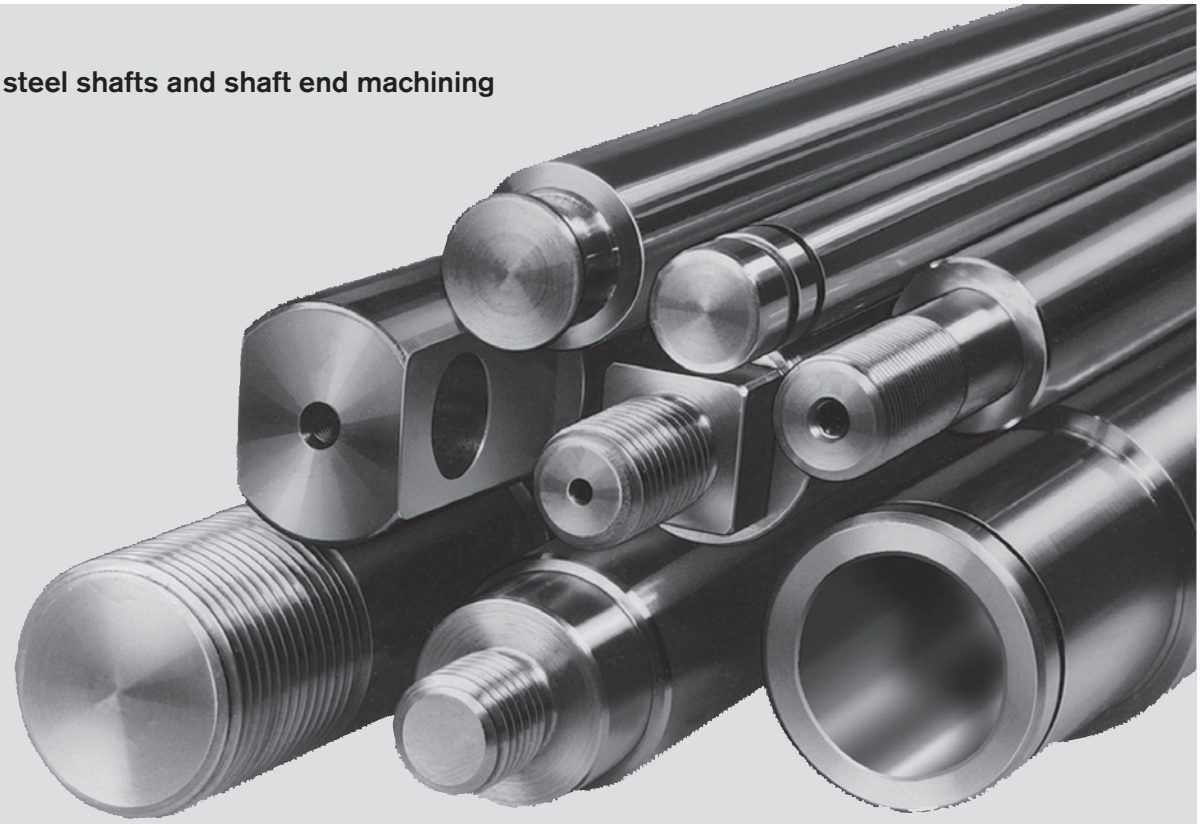
Precision steel shafts and shaft end machining



Precision steel shafts

Overview

Dimensions

Shaft Ø d	Part numbers for solid shafts								
	Heat-treated Cf53		Max. usable	X46Cr13		Max. usable	X90CrMoV18		Max. usable
	h6[1)]	h7[1)]	Length	h6[1)]	h7[1)]	Length	h6[1)]	h7[1)]	Length
(mm)			(mm)			(mm)			(mm)
3	R1000 003 00	–	400	–	–		R1000 003 20	–	400
4	–	–	–	R1000 004 30	R1000 004 31	3,450	–	–	–
5	R1000 005 00	R1000 005 01	3,900	R1000 005 30	R1000 005 31	3,450	–	–	–
6	R1000 006 00	R1000 006 01	5,650	R1000 006 30	R1000 006 31	3,450	–	–	–
8	R1000 008 00	R1000 008 01	5,900	R1000 008 30	R1000 008 31	5,900	–	–	–
10	R1000 010 00	R1000 010 01	5,900	R1000 010 30	R1000 010 31	3,450	–	–	–
12	R1000 012 00	R1000 012 01	5,900	R1000 012 30	R1000 012 31	5,900	R1000 012 20	R1000 012 21	5,900
14	R1000 014 00	R1000 014 01	5,900	R1000 014 30	R1000 014 31	5,900	–	–	–
15	R1000 015 00	R1000 015 01	5,900	–	–	–	–	–	–
16	R1000 016 00	R1000 016 01	5,900	R1000 016 30	R1000 016 31	5,900	R1000 016 20	R1000 016 21	5,900
18	R1000 018 00	R1000 018 01	5,900	–	–	–	–	–	–
20	R1000 020 00	R1000 020 01	5,900	R1000 020 30	R1000 020 31	5,900	R1000 020 20	R1000 020 21	5,900
22	R1000 022 00	R1000 022 01	5,900	–	–	–	–	–	–
24	R1000 024 00	R1000 024 01	5,900	–	–	–	–	–	–
25	R1000 025 00	R1000 025 01	5,900	R1000 025 30	R1000 025 31	5,900	R1000 025 20	R1000 025 21	5,900
30	R1000 030 00	R1000 030 01	5,900	R1000 030 30	R1000 030 31	5,900	R1000 030 20	R1000 030 21	5,900
32	R1000 032 00	R1000 032 01	5,900	–	–	–	–	–	–
35	R1000 035 00	R1000 035 01	5,900	–	–	–	–	–	–
38	R1000 038 00	R1000 038 01	5,900	–	–	–	–	–	–
40	R1000 040 00	R1000 040 01	5,900	R1000 040 30	R1000 040 31	5,900	R1000 040 20	R1000 040 21	5,900
45	R1000 045 00	R1000 045 01	5,900	–	–	–	–	–	–
50	R1000 050 00	R1000 050 01	5,900	R1000 050 30	R1000 050 31	5,900	R1000 050 20	R1000 050 21	5,900
55	R1000 055 00	R1000 055 01	5,900	–	–	–	–	–	–
60	R1000 060 00	R1000 060 01	5,900	R1000 060 30	R1000 060 31	5,900	R1000 060 20	R1000 060 21	5,900
70	R1000 070 00	R1000 070 01	5,900	–	–	–	–	–	–
80	R1000 080 00	R1000 080 01	5,900	R1000 080 30	R1000 080 31	5,900	R1000 080 20	R1000 080 21	5,900
100	R1000 100 00	R1000 100 01	5,900	–	–	–	–	–	–
110	R1000 110 00	R1000 110 01	5,900	–	–	–	–	–	–

1) Other tolerances upon request

Shaft Ø d	Part numbers for solid shafts Hard chrome-plated Cf53				Part numbers for hollow shafts Heat-treated C60; size Ø 8, Ø 10, Ø 16: 100Cr6			Hard chrome-plated Cf53	
	h6	Max. usable Length	h7	Max. usable Length	h6	h7	Max. usable Length	h7	Max. usable Length
(mm)		(mm)		(mm)					
3	–	–	–	–	–	–	–	–	–
4	–	–	–	–	–	–	–	–	–
5	–	–	–	–	–	–	–	–	–
6	–	–	–	–	–	–	–	–	–
8	–	–	–	–	R1001 008 10	–	1,000	–	–
10	–	–	–	–	R1001 010 10	–	1,000	–	–
12	R1000 012 60	5,350	R1000 012 61	5,350	R1001 012 10	R1001 012 11	5,900	–	–
14	R1000 014 60	5,350	R1000 014 61	5,350	–	–	–	–	–
15	–	–	–	–	–	–	–	–	–
16	R1000 016 60	6,350	R1000 016 61	6,350	R1001 016 10	R1001 016 11	2,000	–	–
18	–	–	–	–	–	–	–	–	–
20	R1000 020 60	6,450	R1000 020 61	6,450	R1001 020 10	R1001 020 11	5,900	–	–
22	–	–	–	–	–	–	–	–	–
24	–	–	–	–	–	–	–	–	–
25	R1000 025 60	6,850	R1000 025 61	6,850	R1001 025 10	R1001 025 11	5,900	R1001 025 41	5,900
30	R1000 030 60	6,850	R1000 030 61	6,850	R1001 030 10	R1001 030 11	5,900	R1001 030 41	5,900
32	–	–	–	–	–	–	–	–	–
35	–	–	–	–	–	–	–	–	–
38	–	–	–	–	–	–	–	–	–
40	R1000 040 60	6,850	R1000 040 61	6,850	R1001 040 10	R1001 040 11	5,900	R1001 040 41	5,900
45	–	–	–	–	–	–	–	–	–
50	R1000 050 60	6,850	R1000 050 61	6,850	R1001 050 10	R1001 050 11	5,900	R1001 050 41	5,900
55	–	–	–	–	–	–	–	–	–
60	R1000 060 60	6,850	R1000 060 61	6,850	R1001 060 10	R1001 060 11	5,900	R1001 060 41	5,900
70	–	–	–	–	–	–	–	–	–
80	R1000 080 60	6,850	R1000 080 61	6,850	R1001 080 10	R1001 080 11	5,900	R1001 080 41	5,900
100	–	–	–	–	–	–	–	–	–
110	–	–	–	–	–	–	–	–	–

Precision steel shafts

Ordering information

Heat-treated solid steel shafts

As part of a linear guide, the role of the shaft places strict requirements on the materials used.
We offer the ideal shaft material for any diameter range.
Extremely consistent surface hardness and hardness depth combine with outstanding purity, consistent structure and balanced grading for extraordinarily long service life under rolling loads.

Available diameters (mm)
3, 5, 6, 8, 10, 12, 14, 15, 16, 18, 20, 22, 24, 25, 30, 32, 35, 38, 40, 45, 50, 55, 60, 70, 80, 100, 110

Ø d (mm)	**Lengths** (m)
3	0.4
5 and 6	5.8
8 and higher	6.1

Solid shafts with shaft diameters 20 mm to 8 m in length available upon request.
Sections combine for longer overall lengths.
Linear bushings roll over seams with ease.

Materials	**Hardness**
Cf53	Min. 60 HRC

Material number	
h6 tolerance	R1000 xxx 00
h7 tolerance	R1000 xxx 01

xxx = diameter in mm

Ordering example
Solid shaft, Ø = 25, h7, heat-treated steel, 460 mm long
Material number:
R1000 025 01, 460 mm

ISO 683-17/EN 10088 stainless steel solid shafts

The right choice for applications where corrosion resistance and cleanliness are critical, e.g., in the food industry, semiconductor production and medical equipment.
X 90 CrMoV 18 is more resistant to lactic acid than X 46 Cr 13.

Materials	**Available diameters** (mm)
X 46 Cr13	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

Sections combine for longer overall lengths.
Linear bushings roll over seams with ease.

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

Material number for X 46 Cr 13	
h6 tolerance	R1000 0xx 30
h7 tolerance	R1000 0xx 31

Material number for X 90 CrMoV 18	
h6 tolerance	R1000 0xx 20
h7 tolerance	R1000 0xx 21

xx = diameter in mm

Ordering example:
Solid shaft, Ø = 16, h6, stainless steel X 46 Cr 13, 350 mm long
Material number:
R1000 016 30, 350 mm

Materials

		Code	**Material no.**
Heat-treated steel	Solid shaft	Cf53	1.1213
	Hollow shaft	C60	1.0601
ISO 683-17/EN 10088 stainless steel		X 46 Cr 13	1.4034
		X 90 CrMoV 18	1.4112

Solid shafts, hard chrome-plated

Optimal shaft surface corrosion protection on outer diameter.

Available diameters (mm)
12, 14, 16, 20, 25, 30, 40, 50, 60, 80

Ø d (mm)	**Lengths** (m)
12, 14	5.35
16	6.35
20 – 80	6.85

Sections combine for longer overall lengths. Linear bushings roll over seams with ease.

Materials	**Hardness**
Cf53, C60	Min. 60 HRC (about 700 HV)
Chrome plating (about 10 µm thick)	About 1,000 HV

Material number	
h6 tolerance	R1000 0xx 60
h7 tolerance	R1000 0xx 61

xx = diameter in mm

Ordering example:
Solid shaft, Ø = 30, h7, hard chrome-plated, 480 mm long
Material number:
R1000 030 61, 480 mm

Heat-treated hollow steel shafts

Hollow shafts allow for electrical wiring, or liquid or gaseous media. Hollow shafts are also often used to save weight. The material is seamlessly rolled. The inner diameters are unmachined.

Available diameters (mm)	
Outer	**Inner (approx.)**
8	3.0
10	4.0
12	4.0
16	8.0
20	14.0
25	14.0
30	19.0
40	26.5
50	29.6
60	36.5
80	57.4

Ø d (mm)	**Max. lengths** (m)
8, 10	1.0
16	2.0
12 and 20 – 80	6.1

Materials	**Hardness**
C60	Min. 60 HRC

Material number	
h6 tolerance	R1001 xxx 10
h7 tolerance	R1001 xxx 11

xxx = outer diameter in mm

Ordering example:
Hollow shaft, Ø = 80, h7, 3,600 mm long
Material number:
R1001 080 11, 3600 mm

Hollow shafts, hard chrome-plated

Hollow shafts are hard chrome-plated on the outer diameter. Max. length: 6.1 m

Available diameters (mm)	
Outer	**Inner (approx.)**
25	14.0
30	19.0
40	26.5
50	29.6
60	36.5
80	57.4

Materials	**Hardness**
C60	Min. 60 HRC (about 700 HV)
Chrome plating About 10 µm thick	About 1,000 HV

Material number	
h7 tolerance	R1001 0xx 41

xx = outer diameter in mm

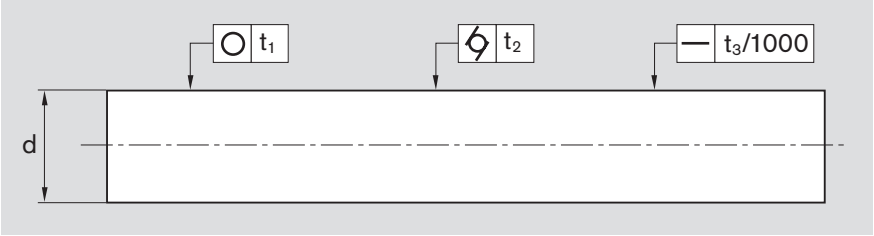
Ordering example:
Hollow shaft, Ø = 40, h7, hard chrome-plated, 2000 mm long
Material number:
R1001 040 41, 2000 mm

Precision steel shafts

Technical data

Dimensional accuracy and tolerance zones

The diameters of the precision steel shafts come in h6 and h7 tolerance zones. The adjacent table shows information on dimensional accuracy. The diameter tolerance of annealed shaft cross-sections vary slightly from the specified tolerance zone.

