

LINEAR BALL BEARINGS & HARDENED STEEL SHAFTS



ROLLCO

SPECIALIZED
ON LINEAR MOTION

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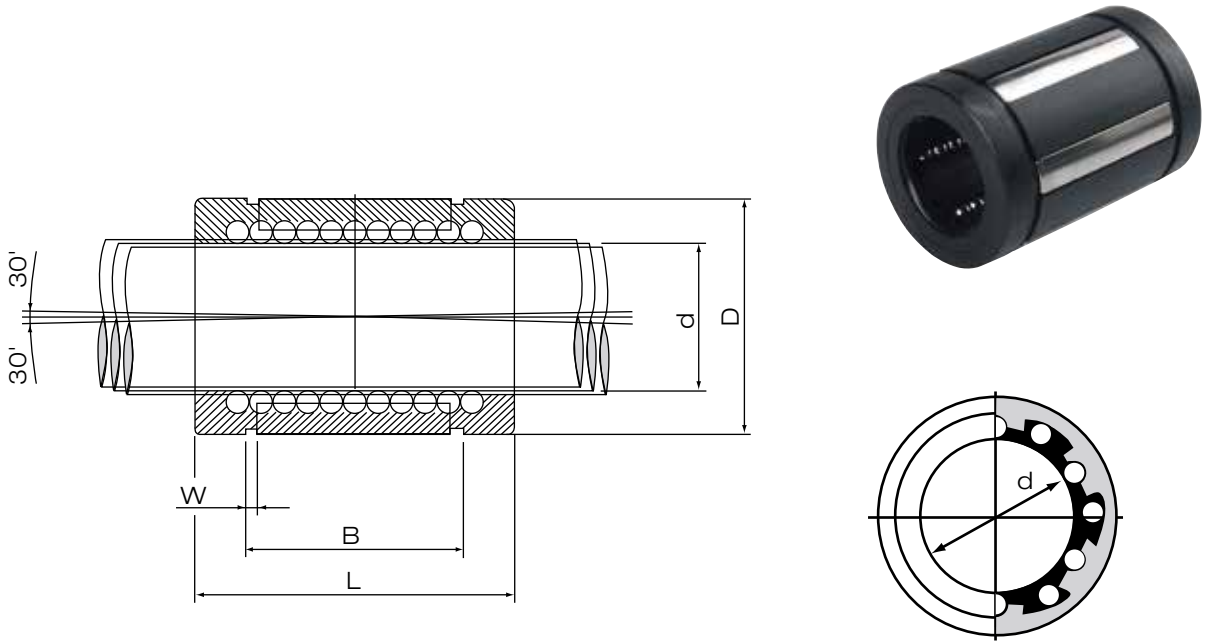
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Self-aligning Closed Type SBE

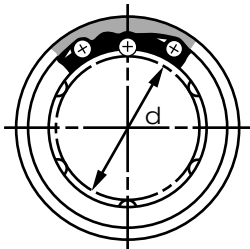
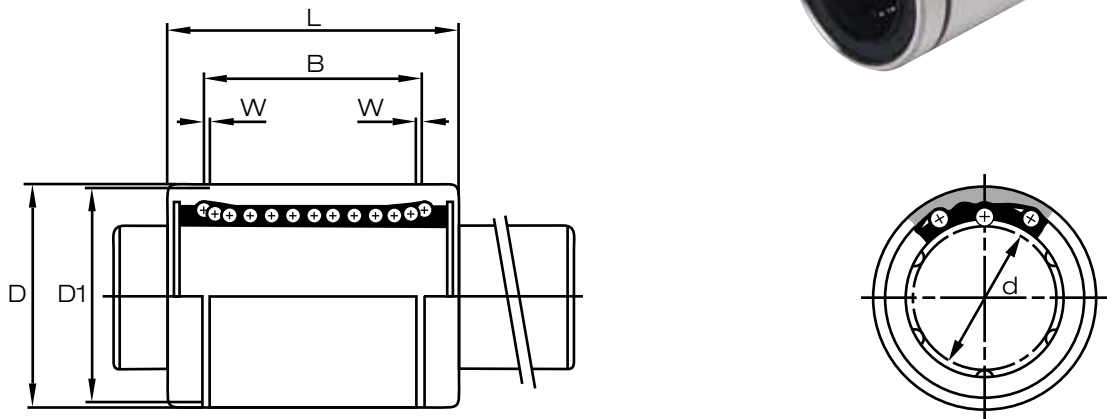


Dimensions: mm

Article No.	Number of ball rows	Inscribed circle diameter	Outer diameter	Length	Outer locking groove	Load capacity		
		d	D	L	B	W	Dynamic C(N)	Static Co(N)
SBE16UU	5	16	26	36	24.6	1.3	1530	1280
SBE20UU	6	20	32	45	31.2	1.6	2630	1700
SBE25UU	6	25	40	58	43.7	1.85	3880	2810
SBE30UU	6	30	47	68	51.7	1.85	4810	2860
SBE40UU	6	40	62	80	60.3	2.15	6630	5840
SBE50UU	6	50	75	100	77.3	2.65	11690	8100

Other types on request

Closed Type LME

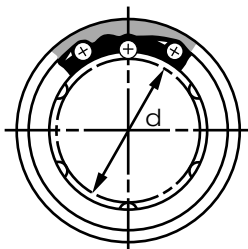
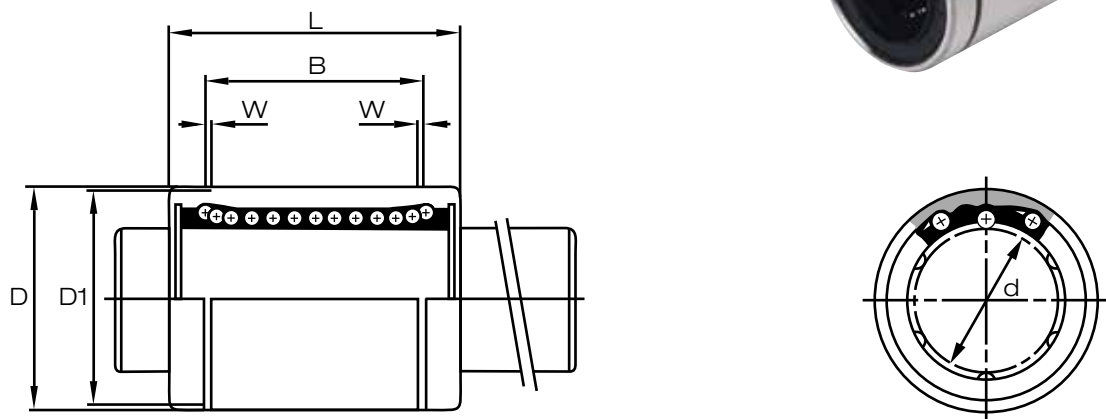


Dimensions: mm

Article No.	Number of ball rows	Inscribed circle diameter	Outer diameter	Length	Outer locking groove	Outer locking groove diameter		Load capacity	
								Dynamic C(N)	Static Co(N)
		d	D	L	B	D1	W		
LME5UU	4	5	12	22	14.5	11.5	1.1	210	270
LME8UU	4	8	16	25	16.5	15.2	1.1	270	410
LME12UU	4	12	22	32	22.9	21	1.3	520	790
LME16UU	5	16	26	36	24.9	24.9	1.3	590	910
LME20UU	5	20	32	45	31.5	30.3	1.6	880	1400
LME25UU	6	25	40	58	44.1	37.5	1.85	1000	1600
LME30UU	6	30	47	68	52.1	44.5	1.85	1600	2800
LME40UU	6	40	62	80	60.6	59	2.15	2200	4000
LME50UU	6	50	75	100	77.6	72	2.65	3900	8100
LME60UU	6	60	90	125	101.7	86.5	3.15	4800	10200

