain sizes, ensure particularly long service life under rolling loads.

Available diameters (mm)	Ø d (mm)	Lengths (m)
3, 4, 5, 6, 8, 10, 12, 14, 15, 16, 18, 20, 22,	3	0.4
24, 25, 30, 32, 35, 38, 40, 45, 50, 55, 60,	4	3.6
70, 80, 100, 110	5 and 6	5.8
	from 8	6.1

Solid shafts from 20 mm in diameter and up to 8 m in length are available upon request. Greater overall lengths are composed of sections joined end-to-end. Linear Bushings can roll over joints without any problems.

Materials	Hardness
Cf 53, Cf 60, Ck 67	min. 60 HRC

Part numbers	
Tolerance h6	R1000 xxx 00
Tolerance h7	R1000 xxx 01

xxx = diameter in mm

Ordering example

Solid shaft Ø 25 h7 made of heat-treated steel, length 460 mm

Part number:
R1000 025 01, 460 mm

Solid shafts made of corrosion-resistant steel per ISO 683-17 / EN 10088

The correct choice for applications requiring high corrosion resistance in a clean environment, e.g. in the food industry, semiconductor manufacturing and medical technology. X 90 CrMoV 18 differs from X 46 Cr 13 in that it is additionally resistant to lactic acid.

Materials	Available diameters (mm)
X 46 Cr 13	4, 5, 6, 8, 10, 12, 14, 16, 20, 25, 30, 40, 50, 60, 80
X 90 CrMoV 18	3, 12, 16, 20, 25, 30, 40, 50, 60, 80

Ø d (mm)	Lengths (m)
3	0.4
4 - 10	3.6
12 - 80	6.1

Greater overall lengths are composed of sections joined end-to-end.

Linear Bushings can roll over joints without any problems.

Materials	Hardness
X 46 Cr 13	min. 54 HRC
X 90 CrMoV 18	min. 55 HRC

Part numbers for X 46 Cr 13	
Tolerance h6	R1000 0xx 30
Tolerance h7	R1000 0xx 31

Part numbers for X 90 CrMoV 18	
Tolerance h6	R1000 0xx 20
Tolerance h7	R1000 0xx 21

xx = diameter in mm

Ordering example:

Solid shaft Ø 16 h6 made of corrosion-resistant steel X 46 Cr 13, length 350 mm

Part number:
R1000 016 30, 350 mm

Solid steel shafts, hard chrome plated

Optimal anti-corrosion protection for shaft surface on outside diameter.

Available diameters (mm)	
12, 16, 20, 25, 30, 40, 50, 60, 80	

Ø d (mm)	Lengths (m)
12	5.5
16	6.5
20 - 80	7

Greater overall lengths are composed of sections joined end-to-end.

Linear Bushings can roll over joints without any problems.

Materials	Hardness
Cf 53, Cf 60, Ck 67	min. 60 HRC (approx. 700 HV)
Chrome plating (thickness approx. 10 µm)	approx. 1000 HV

Part numbers	
Tolerance h6	R1000 0xx 60
Tolerance h7	R1000 0xx 61

xx = diameter in mm

Ordering example:

Solid shaft Ø 30 hard chrome plated h7, length 480 mm

Part number:

R1000 030 61, 480 mm

Tubular shafts made of heat-treated steel

Tubular shafts can be used as ducts for electric cables and liquid or gaseous media. They are also often used for weight reduction. The shafts are made from seamlessly rolled tube material. The inside diameters are not machined.

Available diameters (mm)		
Outside	Inside (approx.)	
8		3
10		4
12		3.4
16		8
20		14
25		14
30		19
40		26.5
50		29.6
60		36.5
80		57.4
100		65

Ø d (mm)	Max. lengths (m)
8, 10	1
16	2
12 and 20 - 100	6.1

Materials	Hardness
Ck 60	min. 60 HRC

Part numbers	
Tolerance h6	R1001 xxx 10
Tolerance h7	R1001 xxx 11

xxx = outside diameter in mm

Ordering example:

Tubular shaft Ø 80 h7, length 3600 mm

Part number:

R1001 080 11, 3600 mm

Tubular shafts, hard chrome plated

Tubular shafts are hard chrome plated on the outside diameter. Length: max. 6.1 m

Available diameters (mm)		
Outside	Inside (approx.)	
25		14
30		19
40		26.5
50		29.6
60		36.5
80		57.4

Materials	Hardness
Ck 60	min. 60 HRC (approx. 700 HV)
Chrome plating (thickness approx. 10 µm)	approx. 1000 HV

Part number	
Tolerance h7	R1001 0xx 41

xx = outside diameter in mm

Ordering example:

Tubular shaft Ø 40, hard chrome plated h7, length 2000 mm

Part number:

R1001 040 41, 2000 mm



Steel Shafts with ready-mounted Shaft Support Rails, Shaft Support Rails

Product Overview

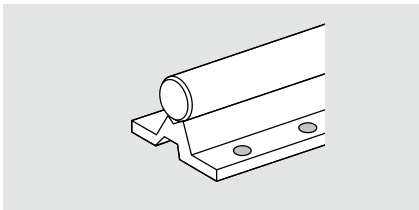
Advantages

- For use with open-type Linear Bushings
- For long guides or high loads that do not permit the use of an unsupported shaft due to shaft deflection
- Unlimited length possible using shafts with plug-and-socket connections
- Suitable support rails for different operating requirements
- Increased degree of freedom in circumferential direction compared to profiled guide rails
- For applications where other linear guides might be susceptible to distortive stresses because of inaccuracies in supporting structures

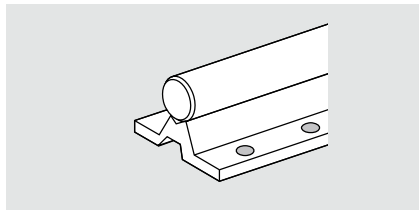
General Notes

The individual support rails are arranged end to end underneath the corresponding shafts. Once the elements have been aligned and the linear motion assemblies screwed down onto a torsionally stiff, surface-machined base, the units will reflect the tolerances as given in the tables.

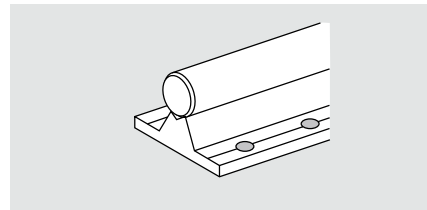
R1010 Precision Steel Shaft with flanged aluminum shaft support rail, very economically priced

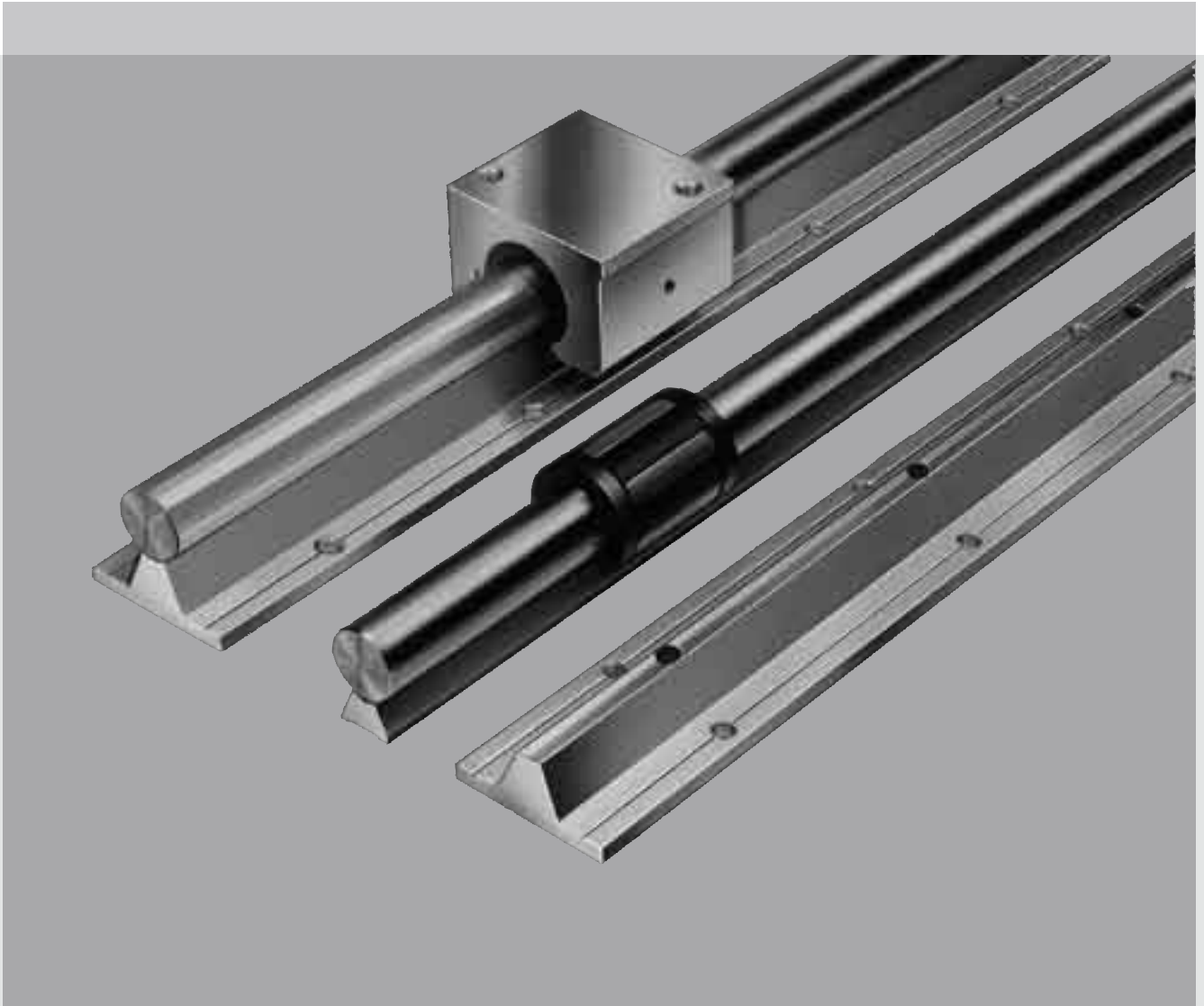


R1025, same as R1010 but with mounting hole spacing for aluminum framing system

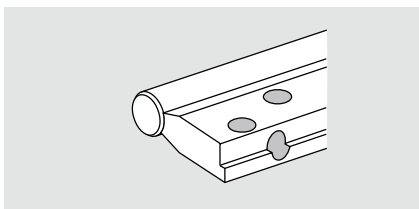


R1014 Precision Steel Shaft with flanged aluminum shaft support rail, very accurate height tolerance

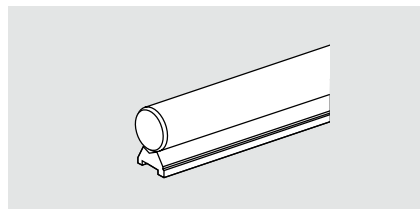




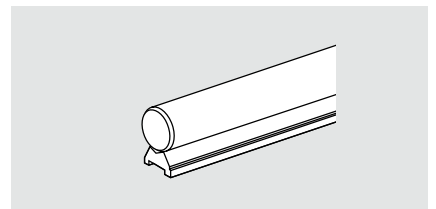
R1015 Precision Steel Shaft with aluminum shaft support rail, for side mounting



R1013 Precision Steel Shaft with flangeless aluminum shaft support rail, very economically priced



R1016 Precision Steel Shaft with flangeless steel shaft support rail, with reference edge



Steel Shafts with ready-mounted Shaft Support Rails

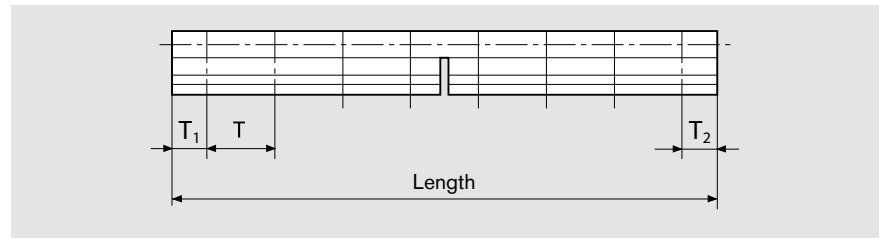
Design Notes, Ordering Data, Mounting

End spaces T_1 and T_2

If the ordered shaft length is a whole multiple of the hole spacing dimension in a shaft support rail, the spaces at the ends of the rail will be half the pitch length (T_1 and $T_2 = T/2$). For other shaft lengths we make sure the holes are centered over the length ($T_1 = T_2$). This is done by cutting off material at both ends of any overhanging shaft support rail. The end spaces T_1 and T_2 should not measure less than $0.2 \times T$. If the customer has not supplied a drawing, our proposal and order confirmation will include the hole spacing we have determined for the steel shaft. This then gives the necessary location of the mounting holes in the machine bed. We recommend comparing this data with the machine design documents.

Ordering data:

Part number R10.. / length ... mm / T_1 ... mm / T_2 ... mm



Extra-long and composite linear motion assemblies

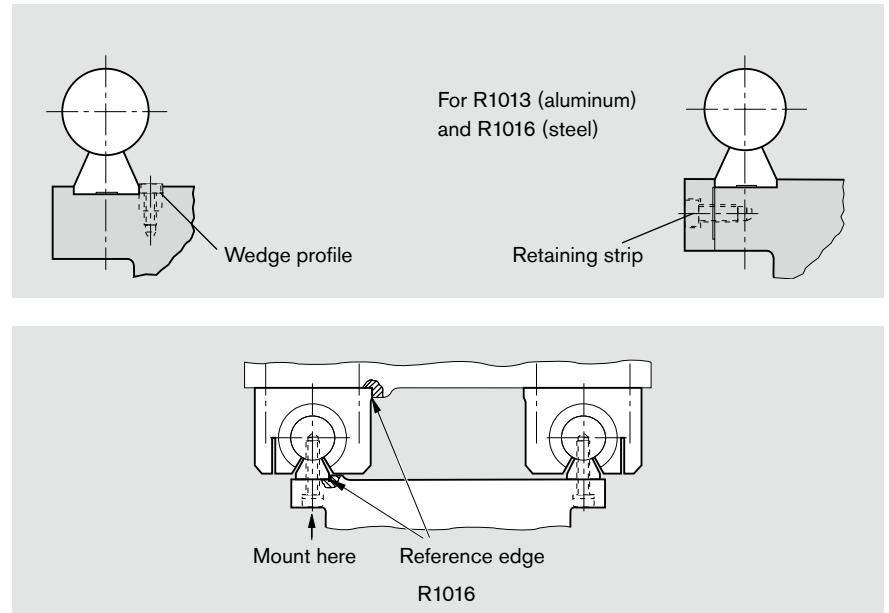
A shaft section with mounted shaft support rail should not exceed 6 meters in length. Longer assemblies are composed of a number of sections fitted end to end by plug-type mounting (see also section on "Composite Shafts, Plug-and-socket joints"). The arrangement of joints in the shaft and the shaft support rail depends on the type of assembly. Basically, however, the joint in the shaft and the joint in shaft support rail must always be staggered.

Customized hole spacing

Mounting note for flangeless shaft support rails

Shafts with ready-mounted shaft support rails can also be ordered with hole spacing to customer specifications.

To facilitate mounting and in applications subject to major side loads, we recommend retention by means of a wedge profile or a flat retaining strip as shown in the illustration below.



The shaft support rail must be carefully aligned for mounting as follows: Push the first shaft and shaft support rail up against the reference edge and screw down; then align the second shaft, preferably with the aid of a straightedge, and screw down. These elements are supplied only together with Precision Steel Shafts. The maximum length of a shaft support rail is 1800 mm; if longer lengths are required, the rails can be mounted end to end. The reference edge allows easy alignment of the shaft support rails, thus avoiding any stressing of the linear bushings.



Steel Shafts with ready-mounted Shaft Support Rails for open-type Standard and Super Linear Bushings

Flanged

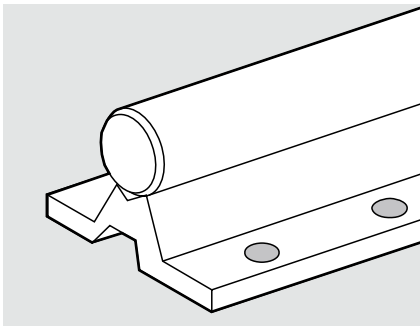
R1010 Steel Shafts with ready-mounted Shaft Support Rails

Material

- Shaft Support Rail: aluminum

Structural design

- Used in conjunction with Linear Sets, these shaft support rails make it possible to build linear motion guideways with an extremely low overall height.
- High rigidity
The shaft bearing surface of the support rail is matched to the diameter of the mating-size shaft to ensure that the shaft bearing pressure acts at the optimum angle; together with the sturdy mounting screws, this guarantees high rigidity.
- Cost-effective use



Shaft Ø d (mm)	Part numbers		Weight (kg/m)
	Hole spacing Type 1	Hole spacing Type 2	
16	R1010 016 ..	R1010 516 ..	2.5
20	R1010 020 ..	R1010 520 ..	3.8
25	R1010 025 ..	R1010 525 ..	5.4
30	R1010 030 ..	R1010 530 ..	7.6
40	R1010 040 ..	R1010 540 ..	12.6

Shafts:

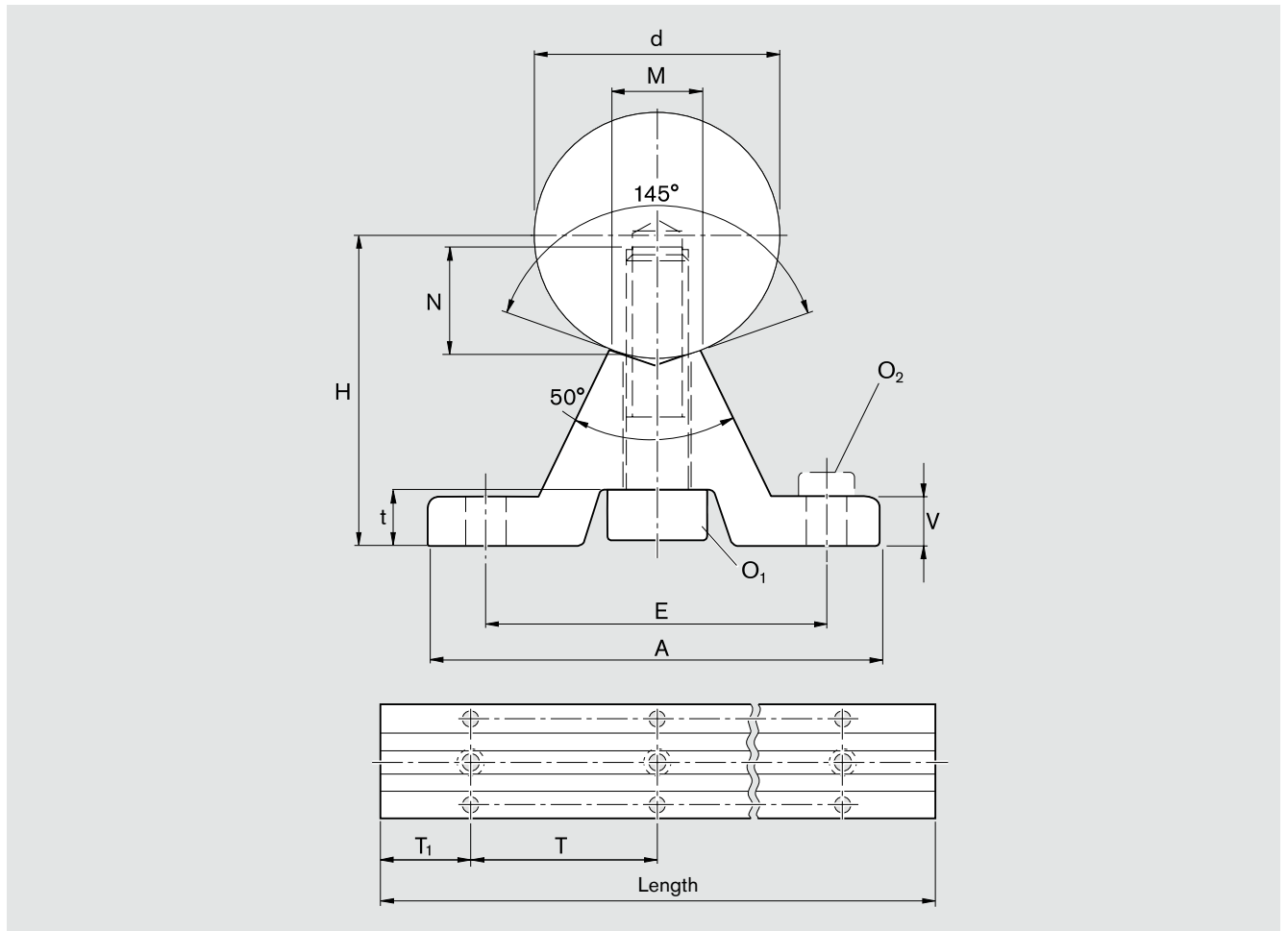
- 00 = heat-treated steel h6
- 01 = heat-treated steel h7
- 30 = corrosion-resistant steel h6
- 31 = corrosion-resistant steel h7
- 60 = heat-treated steel,
hard chrome plated, h6
- 61 = heat-treated steel,
hard chrome plated, h7

Ordering example:

Shaft diameter 30 mm, h7, heat-treated steel, length 900 mm, mounted on shaft support rail Type 1:

R1010 030 01 / 900 mm.