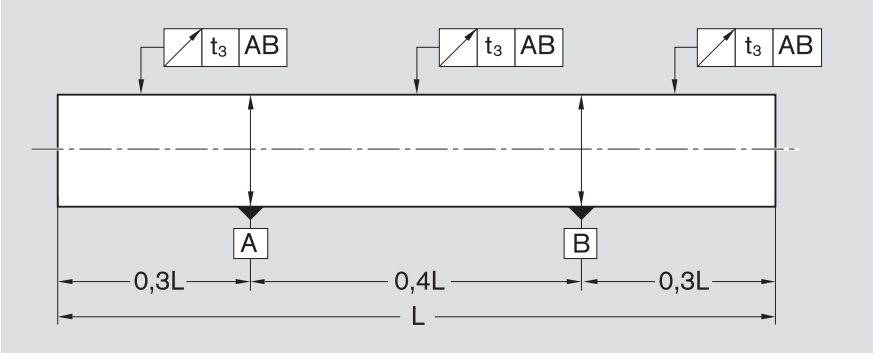


Nominal size ranges d	(mm)	Over	1	3	6	10	18	30	50	80
		Up to	3	6	10	18	30	50	80	120
Diameter tolerance	(µm)	h6	0	0	0	0	0	0	0	0
			–6	–8	–9	–11	–13	–16	–19	–22
		h7	0	0	0	0	0	0	0	0
			–10	–12	–15	–18	–21	–25	–30	–35
Roundness tolerance t_1	(µm)	h6	3	4	4	5	6	7	8	10
		h7	4	5	6	8	9	11	13	15
Cylindricity 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 (Ra)	(µm)		0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32

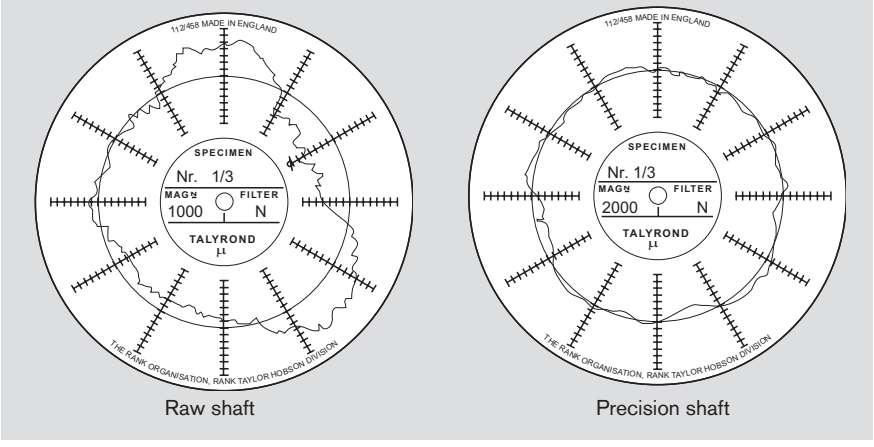
1) Differences in diameter

2) The smallest possible value is 40 µm for lengths under 1 m. Straightness is measured based on ISO 13012.

Straightness based on ISO 13012
The measuring points are evenly distributed between the support points and the shaft sections protruding past them. More supports are used accordingly for long, thin shafts. Straightness is half of the gauge measurement when turning the shaft 360°.



Roundness
The drawing shows the roundness of a raw shaft compared to a precision steel shaft.

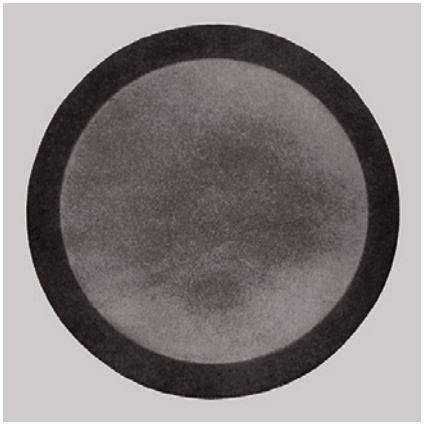


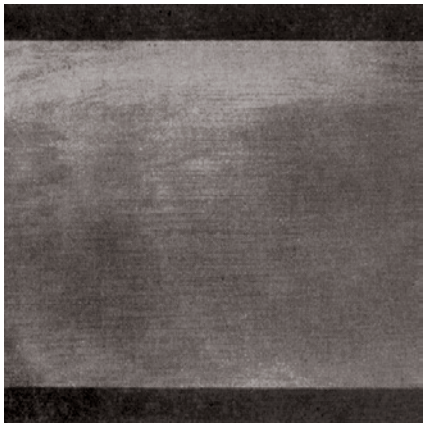
Raw shaft

Precision shaft

Shaft hardness

The outer zone of the shaft is induction-hardened. Depending on the shaft diameter, the depth of hardness ranges from 0.4 to 2.4 mm. Linear and transverse surface hardness and depth of hardness are highly consistent. This ensures high dimensional consistency and long service life.
The adjacent figure shows the cross-section and longitudinal section of a hardened and polished precision steel shaft. The hardened surface zone is made visible by caustic etching.





Shaft Ø d (mm)	**Over**	**1**	**3**	**10**	**18**	**30**	**50**	**80**
	To	**3**	**10**	**18**	**30**	**50**	**80**	**120**
Depth of hardness (mm)	**Min.**	0.4	0.4	0.6	0.9	1.5	2.2	2.4

Min. surface hardness

Materials	Hardness
Cf53, C60	HRC 60
X 46 Cr13	HRC 54
X 90 CrMoV 18	HRC 55

Precision steel shafts

Technical data

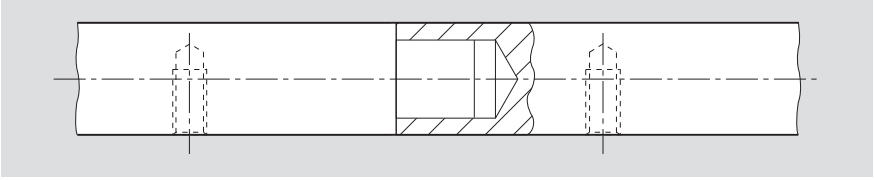
Mill-cut lengths

Shaft design	Diameter (m)	Mill-cut length (m)	Ends not true to size[1] Length (mm) (one side)
Solid shafts[2]	3	0.4	
	5, 6	5.8	75
	8 and higher	6.1	75
Hollow shafts	8, 10	1.0	
	16	2.0	
	12, 20 and higher	6.1	75
Stainless steel solid shafts	3	0.4	
	4 to 10	3.6	75
	12 and higher	6.1	75

1) Regarding geometry and hardness
2) Solid shafts with shaft diameters 20 mm to 8 m in length available upon request.

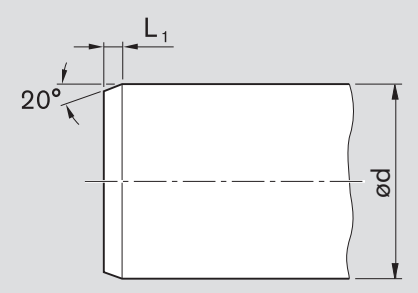
Interconnecting shafts

We also provide interconnectable steel shafts when more than the mill-cut length is needed. One shaft then comes with a spigot, the next with a matching recess (see figure). The interconnected shaft must be supported throughout or at intervals, though generally at the seas (see Section “Shaft support rails”).
The shafts must be under axial tension when fastening the shaft support rails so no gaps form at the seams. Linear bushings roll over seams with ease.



Chamfering

When used as round guides for linear bushings, the ends of steel shafts must be chamfered so the ball retainers/wiper seals are not damaged when the linear bushings are pressed onto the shafts.
The figure and table show the chamfering dimensions.
Linear bushings with wiper seals cannot be pressed over sharp edges on the shaft (e.g., retaining ring grooves) since the sealing lips will be damaged.



Shaft Ø d (mm)	3	4	5	8	10	12	14	16	20	25	30	40	50	60	80
Length of chamfers L_1 (mm)	1	1	1.5	1.5	1.5	2	2	2	2	2	2	3	3	3	3

Machining

Hardened and polished steel shafts are available in mill-cut lengths. These can be cut to size and machined to include:

- Spigots
- Female and male threads
- Counterbores
- Radial and axial holes
- Grooves
- Other machining

Unmachined, cut-to-size shafts come chamfered for accident prevention when not otherwise ordered.

Annealing machined sections

Annealing may be necessary when machining shafts due to the hardened outer zone (minor change in size possible).

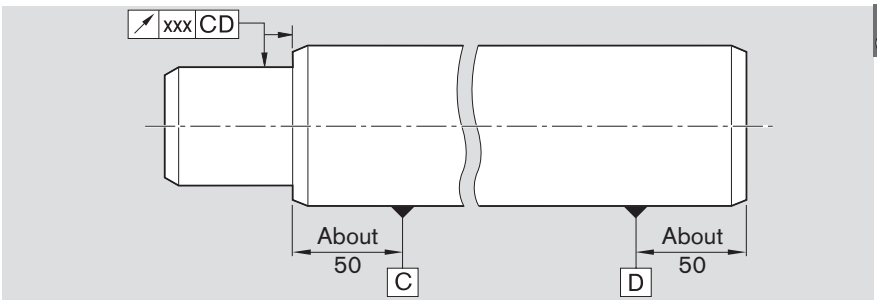
Length tolerance for cut-to-size shafts

Dimensions (mm) Length	Tolerance
up to 400	±0.5
over 400 up to 1,000	±0.8
over 1,000 up to 2,000	±1.2
over 2,000 up to 4,000	±2.0
over 4,000 up to 6,000	±3.0
over 6,000 up to 8,000	±3.5

Steel shafts with smaller length tolerances are also available at additional cost.

Concentric and axial spigot runout

A review in accordance with a specified principle will be performed upon request.
Values xxx < 0.02 upon request.

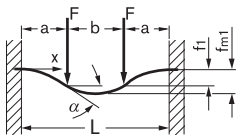
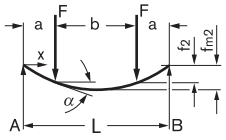
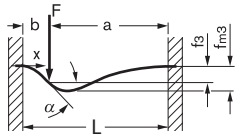
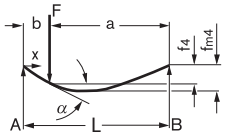
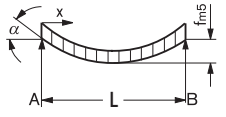


Precision steel shafts

Technical data

Shaft deflection

When steel shafts are used as guides for linear bushings, any shaft deflection that occurs due to load must remain within certain tolerances. Otherwise function and service life will be impacted.[1)]
In order to make it easier to calculate warping, we have listed the most frequent load conditions with their corresponding deflection equations.
The equations for calculating any shaft inclination in the linear bushing (tan α) can also be found in this table.

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

1) Super linear bushings A, H and SH experience no reduction in load rating or service life at a shaft inclination of up to 30 ft (tan 30' = 0.0087).

F	= Load	(N)	I	= Planar moment of inertia	(mm^4)
a	= Distance	(mm)	f_1 to f_4	= Deflection at point of force application	(mm)
b	= Distance	(mm)			
L	= Shaft length	(mm)	f_{m1} to f_{m5}	= Max. deflection	(mm)
E	= Young's modulus	(N/mm^2)	α	= Shaft inclination in the linear bushing	(°)

The table includes the values for the maximum acceptable shaft inclination (tan α_{max}) when using standard linear bushings.
When tan α = tan α_{max}, the acceptable static load is about 0.4 C_0.

Shaft Ø d (mm)	tan α	α (10^{-3}°)	α (°)	α (min.)	(sec)
5	12.3	70.5	0.0705	4	14
8	10.0	57.3	0.0573	3	26
12	10.1	57.9	0.0579	3	28
16	8.5	48.7	0.0487	2	55
20	8.5	48.7	0.0487	2	55
25	7.2	41.3	0.0413	2	29
30	6.4	36.7	0.0367	2	12
40	7.3	41.8	0.0418	2	30
50	6.3	36.1	0.0361	2	10
60	5.7	32.7	0.0327	1	58
80	5.7	32.7	0.0327	1	58

E x I values and weights for steel shafts

Solid shafts		
Ø d (mm)	E x I (N x mm²)	Weight (kg/m)
3	8.35×10^5	0.06
4	2.64×10^6	0.10
5	6.44×10^6	0.15
8	4.22×10^7	0.39
10	1.03×10^8	0.61
12	2.14×10^8	0.88
14	3.96×10^8	1.20
16	6.76×10^8	1.57
20	1.65×10^9	2.45
25	4.03×10^9	3.83
30	8.35×10^9	5.51
40	2.64×10^{10}	9.80
50	6.44×10^{10}	15.32
60	1.34×10^{11}	22.05
80	4.22×10^{11}	39.21

Hollow shafts			
Shaft diameter		E x I	Weight
Outer (mm)	Inner (mm)	(N x mm²)	(kg/m)
8	3.0	4.14×10^7	0.34
10	4.0	1.00×10^8	0.51
12	4.0	2.11×10^8	0.79
16	8.0	6.33×10^8	1.18
20	14.0	1.25×10^9	1.25
25	14.0	3.63×10^9	2.63
30	19.0	7.01×10^9	3.30
40	26.5	2.13×10^{10}	5.50
50	29.6	5.65×10^{10}	9.95
60	36.5	1.15×10^{11}	13.89
80	57.4	3.10×10^{11}	19.02