Other types on request

Closed Type LMES, Stainless

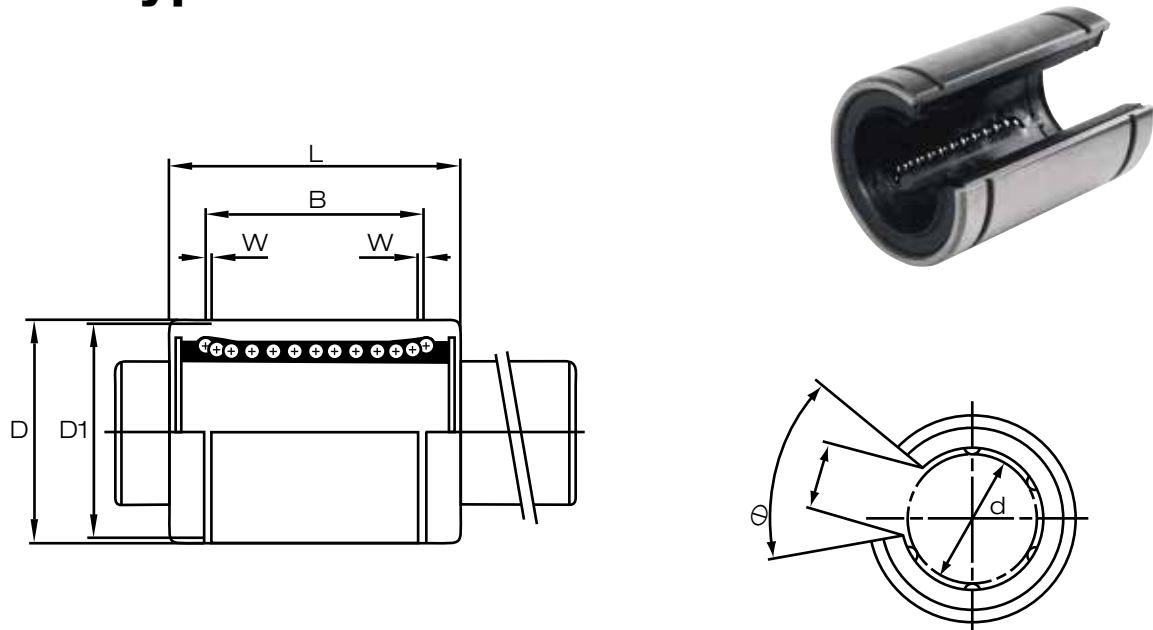


Dimensions: mm

Article No.	Number of ball rows	Inscribed circle diameter	Outer diameter	Length	Outer locking groove	Outer locking groove diameter		Load capacity	
								Dynamic C(N)	Static Co(N)
		d	D	L	B	D1	W		
LMES8UU	4	8	16	25	16,5	15,2	1,1	270	410
LMES12UU	4	12	22	32	22.9	21	1.3	520	790
LMES16UU	5	16	26	36	24.9	24.9	1.3	590	910
LMES20UU	5	20	32	45	31.5	30.3	1.6	880	1400
LMES25UU	6	25	40	58	44.1	37.5	1.85	1000	1600
LMES30UU	6	30	47	68	52.1	44.5	1.85	1600	2800
LMES40UU	6	40	62	80	60.6	59	2.15	2200	4000

Other types on request

Open Type LME...UUOP

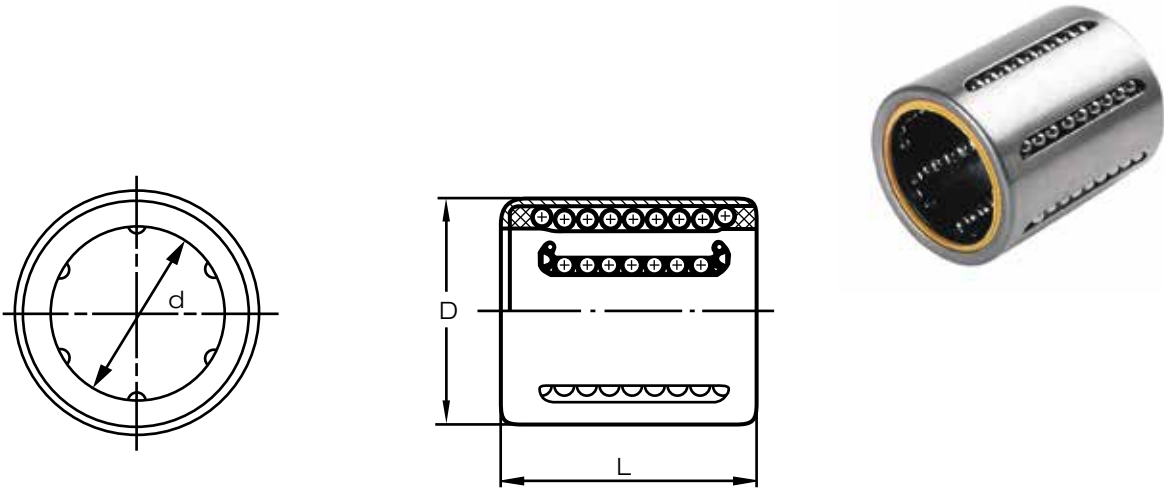


Dimensions: mm

Article No.	Number of ball rows	Inscribed circle diameter	Outer diameter	Length	Outer locking groove	Outer locking groove diameter			Load capacity	
		d	D	L	B	D1	W	θ	Dynamic C(N)	Static Co(N)
LME12UUOP	3	12	22	32	22.9	21	1.3	78°	520	790
LME16UUOP	4	16	26	36	24.9	24.9	1.3	78°	590	910
LME20UUOP	4	20	32	45	31.5	30.3	1.6	60°	880	1400
LME25UUOP	5	25	40	58	44.1	37.5	1.85	60°	1000	1600
LME30UUOP	5	30	47	68	52.1	44.5	1.85	60°	1600	2800
LME40UUOP	5	40	62	80	60.6	59	2.15	60°	2200	4000
LME50UUOP	5	50	75	100	77.6	72	2.65	60°	3900	8100