Dimensions



Dimensions (mm)

$\varnothing d$	$H^{1)}$ ± 0.1	A	V	M	O_1 DIN 6912-8.8	N	E	t	$O_2^{2)}$ DIN 6912-8.8	$T^{3)}$ Type 1	Type 2
16	26	45	5	7	M5x20	9	33	6	M5x16	100	150
20	32	52	6	8.3	M6x25	11	37	7	M6x16	100	150
25	36	57	6	10.8	M8x30	15	42	7	M6x16	120	200
30	42	69	7	11	M10x35	17	51	7.5	M8x25	150	200
40	50	73	8	15	M10x40	19	55	7	M8x25	200	300

1) Measured with gauging shaft of nominal diameter d and length approx. 50 mm. Lengths up to 1800 mm with a parallelism of 0.1 mm on request.

2) Applies only to fixing in tapped holes in steel or cast iron.

3) Type 1: For applications where the load acts transverse to the Linear Bushing opening and loading is near the load capacity limit.

Type 2: For general requirements.

Steel Shafts with ready-mounted Shaft Support Rails for open-type Standard and Super Linear Bushings

For aluminum structural framing

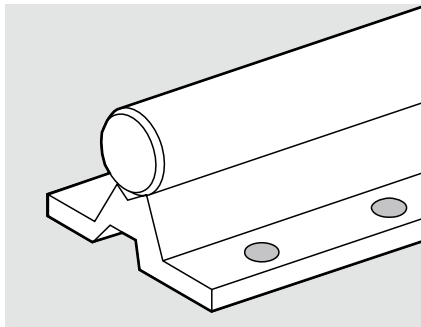
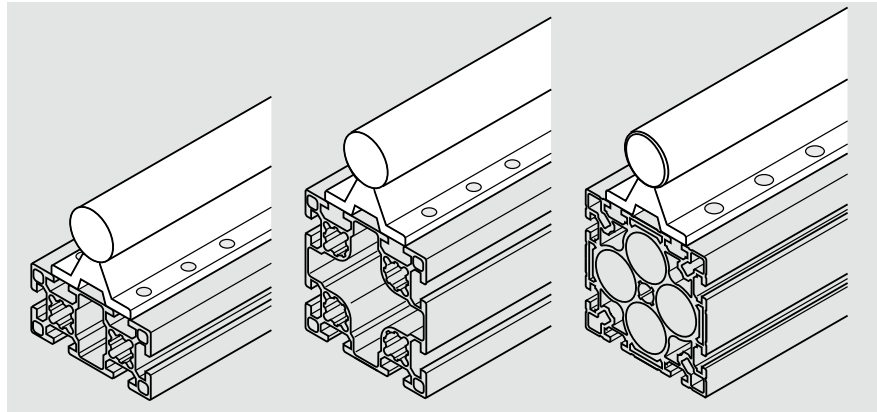
R1025 Steel Shafts with ready-mounted Shaft Support Rails¹⁾

Material

- Shaft Support Rail: aluminum

Structural design

- Fast and easy, modular assembly of linear bushings and shafts on aluminum profile framing systems
- Very cost effective due to greater height tolerance



Shaft Ø d (mm)	Modular dimension E (mm)	Part numbers	Weight (kg/m)
20	40	R1025 020 ..	3.8
25	40	R1025 025 ..	5.4
30	45	R1025 530 ..	7.5
30	50	R1025 030 ..	7.5

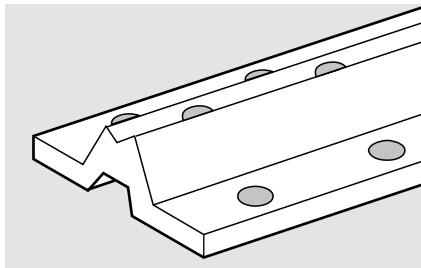
Shafts:

- 00 = heat-treated steel h6
- 01 = heat-treated steel h7
- 30 = corrosion-resistant steel h6
- 31 = corrosion-resistant steel h7
- 60 = heat-treated steel, hard chrome plated, h6
- 61 = heat-treated steel, hard chrome plated, h7

1) Ordering example:

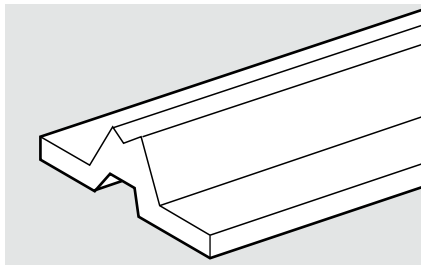
Shaft diameter 25 mm, h7, heat-treated steel, length 900 mm, mounted on shaft support rail:
R1025 025 01 / 900 mm.

R1039 Shaft Support Rails with drilled holes



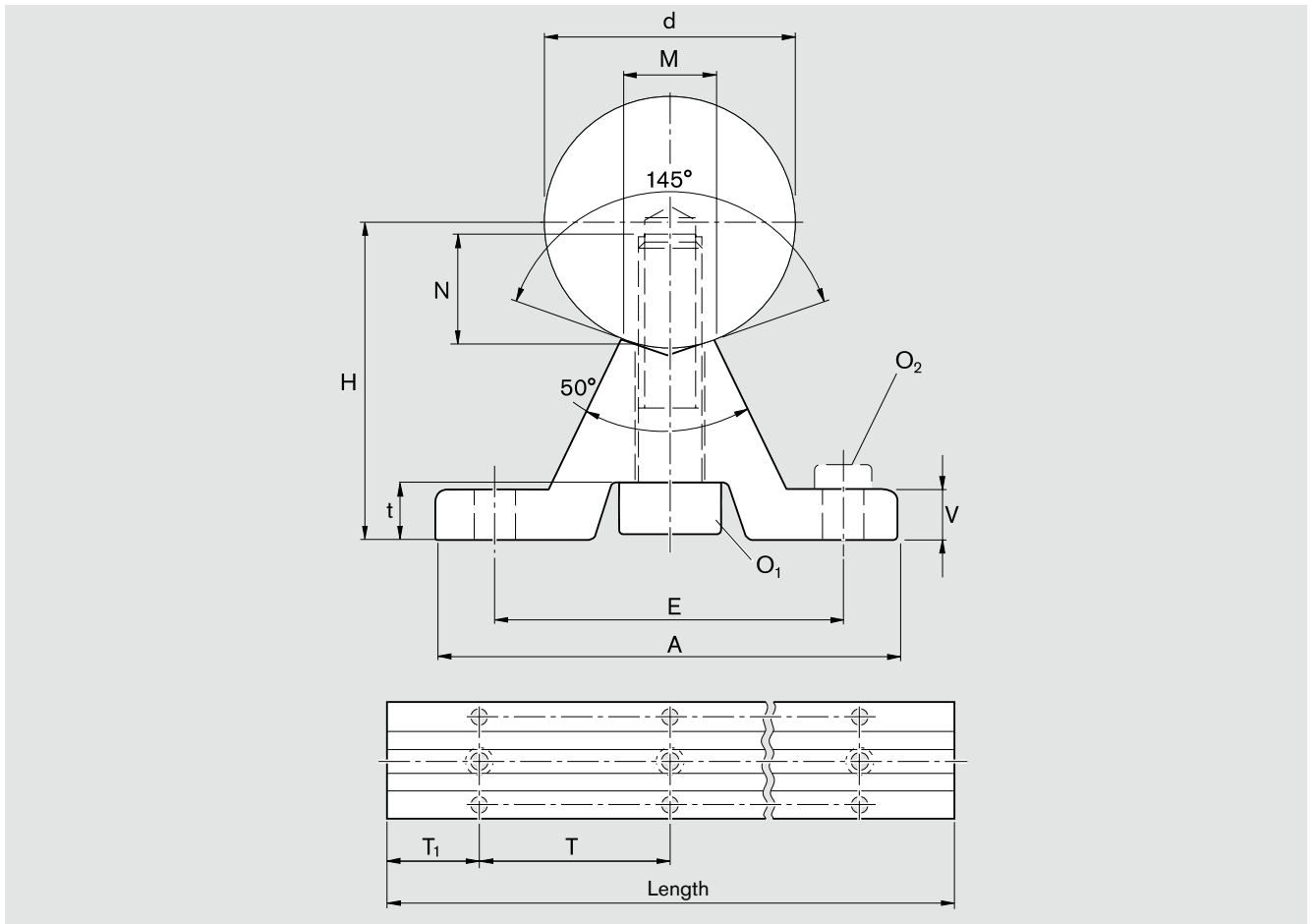
Shaft Ø d (mm)	Modular dimension E (mm)	Part numbers	Weight (kg/m)	Length (mm)
				-0.5
				-1.5
20	40	R1039 820 30	1.3	1800
25	40	R1039 825 30	1.6	1800
30	45	R1039 930 30	2.0	1800
30	50	R1039 830 30	2.0	1800

R1039 Shaft Support Rails without drilled holes



Shaft Ø d (mm)	Part numbers	Weight (kg/m)	Length (mm)
			-0.5
			-1.5
20	R1039 520 30	1.3	1800
25	R1039 525 30	1.6	1800
30	R1039 530 30	2.0	1800

Dimensions



Dimensions (mm)											
$\varnothing d$	$H^{1)}$ ± 0.1	A	V	M	O_1 DIN 6912-8.8	N	E	t	O_2 DIN 6912-8.8	T	
							Modular dimension				
20	32	52	6	8.3	M6x25	11	40	7	M6	180	
25	36	57	6	10.8	M8x30	15	40	7	M6	180	
30	42	69	7	11	M10x35	17	45	7.5	M8	180	
30	42	69	7	11	M10x35	17	50	7.5	M8	180	

1) Measured with gauging shaft of nominal diameter d and length approx. 50 mm. Lengths up to 1800 mm with a parallelism of 0.1 mm on request.

For Aluminum Framing Systems, see "Basic Mechanical Elements" catalog.



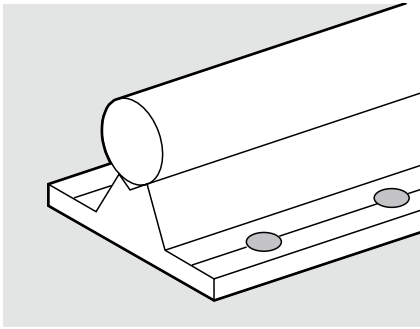
Steel Shafts with ready-mounted Shaft Support Rails for open-type Standard and Super Linear Bushings

Flanged, very accurate height tolerance

R1014 Steel Shafts with ready-mounted Shaft Support Rails

Material

- Shaft Support Rail: aluminum



Structural design

- Used in conjunction with Linear Sets, these shaft support rails make it possible to build linear motion guideways with an extremely low overall height
- High rigidity
The shaft bearing surface of the sup-

port rail is matched to the diameter of the mating-size shaft to ensure that the shaft bearing pressure acts at the optimum angle; together with the sturdy mounting screws, this guarantees high rigidity.

Shaft Ø d (mm)	Part numbers		Weight (kg/m)
	Type 1	Type 2	
12	R1014 012 ..	R1014 512 ..	1.75
16	R1014 016 ..	R1014 516 ..	2.65
20	R1014 020 ..	R1014 520 ..	3.95
25	R1014 025 ..	R1014 525 ..	5.6
30	R1014 030 ..	R1014 530 ..	7.9
40	R1014 040 ..	R1014 540 ..	12.8
50	R1014 050 ..	R1014 550 ..	19.4
60	R1014 060 ..	-	27.3
80	R1014 080 ..	-	47.3

Shafts:

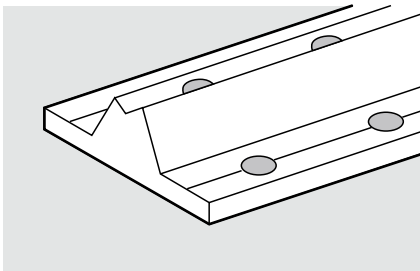
- 00 = heat-treated steel h6
- 01 = heat-treated steel h7
- 30 = corrosion-resistant steel h6
- 31 = corrosion-resistant steel h7
- 60 = heat-treated steel, hard chrome plated, h6
- 61 = heat-treated steel, hard chrome plated, h7

Ordering example:

Shaft diameter 30 mm, h6, heat-treated steel, length 1200 mm, mounted on shaft support rail Type 1 R1050 630 00, ordering code:

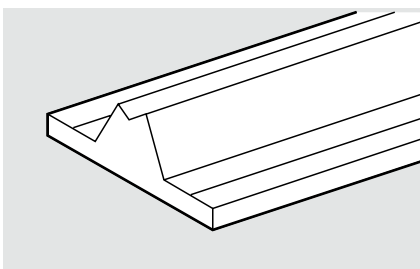
R1014 030 00 / 1200 mm.

R1050 Shaft Support Rails with drilled holes, length (mm) 600^{-0.5}_{-1.5}



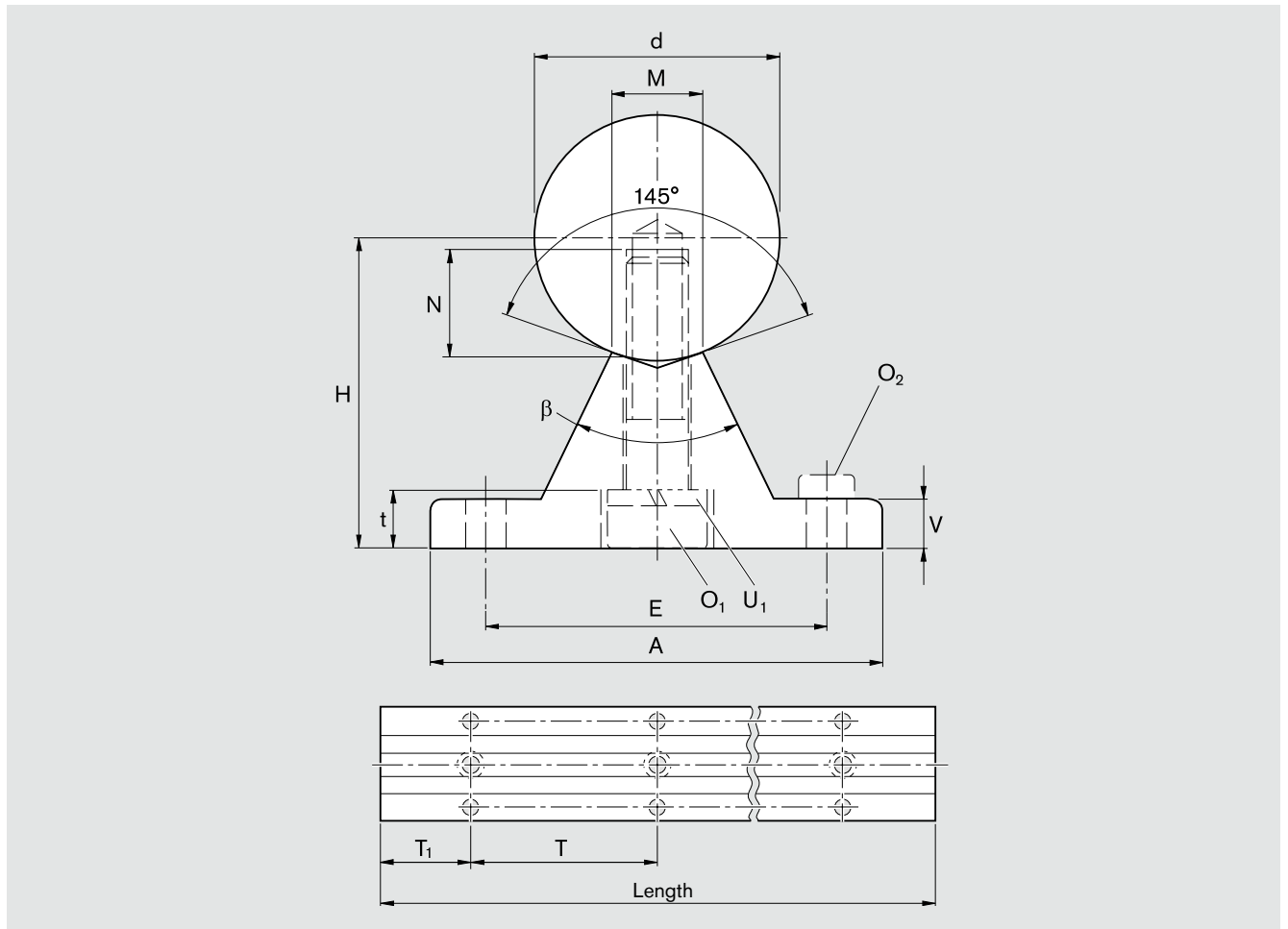
Shaft Ø d (mm)	Part numbers		Weight (kg/m)
	Type 1	Type 2	
12	R1050 612 00	R1050 712 00	0.52
16	R1050 616 00	R1050 716 00	0.64
20	R1050 620 00	R1050 720 00	0.90
25	R1050 625 00	R1050 725 00	1.08
30	R1050 630 00	R1050 730 00	1.43
40	R1050 640 00	R1050 740 00	1.81
50	R1050 650 00	R1050 750 00	2.45
60	R1050 660 00	-	3.16
80	R1050 680 00	-	4.86

R1050 Shaft Support Rails without drilled holes, length (mm) 600^{-0.5}_{-1.5}



Shaft Ø d (mm)	Part numbers	Weight (kg/m)
12	R1050 512 00	0.52
16	R1050 516 00	0.64
20	R1050 520 00	0.90
25	R1050 525 00	1.08
30	R1050 530 00	1.43
40	R1050 540 00	1.81
50	R1050 550 00	2.45
60	R1050 560 00	3.16
80	R1050 580 00	4.86

Dimensions



Dimensions (mm)													Angle	
$\varnothing d$	H^1 ± 0.01	A	V	M	O_1 DIN 6912-8.8	N	U_1 DIN 7980 ²⁾	E	t	O_2 ³⁾ DIN 6912-8.8	$T^4)$ Type 1 Type 2		β ($^\circ$)	
12	22	40	5	5.8	M4x20	4	8	29	4.5	M4x12	75	120	50	
16	26	45	5	7	M5x20	5	9	33	7.6	M5x16	100	150	50	
20	32	52	6	8.3	M6x25	6	11	37	8.6	M6x16	100	150	50	
25	36	57	6	10.8	M8x30	8	15	42	9	M6x16	120	200	50	
30	42	69	7	11	M10x35	10	17	51	10	M8x25	150	200	50	
40	50	73	8	15	M10x40	10	19	55	9.5	M8x25	200	300	50	
50	60	84	9	19	M12x45	12	21	63	11.5	M10x30	200	300	46	
60	68	94	10	25	M14x50	14	25	72	13	M10x30	300	-	46	
80	86	116	12	34	M16x60	16	28	92	15	M12x35	300	-	46	

1) Measured with gauging shaft of nominal diameter d and length approx. 50 mm.

2) DIN 7980 withdrawn. The washer, however, is still available.

3) Applies only to fixing in tapped holes in steel or cast iron.

4) Type 1: For applications where the load acts transverse to the Linear Bushing opening, loading is near the load capacity limit, and high dimensional accuracy is required.

Type 2: For general requirements.

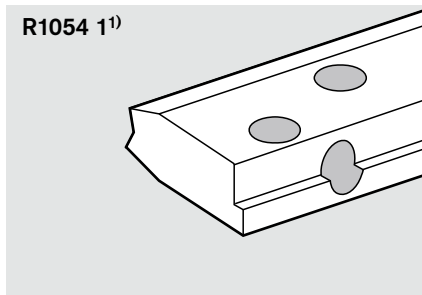
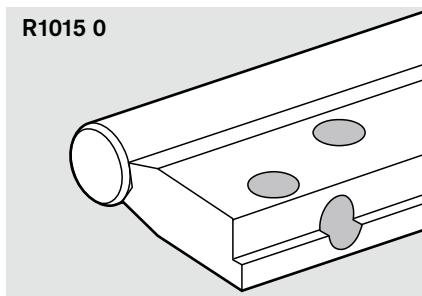
Steel Shafts with ready-mounted Shaft Support Rails for open-type Standard and Super Linear Bushings

Side mounting

R1015 Steel Shafts with ready-mounted Shaft Support Rails

R1054 Shaft Support Rails

Type 1



Material

- Shaft Support Rail: aluminum

Structural design

- Used in conjunction with Linear Sets with side opening, these shaft

support rails make it possible to build extremely durable linear motion guideways.

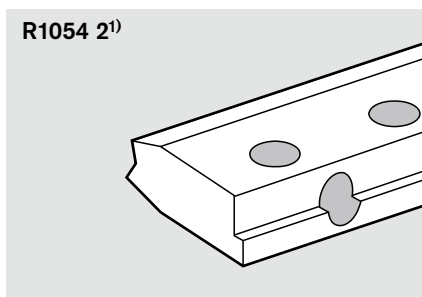
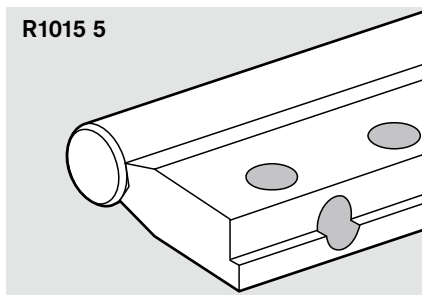
- Reference edge facilitates alignment (mounting).

