Linear ball bearings

Linear ball bearings and housing units

NIKO®

NIPPON KODO
AUTOMATION TECHNOLOGY

www.nipponkodobearings.com

Linear ball bearings

KH Bushing

COMPACT RANGE
KH SERIES P.15

Linear Ball Bearings

LME P.16

LME-AJ P.16

LME-OP P.16

LME-L P.18




Linear Ball Bearings Flanged Type


LME-F P.20


LMEK P.22


LMEF-L P.24


LMEK-L P.26


LMEFC P.28


LMEKC P.28

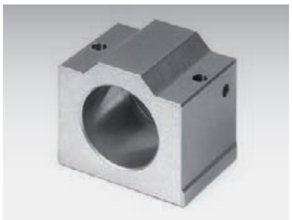
Super Linear Ball Bearings

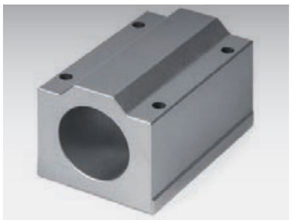

LMES P.34


LMES-OP P.35

Linear ball bearings housing units

Linear ball bearing housing


SA P.37


STA P.38


S2B P.39


S2O P.40

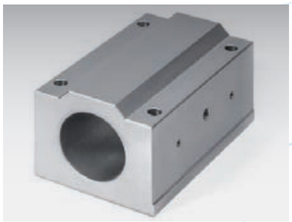

SB P.41


SJ P.42


SO P.43

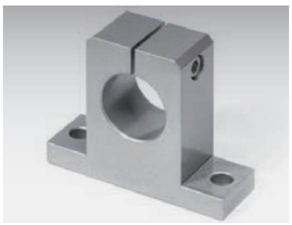

SOJ P.44


SLO P.45


SBT P.46


SOT P.47

Shaft support


FGWA P.48


FGWH P.49

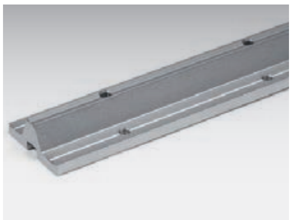

FGWN P.50


SFWR P.51

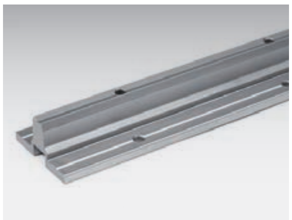



Support rail

FTSU P.52



FTSN P.53



FTSW P.54

FTSWA P.55

Precision linear shafts

P.56

Technical Information

Load Rating

Basic Dynamic Load Rating (C)

This term is arrived at based on an evaluation of a number of identical linear systems individually run in the same conditions, if 90% of them can run with the load (with a constant value in a constant direction) for a distance of 50 km without damage caused by rolling fatigue. This is the basis of the rating.

Allowable Static Moment (M)

This term defines the allowable limit value of static moment load, with reference to the amount of permanent deformation similar to that used for evaluation of basic rated load (Co).

Static Safety Factor (fs)

This factor is used based on the application condition as shown in Table 1.

Basic Static Load Rating (Co)

This term defines a static load such that, at the contacting position where the maximum stress is exercised, the sum of the permanent deformation of the rolling elements and that of the rolling plane is 0.0001 time of the diameter of the rolling elements.

Table 1. Stactic Safety Factors

Condition of use	Low limit of fs
When the shaft has less deflection and shock	1 to 2
When elastic deformation should be considered with respect to pinch load	2 to 4
When the equipment is subject to vibration and impacts	3 to 5

Rating Life

Rating Life of the Lineat System

As long as the linear system reciprocates while being loaded, continuous stress acts on the linear system to cause flaking on the rolling bodies and planes because of material fatigue. The travelling distance of linear system until the fist flaking occurs is called the life of the systems. The life of the system varies even for the systems of the same dimenstions, structure, material, heat treatment and processing method, when used in the same conditions. This variation is brought about from the essential variations in the material fatigue itself. he rating life defined bellow is used as an index for the life expectancy of the linear system.

Rating Life (L)

Rating life is the total travelling distance that 90% of a group of ystems of the same size can reach without causing any flaking when they operate under the same conditions.