Other types on request

Compact Type KH

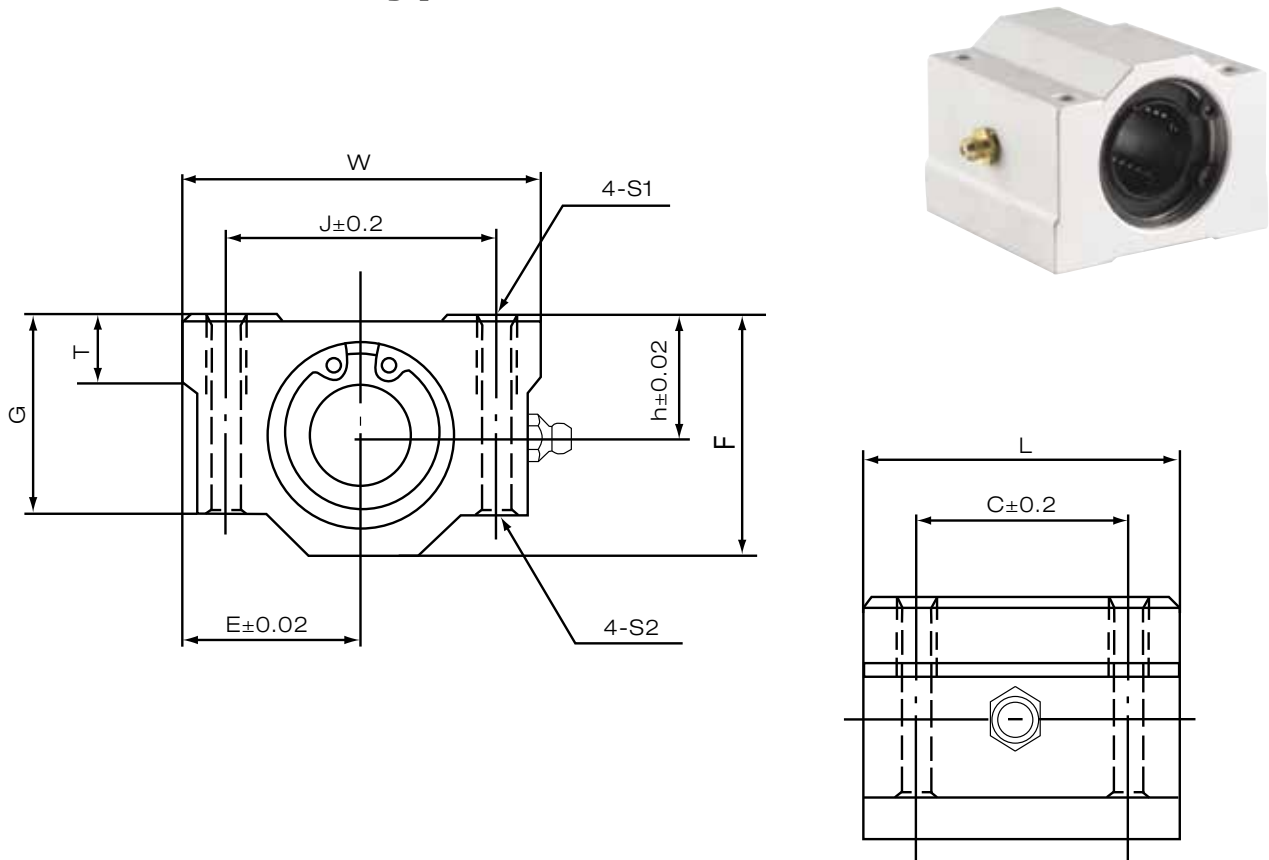


Dimensions: mm

Article No.	Inscribed circle diameter	Outer diameter	Length	Load capacity		External seals
				Dynamic C(N)	Static Co(N)	
KH0622PP	6	12	22	400	239	-
KH0824PP	8	15	24	435	280	-
KH1026PP	10	17	26	500	370	-
KH1228PP	12	19	28	620	510	G 12 x 19 x 3
KH1428PP	14	21	28	620	520	G 14 x 21 x 3
KH1630PP	16	24	30	800	620	G 16 x 24 x 3
KH2030PP	20	28	30	950	790	G 20 x 28 x 4
KH2540PP	25	35	40	1990	1670	G 25 x 35 x 4
KH3050PP	30	40	50	2800	2700	G 30 x 40 x 4
KH4060PP	40	52	60	4400	4450	G 40 x 52 x 5
KH5070PP	50	62	70	5500	6300	-

Other types on request

Closed Unit Type KBA...UU



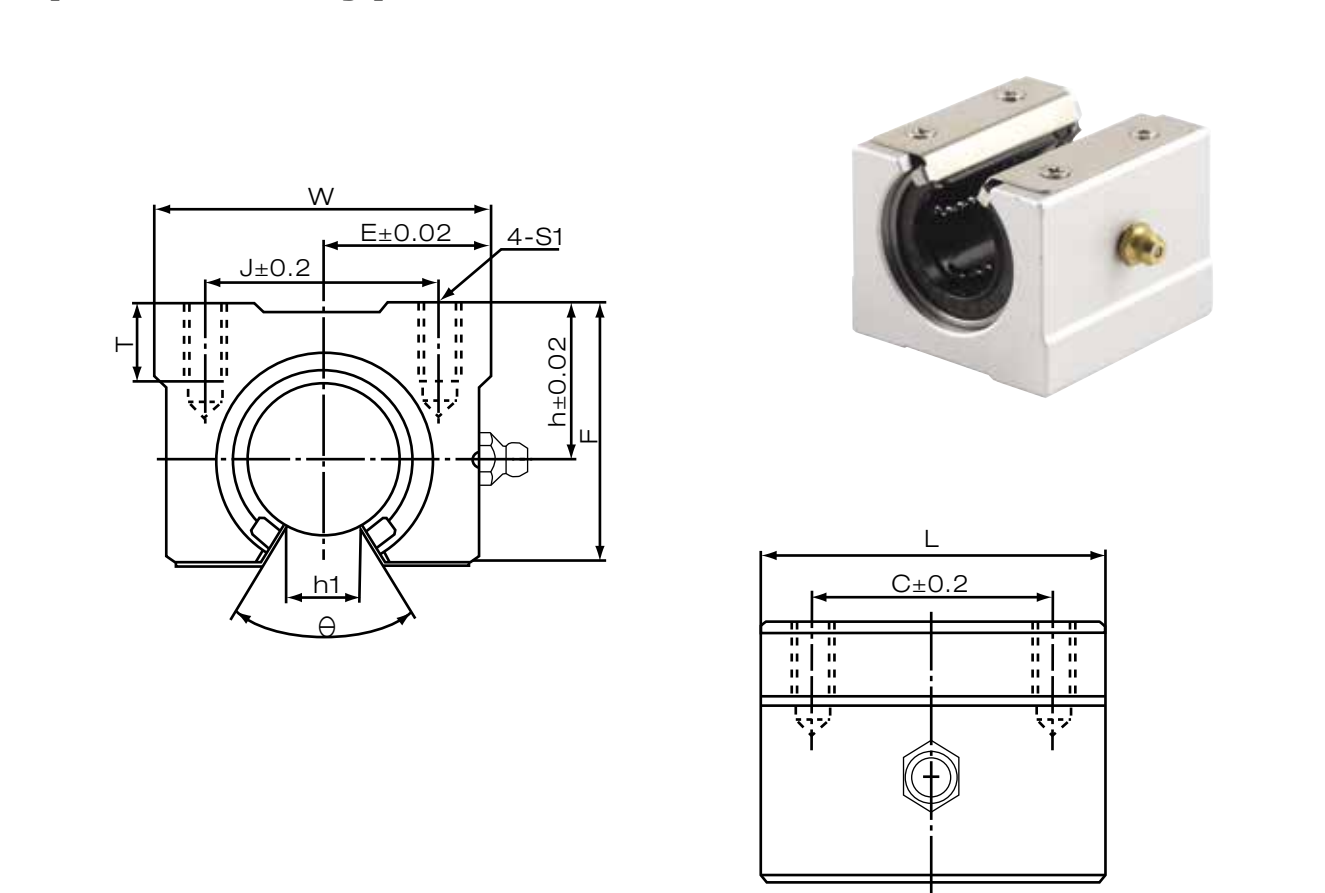
NOTE: Linear Units can also be supplied with selfaligning SBE-Bushing (KBE...UU) or stainless LMES-Bushing (KBS..UU)

Dimensions: mm

Article No.	Inscribed circle diameter												Load capacity	
		h	E	W	L	F	G	T	J	C	S1	S2	Dynamic C(N)	Static Co(N)
KBA12UU	12	15	22	44	39	30	24.5	8	33	26	M5	4.3	520	740
KBA16UU	16	19	25	50	44	38.5	32.5	9	36	34	M5	4.3	590	910
KBA20UU	20	21	27	54	53	41	35	11	40	40	M6	5.2	880	1400
KBA25UU	25	26	38	76	67	51.5	42	12	54	50	M8	7	1000	1600
KBA30UU	30	30	39	78	76	59.5	49	15	58	58	M8	7	1600	2800
KBA40UU	40	40	51	102	90	78	62	20	80	60	M10	8.7	2200	4000
KBA50UU	50	52	61	122	110	102	80	25	100	80	M10	8.7	3900	8100