Shaft Ø d (mm)	Part numbers	Weight (kg)	Part numbers	Weight (kg)
20	R1015 020 ..	4.1	R1054 120 00	1.0
25	R1015 025 ..	6	R1054 125 00	1.3
30	R1015 030 ..	8.7	R1054 130 00	1.9
40	R1015 040 ..	14.3	R1054 140 00	2.7
50	R1015 050 ..	21.5	R1054 150 00	3.7

Shafts:

- 00 = heat-treated steel h6
- 01 = heat-treated steel h7
- 30 = corrosion-resistant steel h6
- 31 = corrosion-resistant steel h7
- 60 = heat-treated steel, hard chrome plated, h6
- 61 = heat-treated steel, hard chrome plated, h7

Type 2



Shaft Ø d (mm)	Part numbers	Weight (kg)	Part numbers	Weight (kg)
20	R1015 520 ..	4.3	R1054 220 00	1.1
25	R1015 525 ..	6.3	R1054 225 00	1.5
30	R1015 530 ..	9	R1054 230 00	2.1
40	R1015 540 ..	14.8	R1054 240 00	3.0
50	R1015 550 ..	22.3	R1054 250 00	4.2

Shafts:

- 00 = heat-treated steel h6
- 01 = heat-treated steel h7
- 30 = corrosion-resistant steel h6
- 31 = corrosion-resistant steel h7
- 60 = heat-treated steel, hard chrome plated, h6
- 61 = heat-treated steel, hard chrome plated, h7

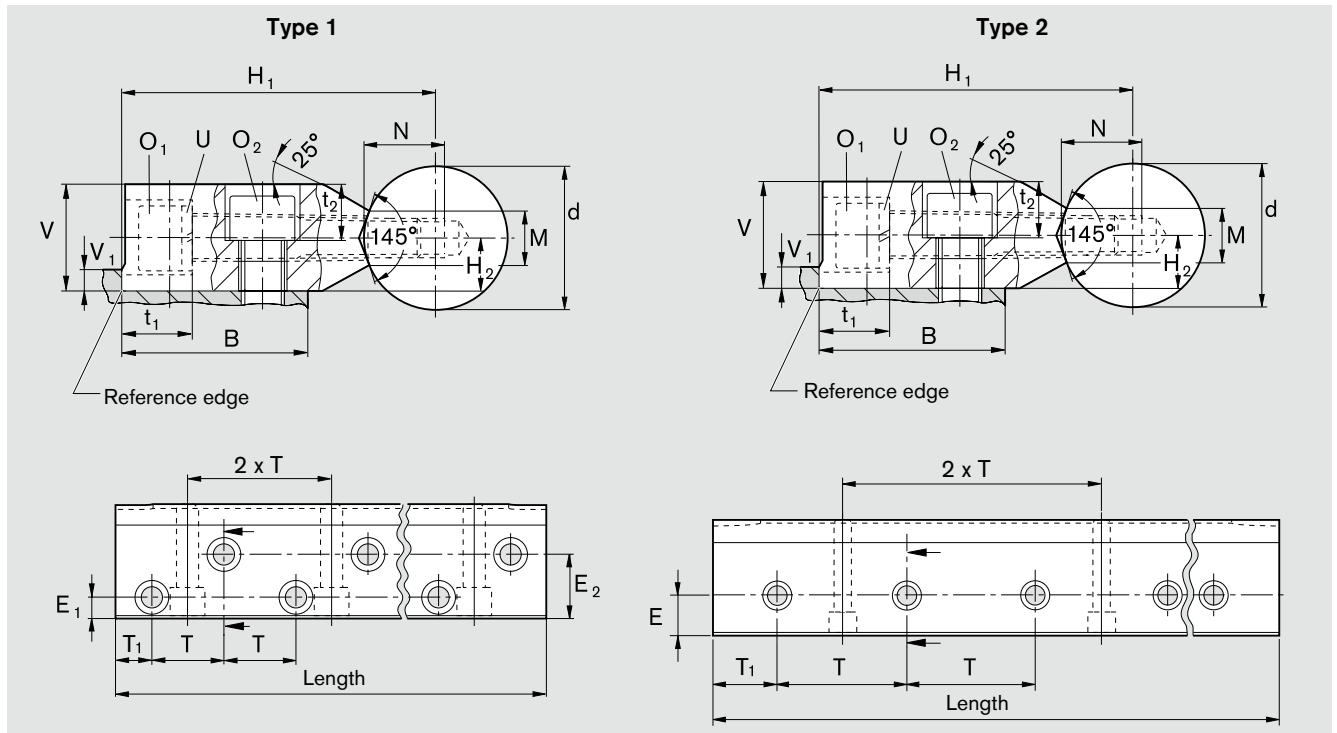
Ordering example:

Shaft diameter 30 mm, h6, heat-treated steel, length 1200 mm, mounted on shaft support rail Type 1 R1054 130 00, ordering code:

R1015 030 00 / 1200 mm.

1) Length (mm) $600^{+0.5}_{-1.5}$

Dimensions



Shaft Support Rail Type 1

Dimensions (mm)																	
$\varnothing d$	$H^{1)}$ js6	$H_2^{1)}$ ± 0.012	V	M	E_1 ± 0.15	E_2 ± 0.15	T	t_1	t_2	$V_1^{2)}$ max.	$B^{2)}$	N	O_1 ISO 4762-8.8	$O_2^{3)}$ ISO 4762-8.8	U DIN 7980 ⁴⁾		
20	52	7.5	15	8.3	8	22	37.5	8.5	8.5	4	30	11	M6x45	M6x16	6		
25	62	10	20	10.8	10	26	37.5	15	11	5.5	36	15	M8x50	M8x20	8		
30	72	12.5	25	11	12	30	50	15.3	13.5	7	42	17	M10x60	M10x25	10		
40	88	15	30	15	12	38	50	19	16	8.5	50	21	M12x70	M12x30	12		
50	105	17.5	35	19	15	45	50	24	18.5	9	60	25	M14x80	M14x35	14		

Shaft Support Rail Type 2

Dimensions (mm)																	
$\varnothing d$	$H^{1)}$ js6	$H_2^{1)}$ ± 0.012	V	M	E ± 0.15	T	t_1	t_2	$V_1^{2)}$ max.	$B^{2)}$	N	O_1 ISO 4762-8.8	$O_2^{3)}$ ISO 4762-8.8	U DIN 7980 ⁴⁾			
20	52	7.5	15	8.3	15	50	8.5	8.5	4	30	11	M6x45	M6x16	6			
25	62	10	20	10.8	18	60	15	11	5.5	36	15	M8x50	M8x20	8			
30	72	12.5	25	11	21	75	15.3	13.5	7	42	17	M10x60	M10x25	10			
40	88	15	30	15	25	100	17.5	16	8.5	50	19	M10x70	M12x30	10			
50	105	17.5	35	19	30	100	21.5	18.5	9	60	21	M12x80	M14x35	12			

1) Measured with gauging shaft of nominal diameter d and length approx. 50 mm.

2) Recommended design: Make mating surface without reference edge (V_1) and line up parallel via the shafts.

3) Applies only to fixing in tapped holes in steel or cast iron.

4) DIN 7980 withdrawn. The washer, however, is still available.

Steel Shafts with ready-mounted Shaft Support Rails for open-type Standard and Super Linear Bushings

Flangeless

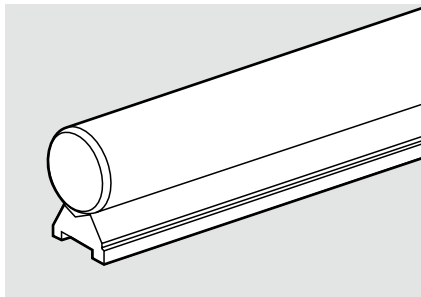
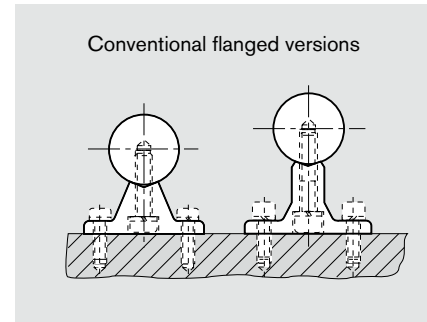
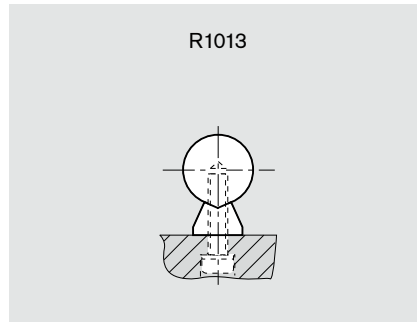
R1013 Steel Shafts with ready-mounted Shaft Support Rails

Material

- Shaft Support Rail: aluminum

Structural design

- This shaft support rail makes it possible to build very compact guideways and is especially suitable for designs where the steel shaft can be attached from below. The comparison with conventional flanged versions (see illustration) shows the particularly low overall height of this element.
- Cost-effective use



Shaft Ø d (mm)	Part numbers	Weight (kg/m)
12	R1013 012 ..	1.1
16	R1013 016 ..	1.9
20	R1013 020 ..	3.0
25	R1013 025 ..	4.5
30	R1013 030 ..	6.3

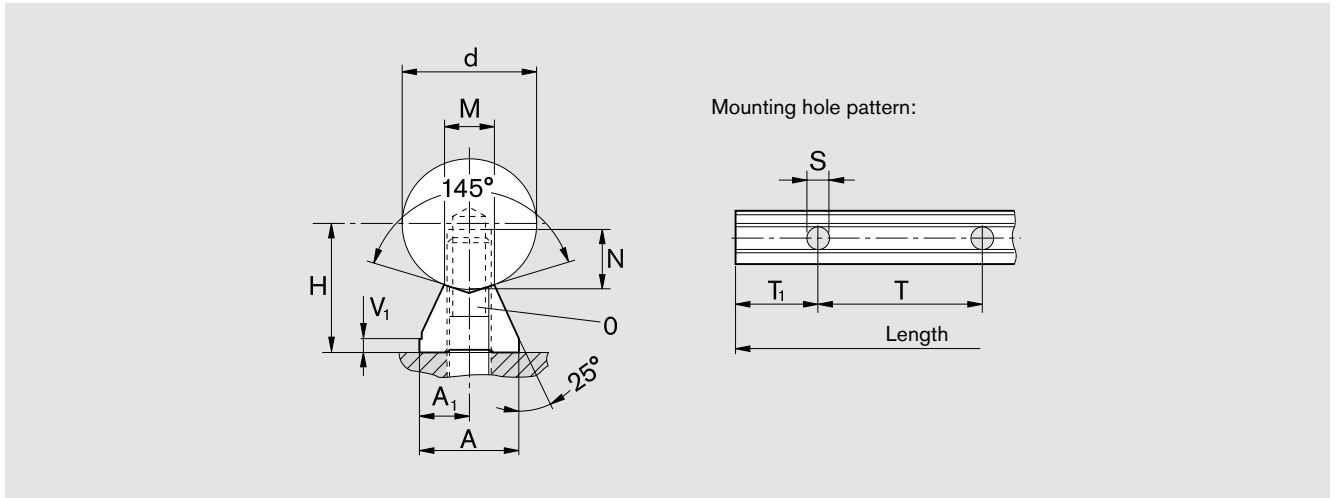
- Shafts:
- 00 = heat-treated steel h6
 - 01 = heat-treated steel h7
 - 30 = corrosion-resistant steel h6
 - 31 = corrosion-resistant steel h7
 - 60 = heat-treated steel, hard chrome plated, h6
 - 61 = heat-treated steel, hard chrome plated, h7

Ordering example:

Shaft diameter 25 mm, h7, heat-treated steel, length 1500 mm, mounted on shaft support rail:

R1013 025 01 / 1500 mm.

Dimensions



Dimensions (mm)									
$\varnothing d$	$H^{1)}$ ± 0.05	A	A ₁	V ₁	T	S	N	M	O
12	14.5	11	5.5	3	75	4.5	8	5.8	M4
16	18	14	7	3	75	5.5	9	7	M5
20	22	17	8.5	3	75	6.6	11	8.3	M6
25	26	21	10.5	3	75	9	15	10.8	M8
30	30	23	11.5	3	100	11	17	11	M10

1) Measured with gauging shaft of nominal diameter d and length approx. 50 mm. Lengths up to 1800 mm with a parallelism of 50 μm on request.



Steel Shafts with ready-mounted Shaft Support Rails for open-type Standard and Super Linear Bushings

Flangeless, with reference edge

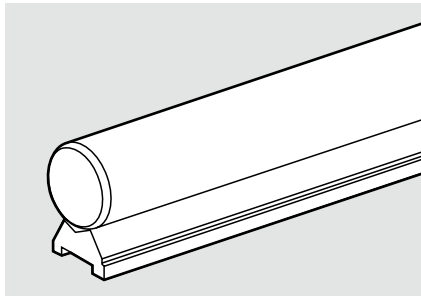
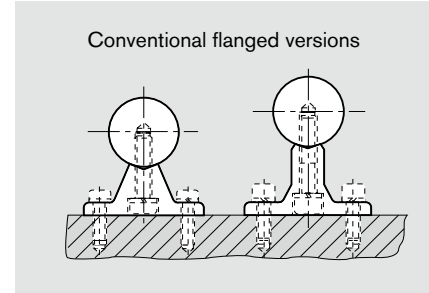
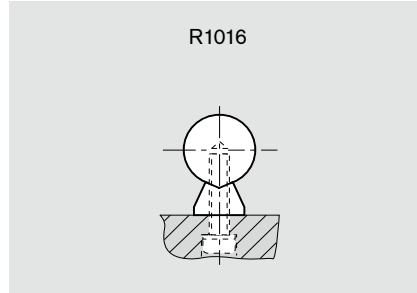
R1016 Steel Shafts with ready-mounted Shaft Support Rails

Material

- Shaft Support Rail: steel

Structural design

- This shaft support rail makes it possible to build very compact guideways and is especially suitable for designs where the steel shaft can be attached from below. The comparison with conventional flanged versions (see illustration) shows the particularly low overall height of this element.
- Reference edge facilitates alignment.



Shaft Ø d (mm)	Part numbers	Weight (kg/m)
16	R1016 016 ..	2.5
20	R1016 020 ..	3.8
25	R1016 025 ..	5.6
30	R1016 030 ..	7.6
40	R1016 040 ..	13.4
50	R1016 050 ..	20.2

Shafts:

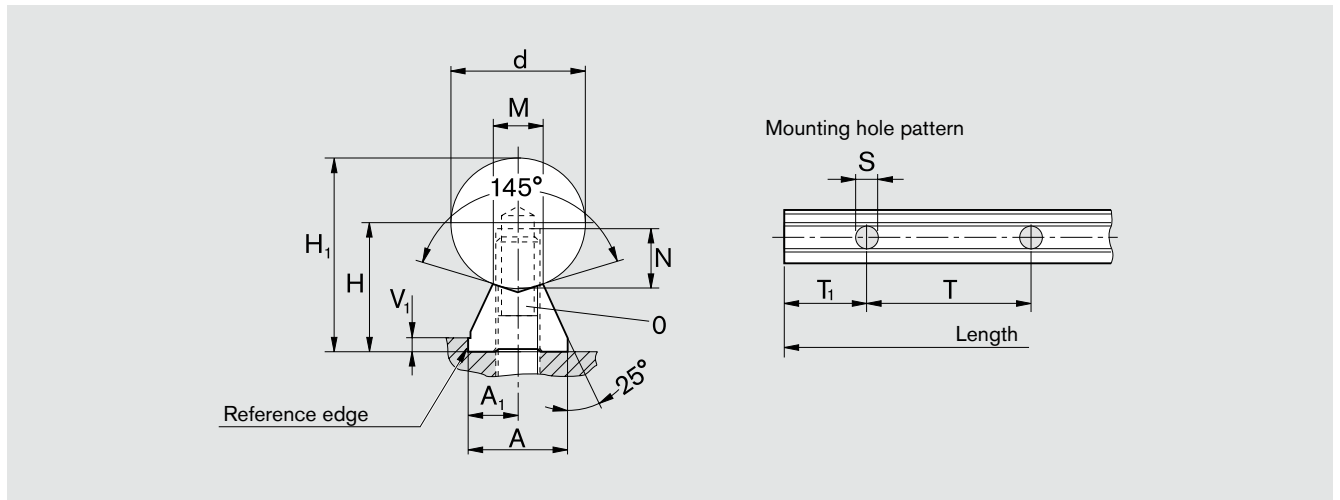
- 00 = heat-treated steel h6
- 01 = heat-treated steel h7
- 30 = corrosion-resistant steel h6
- 31 = corrosion-resistant steel h7
- 60 = heat-treated steel, hard chrome plated, h6
- 61 = heat-treated steel, hard chrome plated, h7

Ordering example

Shaft diameter 30 mm, h7, heat-treated steel, length 900 mm, mounted on shaft support rail:

R1016 030 01 / 900 mm.

Dimensions



Dimensions (mm)											Tolerances within one grade (μm)		
$\varnothing d$	$H^{1)}$	H_1	A ± 0.02	A_1 ± 0.02	V_1	T	S	N	M	O DIN 4762-8.8	$H^{2)}$	Shaft h6 $H_1^{3)}$	Shaft h7 $H_1^{3)}$
16	18	26	14	7	3	75	5.5	9	7	M5	20	32	36
20	22	32	17	8.5	3	75	6.6	11	8.3	M6	20	33	38
25	26	38,5	21	10.5	3	75	9	15	10.8	M8	20	33	38
30	30	45	23	11.5	3	100	11	17	11	M10	20	33	38
40	39	59	30	15	4	100	13.5	21	15	M12	20	35	41
50	46	71	35	17.5	5	100	15.5	25	19	M14	20	35	41

1) Tolerance: ± 0.02 mm; graded by height – delivered to $20 \mu\text{m}$.

2) Measured with gauging shaft of nominal diameter d and length approx. 50 mm. Lengths up to 1800 mm with a parallelism of $10 \mu\text{m}$ on request.

3) Including shaft tolerance (statistically determined).



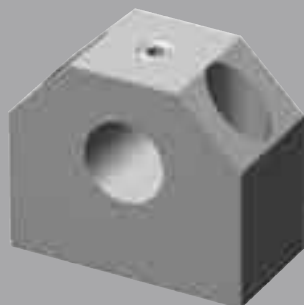
Shaft Support Blocks

Product Overview

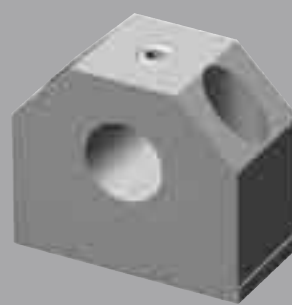
Advantages

- For easy mounting and fast alignment
- Precise execution with reference edge
- More cost-effective than customer-built designs

Aluminum, compact



Aluminum



Cast iron



Cast iron, with flange





Shaft Support Blocks

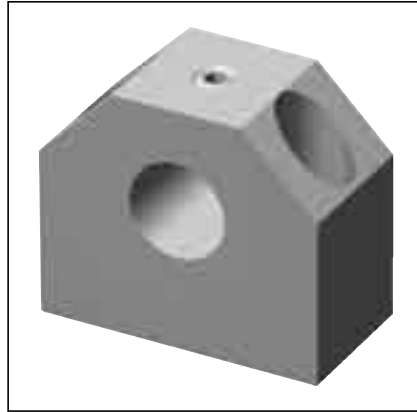
Compact Shaft Support Blocks, R1058

Material

- Aluminum

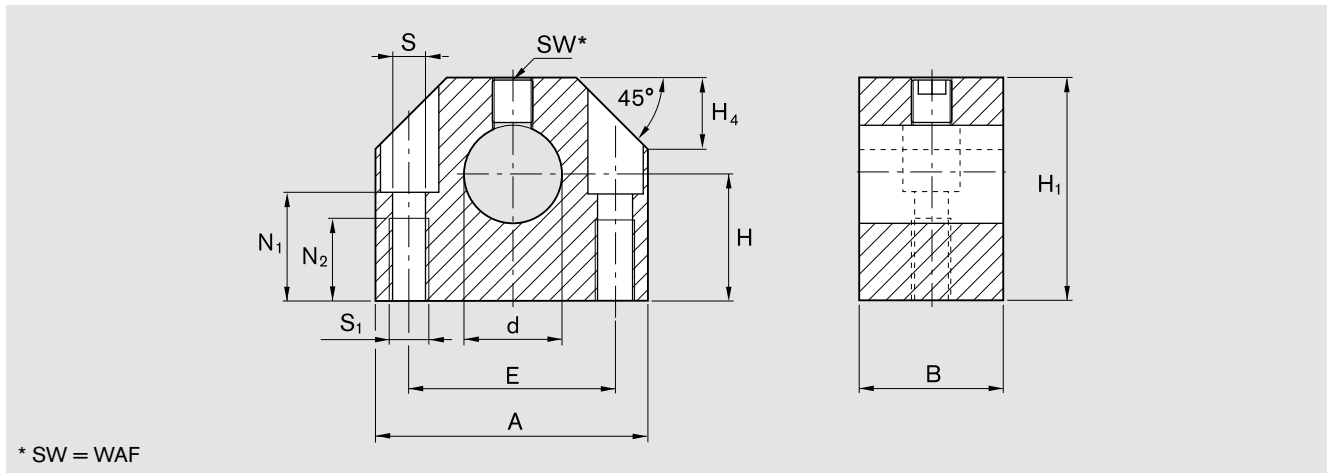
Structural design

- Especially low profile for Linear Sets with Compact Linear Bushings
- Clamping from above for better access
- Greater security through clamping screw with larger thread diameter
- Thread for attachment from below
- Drill holes for attachment from above



Shaft Ø d (mm)	Part numbers	Weight (kg)
12	R1058 012 00	0.045
16	R1058 016 00	0.065
20	R1058 020 00	0.110
25	R1058 025 00	0.170
30	R1058 030 00	0.220
40	R1058 040 00	0.470
50	R1058 050 00	0.820

Dimensions



Dimensions (mm)													Tightening torque
Ø d	d	H ¹⁾	H ₁	A	B	E	S ²⁾	S ₁	N ₁	N ₂	H ₄	WAF	(Nm)
	H8	±0.01				±0.15							
12	12	19	33	40	18	27	5.3	M6	16	13	11	2.5	3.8
16	16	22	38	45	20	32	5.3	M6	18	13	13	2.5	3.8
20	20	25	45	53	24	39	6.6	M8	22	18	15	3.0	6.6
25	25	31	54	62	28	44	8.4	M10	26	22	17	4.0	16
30	30	34	60	67	30	49	8.4	M10	29	22	19	4.0	16
40	40	42	76	87	40	66	10.5	M12	38	26	24	5.0	30
50	50	50	92	103	50	80	13.5	M16	46	34	30	6.0	52

1) Relative to shaft nominal dimension d.