Calculation values:
Young's modulus = 2.1×10^5 N/mm²
Density = 7.8 g/cm³

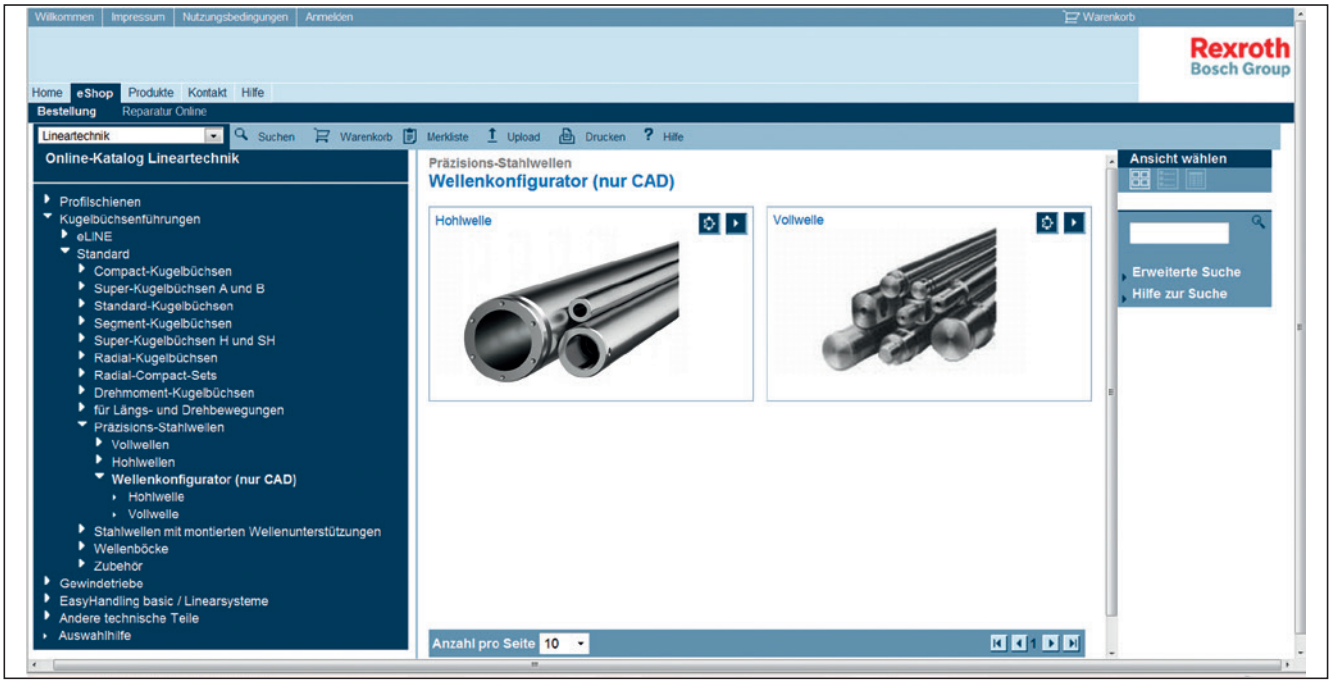
Precision steel shafts

Shaft configuration tool

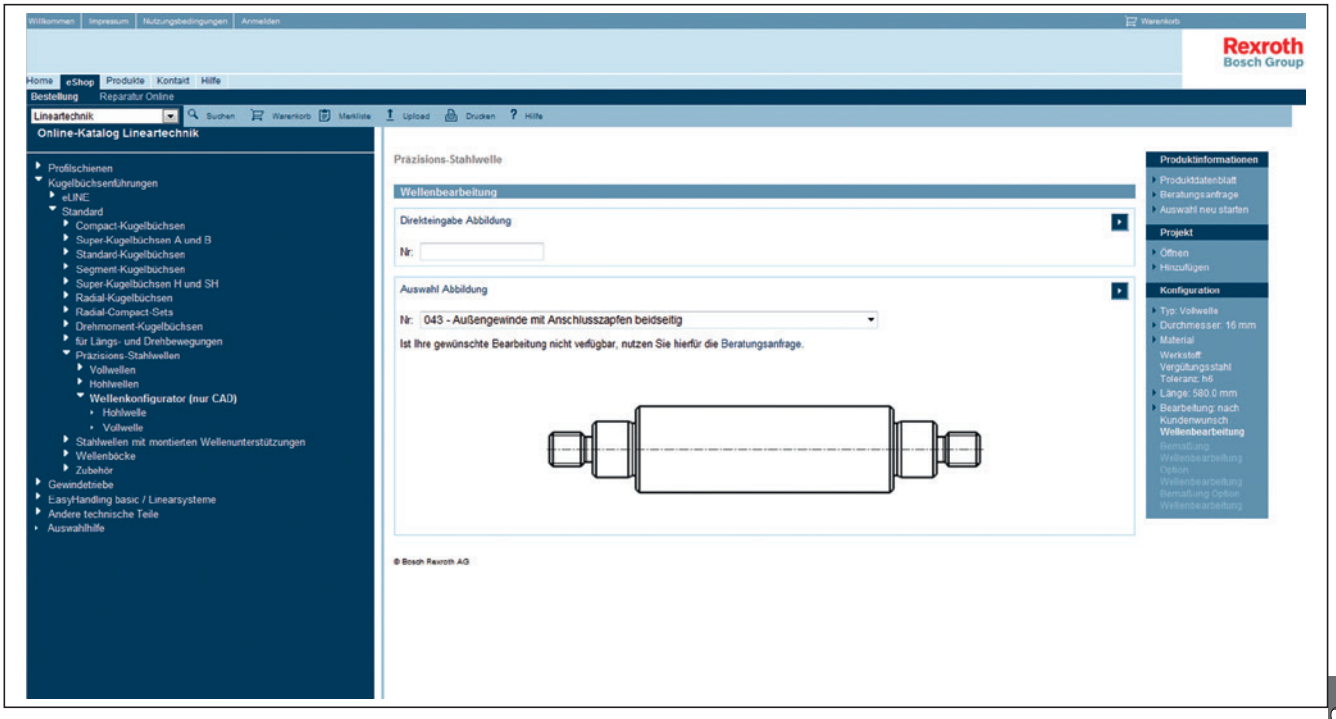
Shaft configuration tool in the Rexroth eShop

Rexroth offers an online product configuration tool for directly submitting product requests. Go to **www.boschrexroth.com/shaft-configuration** to quickly and easily configure specific solutions.
This online tool helps you visually configure
your desired shaft machining step by step. All catalog options are available.

Once configuration is complete, 2D and 3D data is available for download in all established formats.
Please send us a consulting request through the online tool for prices and delivery times.
The figures only show a small portion of our diverse machining options. Rexroth will machine shaft ends to suit your needs. Just send us your request!



Go to the “Shaft configuration tool” submenu in the eShop.



If you have the catalog, you can immediately enter the machining image number under the menu item “Machining to customer specification - Quick start”.
If you do not have the catalog, you can choose from all possible shaft machining options step by step under the menu item “Machining to customer specification”.

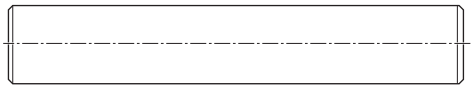
Precision steel shafts

Standard shaft machining

Solid shafts

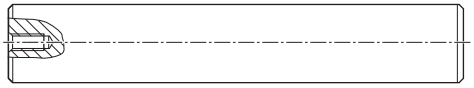
Machining by image number

010



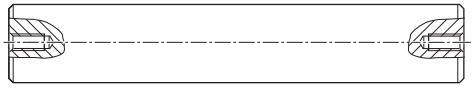
Planar and rotated to length tolerance

020



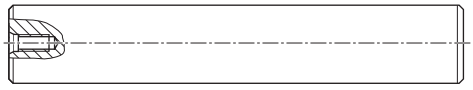
Female thread on one end

021



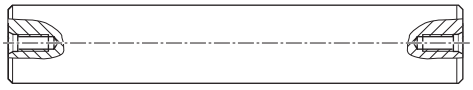
Female thread on both ends

022



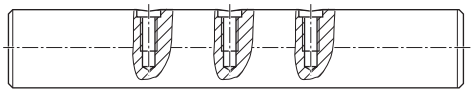
DIN 332-D female thread on one end

023



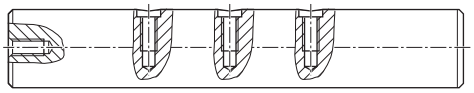
DIN 332-D female thread on both ends

030



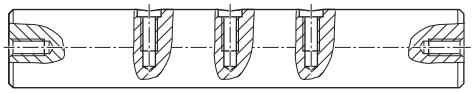
Radial thread

031



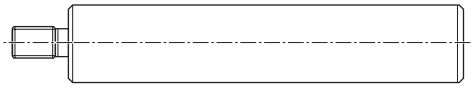
Radial thread and female thread on one end

032



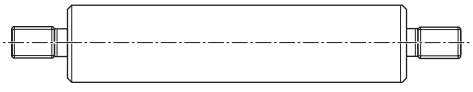
Radial thread and female thread on both ends

040



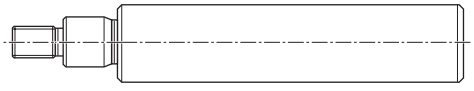
Male thread on one end

041



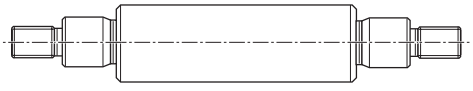
Male thread on both ends

042



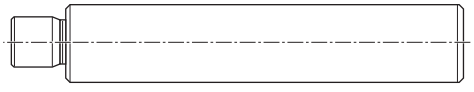
Male thread with connection spigot on one end

043



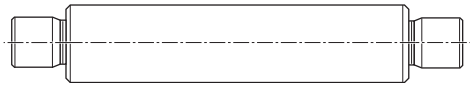
Male thread with connection spigot on both ends

050



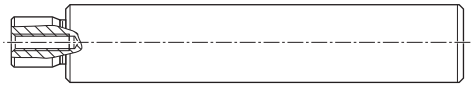
Spigot on one end

051



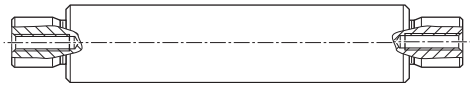
Spigot on both ends

052



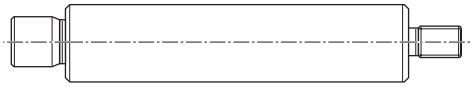
Spigot and female thread on one end

053



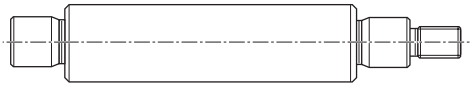
Spigot and female thread on both ends

054



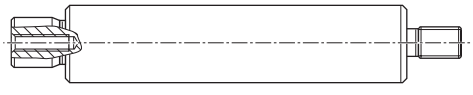
Side 1: spigot, side 2: male thread

055



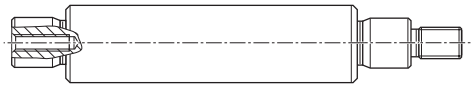
Side 1: spigot, side 2: male thread with spigot

056



Side 1: spigot and female thread, side 2: male thread

057

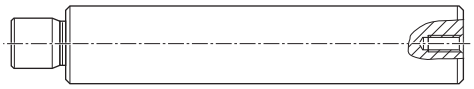


Side 1: spigot and female thread, side 2: male thread with spigot

Solid shafts

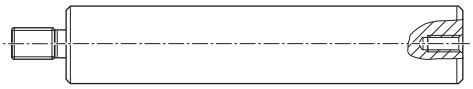
Machining by image number

058



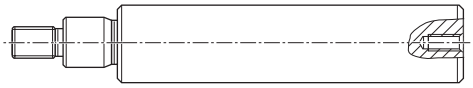
Side 1: spigot, side 2: female thread

059



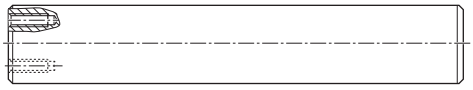
Side 1: male thread, side 2: female thread

060



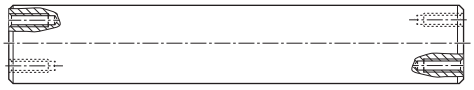
Side 1: male thread with spigot, side 2: female thread

070



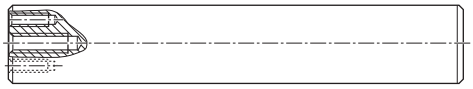
Pitch circle front thread on one end

071



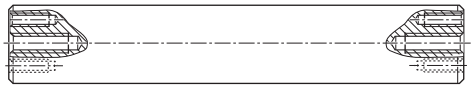
Pitch circle front thread on both ends

072



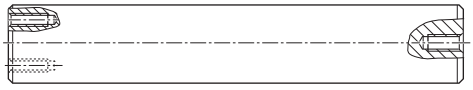
Pitch circle front thread and female thread on one end

073



Pitch circle front thread and female thread on both ends

074

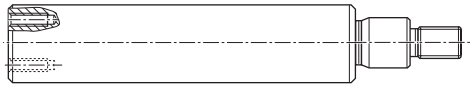


Side 1: pitch circle front thread, side 2: female thread

075

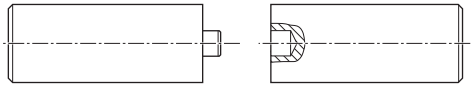
Side 1: pitch circle front thread, side 2: spigot and female thread

076



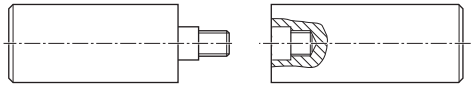
Side 1: pitch circle front thread, side 2: male thread with spigot

080



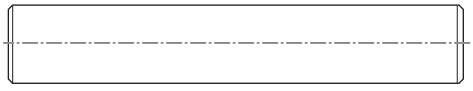
Push fit fitting

081



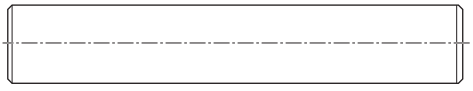
Threaded fitting

090



Annealed on one end

091



Annealed on both ends

This is only a small portion of our diverse machining options. Other machining options available upon request.

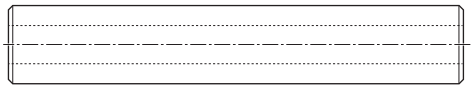
Precision steel shafts

Shaft machining

Hollow shafts

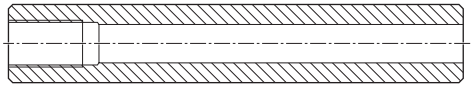
Machining by image number

110



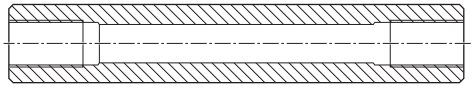
Planar and rotated to length tolerance

120



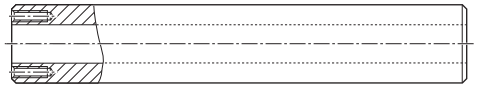
Female thread on one end

121



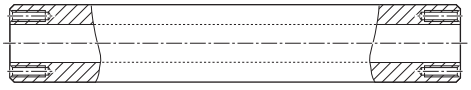
Female thread on both ends

170



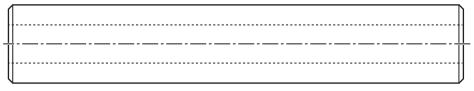
Pitch circle front thread on one end

171



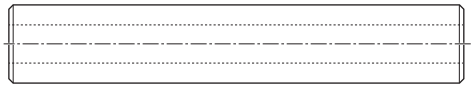
Pitch circle front thread on both ends

190



Annealed on one end

191

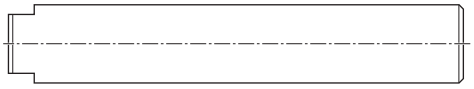


Annealed on both ends

Options

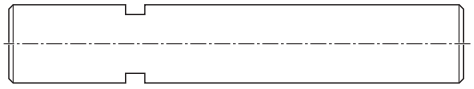
The standard shaft machining options shown above can be supplemented with the following options.

900



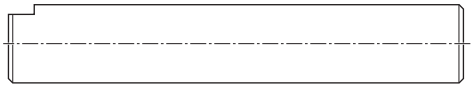
L-form wrench size

901



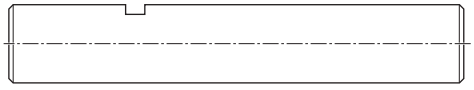
U-form wrench size

902



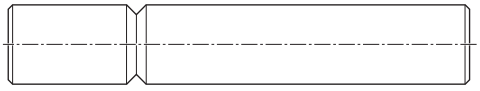
L-form plane

903



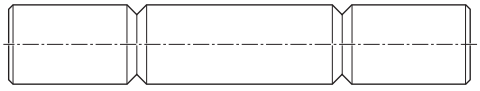
U-form plane

904



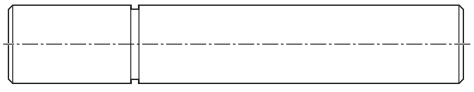
90° groove on one end

905



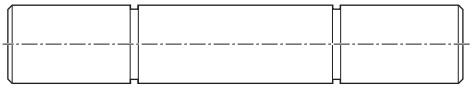
90° groove on both ends

906



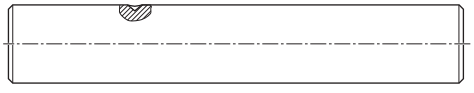
DIN 471 groove on one end

907



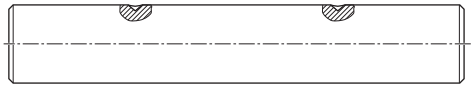
DIN 471 groove on both ends

909



90° countersink on one end

910



90° countersink on both ends

This is only a small portion of our diverse machining options. Other machining options available upon request.

Benefits

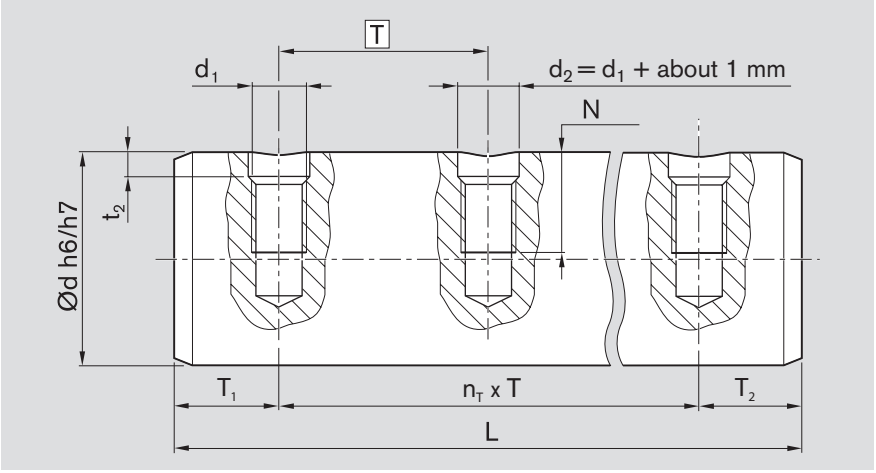
- Diverse machining options
- Short delivery time
- Low cost

Ordering

- Request with customer drawing or
- Use the shaft configuration tool **www.boschrexroth.com/shaft-configuration**

Tapped and untapped radial holes

Radial holes are necessary for supporting steel shafts. Radial holes are made in steel shafts that have already been hardened and polished.
Hole diameter, depth and spacing depend on the diameter of the shaft.
The tables in Section “Steel shafts with ready-mounted shaft support rails” contain reference values.