Other types on request

Open Unit Type KBA...UUOP

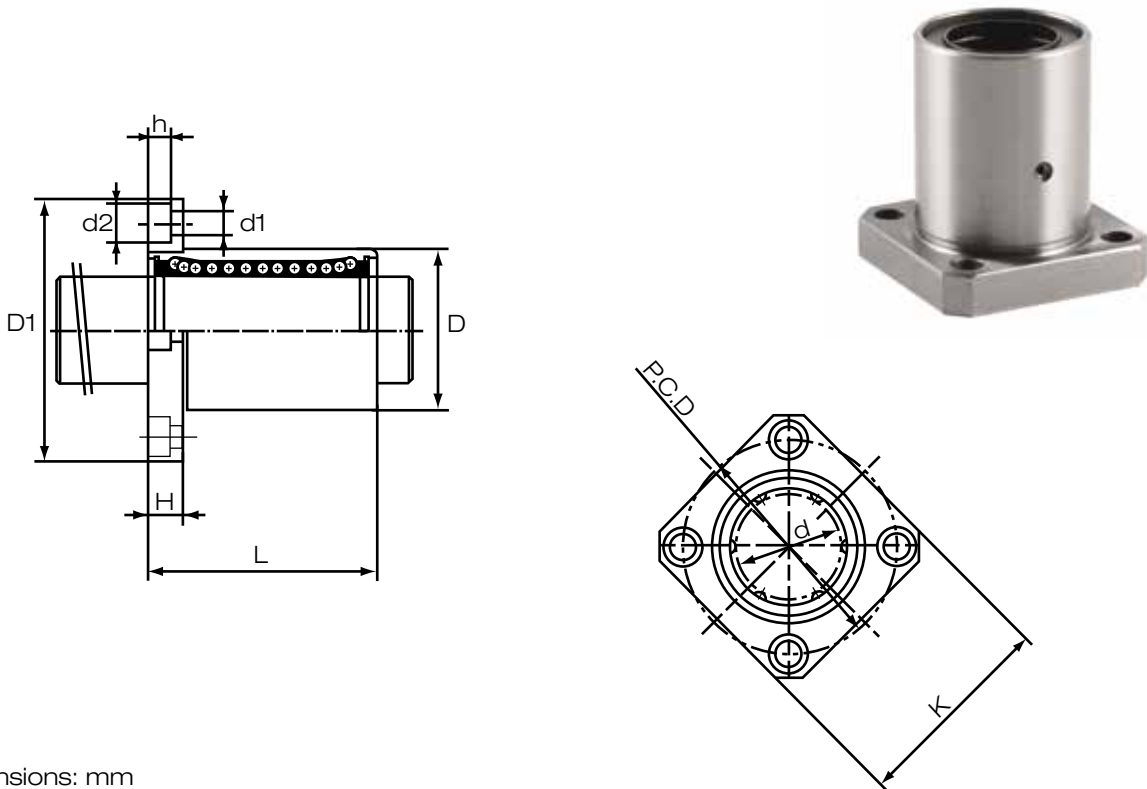


Dimensions: mm

Article No.	Inscribed circle diameter												Load capacity	
		W	F	L	h	E	h1	θ	J	C	S1	T	Dynamic C(N)	Static Co(N)
KBA16UUOP	16	45	33	45	20	22.5	10	80	32	30	M5	12	590	910
KBA20UUOP	20	48	39	50	23	24	10	60	35	35	M6	12	880	1400
KBA25UUOP	25	60	47	65	27	30	11.5	60	40	40	M6	12	1000	1600
KBA30UUOP	30	70	56	70	33	35	14	60	50	50	M8	18	1600	2800
KBA40UUOP	40	90	72	90	42	45	19	60	65	65	M10	20	2200	4100

Other types on request

Flange Unit Type LMEK...UU

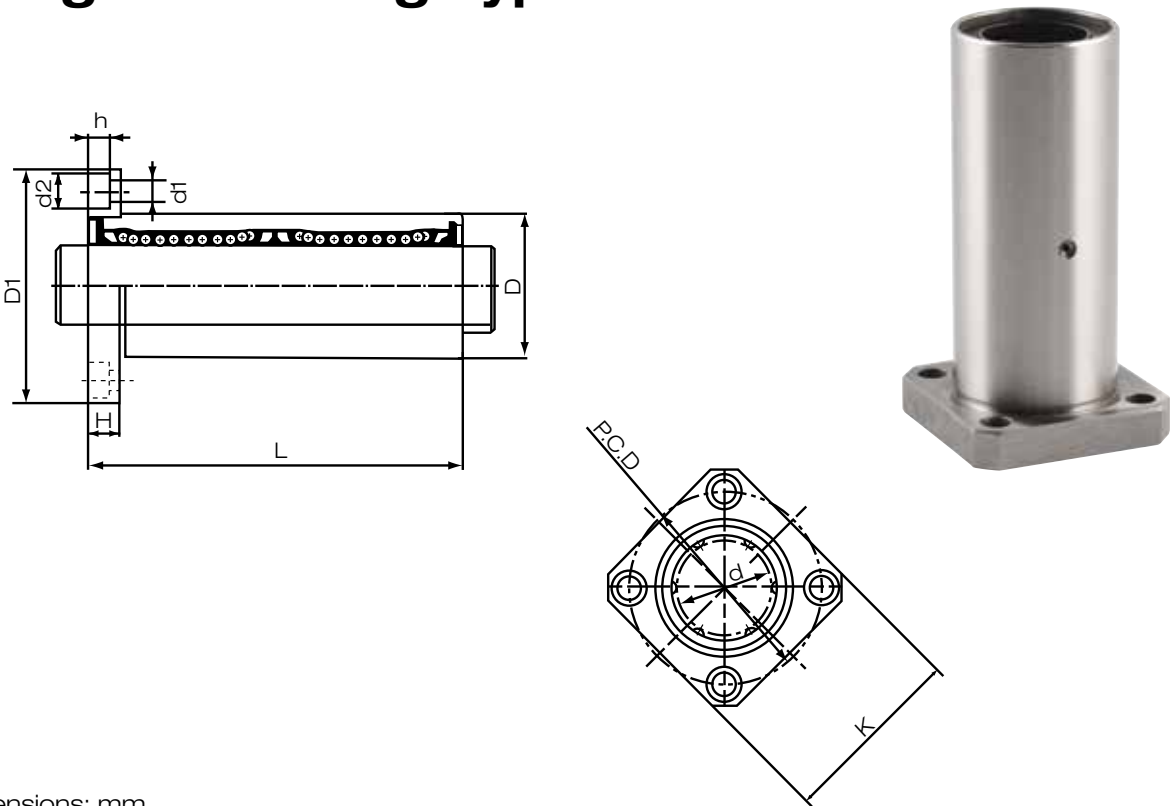


Dimensions: mm

Article No.	No. of ball rows													Load capacity	
		d	D	L	D1	K	H	P.C.D	d1	x	d2	x	h	Dynamic C(N)	Static Co(N)
LMEK8UU	4	8	16	25	32	25	5	24	3,5	x	6	x	3,1	270	410
LMEK12UU	4	12	22	32	42	32	6	32	4,5	x	7,5	x	4,4	520	790
LMEK16UU	5	16	26	36	46	35	6	36	4,5	x	7,5	x	4,4	590	910
LMEK20UU	5	20	32	45	54	42	8	43	5,5	x	9	x	5,4	880	1400
LMEK25UU	6	25	40	58	62	50	8	51	5,5	x	9	x	5,4	1000	1600
LMEK30UU	6	30	47	68	76	60	10	62	6,6	x	11	x	6,5	1600	2800
LMEK40UU	6	40	62	80	98	75	13	80	9	x	14	x	8	2200	4100
LMEK50UU	6	50	75	100	112	88	13	94	9	x	14	x	8,1	3900	8100
LMEK60UU	6	60	90	125	134	106	18	112	11	x	17,5	x	10,8	4800	10000