2) Mounting screws ISO 4762-8.8.

Shaft Support Blocks

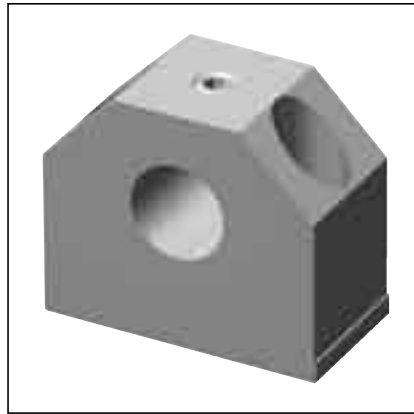
Shaft Support Blocks, R1057

Material

- Aluminum

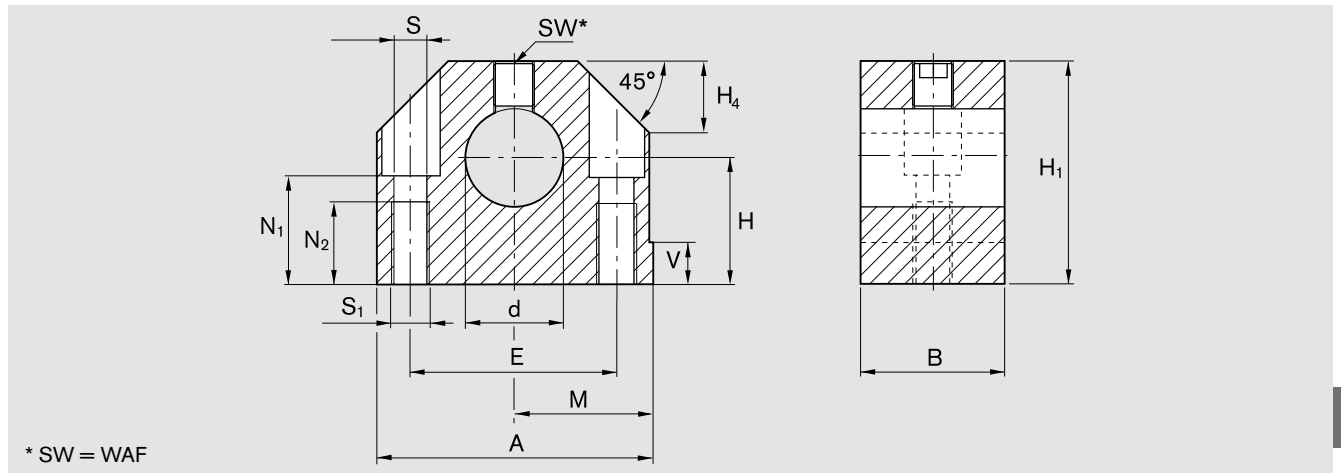
Structural design

- Rigid shaft mounting due to extra-wide design
- Clamping from above for better access
- Greater security through clamping screw with larger thread diameter
- Thread for attachment from below
- Drill holes for attachment from above
- With reference edge for easy alignment



Shaft Ø d (mm)	Part numbers	Weight (kg)
10	R1057 010 00	0.05
12	R1057 012 00	0.06
16	R1057 016 00	0.11
20	R1057 020 00	0.18
25	R1057 025 00	0.35
30	R1057 030 00	0.48
40	R1057 040 00	0.90
50	R1057 050 00	1.50
60	R1057 060 00	3.00

Dimensions



Dimensions (mm)															Tightening torque (Nm)
Ø d	d H8	H ¹⁾ ±0.01	H ₁	M ¹⁾ ±0.01	A	B	E	S ²⁾	S ₁	N ₁	N ₂	V	H ₄	WAF	
10	10	18	31	20	40	20	27±0.15	5.3	M6	14	13	5	10	2.5	3.8
12	12	20	35	21.5	43	20	30±0.15	5.3	M6	16.5	13	5	10	2.5	3.8
16	16	25	42	26.5	53	24	38±0.15	6.6	M8	21	18	5	13	3	6.6
20	20	30	51	30	60	30	42±0.15	8.4	M10	25	22	5	16	4	16
25	25	35	61	39	78	38	56±0.15	10.5	M12	30	26	6.5	20	5	30
30	30	40	70	43.5	87	40	64±0.15	10.5	M12	34	26	8	22	5	30
40	40	50	88	54	108	48	82±0.15	13.5	M16	44	34	10	28	6	52
50	50	60	105	66	132	58	100±0.20	17.5	M20	49	42	12	37	8	120
60	60	75	130	82	164	74	124±0.20	22	M27	59	42	13	42	10	220

1) Relative to shaft nominal dimension d.

2) Mounting screws ISO 4762-8.8.

Shaft Support Blocks

Shaft Support Blocks, R1055

Material

- Spheroidal graphite cast iron

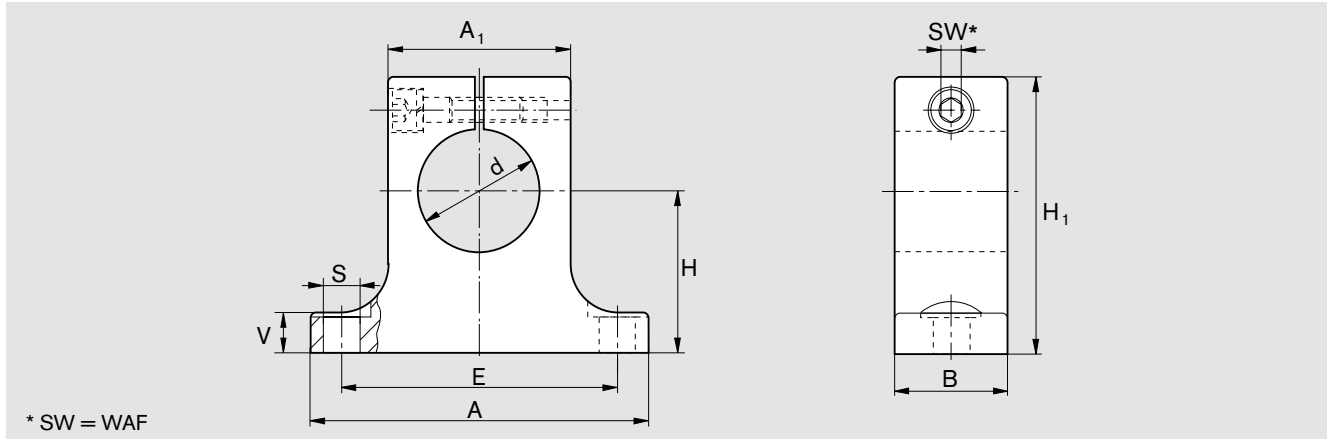
Structural design

- Side clamping



Shaft Ø d (mm)	Part numbers	Weight (kg)
8	R1055 008 00	0.03
12	R1055 012 00	0.06
16	R1055 016 00	0.12
20	R1055 020 00	0.22
25	R1055 025 00	0.37
30	R1055 030 00	0.55
40	R1055 040 00	0.97
50	R1055 050 00	1.90
60	R1055 060 00	3.60
80	R1055 080 00	7.30

Dimensions



* SW = WAF

Dimensions (mm)											
Ø d	d H8	H ¹⁾	H ₁ ²⁾	A ²⁾	A ₁ ²⁾	B ²⁾	E	S ³⁾	V ²⁾	WAF	
8	8	15±0.010	27	32	16	10	25±0.15	4.5	5	2.5	
12	12	20±0.010	35	42	20	12	32±0.15	5.5	5.5	3	
16	16	25±0.010	42	50	26	16	40±0.15	5.5	6.5	3	
20	20	30±0.010	50	60	32	20	45±0.15	5.5	8	3	
25	25	35±0.010	58	74	38	25	60±0.15	6.6	9	4	
30	30	40±0.010	68	84	45	28	68±0.20	9.0	10	5	
40	40	50±0.010	86	108	56	32	86±0.20	11.0	12	6	
50	50	60±0.015	100	130	80	40	108±0.20	11.0	14	6	
60	60	75±0.015	124	160	100	48	132±0.25	13.5	15	8	
80	80	100±0.015	160	200	130	60	170±0.50	17.5	22	10	

1) Relative to shaft nominal dimension d.

2) Tolerance DIN 1685 – GTB 15.

3) Hex socket head cap screws per ISO 4762-8.8.

Shaft Support Blocks

Shaft Support Blocks, R1056
Flange-on version

Material

- Lamellar graphite cast iron

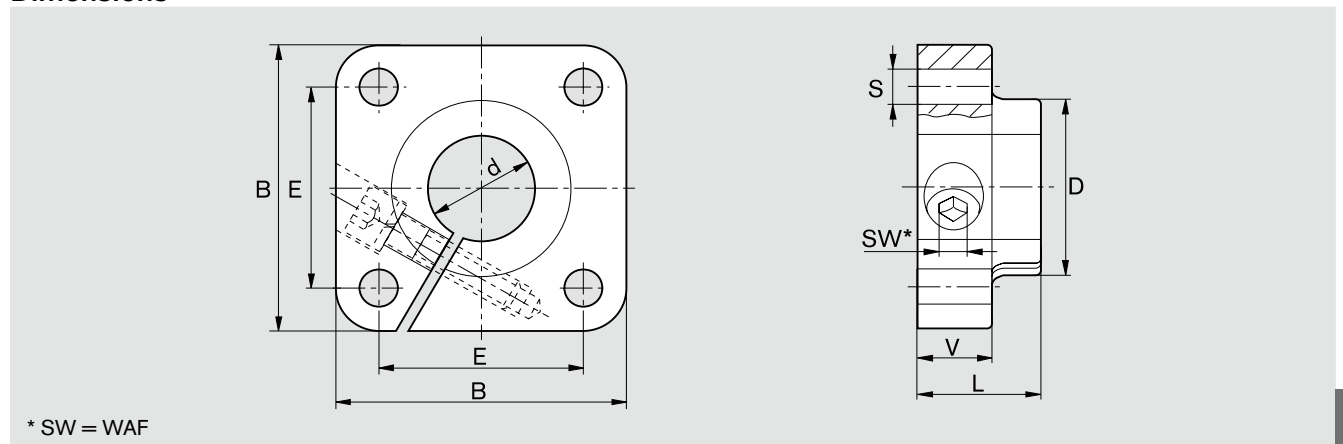
Structural design

- When shafts are installed in customer-designed mounting bores, these flange-on Shaft Support Blocks make it possible to align the shafts and avoid overloading of the Linear Bushings due to non-parallel shafts.
- Side clamping screw



Shaft Ø d (mm)	Part numbers	Weight (kg)
12	R1056 012 00	0.15
16	R1056 016 00	0.21
20	R1056 020 00	0.28
25	R1056 025 00	0.41
30	R1056 030 00	0.75
40	R1056 040 00	1.65
50	R1056 050 00	2.60

Dimensions



Dimensions (mm)									
Ø d	d H7	B ¹⁾	L ¹⁾	D ¹⁾	E	S H13	V ¹⁾	WAF	
12	12	42	20	23.5	30±0.12	5.5	12	3	
16	16	50	20	27.5	35±0.12	5.5	12	3	
20	20	54	23	33.5	38±0.15	6.6	14	4	
25	25	60	25	42.0	42±0.15	6.6	16	5	
30	30	76	30	49.5	54±0.25	9.0	19	6	
40	40	96	40	65.0	68±0.25	11.0	26	8	
50	50	106	50	75.0	75±0.25	11.0	36	8	

1) Tolerance DIN 1686 – GTB 15.

Lubrication

Standard lubrication practices for ball bearings also apply to Linear Bushings. Linear Bushings are delivered already filled with an anti-corrosion agent that is compatible with all mineral oil base lubricants. Either oil or grease can be used as a lubricant. In most cases, the use of grease as a lubricant is preferable. The advantage of using grease rather than oil is that, being more viscous, grease helps to seal off the linear bushing and adheres better to the surfaces inside the bushing. In-service lubrication is therefore only required at long intervals. Please observe the lubricant manufacturer's instructions for use. Linear Sets have been designed for use with grease lubricants. If oil is used instead, it is essential to check that all rolling elements are properly coated with lubricant.

Grease lubricants

We recommend the use of a grease per DIN 51825 as a lubricant.

- K2K
- KP2K (for higher loads).

Rexroth delivers a special lithium-based high performance grease Dynalub 510, which has been specifically adapted for use in linear motion technology applications. It is characterized by good water resistance and corrosion protection.

For miniatures, we recommend Dynalub 520.



Part numbers	Designation			Consistency class per DIN 51818	Temperature range (°C)	Packaging unit	Application range
	Rexroth	DIN 51825	DIN 51826				
R3416 037 00	Dynalub 510	KP2K-20		2	-20 to +80	1 x 400 g	Shafts Ø ≥ 8 mm
R0419 090 01	Dynalub 520		GP00K-20	00	-20 to +80	Maintenance kit 5 ml	Shafts Ø < 8 mm
R3416 043 00	Dynalub 520		GP00K-20	00	-20 to +80	1 x 400 g	Shafts Ø < 8 mm

Oil lubricants

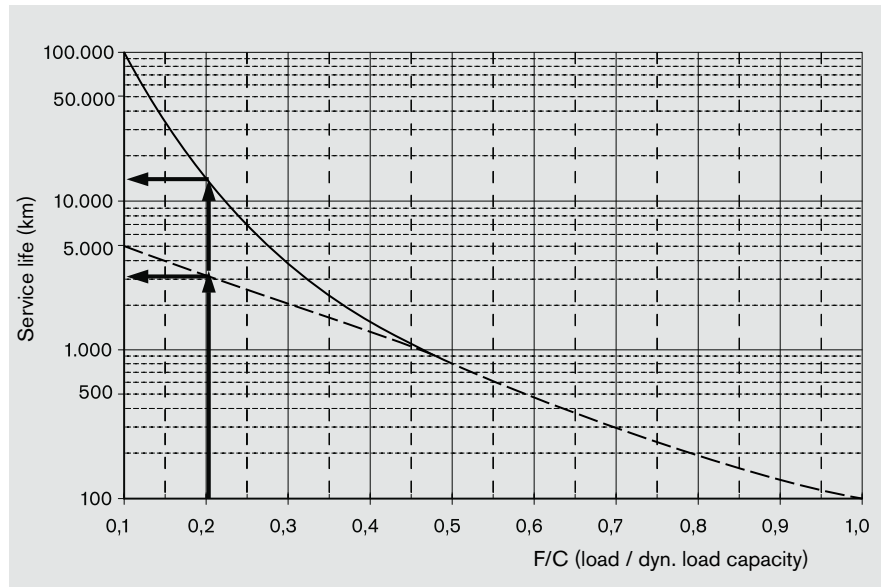
If exceptionally smooth movement is required, oil may be used as a lubricant for the Linear Bushings.

Different types of oil and their viscosity ratings are listed below:

ISO viscosity grade per DIN 51519	Kinematic viscosity at 40 °C (mm ² /s)	Application
ISO VG 32	32	For low friction and light loads
ISO VG 68	68	
ISO VG 100	100	
ISO VG 320	320	For low velocities and/or higher loads
ISO VG 460	460	

Recommended values for load-dependent in-service lubrication

- — — With initial lubrication
(no in-service lubrication)
- — — With regular in-service lubrication



The chart shows recommended values for load-dependent in-service lubrication.

Example

If an eLINE Linear Bushing is loaded with 20% of the dynamic load capacity, its service life under test conditions is 3000 km with initial lubrication only. With regular in-service lubrication every 3000 km, a service life of 12,500 km can be achieved.

Influencing factors

There are many factors that affect in-service lubrication or a change of grease in Linear Bushings.

Some of these factors are listed below:

- Load
- Travel speed
- Motion sequence
- Temperature

Short lubricating intervals are required in the following cases:

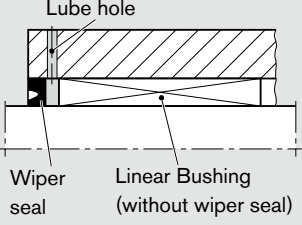
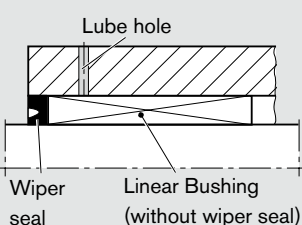
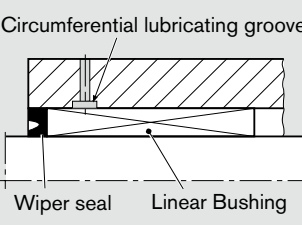




- High loads
- High speed (up to v_{max})
- Short stroke (stroke is shorter than three times the linear bushing length)
- Low resistance to aging in the lubricant

Relubricatable Linear Sets

Initial greasing and maintenance lubrication via lube holes:
Lubricate only when shaft inserted; add lubricant until excess emerges.

Lubrication

Linear bushing in-service lubrication options

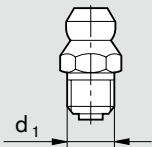
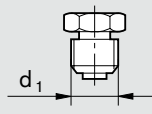
Type of linear bushing	Lubrication through gap between Linear Bushing and seal	Lubrication through lube hole	Lubrication through lube hole with lubricating groove
	 <p>Axial retention of wiper seal and linear bushing required</p>	 <p>Lubrication causes pressure to build up. Always check that the linear bushing and the wiper seal fit tightly.</p>	 <p>● Locate the lube hole along the visible ball recirculating track</p>
eLINE, Compact			
Super , 	●	See Super Linear Bushings  ,  – Technical Data	
- Closed type	●	- “Customer-Built Housings”	
- Open type	●		
Standard			
- Closed type	●		
- Adjustable type	●	● Locate the lube hole near the slot (alignment during installation)	
- Open type	●		
Segmental	●		● Locate the lube hole along the visible ball recirculating track

Notes:

Ensure that there is sufficient retention in open-type versions.
Whenever possible, apply lubricant during longitudinal motion.
Lube holes and lube grooves must be free of burrs.

Lube nipples

Linear Sets designed for in-service lubrication are provided with lube holes for grease lubrication. Suitable grease nipples are shown in the table below:

		
$\varnothing d_1$	Hydraulic type lube nipple DIN 71412 Type A	Funnel-type lube nipple DIN 3405 Type A
(mm)	Part numbers	Part numbers
M6	R3417 002 02	R3417 001 05
M8 x 1	R3417 003 02	R3417 003 05
M10 x 1	R3417 009 02	-

Mounting Instructions

Installation of Linear Bushings

Two linear bushings are required for linear motion assemblies using one shaft only. Assemblies with two shafts must have at least one of the shafts mounted in two linear bushings.

Parallelism

To prevent distortion, which would increase running friction and shorten the service life of the assembly, special care must be taken to ensure precise spacing and parallelism between the two shafts with their respective linear bushings.

Recommended values for maximum spacing inaccuracy P, including deviation from parallelism, for assemblies incorporating linear bushings are as follows:

Shaft Ø d (mm)	P (µm)		h6/H7	
	Zero-clearance Standard, Super Linear Bushing	Segmental, eLINE, Compact Linear Bushing	Standard, Super Linear Bushing	Segmental, Compact Linear Bushing
3	3	–	9	–
4	3	–	9	–
5	4	–	12	–
8	4	7	12	15
10	4	7	12	15
12	5	8	13	17
14	5	8	13	17
16	5	8	13	17
20	7	12	15	20
25	9	15	17	23
30	9	15	17	23
40	11	18	19	25
50	13	22	21	28
60	16	–	24	–
80	22	–	30	–


Operating temperatures

–10 °C to +80 °C

Higher temperatures are permissible only for unsealed Standard Linear Bushings with steel ball retainers. The load capacity will be reduced in such conditions.

At operating temperatures below freezing point, the formation of ice must be avoided.

Shaft deflection

In assemblies with rigid adjacent structures (housings, etc.) and long distances between shaft support points, shaft deflection and the resultant pressure between the bushing edge and the shaft will shorten the service life of self-supporting guides (this does not apply to Super Linear Bushings  up to 30'). For information on how to calculate shaft deflection, see Technical Data on Precision Steel Shafts.

Corrosion-resistant Linear Bushings

Corrosion-resistant steels are steels per ISO 683-17 / EN 10088. In very critical, corrosive environments, the parts must be checked under operating conditions. Use appropriate anti-corrosive agents and lubricants.

Housing bores

For all linear bushings, the operating clearance can be adjusted by the choice of shaft and bore tolerances (except for closed-type Standard Linear Bushings).

For h6 shafts the following applies:

For the normal operating clearance per DIN, the housing bore is machined to tolerance class H7. For small and larger bores, the operating clearance changes accordingly. For low-clearance guidance, we recommend bores with a tolerance of K7. For light preloads, bore tolerances M7 are suitable. (Preloading shortens the life of the Linear Bushings and the shafts.) With eLINE Linear Bushings, low-clearance guidance can be achieved with a housing bore tolerance of H7.