The rating life can be obtained from the following equation with The basic dynamic load rating and the load on the linear system:

For ball type: $L=\left(\frac{C}{P}\right)^3 \cdot 50$ ——————— (1)

L: Rating life (km) C: Basic dynamic load rating (N)
P: Load (N)

Consideration and influence of vibration impact loads and distribution of load should be taken into account when designing a linear motion system, It is difficult to calculate the actual load. The rating life is also affected by the operating temperature. In these conditions, the expression(1) is arranged as follows:

For ball type:

$$L=\left(\frac{f_H \cdot f_T \cdot f_C}{f_W}\frac{C}{P}\right)^3 \cdot 50$$

L: Rating lift (km) fh: Hardness factor (See Fig. 1)
C: Basic dynamic load rating (N)
fT: Temperature coefficient (See Fig. 2) P: Load (N)
fc: Contact coefficient (See Table 2)
fw: Load coefficient (See Table 3)

The rating life in hours can be calculated by obtaining the travelling distance per unit time. The rating life in hours can be obtained from the following expression when the stroke length and the number of strokes are constant:

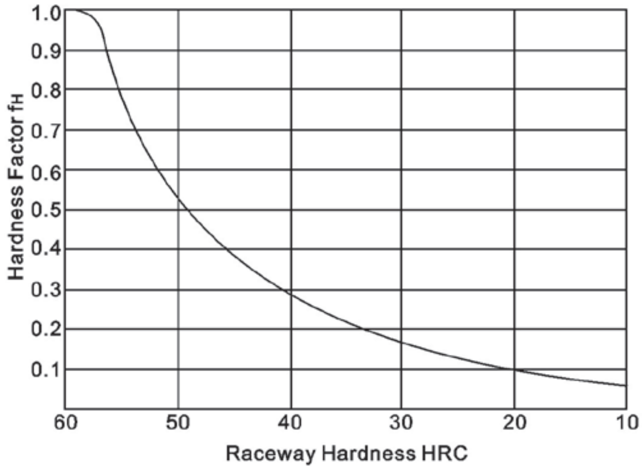
$$L_h=\frac{L \cdot 10^3}{2\ell_s \cdot n_1 \cdot 60}$$

Lh: Rating life in hours (hr)
ℓ_s: Stroke length (m)
L: Rating life (km)
n1: No. of strokes per minute (cpm)

Hardness Factor (fH)

The shaft must be sufficiently hardened when a linear bushing is used. If not properly hardened, permissible load is lowered and the life of the bushing will be shortened.

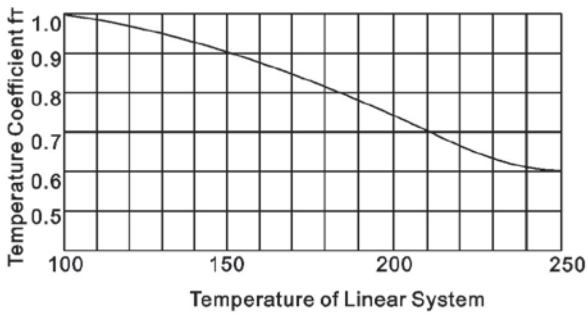
Fig. 1 Hardness Factor



Temperature Coefficient (fT)

If the temperature of the linear system exceeds 100℃, hardness of the linear system and the shaft lowers to decrease the permissible load compared to that of the linear system used at room temperature. As a result, the abnormal temperature rise shortens the rating life.

Fig. 2 Temperature Coefficient



Contact Coeffcient (fc)

Generally two or more linear bushings are used on one shaft. Thus, the load on each linear system differs depending on each processing accuracy. Because the linear bushings are not loaded equally, the number of linear bushings per shaft changes the permissible load off the system.

Table 2 Contact Coefficient

Number of linear systemsper shaft	Contact coefficient fc
1	1.00
2	0.81
3	0.72
4	0.66
5	0.61

Load Coefficient (fw)

When calculating the load on the linear system, it is necessary to accurately obtain object weight, inertial force based on motion speed, moment load, and each transition as time passes. However, it is difficult to calculate those values accurately because reciprocating motion involves the repetition of start and stop as well as vibration and impact. A more practical approach is to obtain the load coefficient by taking the actual operating conditions into account.