Other types on request

Flange Unit Long Type LMEK...LUU

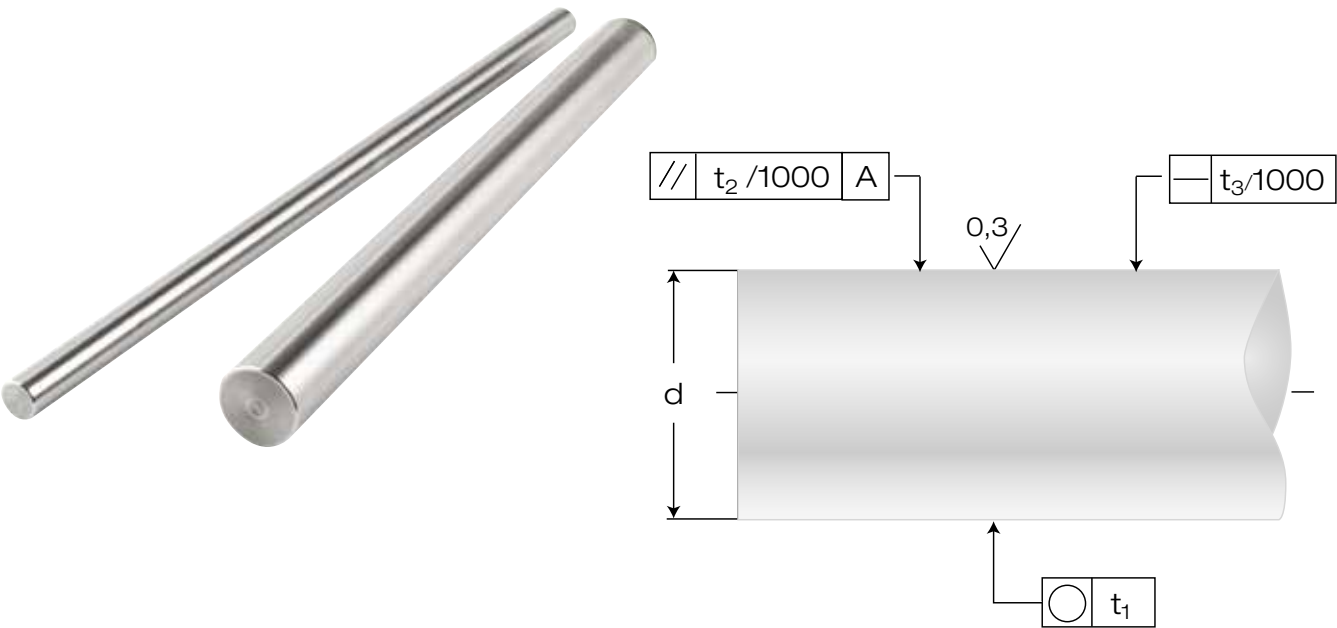


Dimensions: mm

Article No.	No. of ball rows													Load capacity	
		d	D	L	D1	K	H	P.C.D	d1	x	d2	x	h	Dynamic C(N)	Static Co(N)
LMEK12LUU	4	12	22	61	42	32	6	32	4.5	x	8	x	4.4	657	1200
LMEK16LUU	5	16	26	68	46	35	6	36	4.5	x	8	x	4.4	1230	2350
LMEK20LUU	5	20	32	80	54	42	8	43	5.5	x	9.5	x	5.4	1400	2750
LMEK25LUU	6	25	40	112	62	50	8	51	5.5	x	9.5	x	5.4	1560	3140
LMEK30LUU	6	30	47	123	76	60	10	62	6.6	x	11	x	6.5	2490	5490
LMEK40LUU	6	40	62	152	98	75	13	80	9	x	14	x	8.6	3430	8040
LMEK50LUU	6	50	75	192	112	88	13	94	9	X	14	X	8,6	6200	16220
LMEK60LUU	6	60	90	209	134	106	18	112	11	X	17	X	11	7700	20400

Other types on request

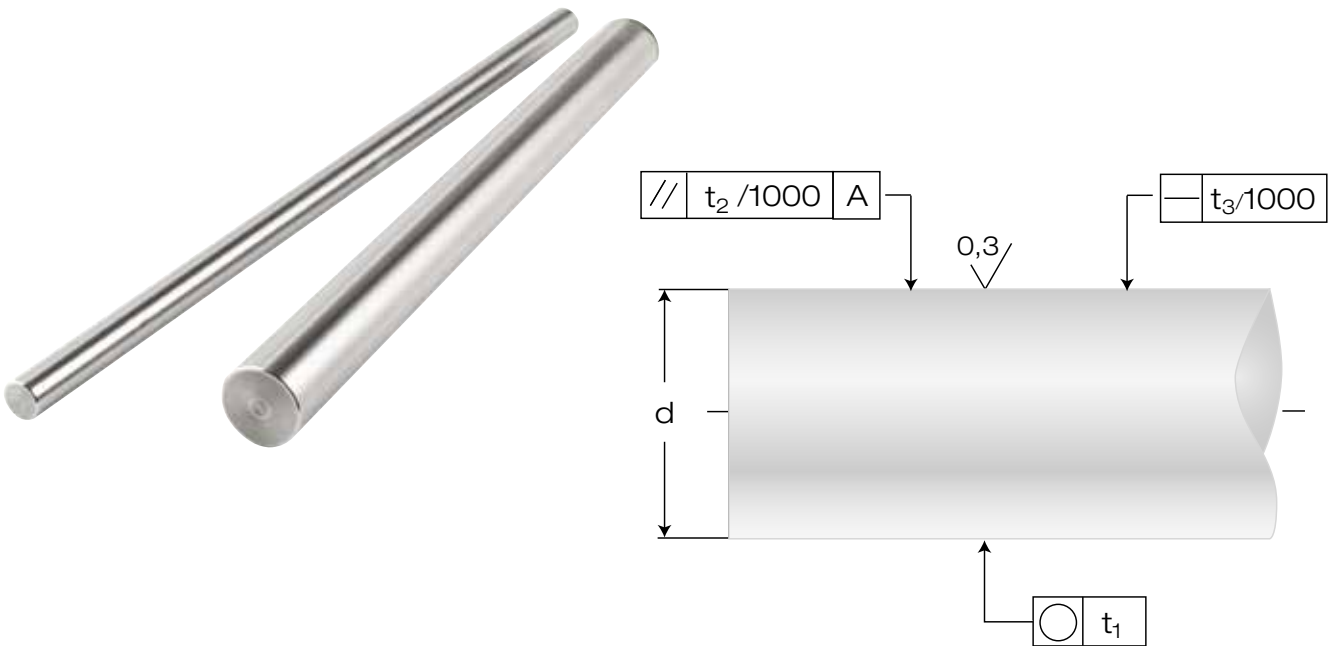
Hardened Precision Shafts W



Article No.	Weight	Shaft Diameter	Hardening depth	Standard tolerance	Roundness (circular)	Parallelism (cylindric)	Straightness
	kg/m	d mm	ISO 13012 mm	ISO h6 μm	t1 μm	t2 μm	t3 mm/m
W5	0,15	5	0,4	0/-8	4	5	0,2
W6	0,22	6	0,4	0/-8	4	5	0,2
W8	0,39	8	0,4	0/-9	4	6	0,2
W10	0,61	10	0,4	0/-9	4	6	0,1
W12	0,89	12	0,6	0/-11	5	8	0,1
W14	1,21	14	0,6	0/-11	5	8	0,1
W16	1,56	16	0,6	0/-11	5	8	0,1
W20	2,47	20	0,9	0/-13	6	9	0,1
W25	3,85	25	0,9	0/-13	6	9	0,1
W30	5,55	30	0,9	0/-13	6	9	0,1
W40	9,86	40	1,5	0/-16	7	11	0,1
W50	15,41	50	2,2	0/-16	7	11	0,1
W60	22,20	60	2,2	0/-19	8	13	0,1
W80	39,46	80	3,2	0/-19	8	13	0,1

- Other types on request
- Material: e. g. quenched and tempered steel Cf53 / 1.1213
- Surface hardness: 59 HRC min.