Reference values for drilling out the hardened surface zone

Dimensions (mm)

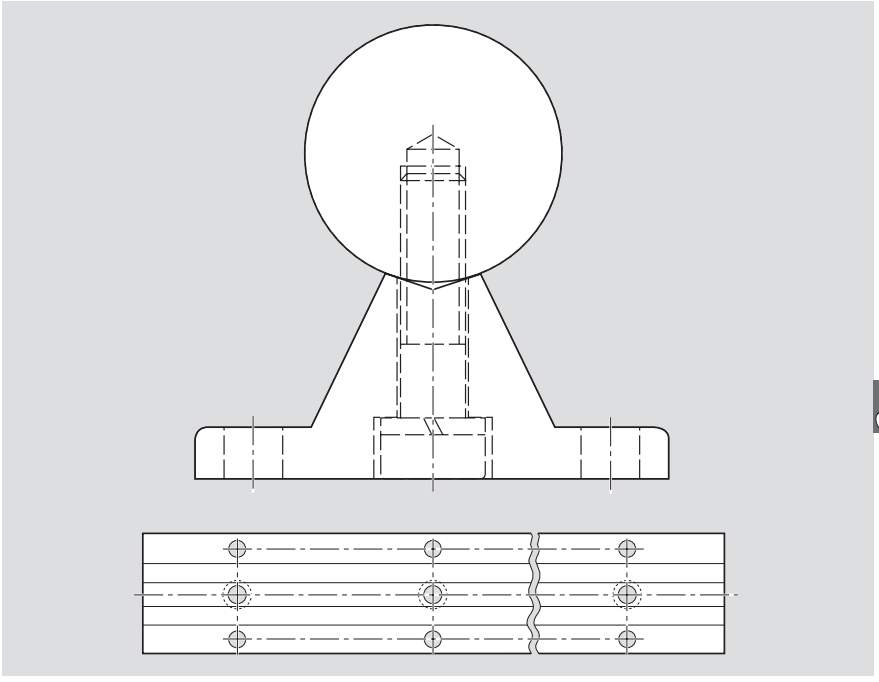
Ø d	d_1	t_2
12	M4	2.5
16	M5	2.5
20	M6	3.0
25	M8	3.0
30	M10	3.5
40	M10	4.0
40	M12	4.5

Dimensions (mm)

Ø 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 stainless steel shafts available upon request.

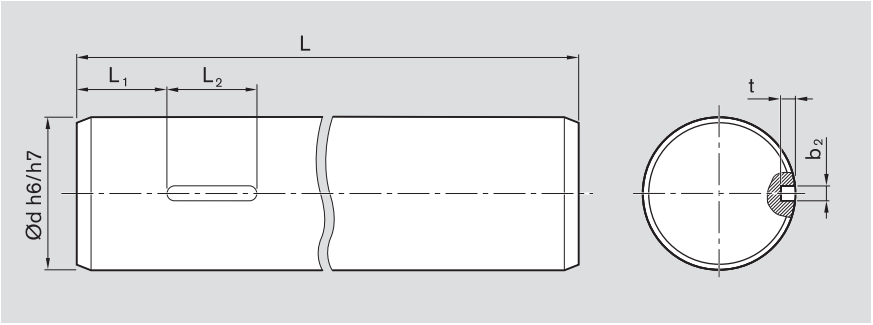
See Section “Steel shafts with ready-mounted shaft support rails” for matching shaft support rails.



Precision steel shafts

Shaft machining (Recommendation)

DIN 6885-1 keyway

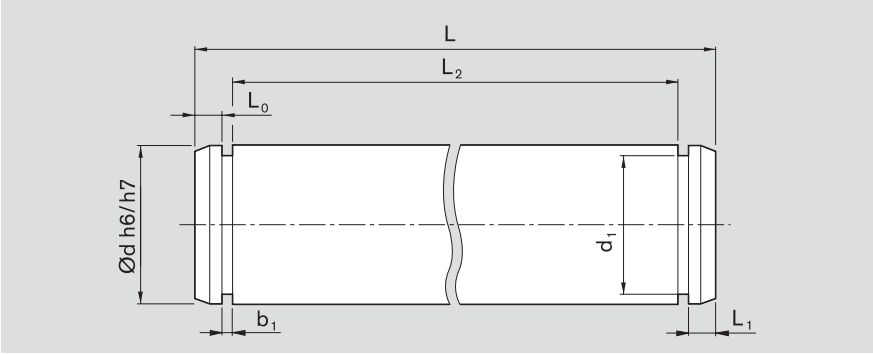


Recommended dimensions:

Dimensions (mm)		
Shaft Ø 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 +0.1
16	5	3.0 +0.1
20	6	3.5 +0.1

Dimensions (mm)		
Shaft Ø d	b_2 P9	t
25	8	4.0 +0.2
30	8	4.0 +0.2
40	12	5.0 +0.2
50	14	5.5 +0.2
60	18	7.0 +0.2
80	22	9.0 +0.2

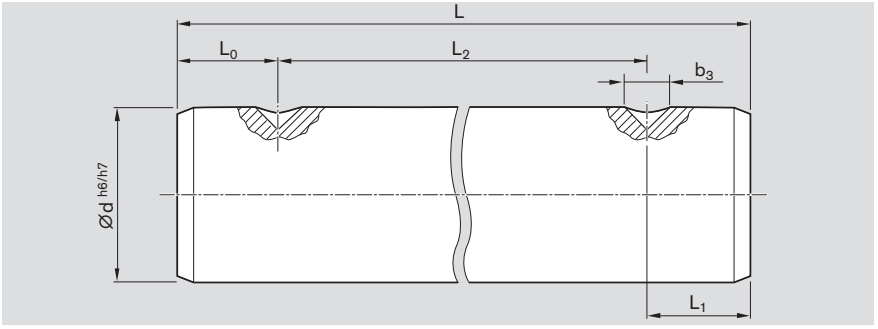
Groove for DIN 471 retaining ring



Recommended dimensions

Dimensions (mm)			DIN 471 retaining ring	
Ø d	b_1 +0.1	d_1	Dimensions (mm)	Material number
4	0.50	3.8 –0.04	4x0.4	R3410 765 00
5	0.70	4.8 –0.04	5x0.6	R3410 742 00
8	0.90	7.6 –0.06	8x0.8	R3410 737 00
10	1.10	9.6 –0.11	10x1	R3410 745 00
12	1.10	11.5 –0.11	12x1	R3410 712 00
14	1.10	13.4 –0.11	14x1	R3410 747 00
16	1.10	15.2 –0.11	16x1	R3410 713 00
20	1.30	19 –0.13	20x1.2	R3410 735 00
25	1.30	23.9 –0.21	25x1.2	R3410 750 00
30	1.60	28.6 –0.21	30x1.5	R3410 724 00
40	1.85	37.5 –0.25	40x1.75	R3410 726 00
50	2.15	47.0 –0.25	50x2	R3410 727 00
60	2.15	57.0 –0.30	60x2	R3410 764 00
80	2.65	76.5 –0.30	80x2.5	–

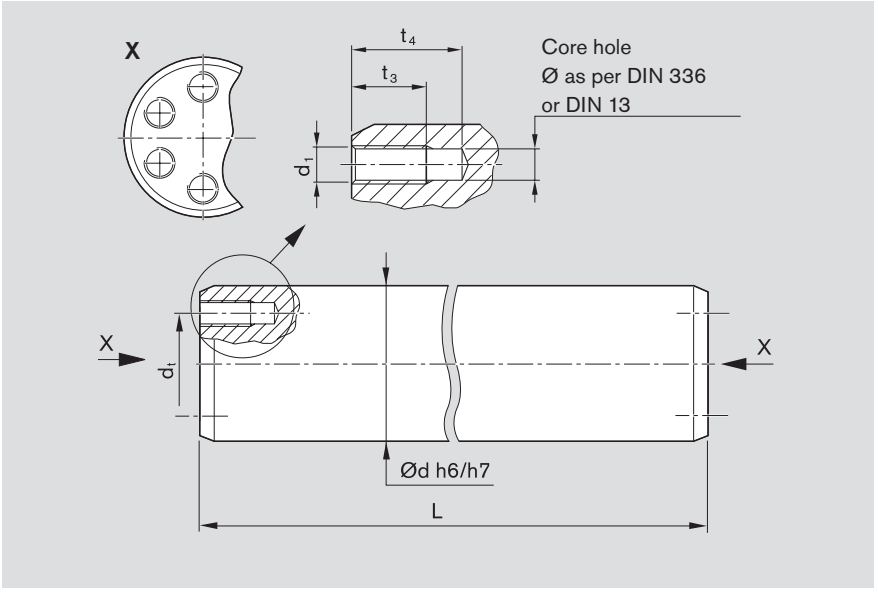
90° countersink



Recommended dimensions

	Dimensions (mm)													
Ø d	4	5	8	10	12	14	16	20	25	30	40	50	60	80
b_3	–	3	4	5	5	5	5	5	6	6	8	8	8	10

Pitch circle female thread



Steel shafts with shaft support rails ready-mounted, shaft support rails

Product overview

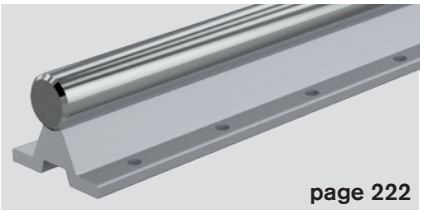
Benefits

- For use with open linear bushings
- For long guides or heavy loads where self-supporting shafts cannot be used due to shaft warping
- Unlimited length when using interconnecting shafts
- Support rails for various requirements
- Additional degrees of freedom in circumferential direction compared to profiled rail systems
- For applications where other linear guides tend to warp due to imprecise substructures.

General

The individual supports are arranged under each shaft and separated only by installation seams. The tolerances specified in the dimension tables refer to after alignment and installation of the guide units on a torsion-resistant, faced mounting base.

R1010 Precision steel shaft with ready-mounted aluminum shaft support rails, flanged, highly affordable



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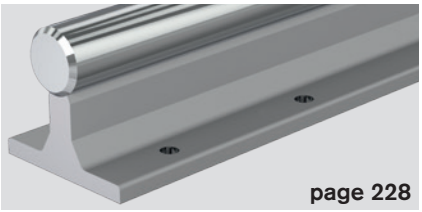
R1011 Precision steel shaft with ready-mounted aluminum shaft support rails, flanged, highly affordable



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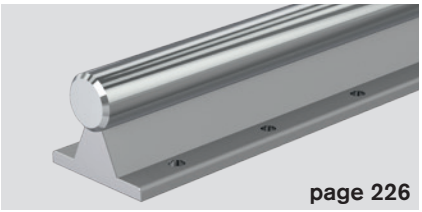
R1014 Precision steel shaft with ready-mounted aluminum shaft support rails, flanged, extremely high height tolerance



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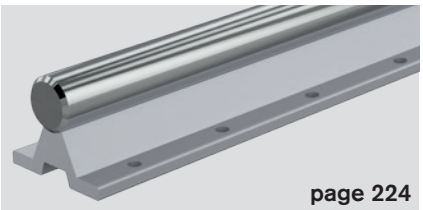
R1025 same as R1010, but hole spacing for profile systems



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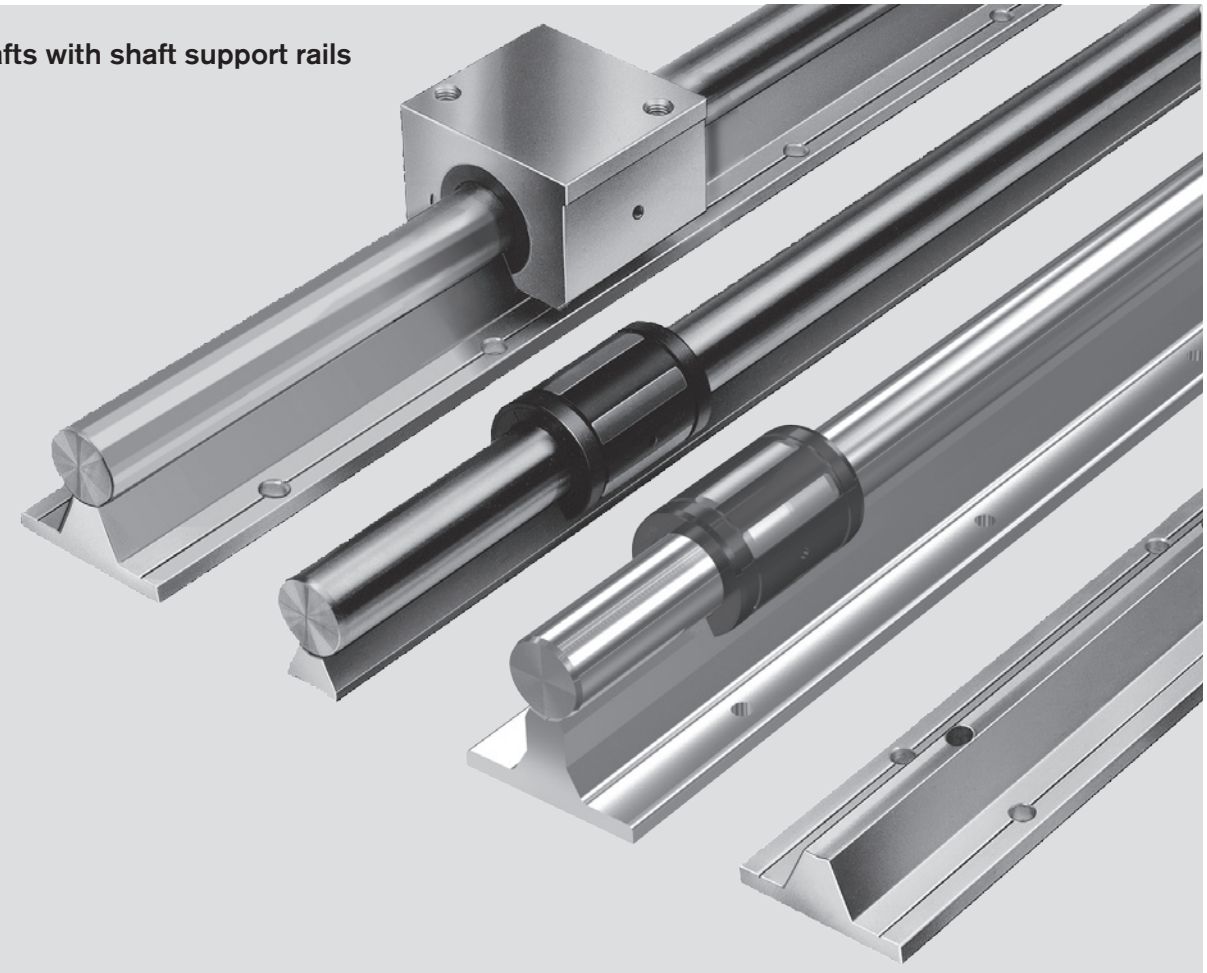
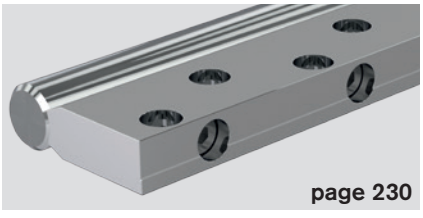
Steel shafts with shaft support rails