Table 3 Load Coefficient

Operating Conditionss	fw
Operation at low speed (15m/min.or less) without impulsive shock from outside	1.0 to 1.5
Operation at intermediate speed (60m/min.or less) without impulsive shock	1.5 to 2.0
Operation at high speed (over 60m/min.) With impulsive shock from outside	2.0 to 3.5

Technical Information

Frictional Resistance

The static frictional resistance of the NIKO linear system is so low as to be only slightly different from the kinetic frictional resistance, enabling smooth linear movement from low to high speeds. In general, the frictional resistance is expressed by the following equation.

$$F=\mu \cdot W+f$$

F: Frictional resistance　　μ : Coefficient of friction
W: Load weight　　f: Sealing resistance

The frictional resistance of each NIKO linear system depends on the model, load weight, speed, and lubricant. The sealing resistance depends on the lip interference and lubricant, regardless of the load weight. The sealing resistance of one linear system is about 200 to 500 gf. The coefficient of friction depends on the load weight, moment load, and preload. Table 6 shows the coefficient of kinetic friction of each type of linear system which has been installed and lubricated properly and applied with normal load （P/C=0.2）

Table 5 Coefficient of Linear System Friction （μ）

Linear System Type	Models	Coefficient of Friction (μ)
Linear Bushing	LM LME LMB	0.002 to 0.003

Ambient Working Temperature

The ambient working temperature range for each NIKO linear system depends on the model. Consult NIKO on use outside the recommended temperature range.

Temperature conversion equation

$$C=\frac{5}{9}(F-32)$$

$$F=32+\frac{9}{5}C$$

Table 6 Ambient Working Temperature

Linear System Type	Models	Ambient Working Temperature
Linear Bushing	LM LME LMB	-20 to 80℃

Lubrication and Dust Prevention

Using NIKO linear systems without lubrication increases the abrasion of the rolling elements, shortening the life span. The NIKO linear systems therefore require appropriate lubrication. For lubrication NIKO recommends turbine oil conforming to ISO Standards G32 to G68 or lithium base soap grease No.2. Some NIKO linear systems are sealed to block dust out and seal lubricant in. If used in a harsh or corrosive environment, however, apply a protective cover to the part involving linear motion.

Structure and Features

- The NIKO linear bushing consists of an outer cylinder, ball retainer, balls and two end rings. The ball retainer which holds the balls in the recirculating trucks in held in side the outer cylinder by end rings.
- Those parts are assmbled to optimize their required functions.
- The outer cylinder is maintained sufficient hardness by heat treatment, therefore if ensures the bushings projected travel life and satisfactory durability.
- The ball retainer is made from steel or synthetics resin. The steel retainer has high rigidity, obtained by heat treat meant.

  The synthetics resin retainer can reduce running noise. The user can select the optimum type for meeting the user's service conditions.

1.High Precision and Rigidity

The NIKO linear bushing is produced from a solid steel outer cylinder and incorporates an industrial strength resin retainer.

2.Ease of Assembly

The standard type of NIKO linear bushing can be loaded from any direction. Precision control is possible using only the shaft supporter, and the mounting surface can be machined easily.

3.Ease of Replacement

NIKO linear bushings of each type are completely interchangeable because of their standardized dimensions and strict precision control. Replacement because of wear or damage is therefore easy and accurate.

4.Variety of Types

NIKO offers a full line of linear bushing: the standard, integral single-retainer closed type, the clearance adjustable type and the open types. The user can choose from among these according to the application requirements to be met.

Technical Information

Types and linear Bushing Number

Example

LME | **25** | **F** | **UU** | **AJ**

Type

LME	Metric dimension series generally used in Europe

Nominal Shaft Diameter

Flange Type

F	Round type
K	Square type
H	

Seal

Symbol	Specification
No entry	No seal
U	Seal on one side
UU	Seals on both sides

Modification

Symbol	Specification
No entry	Standard Type
AJ	Adjustable Type
OP	Open Type

Tolerance

Note that precision of inscribed circle diameters and outside diameters for the clearance adjustable type (····-AJ) and the open type (····-OP) indicates the value obtained before the corresponding type is subjected to cutting process.

Load Rating and life Expectancy

The lift (L) of a linear bushing can be obtained from the following equation with the basic dynamic load rating and the load applied to the bush:

$$L=\left(\frac{f_H \cdot f_T \cdot f_C}{f_W} \cdot \frac{C}{P}\right)^3 \cdot 50 \quad \text{——————} \quad (1)$$

L: Rated life(km)
C: Basic dynamic load rating(N)
P: Working load(N)
fw: Load coefficient

fH: Hardness factor(See page5)
fT: Temperature coefficient(See page5)
fc: Contact coefficient(See page5)

The lifespan(Ln) of a linear bushing in hours can be obtained by calculating the traveling distance per unit tine.
The lifespan can be obtained from the following equation if the stroke length and the number of strokes are constant:

$$L_h=\left(\frac{L \cdot 10^3}{2 \cdot s \cdot n_1 \cdot 60}\right) \quad \text{——————} \quad (2)$$