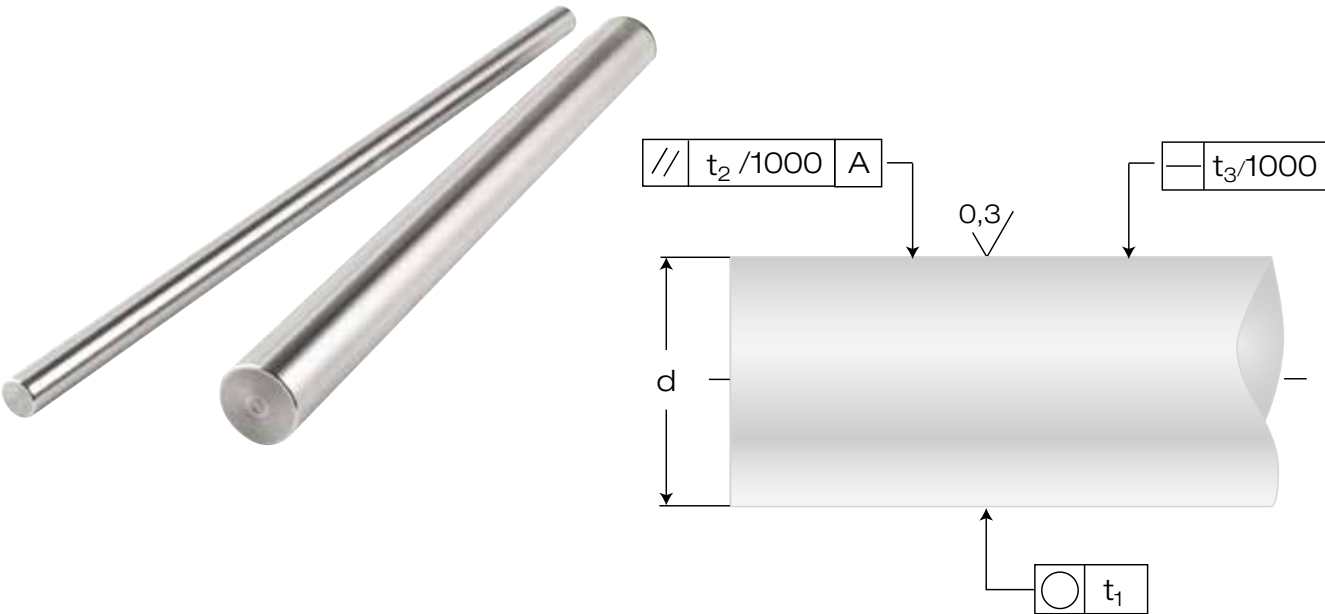
Hardened Precision Shafts WV, Chrome Plated



Article No.	Weight	Shaft Diameter	Hardening depth	Standard tolerance	Roundness (circular)	Parallelism (cylindric)	Straightness
	kg/m	d mm	ISO 13012 mm	ISO h7 μm	t1 μm	t2 μm	t3 mm/m
WV10	0,62	10	0,4	0/-15	6	9	0,1
WV12	0,89	12	0,6	0/-18	8	11	0,1
WV16	1,56	16	0,6	0/-18	8	11	0,1
WV20	2,47	20	0,9	0/-21	9	13	0,1
WV25	3,85	25	0,9	0/-21	9	13	0,1
WV30	5,55	30	0,9	0/-21	9	13	0,1
WV40	9,86	40	1,5	0/-25	11	16	0,1

- Other types on request
- Material: e. g. quenched and tempered steel Cf53 / 1.1213
- Surface hardness: 59 HRC min.
- Chrome layer thickness: ca. 10 μm
- Layer hardness: ≥ 800 HV

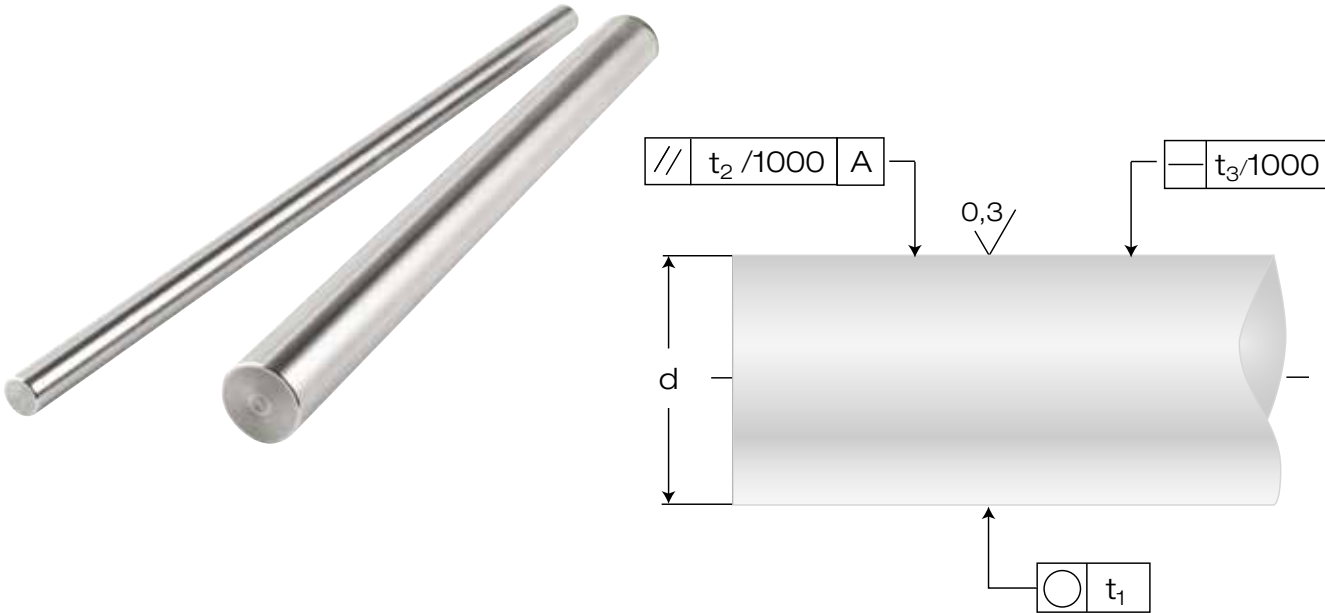
Hardened Precision Shafts WRB,
Stainless Steel X46



Article No.	Weight	Shaft Diameter	Hardening depth	Standard tolerance	Round-ness (circular)	Parallelism (cylindric)	Straight-ness
		d	ISO 13012	ISO h6	t1	t2	t3
	kg/m	mm	mm	µm	µm	µm	mm/m
WRB5	0,15	5	0,4	0/-8	4	5	0,2
WRB6	0,22	6	0,4	0/-8	4	5	0,2
WRB8	0,40	8	0,4	0/-9	4	6	0,2
WRB10	0,62	10	0,4	0/-9	4	6	0,1
WRB12	0,89	12	0,6	0/-11	5	8	0,1
WRB14	1,21	14	0,6	0/-11	5	8	0,1
WRB16	1,58	16	0,6	0/-11	5	8	0,1
WRB20	2,47	20	0,9	0/-13	6	9	0,1
WRB25	3,85	25	0,9	0/-13	6	9	0,1
WRB30	5,55	30	0,9	0/-13	6	9	0,1
WRB40	9,87	40	1,5	0/-16	7	11	0,1
WRB50	15,41	50	2,2	0/-16	7	11	0,1
WRB60	22,20	60	2,2	0/-19	8	13	0,1

- Other types on request
- Material: X46Cr13 / 1.4034
- Surface hardness: 52 HRC min.
- Reduction of load rating for linear ball bearing because of less hardness

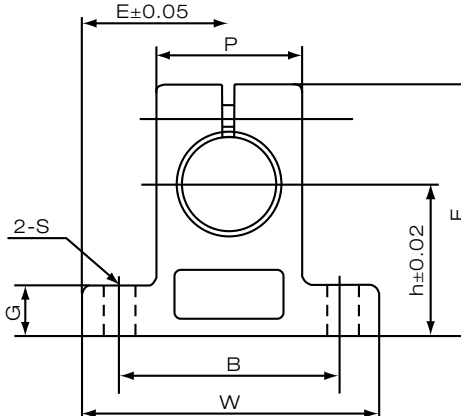
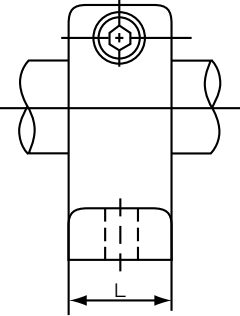