R1015 Precision steel shaft with ready-mounted aluminum shaft support rails, side mounting



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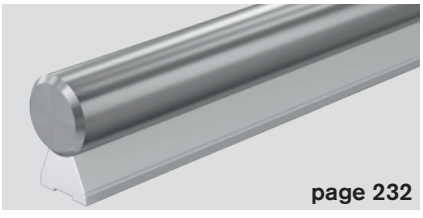
R1013 Precision steel shaft with ready-mounted aluminum shaft support rail, flangeless, highly affordable



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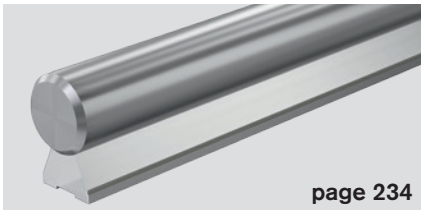
R1016 Precision steel shaft with ready-mounted steel shaft support rail, flangeless, with reference edge



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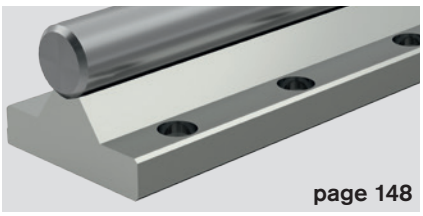
Shaft support rails for radial compact set and radial linear bushing:

R1018



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R1012

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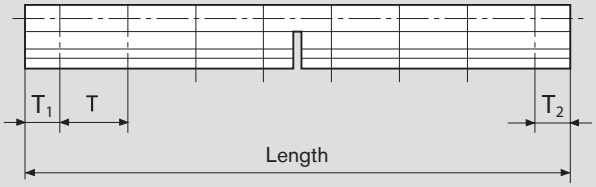
Steel shafts with ready-mounted shaft support rails

Design, ordering information, installation

Terminals T_1 and T_2

If the ordered shaft length corresponds to the whole multiple of the hole spacing of one shaft support rail, the terminals correspond to half of the spacing length (T_1 and $T_2 = T \div 2$). The holes are calculated by us for other lengths ($T_1 = T_2$). This is done by shortening any excess shaft support rails on either end. Both terminals T_1 and T_2 should not be less than 0.2 x T.
If no customer drawings are available, we will include the hole spacing calculated by us for the steel shaft in the quotation and order confirmation. This produces the locations of the mounting holes in the machine bed.
We recommend comparing these specifications with the design documents.
Ordering information: Material number R10.. /length x mm/T_1 x mm/T_2 x mm



Excess and combined guide units

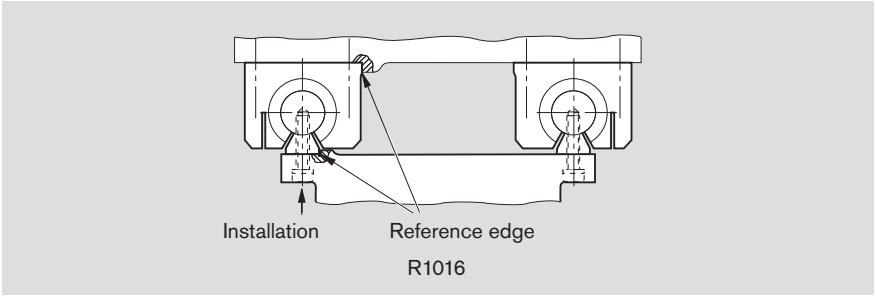
A section of shaft with ready-mounted shaft support rail should not exceed 6 m. Individual sections are combined to form longer lengths (see Section “Combined shafts, connections”).
The joints between shafts and shaft support rails are arranged differently depending on the model. However, the shaft joint should generally be offset from the shaft support rail seam.

Special hole spacing

Shafts with ready-mounted shaft support rails also come with special hole spacings upon the customer's request.

Note on installing flangeless shaft support rails

We recommend using a taper gib or clamping strip to secure the shaft support rail in order to make installation easier or when there is significant lateral load.



The shaft support rail must be straight during installation.
To do this, press the first shaft with shaft support rail onto the reference edge and fasten it down, then align and fasten down the second shaft, preferably using a rod.
These elements only come with precision steel shafts.
The maximum length of the shaft support rail is 1,800 mm and these are joined to create longer lengths. The reference edge allows the shaft support rails to be aligned easily to avoid distortive stress on the linear bushings.

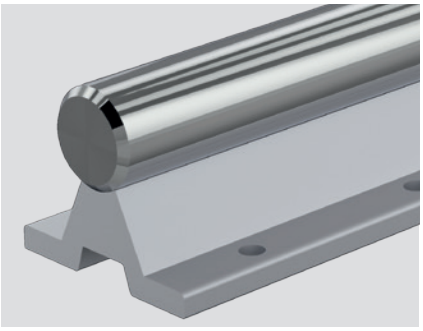
Steel shafts with ready-mounted shaft support rails for open standard and super linear bushings

Flanged

R1010 steel shaft with ready-mounted shaft support rail

Material
– Shaft support rail: Aluminum

Design
– Combined with linear sets, these shaft support rails can be used to create linear guides with very low height.
– High rigidity Carefully adapting the support rail to the linear bushing size produces the ideal pressure angle for fitting the shaft, which ensures high rigidity along with the large fastening bolts.
– Highly affordable

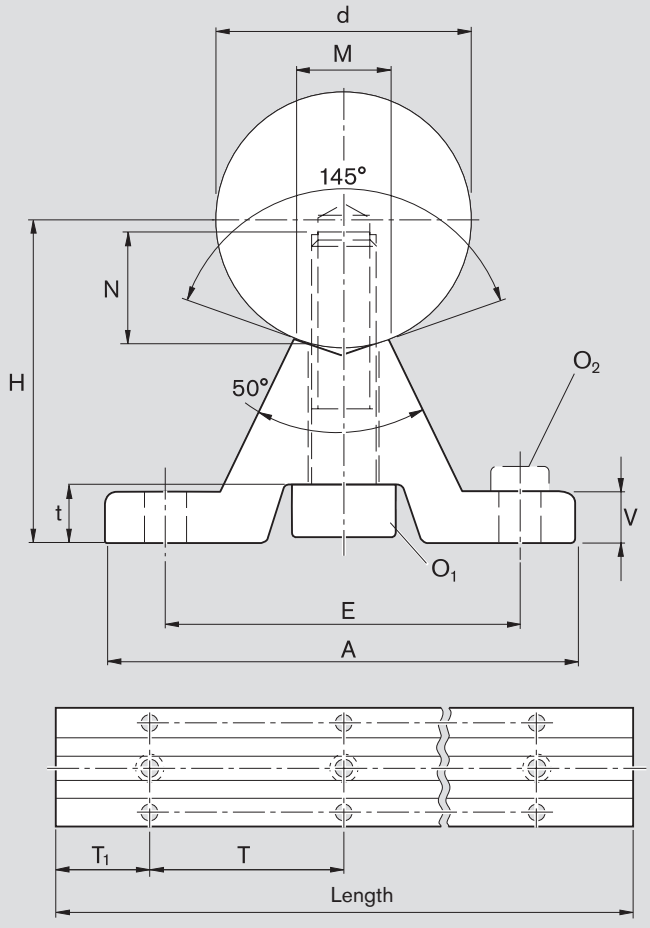


Shaft Ø d (mm)	Material number Hole spacing type 1	Hole spacing type 2	Weight (kg/m)
16	R1010 016 ..	R1010 516 ..	2.5
20	R1010 020 ..	R1010 520 ..	3.8
25	R1010 025 ..	R1010 525 ..	5.4
30	R1010 030 ..	R1010 530 ..	7.6
40	R1010 040 ..	R1010 540 ..	12.6

Shafts:
00 = h6 heat-treated steel
01 = h7 heat-treated steel
30 = h6 stainless steel
31 = h7 stainless steel
60 = h6 hard chrome-plated heat-treated steel
61 = h7 hard chrome-plated heat-treated steel

Ordering example:
Shaft diameter 30 mm, h7, heat-treated steel, 900 mm long, ready-mounted shaft support rail type 1:
R1010 030 01/900 mm.

Dimensions



Dimensions (mm)

Ø d	H[1] ±0.1	A	V	M	O_1 DIN 6912-8.8	N	E	t	O_2[2] DIN 6912-8.8	Mt[3] Type 1	Mt[3] Type 2
16	26	45	5	7.0	M5x20	9	33	6.0	M5x16	100	150
20	32	52	6	8.3	M6x25	11	37	7.0	M6x16	100	150
25	36	57	6	10.8	M8x30	15	42	7.0	M6x16	120	200
30	42	69	7	11.0	M10x35	17	51	7.5	M8x25	150	200
40	50	73	8	15.0	M10x40	19	55	7.0	M8x25	200	300

1) Measured with gauging shaft, nominal dimension d and length about 50 mm. Up to 1,800 mm length with parallelism of 0.1 mm available upon request.
2) Only applicable for bolting with steel or cast iron threads.
3) Type 1: For transverse loads on the linear bushing opening and when approaching maximum load.
Type 2: For general requirements.

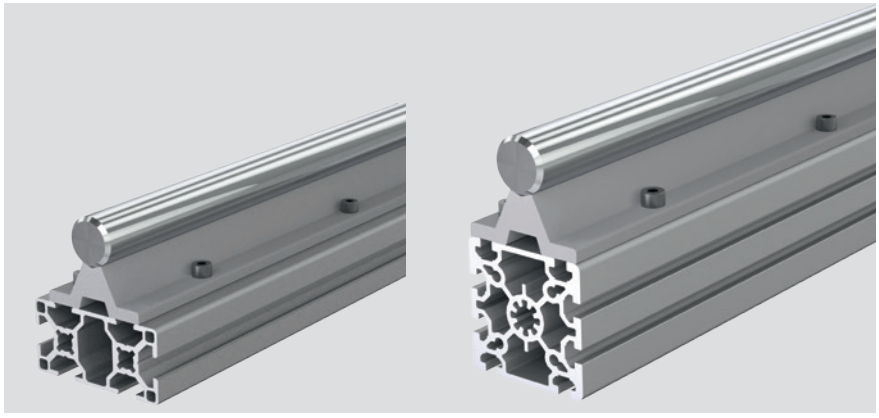
Steel shafts with ready-mounted shaft support rails for open standard and super linear bushings

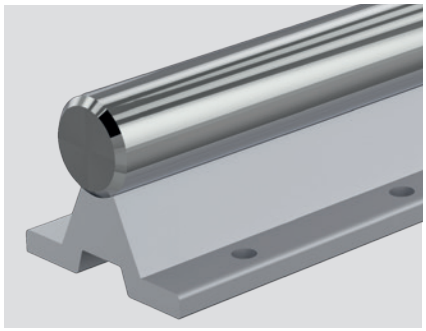
For profile systems

R1025 steel shaft with ready-mounted shaft support rail[1)]

Material
– Shaft support rail: Aluminum

Design
– Fast, easy, modular linear bushing guide design for profile systems
– Highly affordable due to less stringent height tolerance



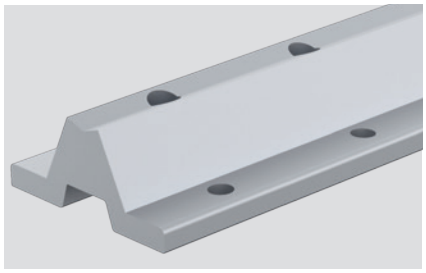


Shaft Ø d (mm)	Modular dimension E (mm)	Material number	Weight (kg/m)
20	40	R1025 020 ..	3.8
25	40	R1025 025 ..	5.4
30	45	R1025 530 ..	7.5
30	50	R1025 030 ..	7.5

Shafts:
- 00 = h6 heat-treated steel
- 01 = h7 heat-treated steel
- 30 = h6 stainless steel
- 31 = h7 stainless steel
- 60 = h6 hard chrome-plated heat-treated steel
- 61 = h7 hard chrome-plated heat-treated steel

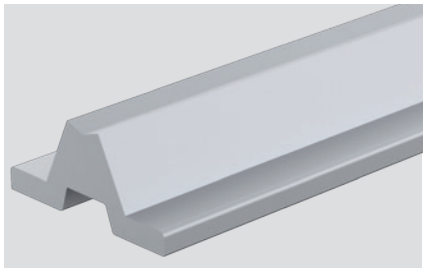
1) **Ordering example:**
Shaft diameter 25 mm, h7, heat-treated steel, 900 mm long, ready-mounted shaft support rail:
R1025 025 01/900 mm.

R1039 shaft support rail, drilled



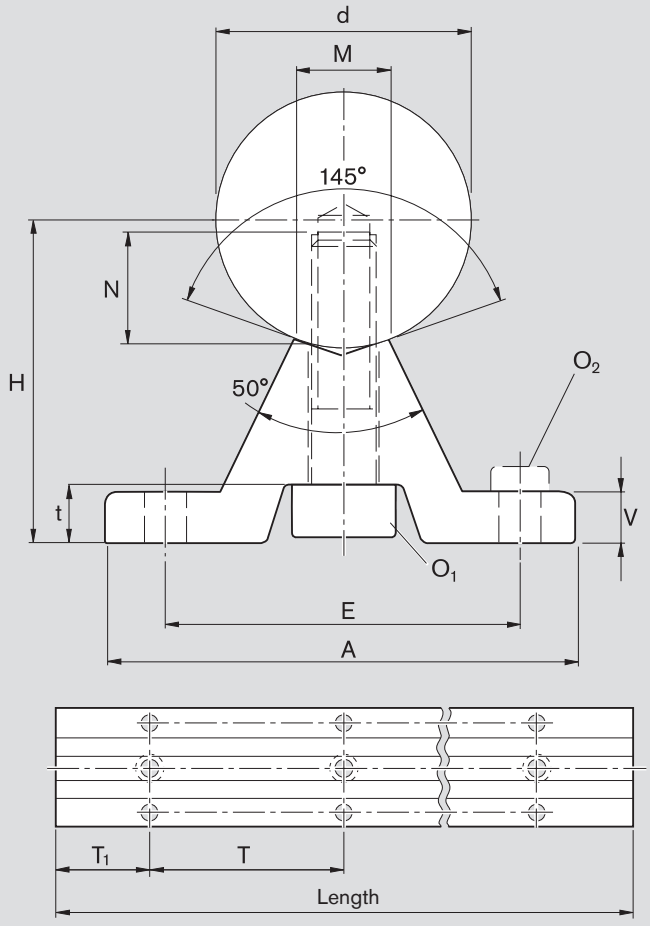
Shaft Ø d (mm)	Modular dimension E (mm)	Material number	Weight (kg/m)	Length (mm) **–0.5 –1.5**
20	40	R1039 820 30	1.3	1,800
25	40	R1039 825 30	1.6	1,800
30	45	R1039 930 30	2.0	1,800
30	50	R1039 830 30	2.0	1,800

R1039 shaft support rail, undrilled



Shaft Ø d (mm)	Material number	Weight (kg/m)	Length (mm) **–0.5 –1.5**
20	R1039 520 30	1.3	1,800
25	R1039 525 30	1.6	1,800
30	R1039 530 30	2.0	1,800

Dimensions



Dimensions (mm)

Ø d	H[1] ±0.1	A	V	M	O_1 DIN 6912-8.8	N	E Modular dimension	t	O_2 DIN 6912-8.8	T
20	32	52	6	8.3	M6x25	11	40	7.0	M6	180
25	36	57	6	10.8	M8x30	15	40	7.0	M6	180
30	42	69	7	11.0	M10x35	17	45	7.5	M8	180
30	42	69	7	11.0	M10x35	17	50	7.5	M8	180

1) Measured with gauging shaft, nominal dimension d and length about 50 mm. Up to 1,800 mm length with parallelism of 0.1 mm available upon request.