Lh: Lifespan(hr)
L: Rated life(km)

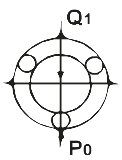
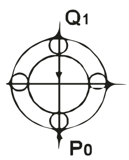
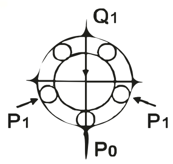
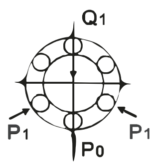
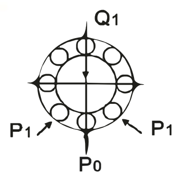
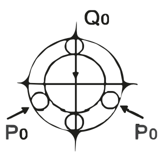
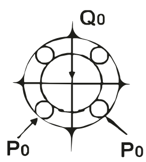
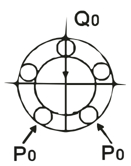
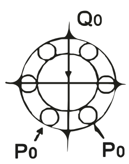
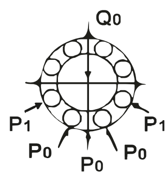
S: Stroke length (m)
n1: Number of strokes per minute (cpm)

Relation between ball Circuits and load rating

The NIKO linear bushing includes bal l circuits that are spaced equally and circumferentially. The load rating varies according to the loaded position on the circumference.

The value the dimension table indicates the load rating when the load is placed on top of one ball circuit. If the KBS linear bushing is used will two ball circuits loaded uniformly, the load rating will be greater. The following table shows the values by the number of ball circuits in such cases:

Table 1

Row position load ratio \ Number of rows	3	4	5	6	8
Row position	 $Q_1=P_0$	 $Q_1=P_0$	 $Q_1=1.106P_0$	 $Q_1=1.354P_0$	 $Q_1=1.841P_0$
Row position	 $Q_0=P_0$	 $Q_0=1.414P_0$	 $Q_0=1.618P_0$	 $Q_0=1.732P_0$	 $Q_0=2.052P_0$
Load ratio	$Q_0/Q_1=1$	$Q_0/Q_1=1.414$	$Q_0/Q_1=1.463$	$Q_0/Q_1=1.280$	$Q_0/Q_1=1.115$

Sample Calculations

1. Obtaining the rated life L and lifespan L_h of the NIKO linear bushing used in the following conditions:

- Linear bushing: LM20
- Stroke length: 50mm
- Number of strokes per minute: 50cpm
- Load per bush: 490N

The basic dynamic load rating of the linear bushing is 882N from the dimension table. From equation(1), therefore, the rated life L is obtained as follows:

$$L=\left(\frac{f_H \cdot f_T \cdot f_C}{f_W}\cdot\frac{C}{P}\right)^3\cdot 50 \qquad F_H=F_T=F_C=F_W=1.0$$

$$=\left(\frac{882}{490}\right)^3\times 50 = 292\text{km}$$

From equation(2), the lifespan Lh is obtained as follows:

$$L_h=\frac{L\times 10^3}{2\times \ell_S\times n_1\times 60}=\frac{292\times 10^3}{2\times 0.05\times 50\times 60}=973\text{hr}$$

2. Selecting the linear bushing type satisfying the following conditions:

- Number of linear bushing used: 4
- Stroke length: 1m
- Traveling speed: 10m/min
- Number of strokes per minute: 5cpm
- Lifespan: 10,000hr
- Total load: 980N

From equation(2), the travelling distance within the lifespan is obtained as follows:

$$L=2\times \ell_S\times n_1\times 60\times L_h=6{,}000\text{km}$$

From equation(1), the basic dynamic load rating is obtained as follows:

$$C=\sqrt[3]{\frac{L}{50}}\cdot\left(\frac{f_W}{f_H\cdot f_T\cdot f_C}\right)\cdot P=1492\text{N}$$

Assume the following with a pair of shafts each with two linear bushings:

$f_C=0.81$, $f_W=f_T=f_H=1$

As a result, LM30 is selected from the dimension table as the KBS linear bushing type satisfying the value of C

Technical Information

Clearance and Fit

When a standard-type NIKO linear bushing is used with a shaft, inadequate clearance, adjustment may cause early bush failure and/or poor, rough travelling. The clearance adjustable linear bush and open linear bush can be clearance adjusted when assembled in the housing which can control the outside cylinder diameter. However, too much clearance adjustment increases the deformation of the outside cylinder,to affect its precision and life. Therefore, the appropriate clearance between the bush and shaft, and clearance between the bush and housing are required according to the application. Table 2 shows recommended fit of the bush:

Table 2

Model \ Division		Shaft		Housing	
		Normal fit	Transitional	Loose fit	Tight fit
LME	High class	h6	j6	H7	J7

Note: The clearance may be zero or negative. Please attention the movement.