Hardened Precision Shafts WRA,
Stainless Steel X90



Article No.	Weight	Shaft Diameter	Hardening depth	Standard tolerance	Round-ness (circular)	Parallelism (cylindric)	Straight-ness
		d	ISO 13012	ISO h6	t1	t2	t3
	kg/m	mm	mm	µm	µm	µm	mm/m
WRA8	0,39	8	0,4	0/-9	4	6	0,2
WRA10	0,62	10	0,4	0/-9	4	6	0,1
WRA12	0,89	12	0,6	0/-11	5	8	0,1
WRA14	1,21	14	0,6	0/-11	5	8	0,1
WRA16	1,56	16	0,6	0/-11	5	8	0,1
WRA20	2,47	20	0,9	0/-13	6	9	0,1
WRA25	3,85	25	0,9	0/-13	6	9	0,1
WRA30	5,55	30	0,9	0/-13	6	9	0,1
WRA40	9,86	40	1,5	0/-16	7	11	0,1
WRA50	15,41	50	2,2	0/-16	7	11	0,1

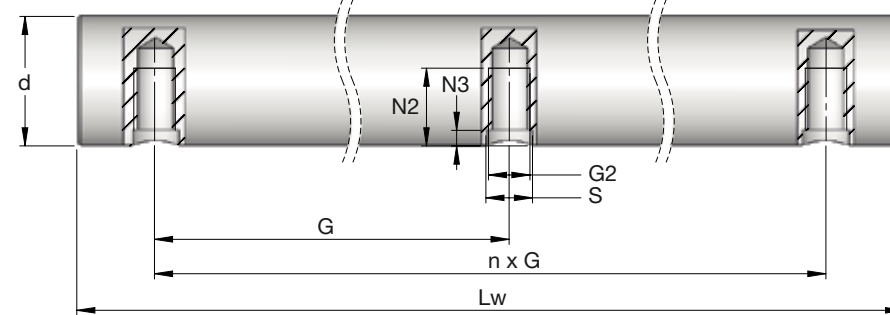

- Other types on request
- Material: X90CrMoV18 / 1.4112
- Surface hardness: 54 HRC min.
- Reduction of load rating for linear ball bearing because of less hardness

Shaft Block Type SK



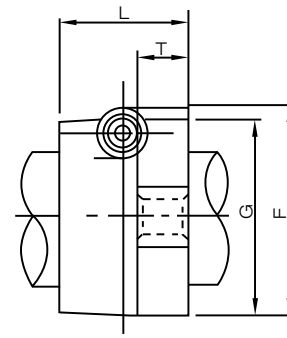
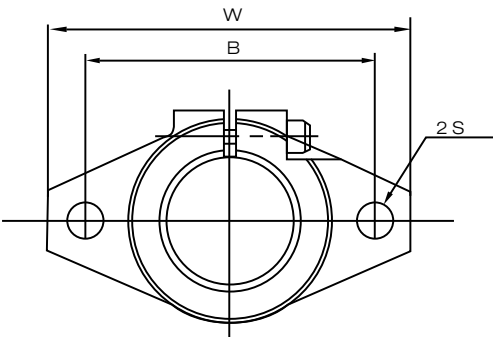

Article No.	Circle diameter	h	W	E	B	P	S	G	F	L	Weight (g)
SK12A	12	23	42	21	32	20	5.5	6	38	14	30
SK16A	16	27	48	24	38	25	5.5	8	44	16	40
SK20A	20	31	60	30	45	30	6.6	10	51	20	70
SK25A	25	35	70	35	56	38	6.6	12	60	24	130
SK30A	30	42	84	42	64	44	9	12	70	28	180
SK40A	40	60	114	57	90	60	11	15	96	36	420
SK50A	50	70	126	63	100	74	14	18	120	40	750

Precision Shafts WB, Predrilled



Other tolerances according to standard shaft W

Shaft Block Type SHF



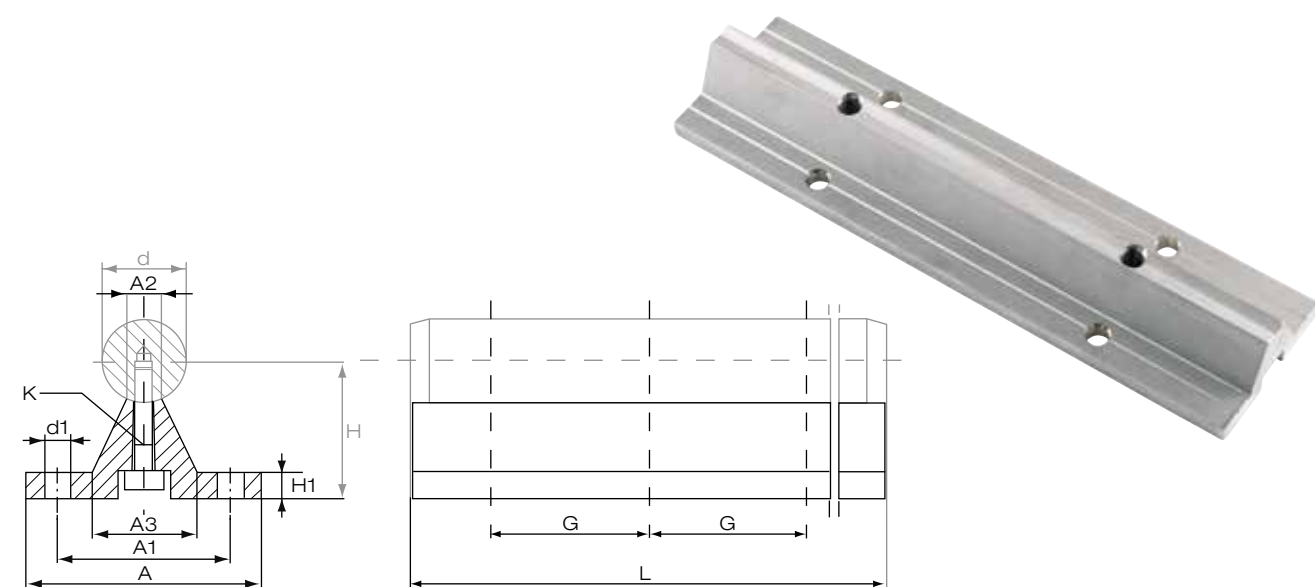
Article No.	Circle diameter	W	L	T	F	G	B	S	Weight (g)
SHF12	12	47	13	7	28	25	36	5,5	20
SHF16	16	50	16	8	31	28	40	5.5	27
SHF20	20	60	20	8	37	34	48	7	40
SHF25	25	70	25	10	42	40	56	7	60
SHF30	30	80	30	12	50	46	64	9	110
SHF40	40	102	40	16	67	56	80	12	510

Dimensions: mm

Article No.	Shaft diameter	Pitch	Thread	Thread depth	Thread dimension	
	d	G	G2	N2	N3	S
WB12	12	75	M4	7	2	5
WB16	16	100	M5	9	2,5	6
WB20	20	100	M6	11	3	7
WB25	25	120	M8	15	3	9
WB30	30	150	M10	17	3,5	11
WB40	40	200	M10	19	4	11

Other types on request

Shaft Support FTSN Flange Type



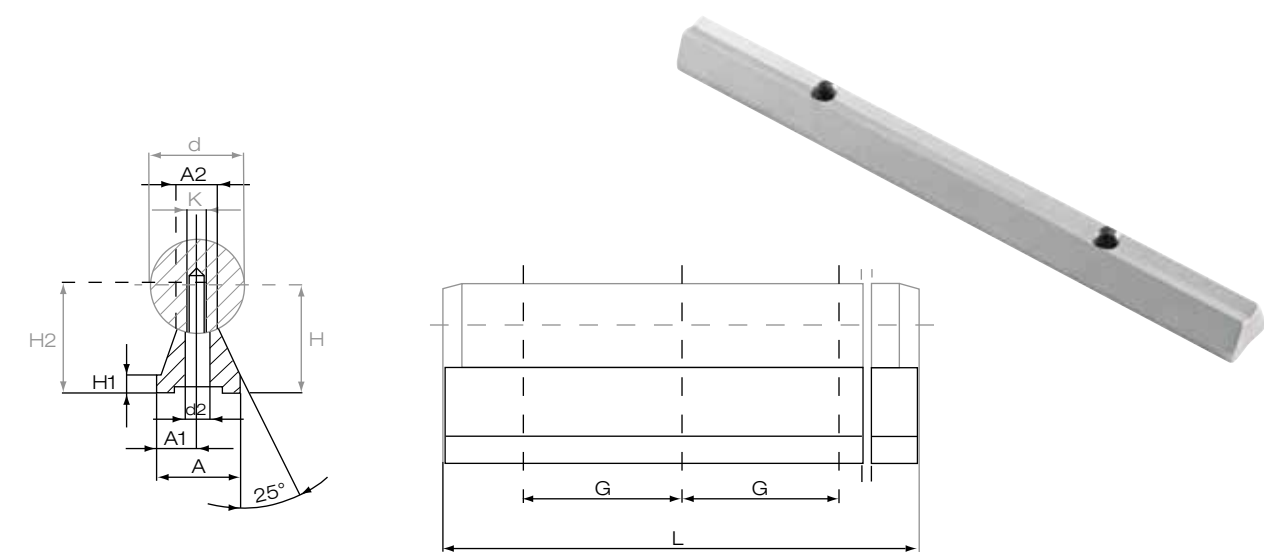
Note: The shaft is not included - please order separately. See page 15 for WB-shafts.