See “Basic mechanical elements” catalog for profile systems.

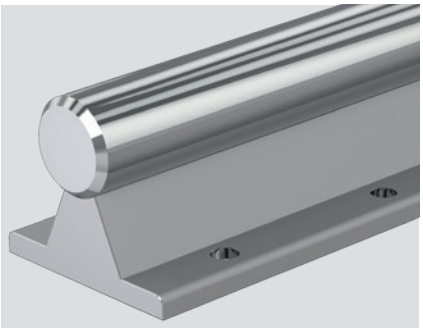
Steel shafts with ready-mounted shaft support rails for open standard and super linear bushings

Flanged, extremely accurate height tolerance

R1014 steel shaft with ready-mounted shaft support rail

Material
– Shaft support rail: Aluminum

Design
– Combined with linear sets, these shaft support rails can be used to create linear guides with very low height.
– High rigidity Carefully adapting the support rail to the linear bushing size produces the ideal pressure angle for fitting the shaft, which ensures high rigidity along with the large fastening bolts.



Shaft Ø d (mm)	Material number Type 1	Type 2	Weight (kg/m)
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

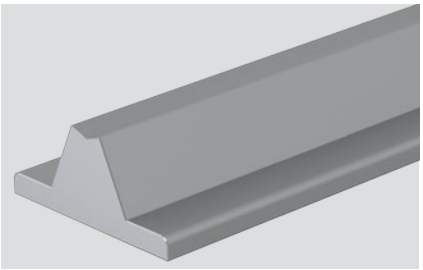
Shafts:
00 = h6 heat-treated steel
01 = h7 heat-treated steel
30 = h6 stainless steel
31 = h7 stainless steel
60 = h6 hard chrome-plated heat-treated steel
61 = h7 hard chrome-plated heat-treated steel

Ordering example:
Shaft diameter 30 mm, h6, heat-treated steel, 1,200 mm long, ready-mounted shaft support rail type 1 R1050 630 00 is ordered as:
R1014 030 00/1,200 mm.

R1050 shaft support rails, drilled, length (mm) $600^{-0.5}_{-1.5}$

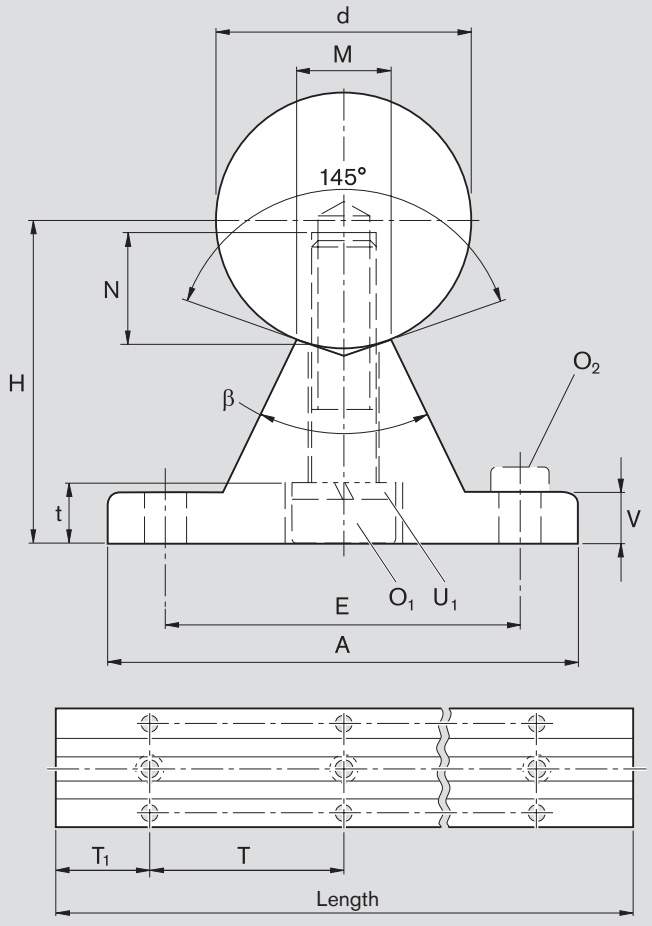
Shaft Ø d (mm)	Material number Type 1	Type 2	Weight (kg/m)
12	R1050 612 00	R1050 712 00	0.52
16	R1050 616 00	R1050 716 00	0.64
20	R1050 620 00	R1050 720 00	0.90
25	R1050 625 00	R1050 725 00	1.08
30	R1050 630 00	R1050 730 00	1.43
40	R1050 640 00	R1050 740 00	1.81
50	R1050 650 00	R1050 750 00	2.45
60	R1050 660 00	–	3.16
80	R1050 680 00	–	4.86

R1050 shaft support rails, undrilled, length (mm) $600^{-0.5}_{-1.5}$



Shaft Ø d (mm)	Material number	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



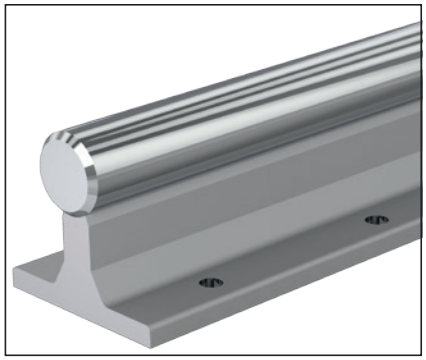
Dimensions (mm)													Angle
Ø d	H[1] ±0.01	A	V	M	O_1 DIN 6912-8.8	N	U_1 DIN 7980[2]	E	t	O_2[3] DIN 6912-8.8	Mt[4] Type 1	Mt[4] Type 2	β (°)
12	22	40	5	5.8	M4x20	8	4	29	4.5	M4x12	75	120	50
16	26	45	5	7.0	M5x20	9	5	33	7.6	M5x16	100	150	50
20	32	52	6	8.3	M6x25	11	6	37	8.6	M6x16	100	150	50
25	36	57	6	10.8	M8x30	15	8	42	9.0	M6x16	120	200	50
30	42	69	7	11.0	M10x35	17	10	51	10.0	M8x25	150	200	50
40	50	73	8	15.0	M10x40	19	10	55	9.5	M8x25	200	300	50
50	60	84	9	19.0	M12x45	21	12	63	11.5	M10x30	200	300	46
60	68	94	10	25.0	M14x50	25	14	72	13.0	M10x30	300	–	46
80	86	116	12	34.0	M16x60	28	16	92	15.0	M12x35	300	–	46

1) Measured with gauging shaft, nominal dimension d and length about 50 mm.
2) DIN 7980 discontinued. Spring washer commercially available.
3) Only applicable for bolting with steel or cast iron threads.
4) Type 1: For transverse loads on the linear bushing opening and when approaching maximum load, as well as when dimensional accuracy is strictly required.
Type 2: For general requirements.

Steel shafts with ready-mounted shaft support rails for open standard and super linear bushings

R1011 steel shaft with ready-mounted shaft support rail

Material
– Shaft support rail: Aluminum

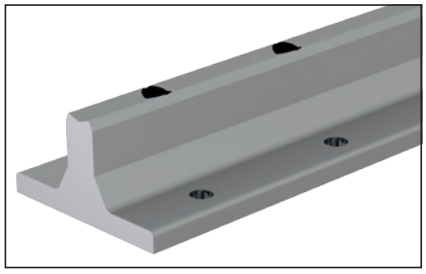


Shaft Ø d (mm)	Material number Type 1	Type 2	Weight (kg/m)
12	R1011 012 ..	R1011 512 ..	1.95
16	R1011 016 ..	R1011 516 ..	2.80
20	R1011 020 ..	R1011 520 ..	4.10
25	R1011 025 ..	R1011 525 ..	5.90
30	R1011 030 ..	R1011 530 ..	8.50
40	R1011 040 ..	R1011 540 ..	13.30
50	R1011 050 ..	R1011 550 ..	20.30

Shafts:
00 = h6 heat-treated steel
01 = h7 heat-treated steel
30 = h6 stainless steel
31 = h7 stainless steel
60 = h6 hard chrome-plated heat-treated steel
61 = h7 hard chrome-plated heat-treated steel

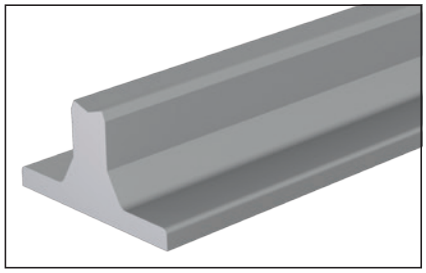
Ordering example:
Shaft diameter 40 mm, h7, stainless steel, 1,100 mm long, ready-mounted shaft support rail type 2 R1050 240 00 is ordered as:
R1011 540 31/1,100 mm.

R1050 shaft support rails, drilled, length (mm) $600^{-0.5}_{-1.5}$



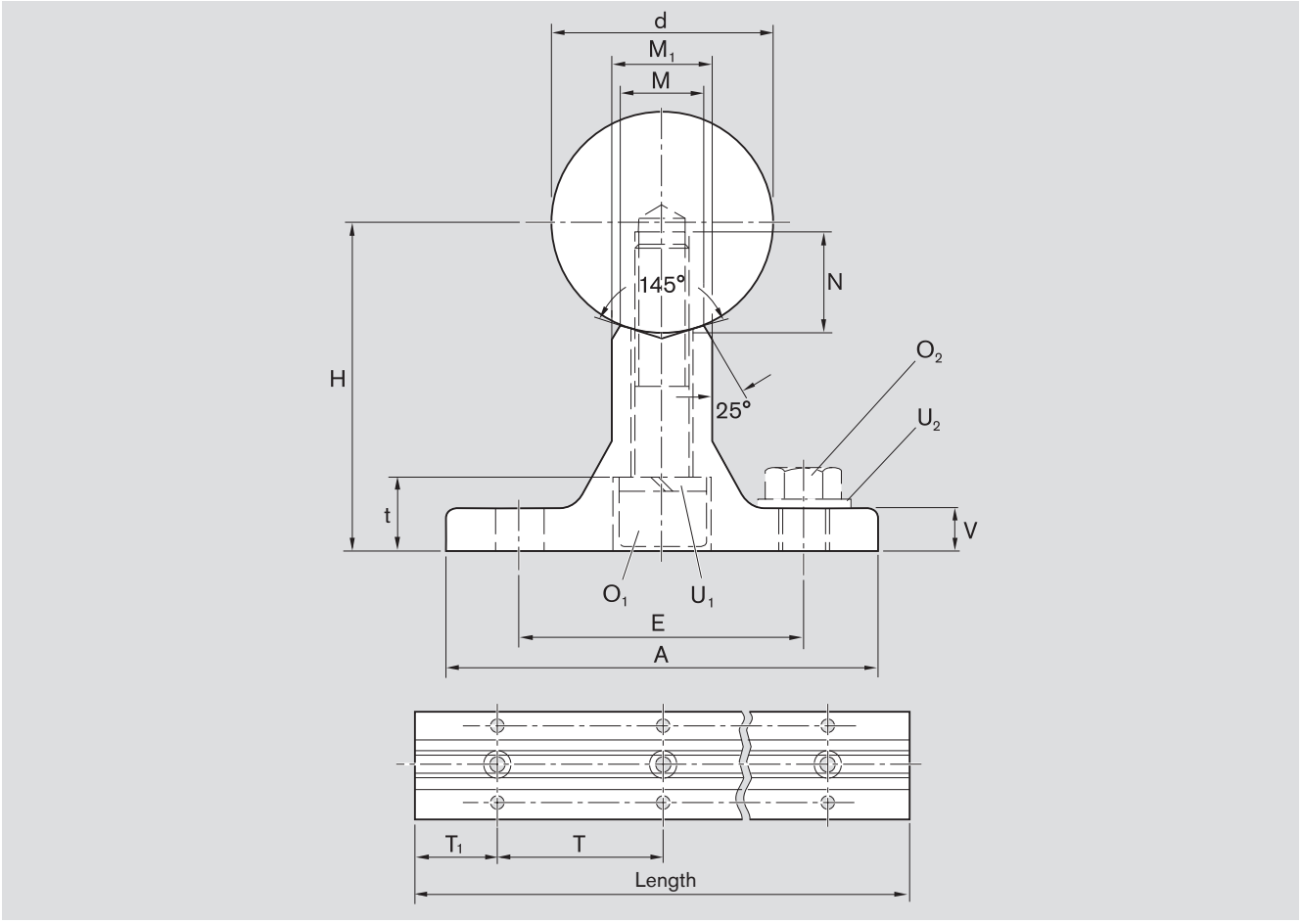
Shaft Ø d (mm)	Material number Type 1	Type 2	Weight (kg)
12	R1050 112 00	R1050 212 00	0.64
16	R1050 116 00	R1050 216 00	0.74
20	R1050 120 00	R1050 220 00	1.00
25	R1050 125 00	R1050 225 00	1.20
30	R1050 130 00	R1050 230 00	1.80
40	R1050 140 00	R1050 240 00	2.10
50	R1050 150 00	R1050 250 00	3.00

R1050 shaft support rails, undrilled, length (mm) $600^{-0.5}_{-1.5}$



Shaft Ø d (mm)	Material number Undrilled	Weight (kg)
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

Dimensions



Dimensions (mm)

Ø d	H[1] ±0.05	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	Mt[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	7.0	10	M5x25	5	9	33	7.0	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	11.0	M6x16	6	120	200
30	53	74	8	11.0	14	M10x40	10	17	51	14.0	M8x25	8	150	200
40	60	78	8	15.0	18	M10x45	10	19	55	13.5	M8x25	8	200	300
50	75	90	10	19.0	22	M12x55	12	21	63	16.0	M10x30	10	200	300

1) Measured with gauging shaft, nominal dimension d and length about 50 mm.
2) DIN 7980 discontinued. Spring washer commercially available.
3) Only applicable for bolting with steel or cast iron threads.
4) Type 1: For transverse loads on the linear bushing opening and when approaching maximum load, as well as when dimensional accuracy is strictly required.
Type 2: For general requirements.