Shaft and Housing

To optimize performance of the NIKO linear bushing high precision of the shaft and housing is required.

1.Shaft

The rolling balls in the NIKO linear bushing are in point contact with the shaft surface. Therefore, the shaft dimensions, tolerance, surface finish, and hardness greatly affect the travelling performance of the bush. The shaft should be manufactured with due attention to the following points:

1) Since the surface finish critically affects smooth rolling of balls, grind the shaft at 1. 5 S or better
2) The best hardness of the shaft is HRC 60 to 64. Hardness less than HRC 60 decreases the life considerably, and hence reduces the permissible load. On the other hand, hardness over HRC 64 accelerates ball wear.
3) The shaft diameter for the clearance adjustable linear bush and open linear bush should as much as possible be of the lower value of the inscribed circle diameter in the specification table. Do not set the shaft diameter to the upper value.
4) Zero clearance or negative clearance increases the frictional resistance slightly. If the negative clearance is too tight, the deformation of the outside cylinder will become larger, to shorten the bush life.

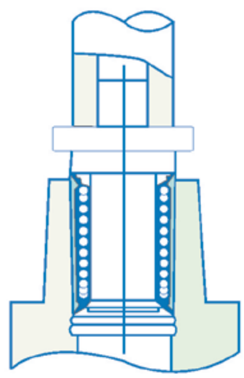
2. Housing

There is a wide range of housing differing in design, machining , and mounting. For the fitness and shapes of housings, see Table 2 and the following section on mounting.

Mounting

When inserting the linear bush into the housing, do not hit the linear bush on the side ring holding the retainer but apply the cylinder circumference with a proper jig and push the linear bush into the housing by hand or lightly knock it in. (See Fig.1) In inserting the shaft after mounting the bush, be careful not to shock the balls. Note that if two shafts are used in parallel, the parallelism is the most important factor to assure the smooth linear movement. Take care in setting the shafts.

Fig.1



Examples of Mounting

The popular way to mount a linear bush is to operate it with an appropriate interference. It is recommended, however, to make a loose fit in principle because otherwise precision is apt to be minimized. The following examples(Figs.2 to 6)show assembling of the inserted bush in terms of designing and mounting, for reference.

Fig.2

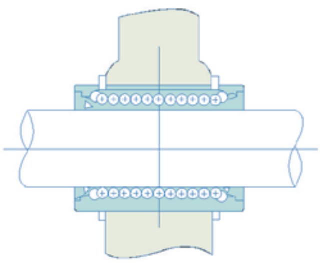


Fig.3

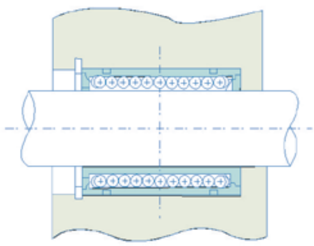


Fig.4

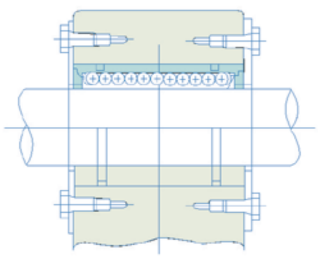


Fig.5

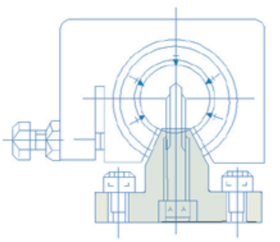
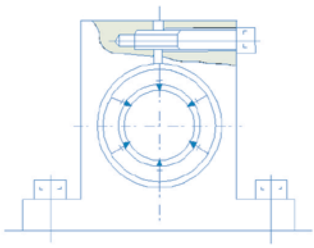


Fig.6



Linear Ball Bearing Interchangeable List

Ball Bushing-Compact Type

NIKO	NTN	STAR	INA	SKF	FAG
KH..	KH..	0658-0..-00	KH.. (LBBS..)	LBBR..	LNA.. (LNA..)
KH.. PP	KH.. LL	0658-2..-40	KH.. PP (LBBS..2LS)	LBBR..2LS	LNA..2RS (LFA..2RS)