Dimensions: mm

Article No.	Dimensions mm		Mounting dimensions mm							
	d	A	H	A2	A3	H1	A1	d1	G	K
FTSN12G	12	40	22	5,4	15	5	29	4,5	75	M4x20
FTSN16G	16	45	26	7	19	5	33	5.5	100	M5x20
FTSN20G	20	52	32	8.1	23	6	37	6.6	100	M6x25
FTSN25G	25	57	36	10.3	26	6	42	6.6	120	M8x30
FTSN30G	30	69	42	11	29	7	51	9	150	M10x35
FTSN40G	40	73	50	15	36	8	55	9	200	M10x40

Standard section length **L=3700 mm**
Support rails can be supplied, upon request, with or without mounting holes and in length different than standad (L_{max} = 3700 mm)
Note: No anodizing in holes

Shaft Support FTSU Low Type



Note: The shaft is not included - please order separately. See page 15 for WB-shafts.

Dimensions: mm

Article No.	Dimensions mm		Mounting dimensions mm							
	d	A	H	A1	A2	H1	K	d2	H2	G
FTSU16G	16	14	18	7	7	3	M5	5.5	19	100
FTSU20G	20	17	22	8.5	8.1	3	M6	6.6	23	100
FTSU25G	25	21	26	10.5	10.3	3	M8	9	28.5	120
FTSU30G	30	23	30	11.5	11	3	M10	11	32	150
FTSU40G	40	30	39	15	15	4	M10	13.5	39.5	200

Standard section length **L=4000 mm**
Support rails can be supplied, upon request, with or without mounting holes and in length different than standad (L_{max} = 4000 mm)
Note: No anodizing in holes

Contact factor (f_c)

Load biasing, attributed to mounting errors and multiple bearing assemblies can be accounted for by using the coefficient in table.

Number of bearings for shaft	Contact factor
1	1.00
2	0,81
3	0,72
4	0,66
5	0,61

Load factor (f_w)

The loads acting on the linear units include payload, inertial effects during acceleration and deceleration as well as moment loads. All of these factors are difficult to assess and are further complicated by the potential presence of shocks and vibrations. A more practical solution involves the use of the coefficients in table.

Operating conditions	f _w
Low speed operations (< 15 m/min) without shockloads	1 - 1,5
Medium speed operations (60 m/min) without shockloads	1,5 - 2
High speed operations (> 60 m/min) without shockloads	2 - 3,5

Static safety factor

For applications with a high requirement for accuracy and smooth running, the static safety factor f_s should be higher than the values shown in table to prevent permanent deformation at the contact points.

f_s = $\frac{\mathbf{Co}}{\mathbf{Po}}$

f_s = static safety factor

Po = static equivalent load (N)

Co = static load rating (N)

Operating conditions	f _s
Shafts subjected to small deflections and low shocks	1 ÷ 2
Elastic deflection can cross load the units	2 ÷ 4
System subjected to shock & vibration	3 ÷ 5

Mounting Tolerances

The table below shows the tolerances to be used for a proper bearing installation. They insure a precise and smooth motion.

Recommended mounting tolerances for SBE-LME-LMES-KH bushings

Housing Material	
Housing tolerance	
Steel/cast iron	H7
Alluminum/alloy	H7

Friction

The magnitude of the friction force is affected by several factors. The type of bearing, the operating conditions, the type and quantity of the lubricant, the presence or lack of seals all impact the overall frictional behaviour. Standard seals can add between 2 and 5 N to the overall friction force. The magnitude of the coefficient of friction depends upon the operating conditions such as load, moments and/or preload. Table below shows the dynamic coefficient of friction for each type of bearing under normal operating condition (P/C = 0.2) and proper assembly.

Type of bearing	Friction coefficient
KH	0.004 to 0.006
LME/SBE	0.002 to 0.003

Operating temperature

The operating temperature ranges of the various bearings are shown in table below. Should the operating temperature exceed the limits shown in the table, please contact Rollco. Stainless steel units, without seals, can operate between -20/+120 deg. C.

Bearing type	Operating temperature
KH	-20 to + 100°C
LME/LMES/SBE	-20 to + 100°C

Lifetime Calculation

Dynamic load rating C

The dynamic load rating C is a load of constant magnitude under which 90% of a statistically significant number of apparently identical bearings would reach a theoretical life of 50 km without the apparent appearance of metal fatigue.

Static load rating Co

The static load rating Co is defined as the load that would cause a permanent deformation equal to 1/10.000 of the ball diameter at the most stressed contact point.

Life of a linear ball bearing

Repeated stresses onto the contact surfaces could lead to material fatigue, This will lead to the appearance of surface pitting. The life of the unit is defined as the duration before the appearance of pitting.

Rated life (L)

The rated life L is the total traveled distance which 90% of a statistically significant number of apparently identical bearings would reach under the same operating conditions without the apparent appearance of metal fatigue.

$$L = (C/P)^3 \cdot 50 \text{ (1)}$$

L = rated life (km)

C = dynamic load ratings (N)

P = equivalent dynamic load (N)

When a system is subjected to a load equal to the dynamic load rating C the resulting life equal the rated life (50 km). The theoretical life of a linear bearing is affected by the load and by the operating conditions (temperature, vibration, shock, load distribution, etc.) In such cases the theoretical life is calculated with the help of equation 2.

$$L = (f_c \cdot C / f_w \cdot P)^3 \cdot 50 \text{ (2)}$$

L = rated life (km)

C = dynamic load ratings (N)

P = equivalent dynamic load (N)

f_c = Contact coefficient

f_w = Load factor

The following equation (3) allows the conversion of the rated life in hours.

$$L_h = L \cdot 10^3 / (2 \cdot L_s \cdot n_1 \cdot 60) \text{ (3)}$$

L_h = rated life (hours)

L_s = stroke length (m)

L = rated life (km)

n₁ = operating frequency (stroke/min)

Product Overview



BALL SCREWS

High efficiency ball screws and nuts.



LINEAR UNIT QME

Complete linear drive unit with ball bushings and ball screws.



LINEAR UNIT RHL

Complete unit with tooth belt.



LINEAR UNITS

Complete unit with ball screw or tooth belt.



ALUMINIUM PROFILES

A full program of aluminium profiles and accessories.



BELT CONVEYOR

Transportation system with different drive options



U-RAIL

Rollers in steel or polyamide. For light, standard or heavy load. Mounted in U-rails.



COMPACT RAIL

No more problems with parallelism. Low noise. Lifetime lubricated bearings.



C-RAIL

A simple and cost effective linear bearing system



LINEAR RAIL SYSTEM

The most standardized linear rail system.



MINIATURE

Range from 3 mm up to 15 mm.



EASY RAIL

A strong solution for short strokes.



ROLLER GUIDES

Four raceways with rollers. High load capacity.



HEAVY TELESCOPIC

The strongest solution for extraction.



LIGHT TELESCOPIC

Telescopic systems for smooth movement. Steel and aluminium.



BALL BEARINGS

Linear ball bearings and hardened steel shafts.

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