Steel shafts with ready-mounted shaft support rails for open standard and super linear bushings

Side mounting

R1015 steel shaft with ready-mounted shaft support rail

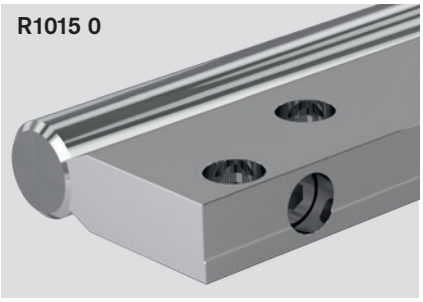
R1054 shaft support rails

Material
– Shaft support rail: Aluminum

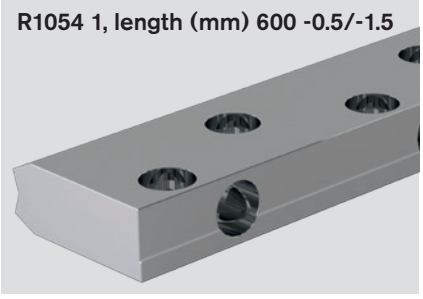
Design
– Combine with linear sets with side opening for heavy-duty linear guides
– Reference edge makes aligning easier (installation)

Type 1

R1015 0



R1054 1, length (mm) 600 -0.5/-1.5

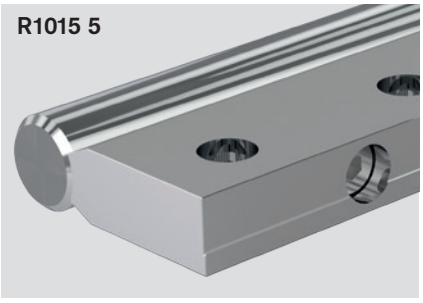


Shaft Ø d (mm)	Material number	Weight (kg)	Material number	Weight (kg)
20	R1015 020 ..	4.1	R1054 120 00	1.0
25	R1015 025 ..	6	R1054 125 00	1.3
30	R1015 030 ..	8.7	R1054 130 00	1.9
40	R1015 040 ..	14.3	R1054 140 00	2.7
50	R1015 050 ..	21.5	R1054 150 00	3.7

Shafts:
00 = h6 heat-treated steel
01 = h7 heat-treated steel
30 = h6 stainless steel
31 = h7 stainless steel
60 = h6 hard chrome-plated heat-treated steel
61 = h7 hard chrome-plated heat-treated steel

Type 2

R1015 5



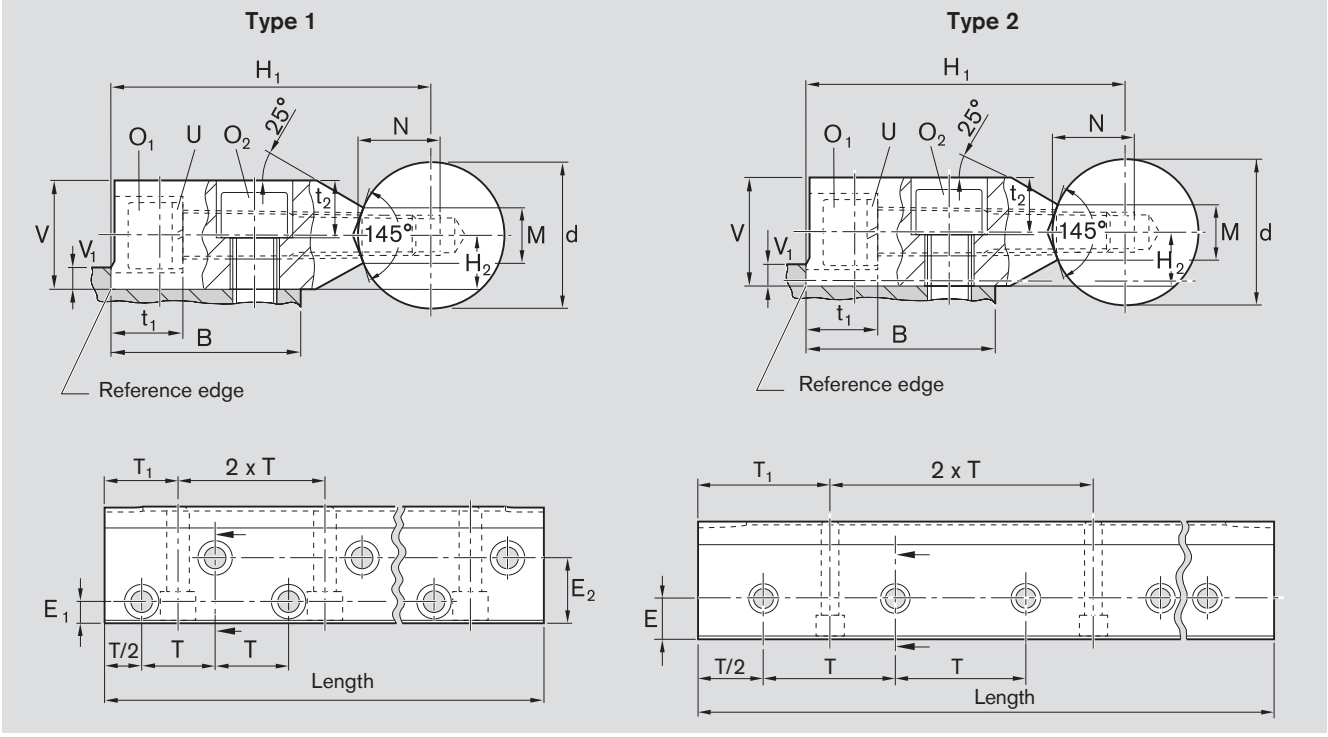
R1054 2, length (mm) 600 -0.5/-1.5

Shaft Ø d (mm)	Material number	Weight (kg)	Material number	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 = h6 heat-treated steel
01 = h7 heat-treated steel
30 = h6 stainless steel
31 = h7 stainless steel
60 = h6 hard chrome-plated heat-treated steel
61 = h7 hard chrome-plated heat-treated steel

Ordering example:
Shaft diameter 30 mm, h6, heat-treated steel, 1,200 mm long, ready-mounted shaft support rail type 1 R1054 130 00 is ordered as:
R1015 030 00/1,200 mm.

Dimensions



Shaft support rail type 1

Dimensions (mm)															
Ø d	H_1[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	4.0	30	11	M6x45	M6x16	6
25	62	10.0	20	10.8	10	26	37.5	15.0	11.0	5.5	36	15	M8x50	M8x20	8
30	72	12.5	25	11.0	12	30	50.0	15.3	13.5	7.0	42	17	M10x60	M10x25	10
40	88	15.0	30	15.0	12	38	50.0	19.0	16.0	8.5	50	21	M12x70	M12x30	12
50	105	17.5	35	19.0	15	45	50.0	24.0	18.5	9.0	60	25	M14x80	M14x35	14

Shaft support rail type 2

Dimensions (mm)															
Ø d	H_1[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	4.0	30	11	M6x45	M6x16	6
25	62	10.0	20	10.8	18	60	15.0	11.0	5.5	36	15	M8x50	M8x20	8
30	72	12.5	25	11.0	21	75	15.3	13.5	7.0	42	17	M10x60	M10x25	10
40	88	15.0	30	15.0	25	100	17.5	16.0	8.5	50	19	M10x70	M12x30	10
50	105	17.5	35	19.0	30	100	21.5	18.5	9.0	60	21	M12x80	M14x35	12

1) Measured with gauging shaft, nominal dimension d and length about 50 mm.
2) Recommended design: No reference edge on opposite side (V_1), align parallel over shafts.
3) Recommendation applies only for bolting in steel or cast iron threads.
4) DIN 7980 discontinued. Spring washer commercially available.

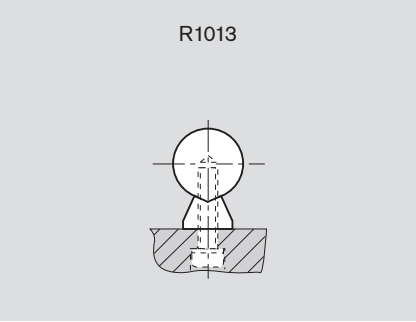
Steel shafts with ready-mounted shaft support rails for open standard and super linear bushings

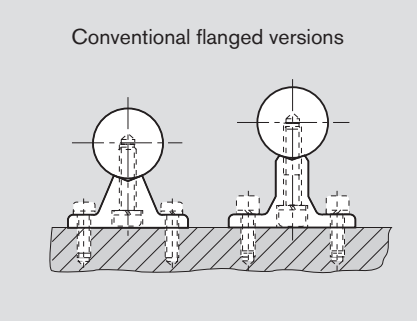
Flangeless

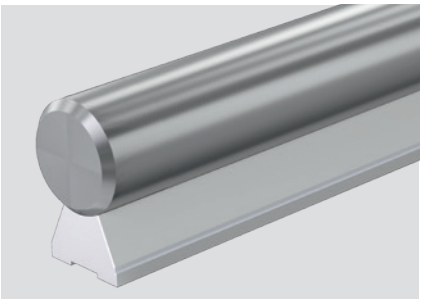
R1013 steel shaft with ready-mounted shaft support rail

Material
– Shaft support rail: Aluminum

Design
– This shaft support rail helps create highly compact guides and is designed for when installing the steel shaft from underneath. Compared to conventional flanged versions (see figure), this element has extremely low height.
– Highly affordable





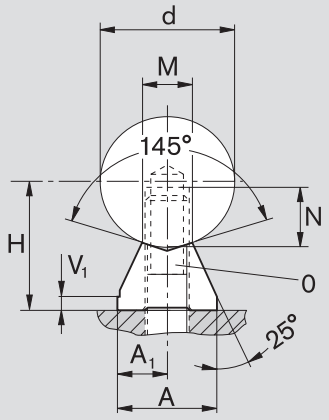


Shaft Ø d (mm)	Material number	Weight (kg/m)
12	R1013 012 ..	1.1
16	R1013 016 ..	1.9
20	R1013 020 ..	3.0
25	R1013 025 ..	4.5
30	R1013 030 ..	6.3

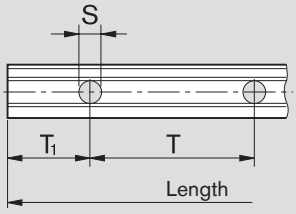
Shafts:
00 = h6 heat-treated steel
01 = h7 heat-treated steel
30 = h6 stainless steel
31 = h7 stainless steel
60 = h6 hard chrome-plated heat-treated steel
61 = h7 hard chrome-plated heat-treated steel

Ordering example:
Shaft diameter 25 mm, h7, heat-treated steel, 1,500 mm long, ready-mounted shaft support rail:
R1013 025 01/1500 mm.

Dimensions



Hole pattern:



Dimensions (mm)

Ø d	H[1] ±0.05	A	A_1	V_1	T	S	N	M	O ISO 4762-8.8
12	14.5	11	5.5	3	75	4.5	8	5.8	M4
16	18.0	14	7.0	3	75	5.5	9	7.0	M5
20	22.0	17	8.5	3	75	6.6	11	8.3	M6
25	26.0	21	10.5	3	75	9.0	15	10.8	M8
30	30.0	23	11.5	3	100	11.0	17	11.0	M10

1) Measured with gauging shaft, nominal dimension d and length about 50 mm. Up to 1,800 mm length with parallelism of 50 µm available upon request.

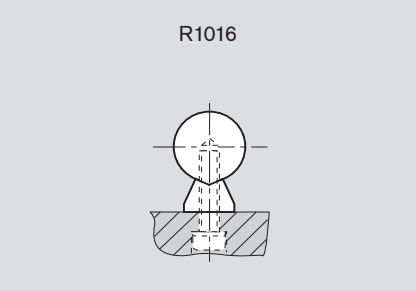
Steel shafts with ready-mounted shaft support rails for open standard and super linear bushings

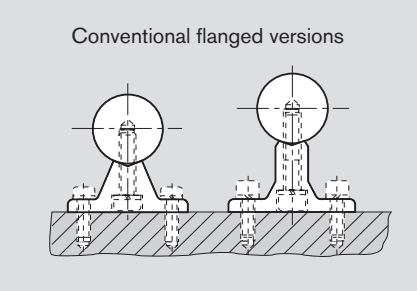
Flangeless, with reference edge

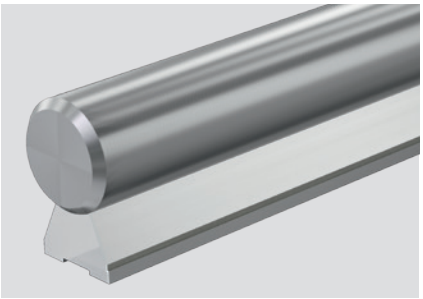
R1016 steel shaft with ready-mounted shaft support rail

Material
– Shaft support rail: Steel

Design
– This steel support rail helps create highly compact guides and is designed for when installing the steel shaft from underneath. Compared to conventional flanged versions (see figure), this element has extremely low height.
– Reference edge makes aligning easier





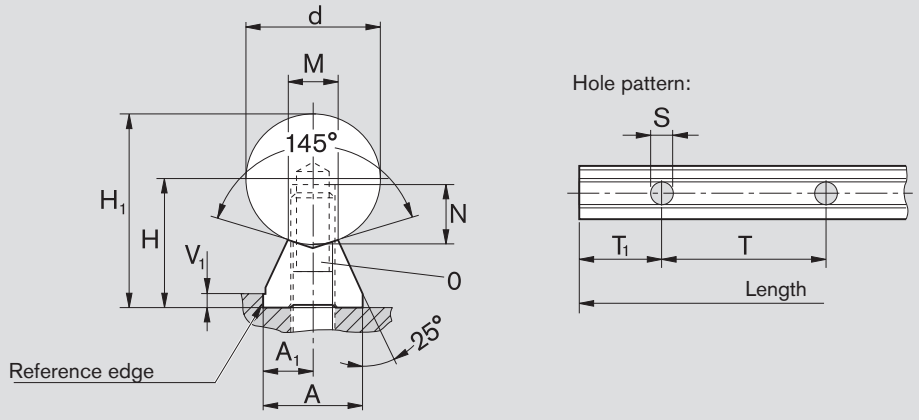


Shaft Ø d (mm)	Material number	Weight (kg/m)
16	R1016 016 ..	2.5
20	R1016 020 ..	3.8
25	R1016 025 ..	5.6
30	R1016 030 ..	7.6
40	R1016 040 ..	13.4
50	R1016 050 ..	20.2

Shafts:
00 = h6 heat-treated steel
01 = h7 heat-treated steel
30 = h6 stainless steel
31 = h7 stainless steel
60 = h6 hard chrome-plated heat-treated steel
61 = h7 hard chrome-plated heat-treated steel

Ordering example:
Shaft diameter 30 mm, h7, heat-treated steel, 900 mm long, ready-mounted shaft support rail:
R1016 030 01/900 mm.

Dimensions



Dimensions (mm)											Grading tolerances (µm)		
												h6 shaft	h7 shaft
Ø 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]	H_1[3]	H_1[3]
16	18	26.0	14	7.0	3	75	5.5	9	7.0	M5	20	32	36
20	22	32.0	17	8.5	3	75	6.6	11	8.3	M6	20	33	38
25	26	38.5	21	10.5	3	75	9.0	15	10.8	M8	20	33	38
30	30	45.0	23	11.5	3	100	11.0	17	11.0	M10	20	33	38
40	39	59.0	30	15.0	4	100	13.5	21	15.0	M12	20	35	41
50	46	71.0	35	17.5	5	100	15.5	25	19.0	M14	20	35	41

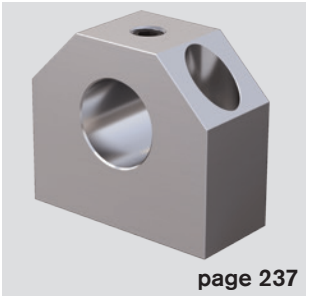
1) Tolerance: ±0.02 mm; comes with a height grade of 20 µm.
2) Measured with gauging shaft, nominal dimension d and length about 50 mm. Up to 1,800 mm length with parallelism of 10 µm available upon request.
3) Includes shaft tolerance (determined from statistics).