Mounting Instructions

Radial clearance

The radial clearance values given in the tables for Linear Bushings and Linear Sets have been obtained by statistical methods and are representative of the clearances to be expected in actual practice.

Adjusting the radial clearance

If an application calls for zero-clearance, the linear bushing's radial clearance must be reduced by means of an adjusting screw in the housing until a slight resistance is felt when the shaft is turned. In applications subject to vibration, the adjusting screw should be suitably secured against working loose once the desired clearance has been established.

The radial clearance of closed-type Standard Linear Bushings is not adjustable.

Adjusting the preload

If negative clearance (preloading) is required, we recommend that zero-clearance should first be established as described above using a dummy shaft whose diameter is smaller by the amount of the desired preload than the actual guide shaft on which the linear bushing is to run.

Vertical dimensions

The tables for Linear Sets contain tolerance values for the height dimension "H". These tolerance values have been obtained by statistical methods and are representative of the values to be expected in actual practice.

Retention

See "Technical Data" for the various Linear Bushings.

Points to note when mounting

The edge of the housing bore must be chamfered. The smaller sizes of linear bushing (but not the eLINE or Compact series from shaft diameter 12 and up) can be inserted by hand.

Use of an arbor is recommended for larger diameters and for the eLINE and Compact Linear Bushings. Care should be taken not to exert pressure on the wiper seals and steel holding rings (Standard Linear Bushings), as this could damage the ball retainers. If an eLINE, or Compact Linear Bushing is slightly skewed on entering the housing bore, it will align itself as it is inserted further.

Removal and re-alignment are unnecessary.

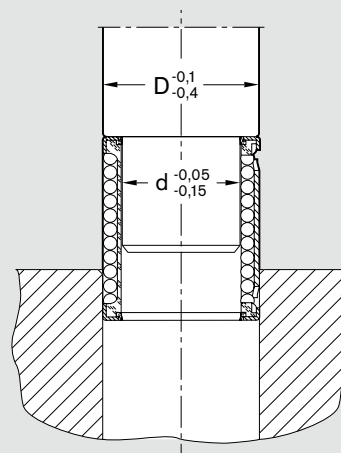
Likewise, to prevent damage to the ball retainers and seals, care must be taken to ensure that the ends of the shaft are chamfered and that the Linear Bushing is not tilted when it is pushed onto the shaft.

Hammers should never be used on the sleeve, holding rings or ball retainers of linear bushings, as this will invariably cause damage to the bushing.

Linear Bushings with seals must not be pushed onto the shaft over sharp edges as this can cause damage to the lips of the seals.

Torque-Resistant Linear Bushings must be mounted as described in the "Mounting instructions" in the relevant section.

Arbor









Phase-out parts

Product Overview

- Only limited availability
- Expect longer delivery times
- Wherever possible, select other products for new-build projects
- Make use of our free consultancy service to identify alternatives

Super Linear Bushings

<p>Super  Closed type R0732</p>  <p>Open type R0733</p> 	<p>Super  Closed type R0730</p>  <p>Open type R0731</p> 
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Linear Sets with Super Linear Bushings  or 

<p>Closed type R1701</p>  <p>Adjustable R1702</p> 	<p>Open type R1703</p>  <p>Open type, adjustable R1704</p> 	<p>With side opening, adjustable R1706</p> 
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Radial Linear Bushings R0678



Linear Sets with Radial Linear Bushings

<p>Open type, adjustable R1076</p> 	<p>With side opening, adjustable R1078</p> 
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Radial Compact Sets

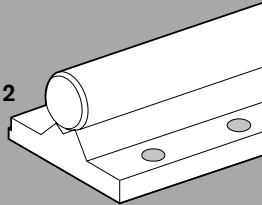
Open type, adjustable R1613



Steel Shafts with ready-mounted Shaft Support Rails

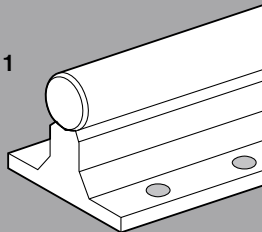
For Radial Compact Sets

R1012



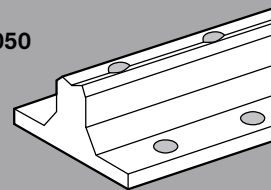
For open-type Standard and Super Linear Bushings

R1011



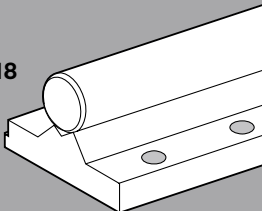
Shaft Support Rails

R1050

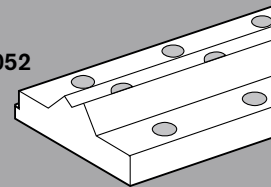


For Radial Linear Bushings

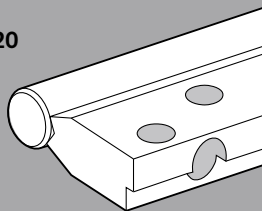
R1018



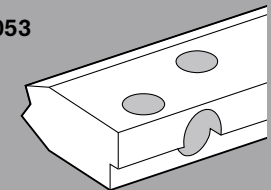
R1052




R1020



R1053





Phase-out parts, Super Linear Bushings 

Super Linear Bushings, R0732
Closed type




Super Linear Bushings, R0733
Open type




Shaft Ø d (mm)	Part numbers				Weight (kg)
	Without seals	With two seals	Hollow screw	Locating screw ¹⁾	
20	R0732 020 00	R0732 220 40	R3432 010 00	R3427 008 09	0.070
25	R0732 025 00	R0732 225 40	R3432 007 00	R3427 003 09	0.150
30	R0732 030 00	R0732 230 40	R3432 007 00	R3427 003 09	0.210
40	R0732 040 00	R0732 240 40	R3432 007 00	R3427 003 09	0.400
50	R0732 050 00	R0732 250 40	R3432 008 00	R3427 004 09	0.700
60	R0732 060 00	R0732 260 40	R3432 009 00	R3427 007 09	1.200
					




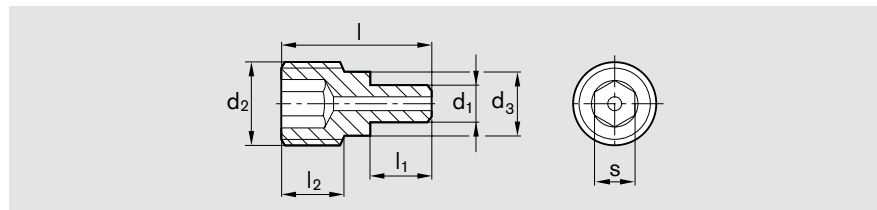
With one integrated wiper seal: R0732 1.. 40 or R0733 1.. 40

Shaft Ø d (mm)	Part numbers				Weight (kg)
	Without seals	With two seals	Fully sealed	Locating screw ¹⁾	
20	R0733 020 00	R0733 220 40	R0733 220 45	R3427 008 09	0.060
25	R0733 025 00	R0733 225 40	R0733 225 45	R3427 003 09	0.130
30	R0733 030 00	R0733 230 40	R0733 230 45	R3427 003 09	0.180
40	R0733 040 00	R0733 240 40	R0733 240 45	R3427 003 09	0.350
50	R0733 050 00	R0733 250 40	R0733 250 45	R3427 004 09	0.600
60	R0733 060 00	R0733 260 40	R0733 260 45	R3427 007 09	1.000
					

1) For dimensions, refer to Super Linear Bushings 

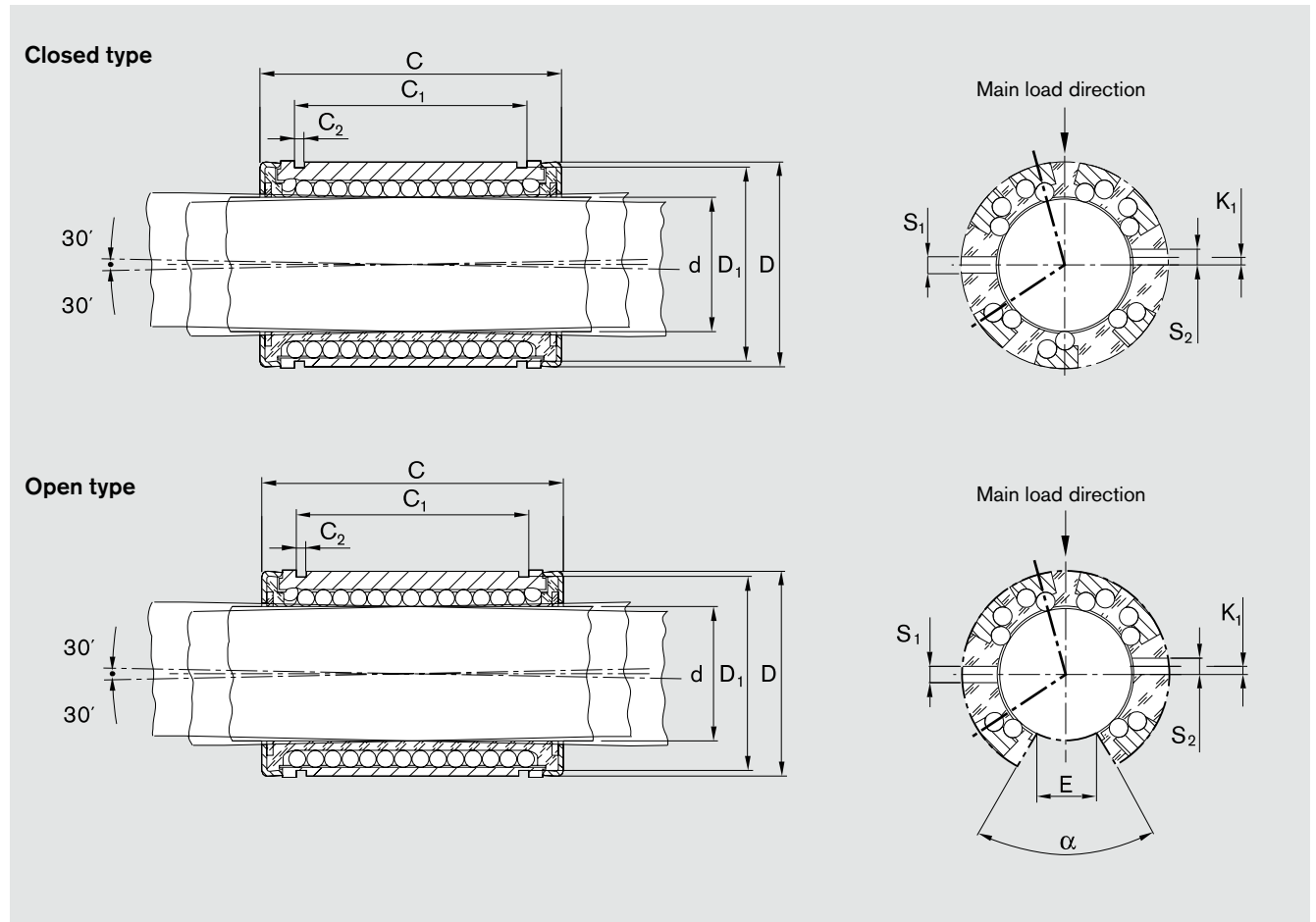
Hollow screw



For lubrication and retention of the Super Linear Bushing  (closed type) through hole S₁.



Dimensions (mm)							Hollow screw Part numbers	Tightening torque (Nm)
d ₂	d ₁	d ₃	l	l ₁	l ₂	s		
M8x1	3	6.5	10.5	5	3.5	4	R3432 010 00	5.5
M8x1	3.5	6.5	14.5	6	5.6	4	R3432 007 00	5.5
M8x1	4.5	6.5	18	8	7	4	R3432 008 00	5.5
M10x1	6	8.5	25	11.5	10.2	5	R3432 009 00	9.5

Dimensions



Dimensions (mm)										No. of ball circuits		Angle	Radial clearance (μm)			Load capacities ³⁾ (N)	
Ø d	D	C	C ₁	C ₂	D ₁	S ₁ ¹⁾	S ₂ ¹⁾	K ₁	E ²⁾			α (°)	Shaft/bore			dyn. C	stat. C ₀
		h13	H13			+0.1	+0.1						h6/H7	h6/K7	h6/M7		
20	32	45	31.2	1.6	30.5	3.0	-	-	9.5	7	6	60	+43 +11	+25 -7	+18 -14	2520	1880
25	40	58	43.7	1.85	38.5	3.5	3	-1.5	12	7	6	60	+43 +11	+25 -7	+18 -14	4430	3360
30	47	68	51.7	1.85	44.5	3.5	3	2	12.8	7	6	60	+43 +11	+25 -7	+18 -14	6300	5230
40	62	80	60.3	2.15	59	3.5	3	1.5	16.8	7	6	60	+50 +12	+29 -7	+20 -18	9680	7600
50	75	100	77.3	2.65	72	4.5	5	2.5	22.1	7	6	60	+50 +12	+29 -7	+20 -18	16000	12200
60	90	125	101.3	3.15	86.5	6.0	-	-	27	7	6	60	+56 +14	+31 -11	+21 -21	23500	18700


1) Holes are located centrally relative to dimension C.

2) Lower limit relative to shaft Ø d.

3) The load capacities apply for the main direction of loading.

Determination of the dynamic load capacities is based on a travel life of 100,000 m.



Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Phase-out parts, Super Linear Bushings 

Super Linear Bushings, R0730
Closed type




Super Linear Bushings, R0731
Open type





Shaft Ø d (mm)	Part numbers			Weight (kg)
	Without seals	With two seals	Locating screw	
20	R0730 020 00	R0730 220 40	R3427 001 09	0.009
25	R0730 025 00	R0730 225 40	R3427 001 09	0.190
30	R0730 030 00	R0730 230 40	R3427 003 09	0.300
40	R0730 040 00	R0730 240 40	R3427 003 09	0.600
50	R0730 050 00	R0730 250 40	R3427 004 09	1.050
				

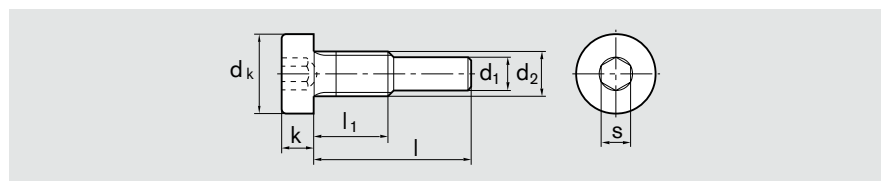
With one integrated wiper seal: R0730 1.. 40 or R0731 1.. 40



Shaft Ø d (mm)	Part numbers			Locating screw	Weight (kg)
	Without seals	With two seals	Fully sealed		
20	R0731 020 00	R0731 220 40	R0731 220 45	R3427 001 09	0.075
25	R0731 025 00	R0731 225 40	R0731 225 45	R3427 001 09	0.160
30	R0731 030 00	R0731 230 40	R0731 230 45	R3427 003 09	0.250
40	R0731 040 00	R0731 240 40	R0731 240 45	R3427 003 09	0.500
50	R0731 050 00	R0731 250 40	R0731 250 45	R3427 004 09	0.900
					

Locating screw

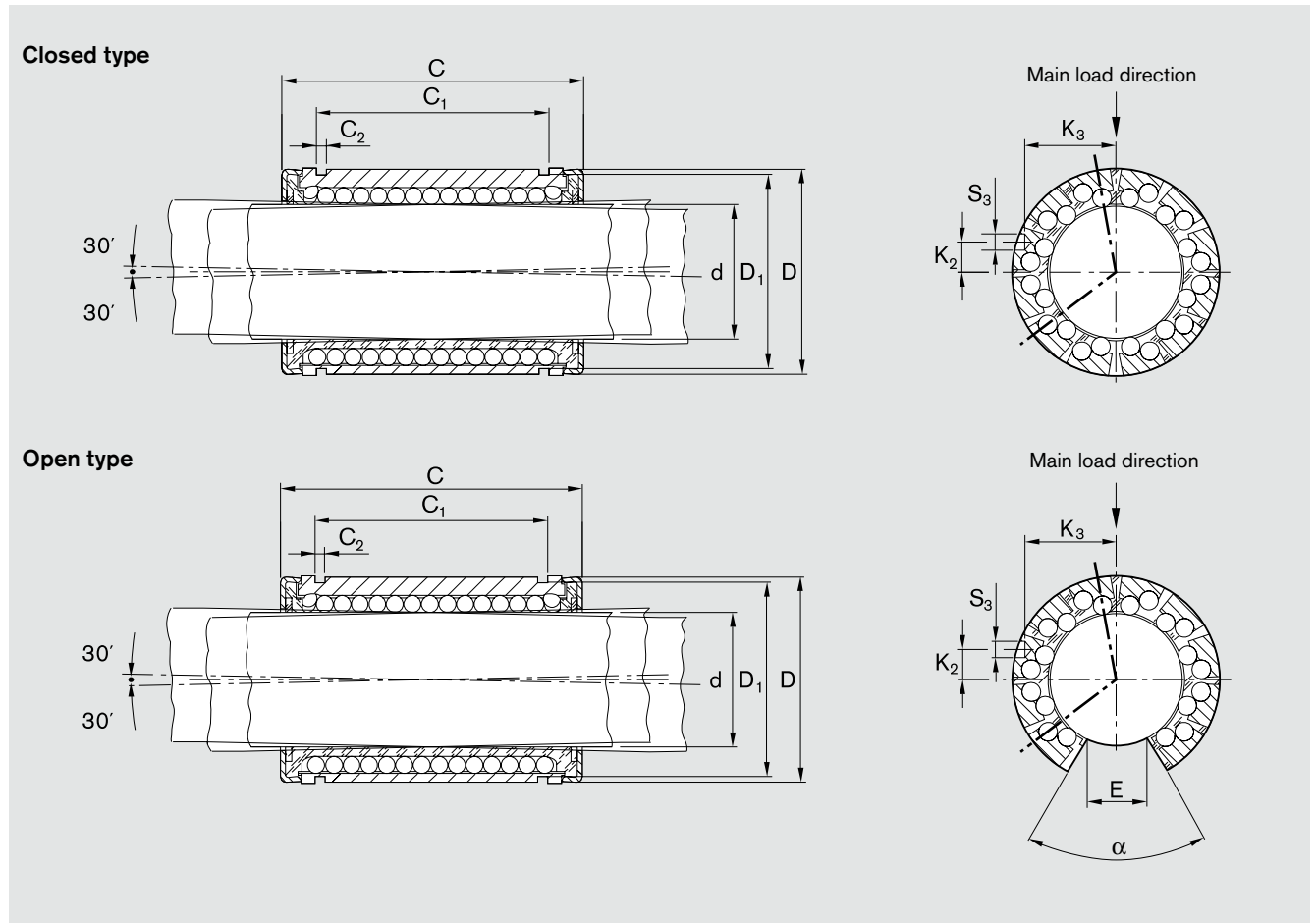
For retention of Super Linear Bushings  and .



Dimensions (mm)							Locating screw	
d ₂	d _k	d ₁	l	l ₁	k	s	Part numbers	Tightening torque (Nm)
M4	7	2.5	12	6.3	2.8	2.5	R3427 001 09	1.9
M4	7	3	14.1	6.5	2.8	2.5	R3427 008 09	1.9
M5	8.5	3.5	17	8	3.5	3	R3427 003 09	3.8
M6	10	4.5	26	13.5	4	4	R3427 004 09	6.7
M8	13	6	33	17	5	5	R3427 007 09	16

Other dimensions per DIN 7984.