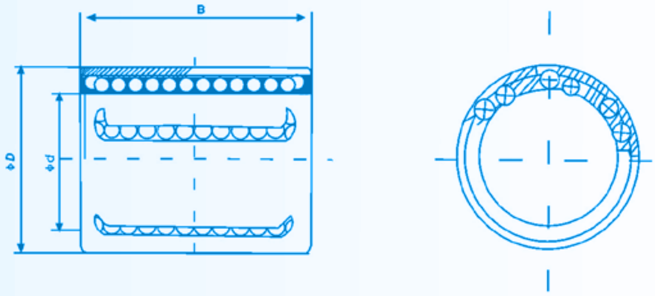
Ball Bushing-Resin Retainer

NIKO	NB	INA	SKF	THK	IKO	IKO	EASE
LME..	KB..G	KB..	LBAR/LBCR..	LME..	LBE..	MA M..	SDE..
LME..UU	KB..GUU	KB..PP	LBAR/LBCR..2LS	LME..UU	LBE..UU	MA M..WW	SDE..UU
LME..AJ	KB..GAJ	KBS..	LBAS..	LME..AJ	LBE..AJ	MA M..ADJ	SDE..AJ
LME..UUAJ	KB..GUUAJ	KBS..PP	LBAS..2LS	LME..UUAJ	LBE..UUAJ	MA M..ADJ WW	SDE..UUAJ
LME..OP	KB..GOP	KBO..	LBAT/LBCT..	LME..OP	LBE..OP	MA M..OPN	SDE..OP
LME..UUOP	KB..GUUOP	KBO..PP	LBAT/LBCT..2LS	LME..UUOP	LBE..UUOP	MA M..OPN WW	SDE..UUOP

The above types are metric dimension series generally used in Europe.

KH Bushing

Standard Linear Ball Bearing Steel Drawn Cup/Cage Plastic



	Dimensions [mm]			Load Capacity [N]		Weight [g]
Part-No.	Φd	ΦD	B	Dyn.	Stat.	
KH-0622	6	12	22	400	240	7
KH-0824	8	15	24	440	280	12
KH-1026	10	17	26	500	370	14.5
KH-1228	12	19	28	620	510	18.5
KH-1428	14	21	28	710	530	20.5
KH-1630	16	24	30	800	630	27.5
KH-2030	20	28	30	950	800	32.5
KH-2540	25	35	40	1990	1560	66
KH-3050	30	40	50	2900	2700	95
KH-4060	40	52	60	5100	4500	182
KH-5070	50	62	70	6950	6300	252

Ordering Example:

KH — Standard linear Bearing

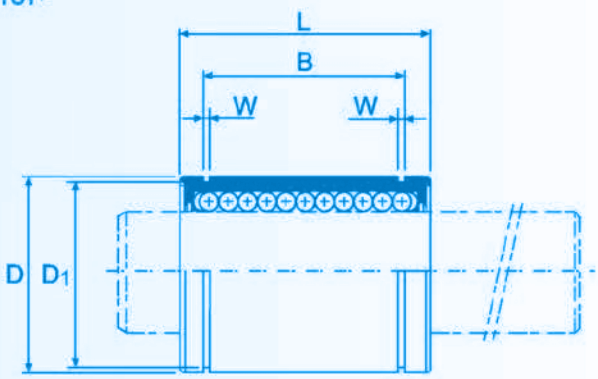
Φ — Shaft Diameter

PP — P=seal one end, PP=seal both ends

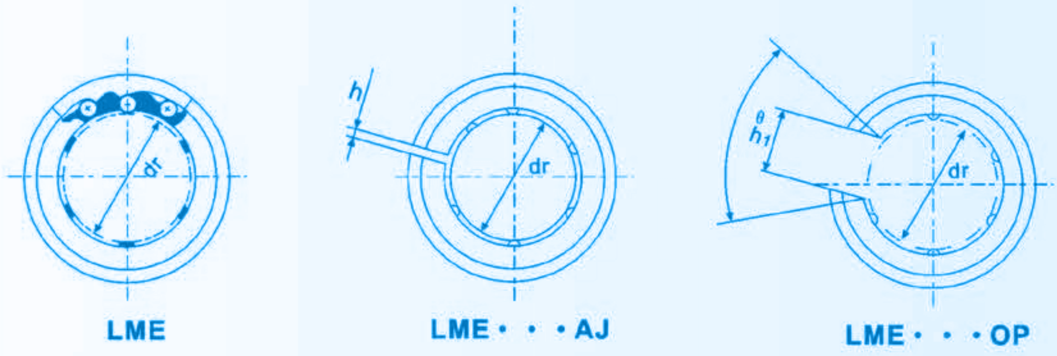
Linear Ball Bearings

LME <Built-in Synthetics Resin Retainer>

This type is a metric dimension series generally used in Europe.