Shaft support blocks

Product overview

The benefits

- For easy installing and quick aligning
- Precise design with reference edge
- More affordable than in-house designs



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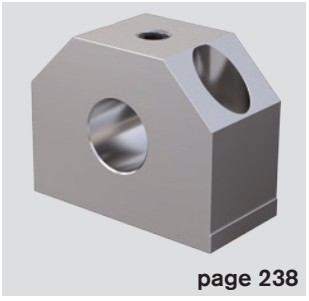
Aluminum compact R1058



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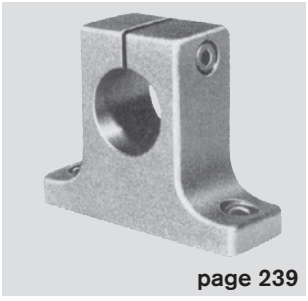
Aluminum R1057



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Cast iron, steel R1055

page 240

Cast iron flange R1056

Sample shaft support block:

Shaft support block
WBA-30-C-FO

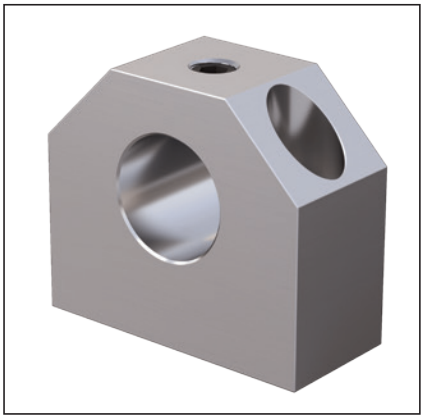
Definition of codes			WB	A	30	C	FO			
Type	Shaft support block	= WB								
Material	Cast iron	= G								
	Aluminum	= A								
	Steel	= S								
Shaft diameter		= 30								
								FO	= Top securing	**Fastening**
								P	= For profile systems	
								F	= Flanged	
								C	= Compact	**Form**

Shaft support blocks

Compact shaft block, R1058

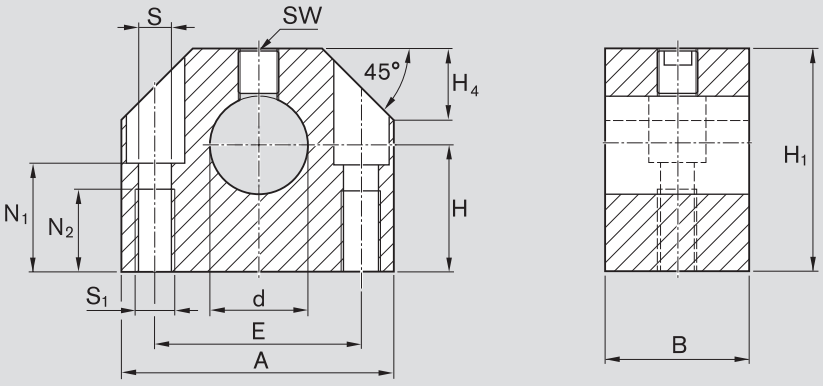
Material
- Aluminum

Design
- Very low height fitting linear sets with compact linear bushings
- Topside clamping for better accessibility
- Better security thanks to clamping screw with larger thread diameter
- Thread for fastening from below
- Drill hole for fastening from above



Shaft Ø d (mm)	Material number WBA-...C-FO	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) Ø d	d H8	H[1] ±0.01	H_1	A	B	E ±0.15	S[2]	S_1	N_1	N_2	H_4	SW	Tightening torque (Nm)
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	16.0
30	30	34	60	67	30	49	8.4	M10	29	22	19	4.0	16.0
40	40	42	76	87	40	66	10.5	M12	38	26	24	5.0	30.0
50	50	50	92	103	50	80	13.5	M16	46	34	30	6.0	52.0

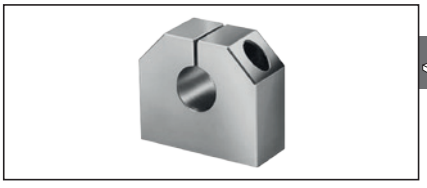
1) In relation to nominal shaft dimension d
2) ISO 4762-8.8 fastening bolts

Explanation of sample short product name

WB	A	20	-	C	-	FO
Shaft support block	Aluminum	Ø 20		Compact series		Top securing

See page 236 for more information on short product names.

Note: Same version with side clamping available under R1058 7 ..

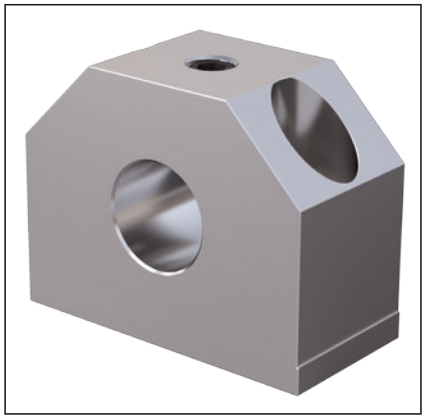


Shaft support blocks

Shaft support blocks, R1057

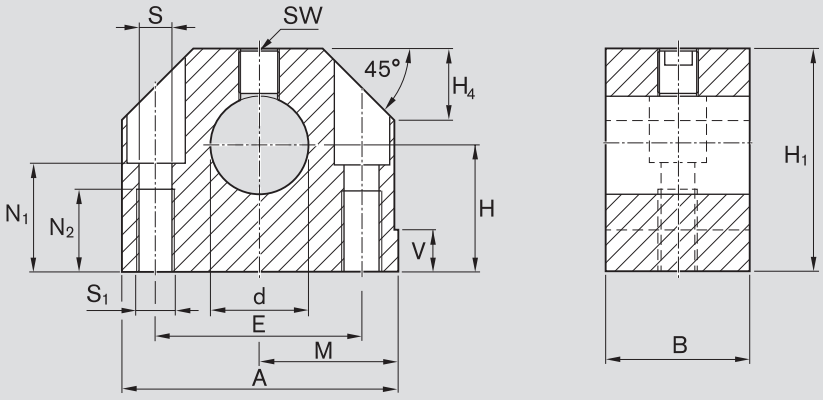
Material
- Aluminum

Design
- Rigid shaft mounting due to extra-wide design
- Topside clamping for better accessibility
- Better security thanks to clamping screw with larger thread diameter
- Thread for fastening from below
- Drill hole for fastening from above
- Reference edge for easy alignment



Shaft Ø d (mm)	Material number WBA-...-FO	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) Ø d	d H8	H1) ±0.01	H_1	M1) ±0.01	A	B	E	S2)	S_1	N_1	N_2	V	H_4	SW	Tightening torque (Nm)
10	10	18	31	20.0	40	20	$27^{\pm 0.15}$	5.3	M6	14.0	13	5.0	10	2.5	3.8
12	12	20	35	21.5	43	20	$30^{\pm 0.15}$	5.3	M6	16.5	13	5.0	10	2.5	3.8
16	16	25	42	26.5	53	24	$38^{\pm 0.15}$	6.6	M8	21.0	18	5.0	13	3.0	6.6
20	20	30	51	30.0	60	30	$42^{\pm 0.15}$	8.4	M10	25.0	22	5.0	16	4.0	16.0
25	25	35	61	39.0	78	38	$56^{\pm 0.15}$	10.5	M12	30.0	26	6.5	20	5.0	30.0
30	30	40	70	43.5	87	40	$64^{\pm 0.15}$	10.5	M12	34.0	26	8.0	22	5.0	30.0
40	40	50	88	54.0	108	48	$82^{\pm 0.15}$	13.5	M16	44.0	34	10.0	28	6.0	52.0
50	50	60	105	66.0	132	58	$100^{\pm 0.20}$	17.5	M20	49.0	42	12.0	37	8.0	120.0
60	60	75	130	82.0	164	74	$124^{\pm 0.20}$	22.0	M27	59.0	42	13.0	42	10.0	220.0

1) In relation to nominal shaft dimension d 2) ISO 4762-8.8 fastening bolts

Explanation of sample short product name

WB	A	20	-	FO
Shaft support block	Aluminum	Ø 20		Top securing

See page 236 for more information on short product names.

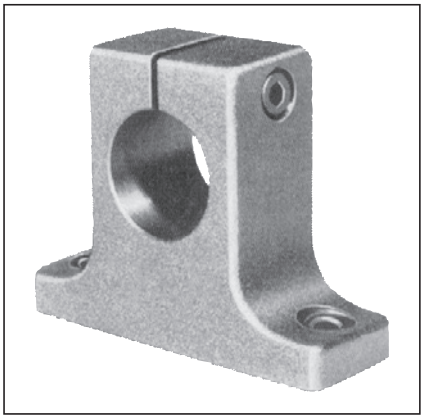
Note: Same version with side clamping available under R1057 7 ..

Shaft support blocks

Shaft support blocks, R1055

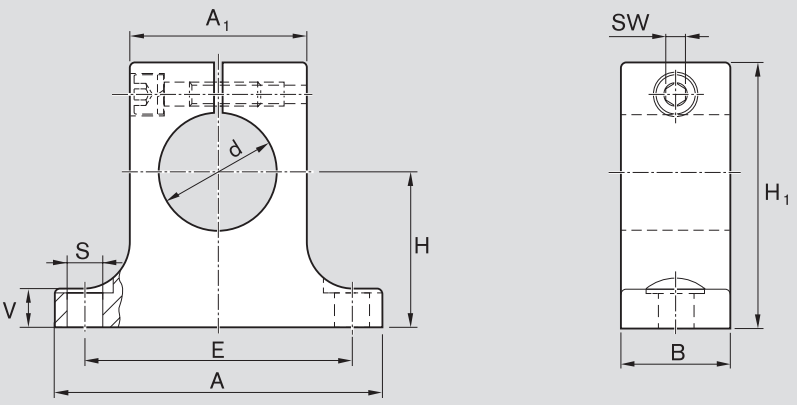
Material
- Spheroidal graphite cast iron
- Steel

Design
- Side clamping



Shaft Ø d (mm)	Material number WBG-...	Weight (kg)
8	R1055 008 00	0.04
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



Dimensions (mm)

Ø d	d H8	H[1)]	H_1[2)]	A[2)]	A_1[2)]	B[2)]	E	S[3)]	V[2)]	SW
8	8	$15^{\pm 0.010}$	27	32	16	10	$25^{\pm 0.15}$	4.5	5.0	2.5
12	12	$20^{\pm 0.010}$	35	42	20	12	$32^{\pm 0.15}$	5.5	5.5	3.0
16	16	$25^{\pm 0.010}$	42	50	26	16	$40^{\pm 0.15}$	5.5	6.5	3.0
20	20	$30^{\pm 0.010}$	50	60	32	20	$45^{\pm 0.15}$	5.5	8.0	3.0
25	25	$35^{\pm 0.010}$	58	74	38	25	$60^{\pm 0.15}$	6.6	9.0	4.0
30	30	$40^{\pm 0.010}$	68	84	45	28	$68^{\pm 0.20}$	9.0	10.0	5.0
40	40	$50^{\pm 0.010}$	86	108	56	32	$86^{\pm 0.20}$	11.0	12.0	6.0
50	50	$60^{\pm 0.015}$	100	130	80	40	$108^{\pm 0.20}$	11.0	14.0	6.0
60	60	$75^{\pm 0.015}$	124	160	100	48	$132^{\pm 0.25}$	13.5	15.0	8.0
80	80	$100^{\pm 0.015}$	160	200	130	60	$170^{\pm 0.50}$	17.5	22.0	10.0

1) In relation to nominal shaft dimension d
2) ISO 8062-3 - DCTG 11 tolerance
3) ISO 4762-8.8 socket head cap bolts.

Explanation of sample short product name

WB	G	20
Shaft support block	Spheroidal graphite cast iron	Ø 20

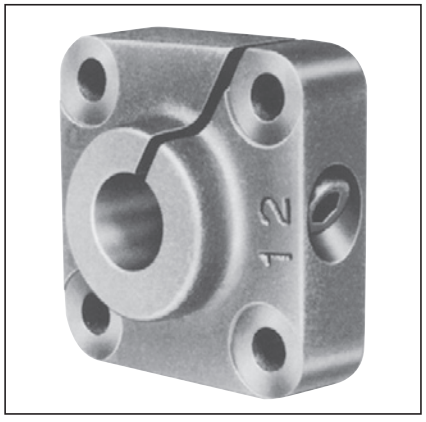
See page 236 for more information on short product names.

Shaft support blocks

Shaft support block, R1056 Flanged

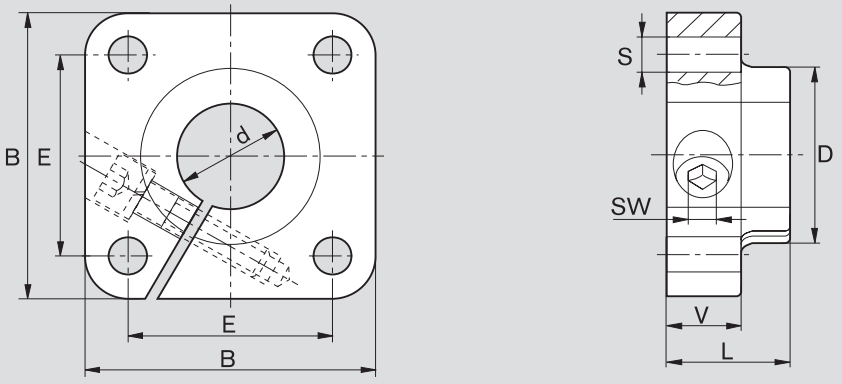
Material
– Lamellar graphite cast iron

Design
– Compared to installing the shafts in customer-made bores, flanged shaft support blocks allow the shafts to be aligned and prevent the linear bushings from overloading due to shafts that are not parallel
– Side clamping screw



Shaft Ø d (mm)	Material number WBG-...F	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)]	SW
12	12	42	20	23.5	$30^{\pm 0.12}$	5.5	12	3
16	16	50	20	27.5	$35^{\pm 0.12}$	5.5	12	3
20	20	54	23	33.5	$38^{\pm 0.15}$	6.6	14	4
25	25	60	25	42.0	$42^{\pm 0.15}$	6.6	16	5
30	30	76	30	49.5	$54^{\pm 0.25}$	9.0	19	6
40	40	96	40	65.0	$68^{\pm 0.25}$	11.0	26	8
50	50	106	50	75.0	$75^{\pm 0.25}$	11.0	36	8

1) ISO 8062-3 - DCTG 9 tolerance

Explanation of sample short product name

WB	G	20	-	F
Shaft support block	Lamellar graphite cast iron	Ø 20		Flanged

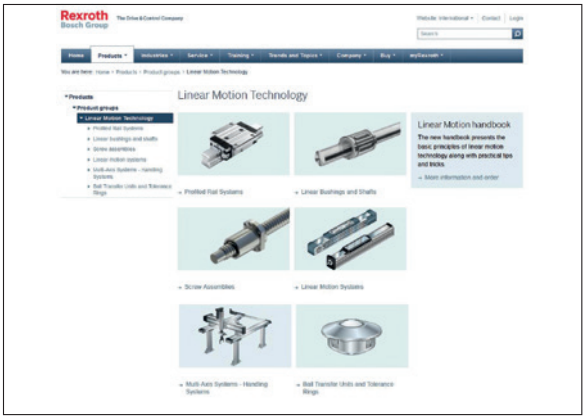
See page 236 for more information on short product names.

Further information

Here you will find extensive information on products, eShop, training and services.

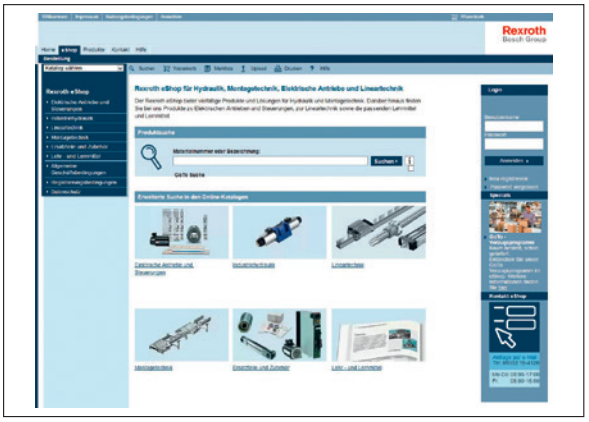
Product information:

http://www.boschrexroth.com/en/xc/products/product-groups/linear-motion-technology/index



eShop:

http://www.boschrexroth.com/eshop



Training:

http://www.boschrexroth.com/training

Service:

http://www.boschrexroth.com/service

Notes

The Drive & Control Company

Rexroth
Bosch Group

Bosch Rexroth AG
Ernst-Sachs-Straße 100
97424 Schweinfurt, Deutschland
Phone +49 9721 937-0
Fax +49 9721 937-275
www.boschrexroth.com

Find your local contact here:
www.boschrexroth.com/contact

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