Dimensions







Dimensions (mm)										No. of ball circuits		Angle	Radial clearance (µm)			Load capacities ³⁾ (N)	
Ø d	D	C	C ₁	C ₂	D ₁	S ₃ ¹⁾	K ₂	K ₃	E ²⁾			α (°)	Shaft/bore			dyn. C	stat. C ₀
		h13	H13			+0.1							h6/H7	h6/K7	h6/M7		
20	32	45	31.2	1.6	30.5	3.0	1.3	14.7	9.5	10	8	60	+43 +11	+25 -7	+18 -14	3530	2530
25	40	58	43.7	1.85	38.5	3.5	2	18.5	12	10	8	60	+43 +11	+25 -7	+18 -14	6190	4530
30	47	68	51.7	1.85	44.5	3.5	7	21	12.8	12	10	60	+43 +11	+25 -7	+18 -14	6300	7180
40	62	80	60.3	2.15	59	3.5	9.5	27.5	16.8	12	10	60	+50 +12	+29 -7	+20 -18	13500	7600
50	75	100	77.3	2.65	72	4.5	10	33.5	22.1	12	10	60	+50 +12	+29 -7	+20 -18	22300	16800





- 1) Holes are located centrally relative to dimension C.
- 2) Lower limit relative to shaft Ø d.
- 3) The load capacities apply for the main direction of loading.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

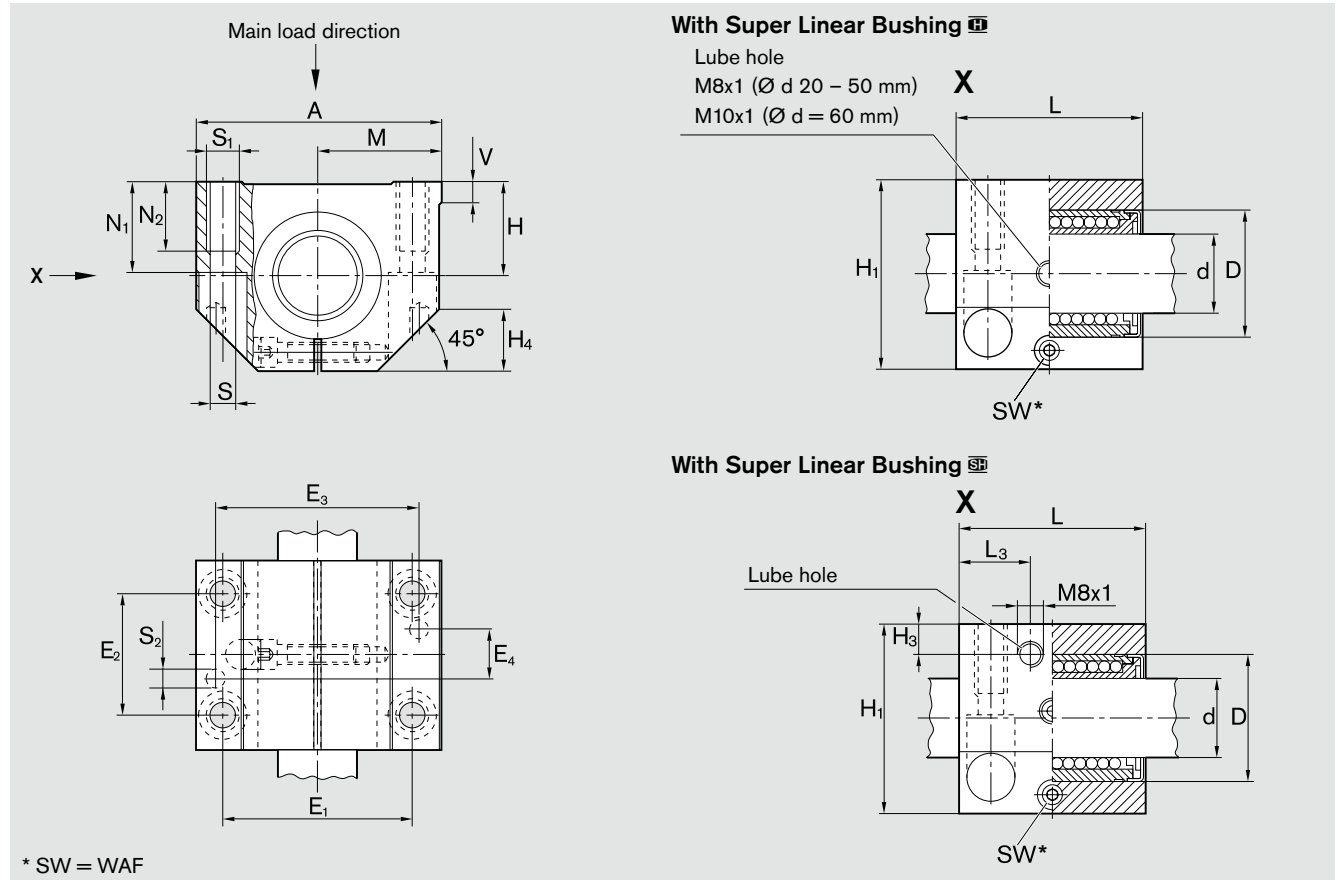
Phase-out parts, Linear Sets with Super Linear Bushings  or **Linear Sets, R1701**
Closed type**Linear Sets, R1702**
Adjustable type**Closed type**

Shaft Ø d (mm)	Part numbers With Super Linear Bushing		Weight (kg) With Super Linear Bushing	
				
20	R1701 220 20	R1701 420 20	0.29	0.31
25	R1701 225 20	R1701 425 20	0.58	0.63
30	R1701 230 20	R1701 430 20	0.88	0.97
40	R1701 240 20	R1701 440 20	1.63	1.86
50	R1701 250 20	R1701 450 20	2.70	3.10
60	R1701 260 20	-	5.20	-

Adjustable type

Shaft Ø d (mm)	Part numbers With Super Linear Bushing		Weight (kg) With Super Linear Bushing	
				
20	R1702 220 20	R1702 420 20	0.29	0.31
25	R1702 225 20	R1702 425 20	0.58	0.63
30	R1702 230 20	R1702 430 20	0.88	0.97
40	R1702 240 20	R1702 440 20	1.63	1.86
50	R1702 250 20	R1702 450 20	2.70	3.10
60	R1702 260 20	-	5.20	-

Dimensions





Dimensions (mm)																					
$\varnothing d$	D	H ¹⁾ +0.008 -0.016	H ₁	M ¹⁾ ± 0.01	A	L	E ₁	E ₂	E ₃	E ₄	S	S ₁	S ₂	N ₁	N ₂	H ₃	L ₃	V	WAF	H ₄	
20	32	25	50	30	60	46	45±0.15	32±0.15	50	15	6.6	M8	5	24	18	10	16	5	4	16	
25	40	30	60	39	78	59	60±0.15	40±0.15	64	17	8.4	M10	6	29	22	10	21	6.5	5	20	
30	47	35	70	43.5	87	69	68±0.15	45±0.15	72	20	8.4	M10	6	34	22	11.5	26	8	5	22	
40	62	45	90	54	108	81	86±0.15	58±0.15	90	25	10.5	M12	8	44	26	14	30	10	6	28	
50	75	50	105	66	132	101	108±0.20	50±0.20	108	85	13.5	M16	10	49	34	12.5	39	12	8	37	
60	90	60	125	82	164	126	132±0.20	65±0.20	132	108	17.5	M20	12	59	42	-	-	13	10	45	

Shaft $\varnothing d$ (mm)	Radial clearance ²⁾ (μm)		Load capacities ³⁾ (N)			
	R1701 Shaft h6	R1702	With Super Linear Bushing [SB]		[SB]	
			C	C ₀	C	C ₀
20	+43 +11	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	2520	1880	3530	2530
25	+43 +11		4430	3360	6190	4530
30	+43 +11		6300	5230	8800	7180
40	+50 +12		9680	7600	13500	10400
50	+50 +12		16000	12200	22300	16800
60	+56 +14		23500	18700	-	-

- 1) When screwed down, relative to shaft nominal dimension d.
- 2) When screwed down.
- 3) The load capacities apply for the main direction of loading.





Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Phase-out parts, Linear Sets with Super Linear Bushings  or 





Linear Sets, R1703 Open type

Linear Sets, R1704 Open type, adjustable



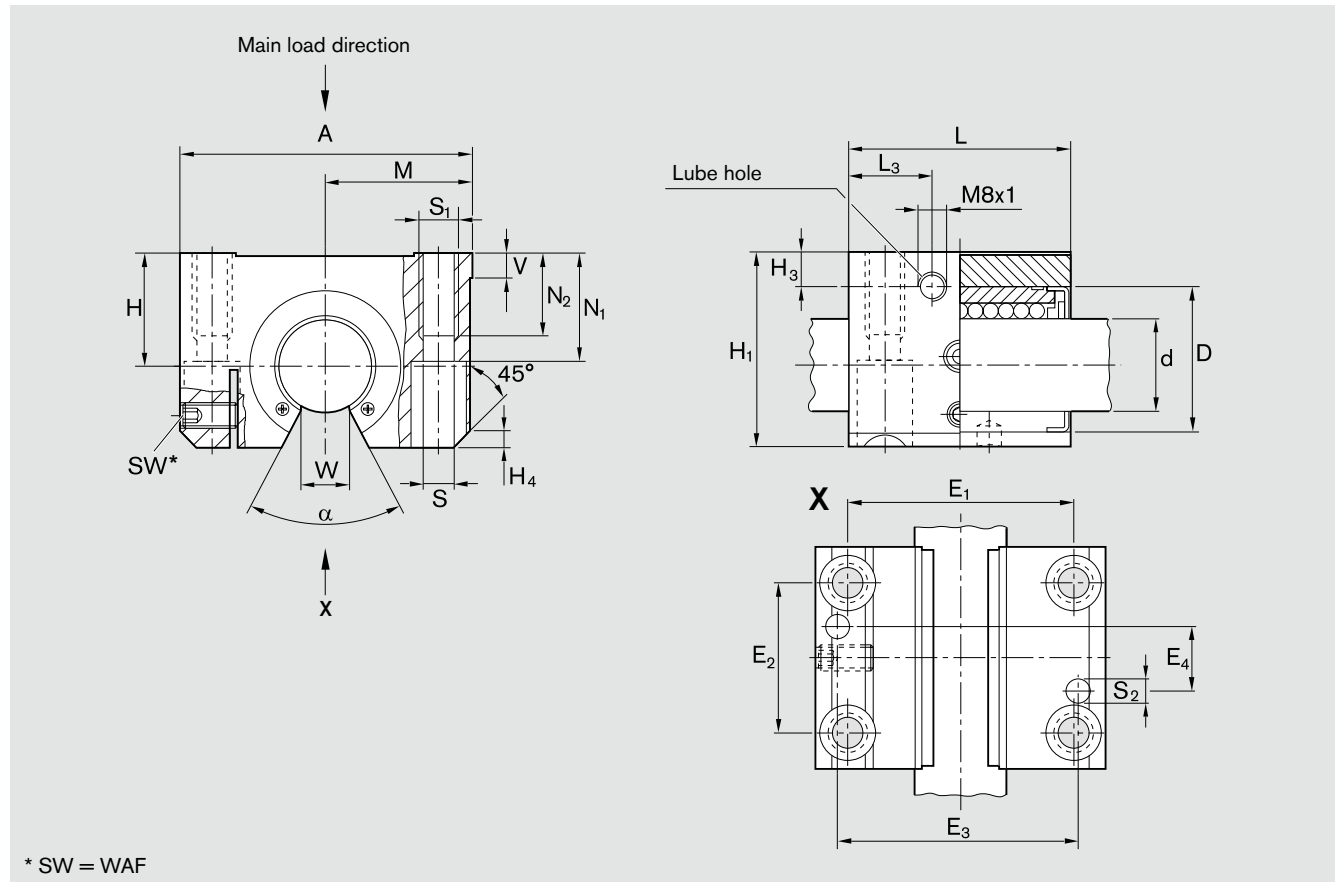
Shaft Ø d (mm)	Part numbers With Super Linear Bushing ¹⁾		Weight (kg) With Super Linear Bushing	
				
20	R1703 220 70	R1703 420 70	0.24	0.26
25	R1703 225 70	R1703 425 70	0.48	0.51
30	R1703 230 70	R1703 430 70	0.72	0.79
40	R1703 240 70	R1703 440 70	1.38	1.56
50	R1703 250 70	R1703 450 70	2.30	2.60
60	R1703 260 70	–	4.40	–



Shaft Ø d (mm)	Part numbers With Super Linear Bushing ¹⁾		Weight (kg) With Super Linear Bushing	
				
20	R1704 220 70	R1704 420 70	0.24	0.26
25	R1704 225 70	R1704 425 70	0.48	0.51
30	R1704 230 70	R1704 430 70	0.72	0.79
40	R1704 240 70	R1704 440 70	1.38	1.56
50	R1704 250 70	R1703 450 70	2.30	2.60
60	R1704 260 70	–	4.40	–

1) Fully sealed, lubricatable.

Dimensions



* SW = WAF



Dimensions (mm)

Ø d	D	H ¹⁾ +0.008 -0.016	H ₁	M ¹⁾ ±0.01	A	L	E ₁	E ₂	E ₃	E ₄	S	S ₁	S ₂	N ₁	N ₂	H ₃	L ₃	V	WAF	W	H ₄
20	32	25	42	30	60	46	45±0.15	32±0.15	50	15	6.6	M8	5	24	18	10	16	5	2.5	9.5	3.5
25	40	30	51	39	78	59	60±0.15	40±0.15	64	17	8.4	M10	6	29	22	10	21	6.5	3	12	4
30	47	35	60	43.5	87	69	68±0.15	45±0.15	72	20	8.4	M10	6	34	22	11.5	26	8	3	12.8	6
40	62	45	77	54	108	81	86±0.15	58±0.15	90	25	10.5	M12	8	44	26	14	30	10	4	16.8	6
50	75	50	88	66	132	101	108±0.20	50±0.20	108	35	13.5	M16	10	49	34	12.5	39	12	5	22.1	6
60	90	60	105	82	164	126	132±0.20	65±0.20	132	40	17.5	M20	12	59	42	15	50	13	6	27	5

Shaft Ø d (mm)	Angle α (°)	Radial clearance ²⁾ (µm)		Load capacities ³⁾ (N)			
		R1073 Shaft h6	R1074	With Super Linear Bushing			
				C	C ₀	C	C ₀
20	54	+31 -2	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit) when screwed down	2520	1880	3530	2530
25	55	+31 -2		4430	3360	6190	4530
30	60	+31 -2		6300	5230	8800	7180
40	60	+35 -3		9680	7600	13500	10400
50	52	+35 -3		16000	12200	22300	16800
60	55	+39 -4		23500	18700	-	-





- 1) When screwed down, relative to shaft nominal dimension d.
- 2) When screwed down.
- 3) The load capacities apply for the main direction of loading.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Phase-out parts, Linear Sets with Super Linear Bushings  or 

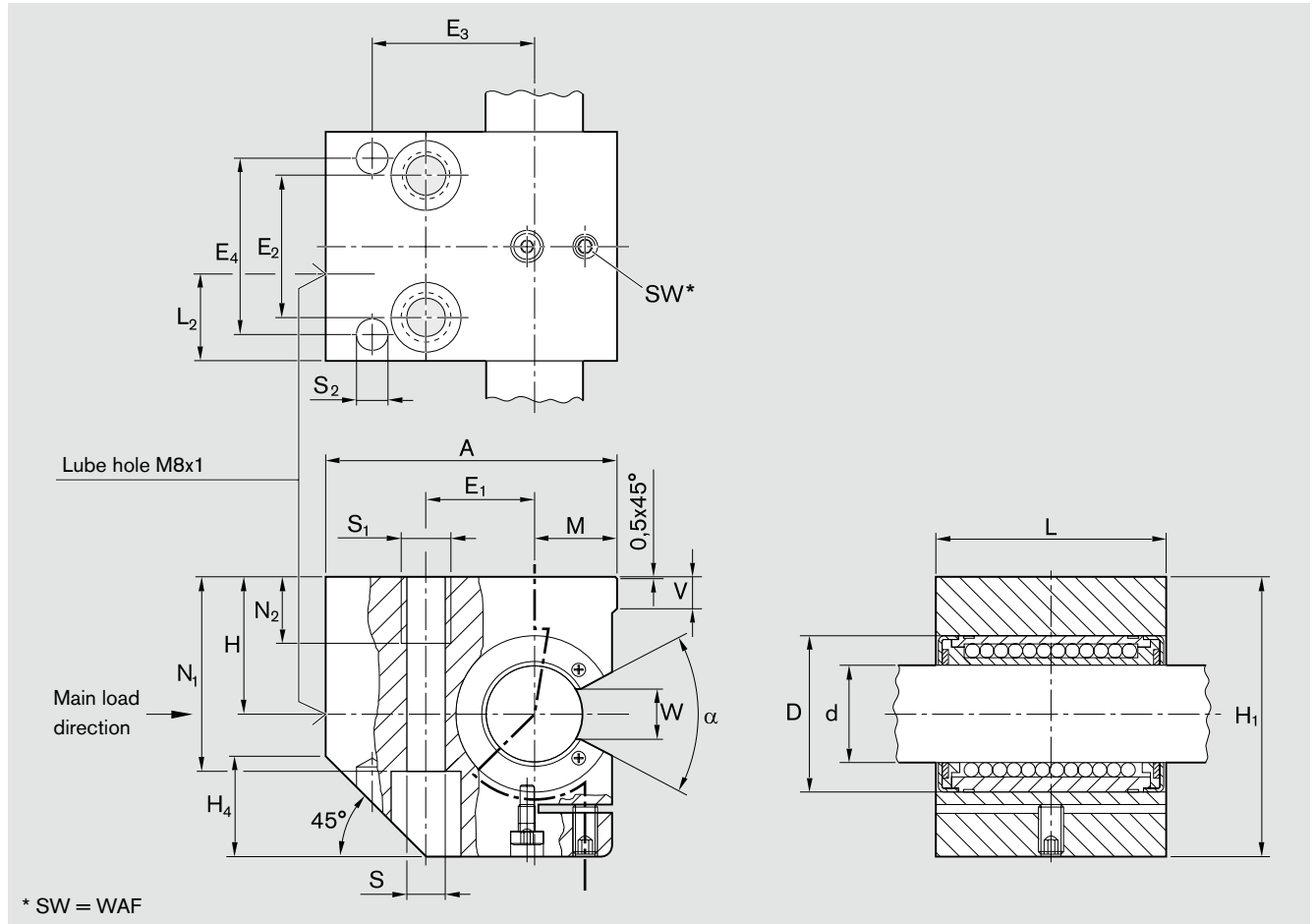
Linear Sets, R1706 With side opening, adjustable



Shaft Ø d (mm)	Part numbers With Super Linear Bushing ¹⁾		Weight (kg) With Super Linear Bushing	
				
20	R1706 220 70	R1706 420 70	0.35	0.37
25	R1706 225 70	R1706 425 70	0.70	0.73
30	R1706 230 70	R1706 430 70	1.03	1.10
40	R1706 240 70	R1706 440 70	1.80	1.95
50	R1706 250 70	R1706 450 70	3.00	3.25

1) Fully sealed, lubricatable.

Dimensions



Dimensions (mm)

Ø d	D	H ¹⁾ +0.008 -0.016	H ₁	M ¹⁾ ±0.01	A	L	E ₁	E ₂	E ₃	E ₄	S	S ₁	S ₂	N ₁	N ₂	L ₂	V	WAF	W	H ₄
20	32	30	60	17	60	47	22±0.15	30±0.15	35	35	8.4	M10	6	42	15	17.5	5	2.5	9.5	22
25	40	35	72	21	75	59	28±0.15	36±0.15	42	45	10.5	M12	8	50	18	22	6.5	3	12	26
30	47	40	82	25	86	69	34±0.15	42±0.15	52	52	13.5	M16	10	55	24	27	8	3	12.8	30
40	62	45	100	32	110	81	43±0.15	48±0.15	65	60	15.5	M20	12	67	30	31	10	4	16.8	38
50	75	50	115	38	127	101	50±0.15	62±0.15	75	75	17.5	M20	12	78	30	39	12	5	22.1	45

Shaft Ø d (mm)	Angle α (°)	Radial clearance (µm) Adjusted prior to delivery to zero- clearance on h5 shaft (lower limit) when screwed down	Load capacities ²⁾ (N) With Super Linear Bushing			
			C	C ₀	C	C ₀
20	54		2520	1880	3530	2530
25	55		4430	3360	6190	4530
30	60		6300	5230	8800	7180
40	60		9680	7600	13500	10400
50	52		16000	12200	22300	16800

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

- 1) When screwed down, relative to shaft nominal dimension d.
- 2) The load capacities apply for the main direction of loading.

Phase-out parts, Radial Linear Bushings

Radial Linear Bushings, R0678

Without wiper seals
or fully sealed

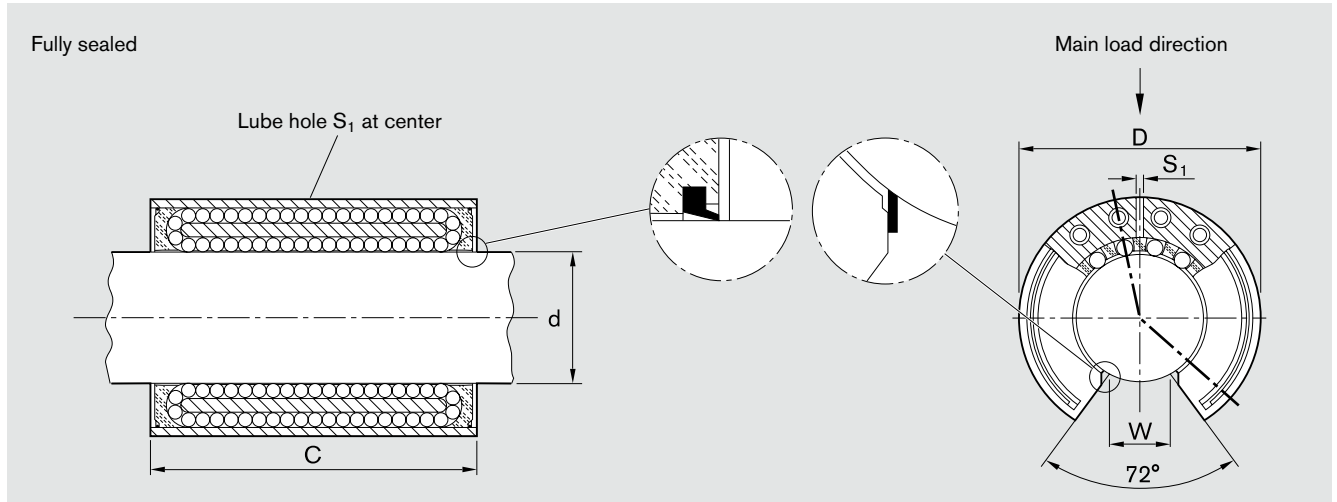


Shaft Ø d (mm)	Part numbers		Weight (kg)
	Without seals	Fully sealed	
30	R0678 030 00	R0678 230 45	0.7
40	R0678 040 00	R0678 240 45	1.4
50	R0678 050 00	R0678 250 45	2.5
60	R0678 060 00	R0678 260 45	4.9
80	R0678 080 00	R0678 280 45	10.4



Shaft Ø d (mm)	Part numbers		Weight (kg)
	Wiper seal		
30	R1331 930 00		0.050
40	R1331 940 00		0.075
50	R1331 950 00		0.145
60	R1331 960 00		0.230
80	R1331 980 00		0.400

Dimensions



Dimensions (mm)				S_1	No. of ball circuits	Radial clearance (μm)			Load capacities ³⁾ (N)	
$\varnothing d$	D	C h11	W^1			h6/H6	h6/JS6 ²⁾	h6/K6 ²⁾	dyn. C	stat. C_0
30	60	75	14	3	12	+21 -10	+12 -20	+6 -25	8500	9520
40	75	100	19.5	3	12	+23 -13	+13 -22	+8 -28	13900	16000
50	90	125	24.5	3	12	+25 -12	+14 -23	+7 -30	20800	24400
60	110	150	29	4	12	+26 -15	+15 -26	+8 -33	29500	34100
80	145	200	39	4	12	+29 -15	+16 -27	+8 -36	54800	61500

1) Lower limit relative to $\varnothing d$.