Nominal Part No.						Nominal Shaft Diameter (mm)	
Standard Type	Seal Type	Ball Circuit	Weight g	Adjustable Type	Open Type	dr	Tolerance
LME 5 LME 8 LME 12	LME 5UU LME 8UU LME 12UU	4 4 4	11 22 45	LME 5-AJ LME 8-AJ LME 12-AJ	LME 12-OP	5 8 12	+0.008 0
LME 16 LME 20 LME 25	LME 16UU LME 20UU LME 25UU	5 5 6	60 102 235	LME 16-AJ LME 20-AJ LME 25-AJ	LME 16-OP LME 20-OP LME 25-OP	16 20 25	+0.009 -0.001 +0.011
LME 30 LME 40 LME 50	LME 30UU LME 40UU LME 50UU	6 6 6	360 720 1570	LME 30-AJ LME 40-AJ LME 50-AJ	LME 30-OP LME 40-OP LME 50-OP	30 40 50	-0.001 +0.013 -0.002
LME 60	LME 60UU	6	2220	LME 60-AJ	LME 60-OP	60	



Linear Ball Bearings

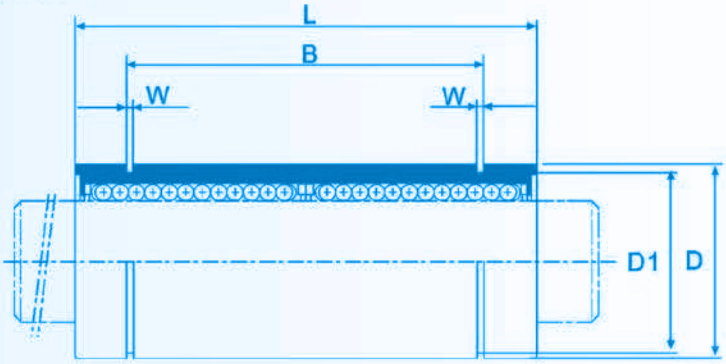
Major Dimensions and Tolerance (mm)											Eccentricity (max) µm	Radial Clearance (max) µm	Basic Load Rating C(N)	Basic Load Rating Co(N)	Nominal Part No.
D	Tolerance	L	Tolerance	B	Tolerance	W	D1	h	h1	θ					
12	0	22		14.5		1.1	11.5	1			12	−3	206	265	LME 5
16	-0.008	25		16.5		1.1	15.2	1			12	−3	265	402	LME 8
22	0	32	0 / -0.2	22.9	0 / -0.2	1.3	21	1.5	7.5	78°	12	−4	510	784	LME 12
26	-0.009	36		24.9		1.3	24.9	1.5	10	78°	12	−4	578	892	LME 16
32		45		31.5		1.6	30.5	2	10	60°	15	−6	862	1370	LME 20
40	0 / -0.011	58		44.1		1.85	38	2	12.5	60°	15	−6	980	1570	LME 25
47		68	0 / -0.3	52.1	0 / -0.3	1.85	44.5	2	12.5	50°	15	−8	1570	2740	LME 30
62	0	80		60.6		2.15	59	3	16.8	50°	17	−8	2160	4020	LME 40
75	-0.013	100		77.6		2.65	72	3	21	50°	17	−13	3820	7940	LME 50
90	0 / -0.015	125	0 / -0.4	101.7	0 / -0.4	3.15	86.5	3	27.2	54°	20	−13	4700	9800	LME 60

SI Unit 1N≒0.102kgf

Linear Ball Bearings

LME-L <Built-in Synthetics Resin Retainer>

This type is a metric dimension series generally used in Europe.



Linear Ball Bearings

Nominal Part No.				Nominal Shaft Diameter (mm)	
Standard Type	Seal Type	Ball Circuit	Weight g	dr	Tolerance
LME 8L	LME 8L UU	4	40	8	+0.009 -0.001
LME 12L	LME 12L UU	4	80	12	
LME 16L	LME 16L UU	5	115	16	+0.011
LME 20L	LME 20L UU	5	180	20	-0.001
LME 25L	LME 25L UU	6	430	25	+0.013 -0.002
LME 30L	LME 30L UU	6	615	30	
LME 40L	LME 40L UU	6	1,400	40	
LME 50L	LME 50L UU	6	2,320	50	+0.016 -0.004
LME 60L	LME 60L UU	6	3,500	60	