2) Caution: Travel life may be shortened by excessive preload (see tables TB-06-052-05 and -06).

3) The load capacities apply for the main direction of loading.

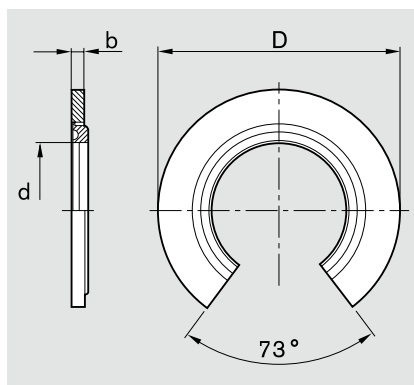
Determination of the dynamic load capacities is based on a travel life of 100,000 m.

Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Seals

Structural design

- Steel holding ring
- Elastomer seal

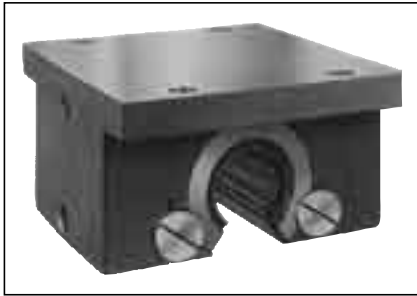


Dimensions (mm)		
$\varnothing d$	D^4	b
30	60	5
40	75	5
50	90	7
60	110	7
80	145	7

4) The outside diameter D is oversized by approx. 0.1 mm. No retaining elements required except for applications subject to vibration or high acceleration.

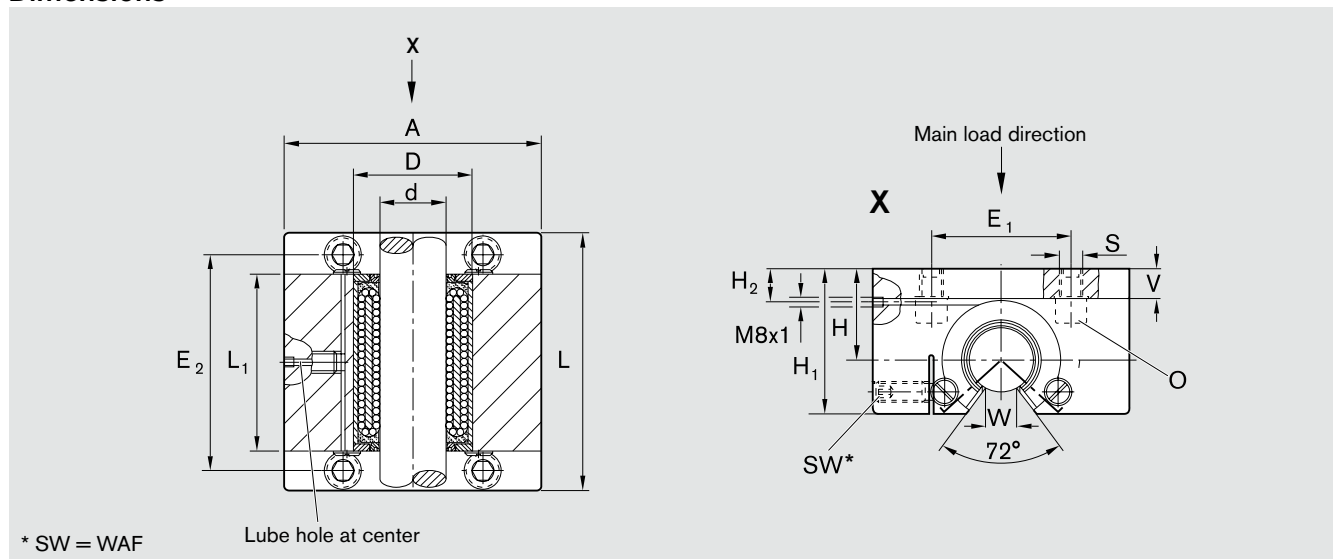
Phase-out parts, Linear Sets with Radial Linear Bushings

Linear Sets, R1076
Open type, adjustable



Shaft Ø d (mm)	Part numbers With two seals	Weight (kg)
30	R1076 230 20	6.1
40	R1076 240 20	11.8
50	R1076 250 20	19.7
60	R1076 260 20	38.4
80	R1076 280 20	76.1

Dimensions

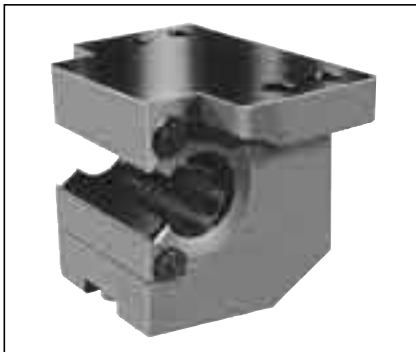


Dimensions (mm)															Radial clearance (µm)	Tolerance (µm) for dimension H ⁴⁾	Load capacities ⁵⁾ (N)	
Ø d	D	A ¹⁾	L ¹⁾	L ₁ ^{+0.5}	H	H ₁ ¹⁾	H ₂	V ¹⁾	E ₁ ^{±0.5}	E ₂ ^{±0.5}	S ^{H13}	W ²⁾	O ³⁾	WAF			dyn. C	stat. C ₀
30	60	140	130	84	48	75	18	16	75	108	11	14	M10x30	5	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit)	+15	8500	9520
40	75	170	160	109	60	94	22.5	20	90	135	13.5	19.5	M12x40	6		+17	13900	16000
50	90	200	200	138	70	110	25	23	110	170	17.5	24.5	M16x50	8		+18	20800	24400
60	110	240	240	163	85	135	30	28	130	200	22	29	M20x60	10		+23	29500	34100
80	145	310	310	213	110	175	37.5	35	170	260	26	39	M24x80	12		+22	54800	61500

- 1) Tolerance js16.
- 2) Lower limit relative to Ø d.
- 3) Hex. socket head cap screws per ISO 4762–8.8. Applies only to fixing in tapped holes in steel or cast iron.
- 4) When screwed down, relative to shaft nominal dimension d.
- 5) The load capacities apply for the main direction of loading.

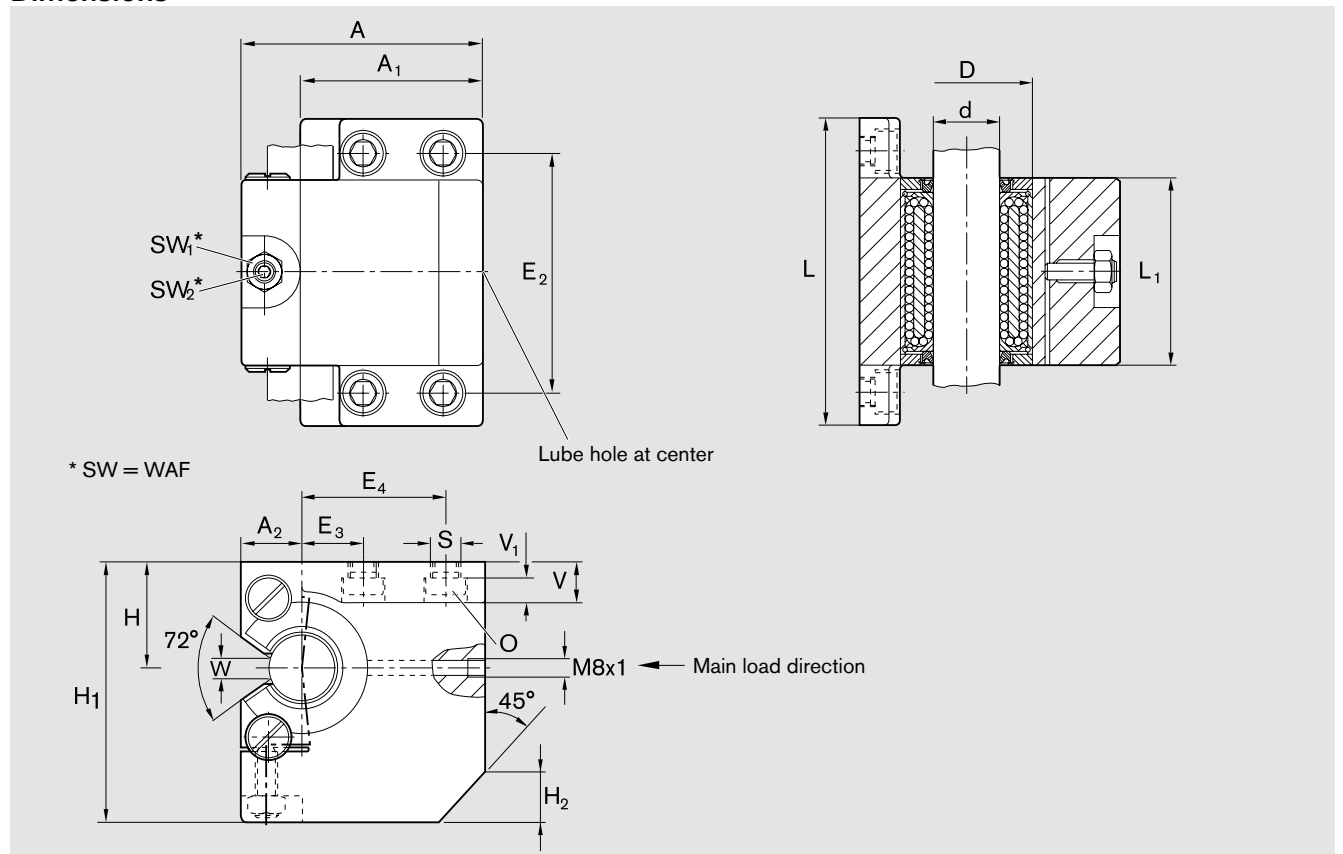
Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Linear Sets, R1078
With side opening, adjustable



Shaft Ø d (mm)	Part numbers With two seals	Weight (kg)
30	R1078 230 20	7.8
40	R1078 240 20	15
50	R1078 250 20	27.5
60	R1078 260 20	48
80	R1078 280 20	105

Dimensions



Dimensions (mm)																			
Ø d	D	A ¹⁾	A ₁ ¹⁾	A ₂ ¹⁾	L ¹⁾	L ₁ ¹⁾	H ₂ ¹⁾	H	H ₁ ¹⁾	V ¹⁾	V ₁	E ₂	E ₃	E ₄	S	W ²⁾	WAF ₁	WAF ₂	O ³⁾
30	60	110	83	27	140	84 +0.5	30	48	118	18	11	110	28	65	13.5	14	17	5	M12x30
40	75	135	100	35	180	109	35	60	145	25	15	142	40	76	17.5	19.5	19	6	M16x40
50	90	165	125	40	230	138	45	70	170	30	17.5	180	50	95	22	24.5	24	8	M20x50
60	110	200	150	50	275	163	55	85	205	35	20.5	215	60	115	26	29	30	10	M24x60
80	145	265	200	65	345	213	70	110	265	45	25.5	275	75	155	33	39	36	12	M30x80

Note: For radial clearance, tolerance for dimension H, load capacities and footnotes, please refer to Linear Set R1076.

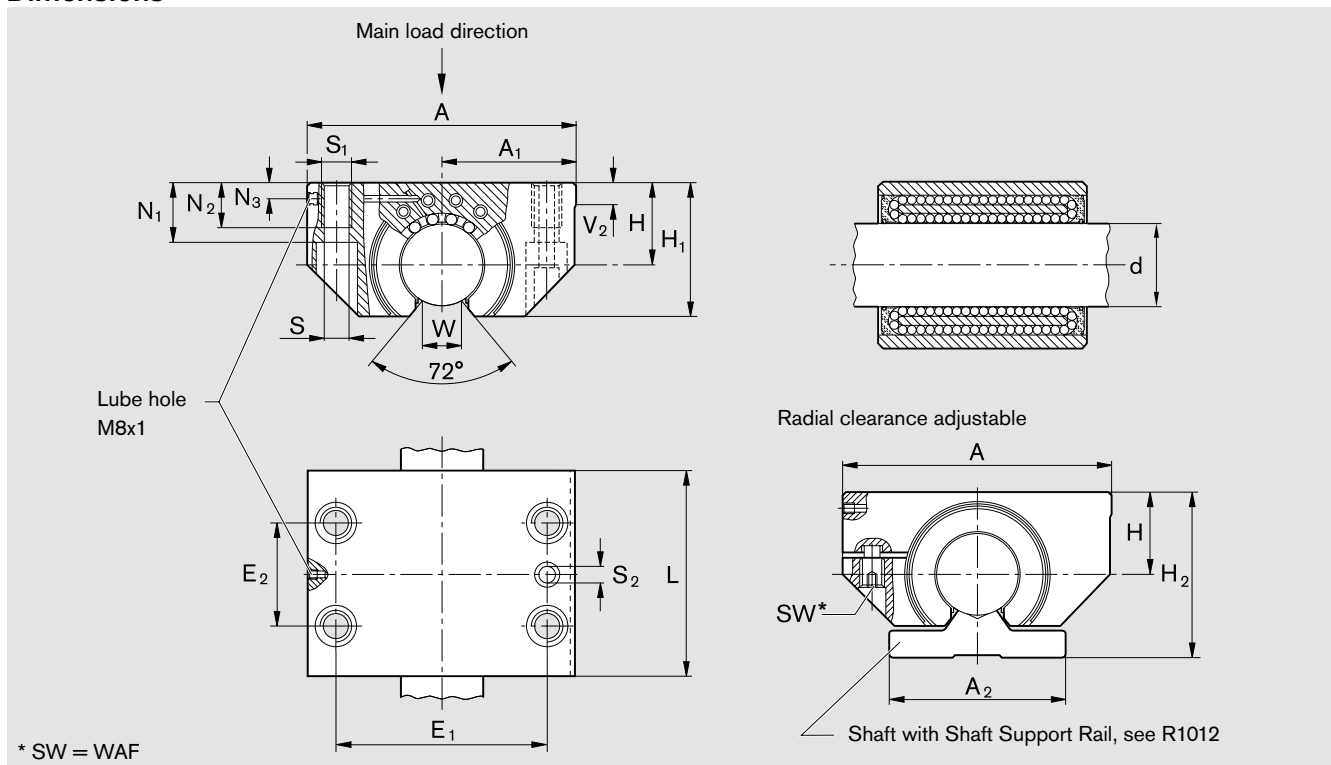
Phase-out parts, Radial Compact Sets

Radial Compact Sets, R1613
Open type, adjustable



Shaft Ø d (mm)	Part numbers Fully sealed, lubricatable	Weight (kg)
30	R1613 300 00	1.75
40	R1613 400 00	3.5
50	R1613 500 00	7.1
60	R1613 600 00	11.9
80	R1613 800 00	29.6

Dimensions



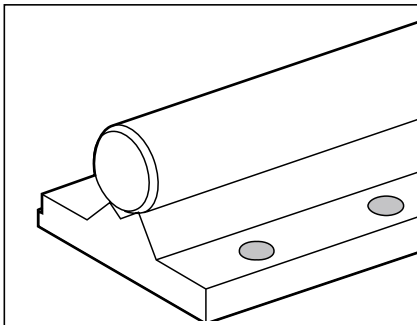
Dimensions (mm)																				Radial clearance (µm)	Load capacities ⁴⁾ (N)	
Ø d	A	A ₁ ±0.008	A ₂	H ¹⁾ ±0.008	H ₁	H ₂	L	E ₁	E ₂	S	S ₁	S ₂ ²⁾	N ₁	N ₂	N ₃	V ₂	W ³⁾	WAF	dyn. C		stat. C ₀	
30	100	50	68	32	53	65	75	76	40	10.5	M12	7.7	21	15	9	6	14	5	Adjusted prior to delivery to zero-clearance on h5 shaft (lower limit)	8500	9520	
40	125	62.5	85	40	66	80	100	94	50	14	M16	9.7	27	18	11	6	19.5	6		13900	16000	
50	160	80	105	50	81.5	100	125	122	65	17.5	M20	11.7	35	24	12	8	24.5	8		20800	24400	
60	190	95	130	60	97	120	150	150	75	22	M27	13.7	42	32	13	16	29	10		29500	34100	
80	260	130	170	80	130	160	200	205	100	26	M30	15.7	57	36	15	16	39	12		54800	61500	

- 1) When screwed down, relative to shaft nominal dimension d.
- 2) Pre-drilled holes for locating pins.
- 3) Lower limit relative to Ø d.
- 4) The load capacities apply for the main direction of loading.

Determination of the dynamic load capacities is based on a travel life of 100,000 m. Often only 50,000 m are actually stipulated. For comparison: Multiply values C from the table by 1.26.

Phase-out parts, Steel Shafts with ready-mounted Shaft Support Rails for Radial Compact Sets

R1012 Steel Shafts with ready-mounted Shaft Support Rails



Shaft Ø d (mm)	Part numbers	Weight (kg/m)
30	R1012 030 ..	12.3
40	R1012 040 ..	19.6
50	R1012 050 ..	31.0
60	R1012 060 ..	45.6
80	R1012 080 ..	79.2

- Shafts:
- 00 = heat-treated steel h6
 - 30 = corrosion-resistant steel h6
 - 60 = heat-treated steel, hard chrome plated, h6

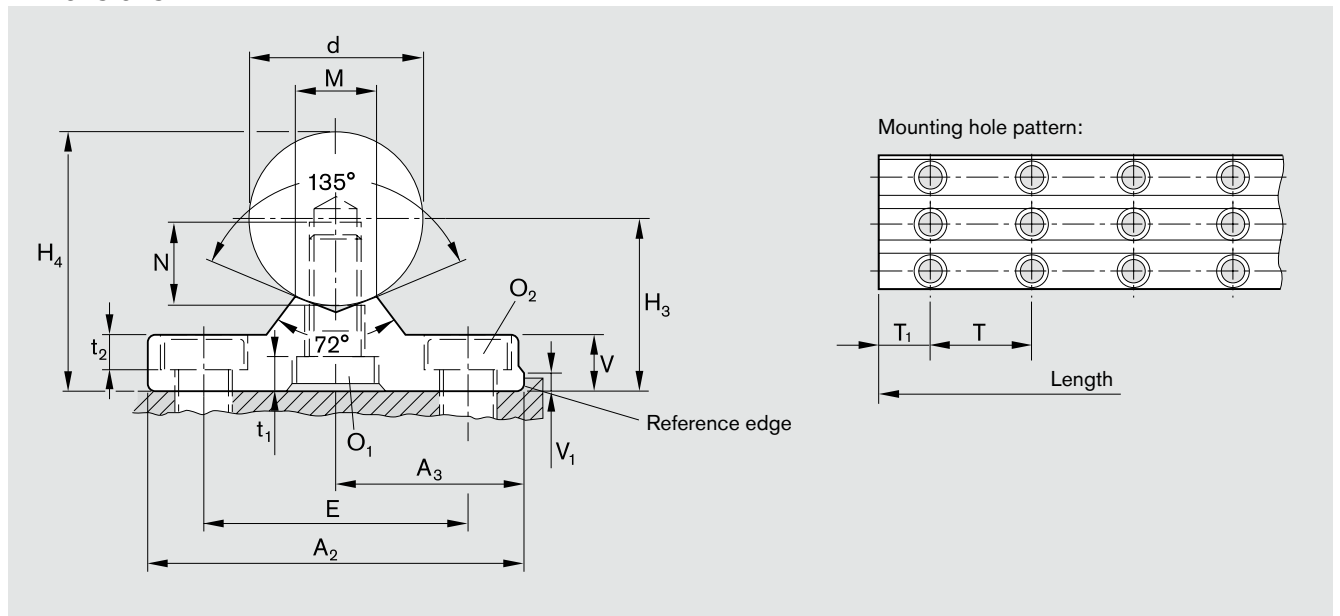
Material

– Shaft support rail: steel

Ordering example:

Shaft diameter 40 mm, h6, heat-treated steel, length 1500 mm, mounted on shaft support rail, order code:
R1012 040 00 / 1500 mm

Dimensions



Dimensions (mm)																Tolerances within one grade (µm)	
Ø d	A ₂	A ₃ ±0.02	H ₃ ¹⁾	H ₄	V	V ₁	M -0.5	E	O ₁ DIN 6912-8.8	t ₁	N	O ₂ DIN 7984-8.8	t ₂	T	H ₃ ²⁾	Shaft h6 H ₄ ³⁾	
															20 ⁴⁾	29	
30	68	34	33	48	11	6	13	46	M10x25	9	17	M10	6.8	60	20 ⁴⁾	29	
40	85	42.5	40	60	13	6	18	58	M12x30	10	21	M12	8.4	75	20 ⁴⁾	31	
50	105	52.5	50	75	17	8	23	74	M16x40	10.8	28	M16	10.5	100	20 ⁴⁾	31	
60	130	65	60	90	20	8	27	90	M20x40	16	32	M20	12.5	120	20	33	
80	170	85	80	120	26	10	37	120	M24x60	16	40	M24	16	150	20	33	

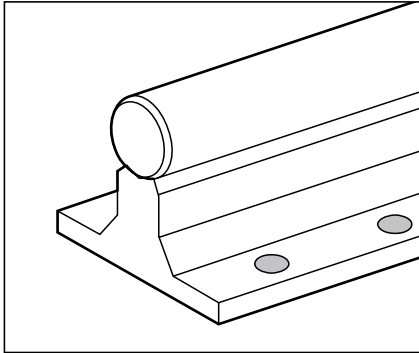
- 1) Tolerance: ± 0.02 mm; graded by height – delivered to 20 µm.
- 2) Measured with gauging shaft of nominal diameter d and length approx. 50 mm.
- 3) Including shaft tolerance (statistically determined).
- 4) Lengths up to 1800 mm with a parallelism of 10 µm on request.

Phase-out parts, Steel Shafts with ready-mounted Shaft Support Rails for open-type Standard and Super Linear Bushings

R1011 Steel Shafts with ready-mounted Shaft Support Rails

Material

– Shaft support rail: aluminum



Shaft Ø d (mm)	Part numbers		Weight (kg/m)
	Type 1	Type 2	
12	R1011 012 ..	R1011 512 ..	1.95
16	R1011 016 ..	R1011 516 ..	2.8
20	R1011 020 ..	R1011 520 ..	4.1
25	R1011 025 ..	R1011 525 ..	5.9
30	R1011 030 ..	R1011 530 ..	8.5
40	R1011 040 ..	R1011 540 ..	13.3
50	R1011 050 ..	R1011 550 ..	20.3
60	R1011 060 ..	–	28.7
80	R1011 080 ..	–	49.7

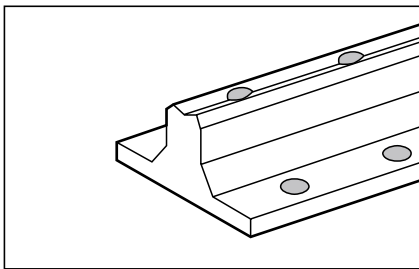
Shafts:

- 00 = heat-treated steel h6
- 01 = heat-treated steel h7
- 30 = corrosion-resistant steel h6
- 31 = corrosion-resistant steel h7
- 60 = heat-treated steel, hard chrome plated, h6
- 61 = heat-treated steel, hard chrome plated, h7

Ordering example:

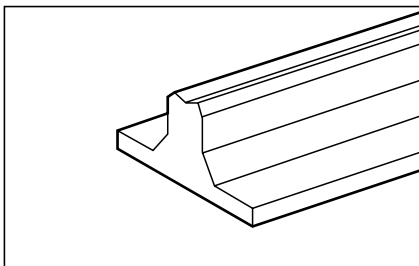
Shaft diameter 40 mm, h7, corrosion-resistant steel, length 1100 mm, mounted on shaft support rail Type 2 R1050 240 00, ordering code: **R1011 540 31 / 1100 mm**.

R1050 Shaft Support Rails with drilled holes, length (mm) 600^{-0.5}_{-1.5}



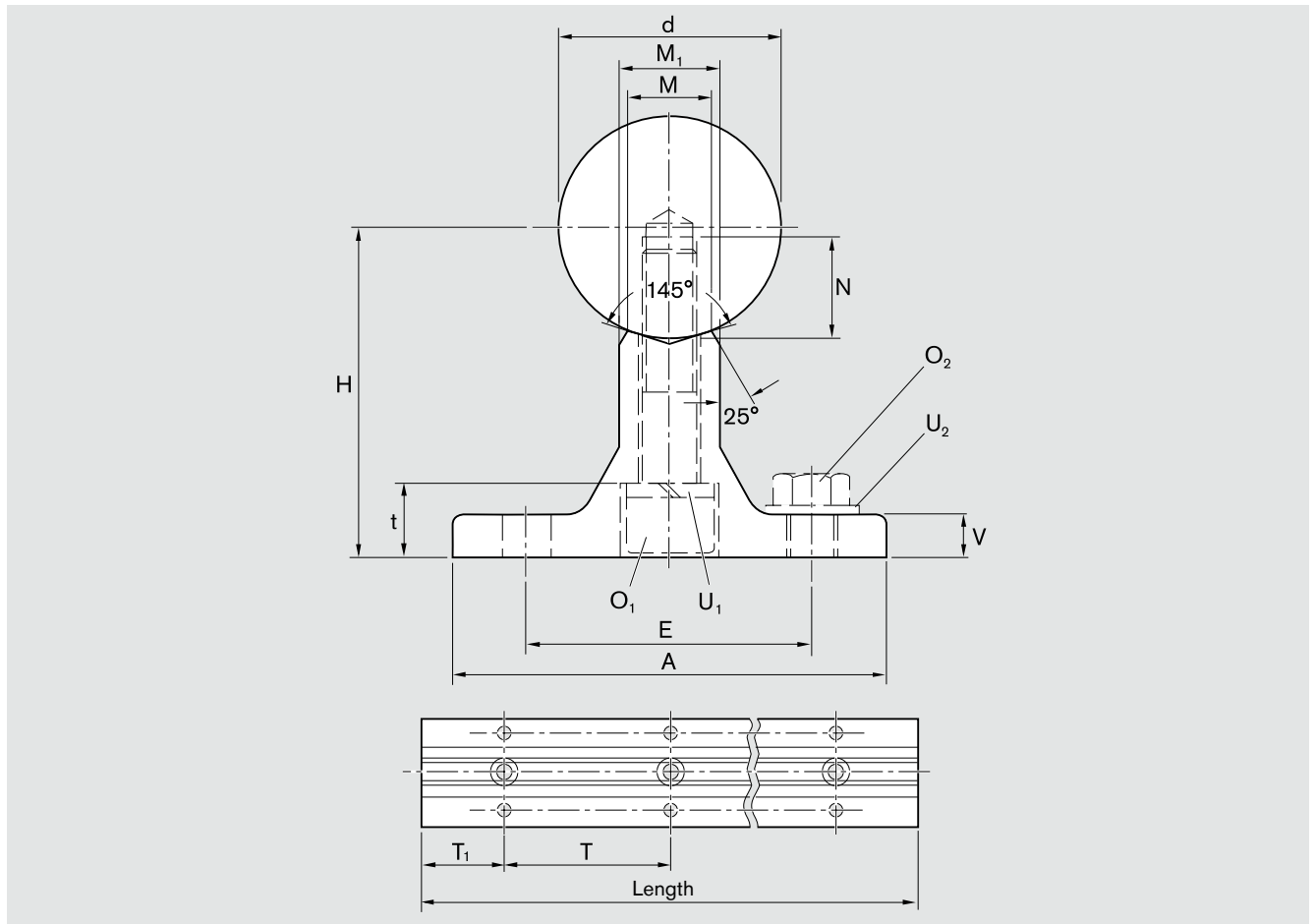
Shaft Ø d (mm)	Part numbers		Weight (kg)
	Type 1	Type 2	
12	R1050 112 00	R1050 212 00	0.64
16	R1050 116 00	R1050 216 00	0.74
20	R1050 120 00	R1050 220 00	1.00
25	R1050 125 00	R1050 225 00	1.20
30	R1050 130 00	R1050 230 00	1.80
40	R1050 140 00	R1050 240 00	2.10
50	R1050 150 00	R1050 250 00	3.00
60	R1050 160 00	–	4.00
80	R1050 180 00	–	6.30

R1050 Shaft Support Rails without drilled holes, length (mm) 600^{-0.5}_{-1.5}



Shaft Ø d (mm)	Part numbers		Weight (kg)
	undrilled		
12	R1050 012 00		0.64
16	R1050 016 00		0.74
20	R1050 020 00		1.00
25	R1050 025 00		1.20
30	R1050 030 00		1.80
40	R1050 040 00		2.10
50	R1050 050 00		3.00
60	R1050 060 00		4.00
80	R1050 080 00		6.30

Dimensions



Dimensions (mm)														
$\varnothing d$	$H^{1)}$ ± 0.01	A	V	M	M_1	O_1 ISO 4762-8.8	U_1 DIN 7980 ²⁾	N	E	t	$O_2^{3)}$ ISO 4762-8.8 or ISO 4017-8.8	U_2 DIN 125	$T^{4)}$ Type 1	Type 2
12	28	43	5	5.8	9	M4x25	4	8	29	5.5	M4x12	4	75	120
16	30	48	5	7	10	M5x25	5	9	33	7	M5x16	5	100	150
20	38	56	6	8.3	11	M6x30	6	11	37	9.6	M6x16	6	100	150
25	42	60	6	10.8	14	M8x35	8	15	42	11	M6x16	6	120	200
30	53	74	8	11	14	M10x40	10	17	51	14	M8x25	8	150	200
40	60	78	8	15	18	M10x45	10	19	55	13.5	M8x25	8	200	300
50	75	90	10	19	22	M12x55	12	21	63	16	M10x30	10	200	300
60	80	100	12	25	30	M14x55	14	25	72	19	M10x30	10	300	-
80	100	125	14	34	42	M16x65	16	28	92	21.5	M12x35	12	300	-

1) Measured with gauging shaft of nominal diameter d and length approx. 50 mm.

2) DIN 7980 withdrawn. The washer, however, is still available.

3) Applies only to fixing in tapped holes in steel or cast iron.

4) Type 1: For applications where the load acts transverse to the Linear Bushing opening, loading is near the load capacity limit, and high dimensional accuracy is required.

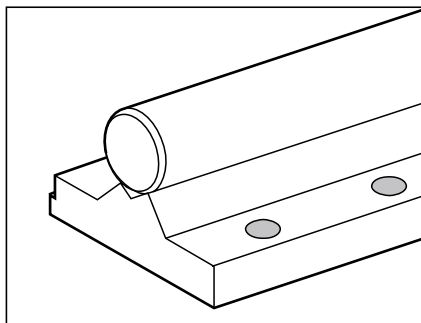
Type 2: For general requirements.

Phase-out parts, Steel Shafts with ready-mounted Shaft Support Rails for Radial Linear Bushings

R1018 Steel Shafts with ready-mounted Shaft Support Rails

Material

– Shaft support rail: steel



Shaft Ø d (mm)	Part numbers	Weight (kg/m)
30	R1018 030 ..	20.5
40	R1018 040 ..	31
50	R1018 050 ..	50
60	R1018 060 ..	70
80	R1018 080 ..	121

Shafts:

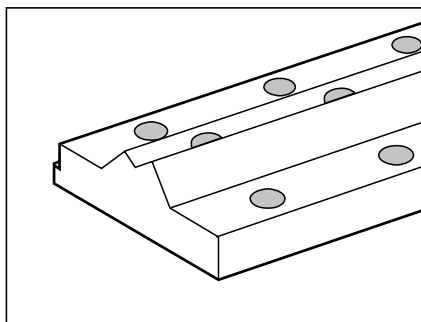
- 00 = heat-treated steel h6
- 30 = corrosion-resistant steel h6
- 60 = heat-treated steel, hard chrome plated, h6

Ordering example:

Shaft diameter 30 mm, h6, heat-treated steel, length 1200 mm, mounted on shaft support rail R1052 130 00, ordering code:

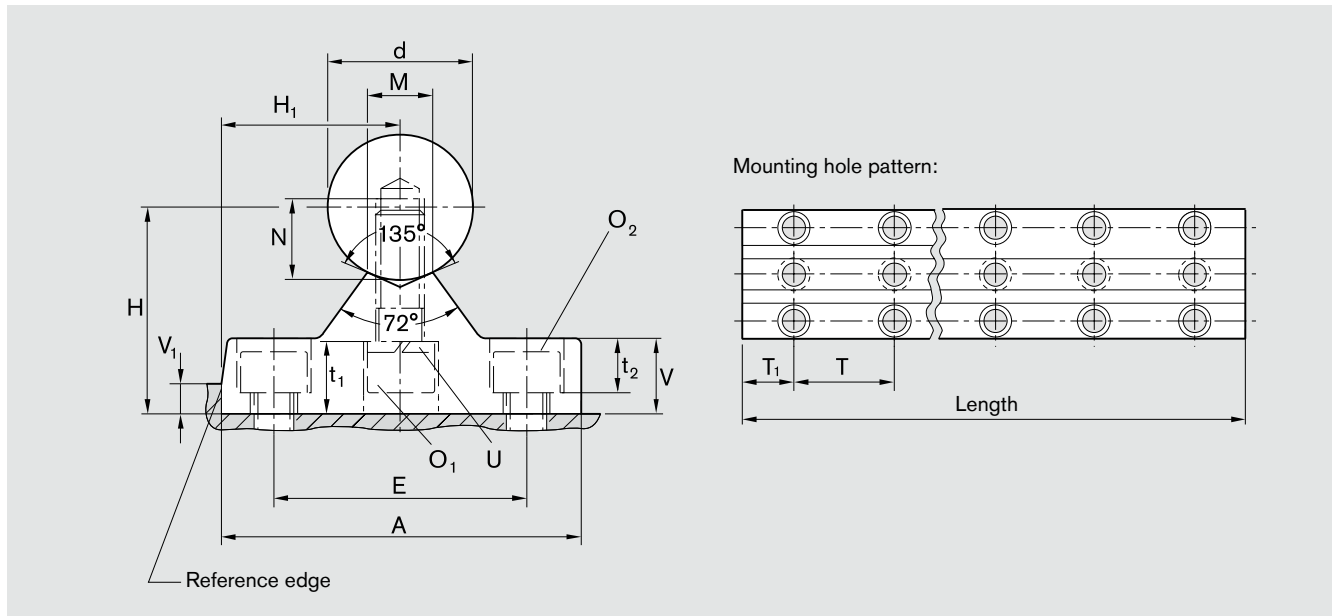
R1018 030 00 / 1200 mm

R1052 Shaft Support Rails, length (mm) 600^{-0.5}_{-1.5}



Shaft Ø d (mm)	Part numbers	Weight (kg)
30	R1052 130 00	9.0
40	R1052 140 00	12.7
50	R1052 150 00	20.7
60	R1052 160 00	29.0
80	R1052 180 00	48.9

Dimensions



Dimensions (mm)

$\varnothing d$	A	H ¹⁾ js7	H ₁ js7	V	V ₁ ²⁾	M -0.5	E	T	t ₁	t ₂	N	O ₁ ISO 4762-8.8	O ₂ ISO 4762-8.8	U DIN 7980 ³⁾
30	80	50	40	19	7	13	55	60	22	13.5	17	M10x30	M10	10
40	100	60	50	22	8.5	18	70	75	22	16	21	M12x40	M12	12
50	125	75	62.5	30	9	23	90	100	28	21	28	M16x50	M16	16
60	150	90	75	34	13	27	110	120	34	25.5	32	M20x60	M20	20
80	200	115	100	42	18	37	140	150	38.5	30.5	40	M24x80	M24	24

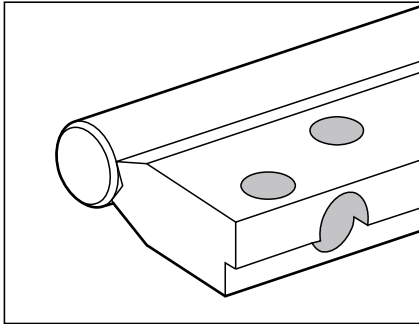
- 1) Measured with gauging shaft of nominal diameter d and length approx. 50 mm.
- 2) Make mating surface without reference edge (V_1) and line up parallel via the shafts.
- 3) DIN 7980 withdrawn. The washer, however, is still available.

Phase-out parts, Steel Shafts with ready-mounted Shaft Support Rails for Radial Linear Bushings

R1020 Steel Shafts with ready-mounted Shaft Support Rails

Material

– Shaft support rail: steel



Shaft Ø d (mm)	Part numbers	Weight (kg/m)
30	R1020 030 ..	20
40	R1020 040 ..	36
50	R1020 050 ..	54
60	R1020 060 ..	82
80	R1020 080 ..	136

Shafts:

— 00 = heat-treated steel h6

— 30 = corrosion-resistant steel h6

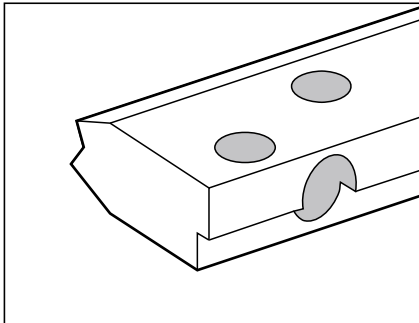
— 60 = heat-treated steel, hard chrome plated, h6

Ordering example:

Shaft diameter 30 mm, h6, heat-treated steel, length 1200 mm, mounted on shaft support rail R1053 130 00, ordering code:

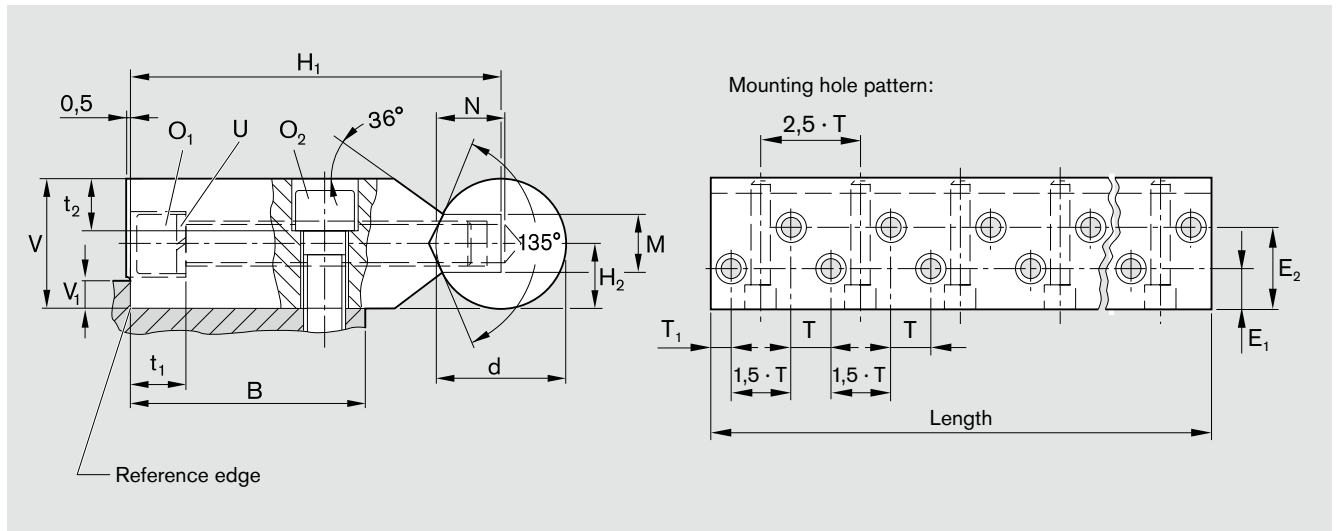
R1020 030 00 / 1200 mm.

R1053 Shaft Support Rails, length (mm) 600^{-0.5}_{-1.5}



Shaft Ø d (mm)	Part numbers	Weight (kg)
30	R1053 130 00	8.7
40	R1053 140 00	15.5
50	R1053 150 00	23.0
60	R1053 160 00	36.0
80	R1053 180 00	58.0

Dimensions



Dimensions (mm)																
$\varnothing d$	H_1	$H_2^{1)}$	V	$V_1^{2)}$	M	E_1	E_2	T_1	T	t_1	t_2	$B^{3)}$	N	O_1	$O_2^{4)}$	U
	± 0.015	± 0.013		max.	-0.5	± 0.2	± 0.2							ISO 4762-8.8	ISO 4762-8.8	DIN 7980 ⁵⁾
30	90	15	30	7	13	23	46	12	24	13.5	13.5	57	17	M10x80	M10x30	10
40	115	20	40	8.5	18	30	60	15	30	16	16	73	21	M12x100	M12x40	12
50	140	25	50	9	23	38	76	20	40	23	21	92	28	M16x120	M16x50	16
60	180	30	60	13	27	50	100	24	48	25.5	25.5	120	32	M20x160	M20x60	20
80	220	40	80	18	37	60	120	30	60	44	30.5	145	40	M24x180	M24x80	24

- 1) Measured with gauging shaft of nominal diameter d and length approx. 50 mm.
- 2) Make mating surface without reference edge (V_1) and line up parallel via the shafts.
- 3) Design recommendation for adjoining structures.
- 4) Applies only to fixing in tapped holes in steel or cast iron.
- 5) DIN 7980 withdrawn. The washer, however, is still available.

Bosch Rexroth AG
Linear Motion and
Assembly Technologies
Ernst-Sachs-Strasse 100
97424 Schweinfurt, Germany
Tel. +49 9721 937-0
Fax +49 9721 937-275
www.boschrexroth.com/brl

Australia

Bosch Rexroth Pty. Ltd.
3 Valediction Road
Kings Park, NSW 2148, Sydney
Tel. +61 2 9831 7788
Fax +61 2 9831 5553

Great Britain

Bosch Rexroth Limited
Cromwell Road
St. Neots, Huntingdon
Cambs. PE19 2ES
Tel. +44 1480 223 298
Fax +44 1480 470 789

Canada

Bosch Rexroth Canada Corp.
3426 Mainway Drive
Burlington, Ontario L7M 1A8
Tel. +1 905 335-5511
Fax +1 905 335-4184

USA

Bosch Rexroth Corporation
14001 South Lakes Drive
Charlotte, NC 28273
Tel. +1 800 REXROTH
+1 800 739 7684
Fax +1 704 583 0523

Singapore

Bosch Rexroth Pte. Ltd.
15D Tuas Road
638520 Singapore
Tel. +65 6861 8733
Fax +65 6861 1825

Your sales partner

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