LME-L

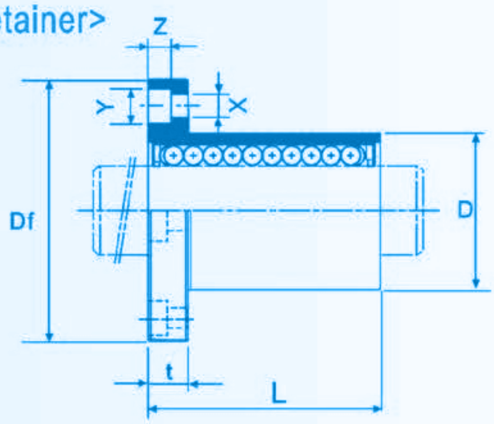
Major Dimensions and Tolerance (mm)								Eccentricity (max) µm	Basic Load Rating Dynamic C(N)	Basic Load Rating Static Co(N)	Nominal Part No.
D	Tolerance	L	Tolerance	B	Tolerance	W	D1				
16	0 / -0.009	46		33		1.1	15.2	15	421	804	LME 8L
22	0 / -0.011	61		45.8		1.3	21	15	813	1,570	LME 12L
26		68	0 / -0.3	49.8	0 / -0.3	1.3	24.9	15	921	1,780	LME 16L
32		80		61		1.6	30.5	17	1,370	2,740	LME 20L
40	0 / -0.013	112		82		1.85	38	17	1,570	3,140	LME 25L
47		123		104.2		1.85	44.5	17	2,500	5,490	LME 30L
62	0 / -0.015	151	0 / -0.4	121.2	0 / -0.4	2.15	59	20	3,430	8,040	LME 40L
75		192		155.2		2.65	72	20	6,080	15,900	LME 50L
90	0 / -0.020	209		170		3.15	86.5	25	7,550	20,000	LME 60L

SI Unit 1N≒0.102kgf

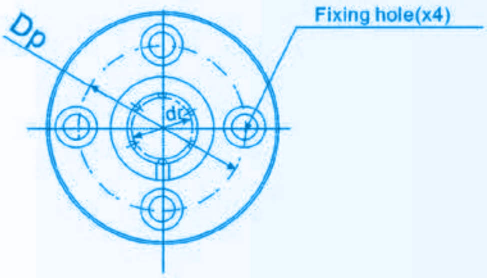
Linear Ball Bearings Flanged Type

LME F <Built-in Synthetics Resin Retainer>

This type is a metric dimension series generally used in Europe.



Nominal Part No.				Major Dimensions and Tolerance (mm)					
Standard Type	Seal Type	Ball Circuit	Weight g	dr	Tolerance	D	Tolerance	L	Tolerance
LME F 5	LME F 5 UU	4	26	5	+0.008 / 0	12	0 / -0.013	22	±0.3
LME F 8	LME F 8 UU	4	41	8		16		25	
LME F 12	LME F 12 UU	4	80	12		22	0 / -0.016	32	
LME F 16	LME F 16 UU	5	103	16	+0.009 / -0.001	26		36	
LME F 20	LME F 20 UU	5	182	20		32	0 / -0.019	45	
LME F 25	LME F 25 UU	6	335	25	+0.011 / -0.001	40		58	
LME F 30	LME F 30 UU	6	560	30		47		68	
LME F 40	LME F 40 UU	6	1,175	40	+0.013 / -0.002	62	0 / -0.022	80	
LME F 50	LME F 50 UU	6	1,745	50		75		100	
LME F 60	LME F 60 UU	6	3,220	60		90	0 / -0.025	125	



LME F

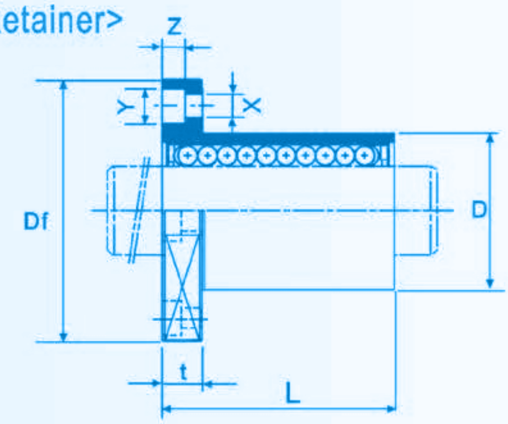
Major Dimensions and Tolerance (mm)						Eccentricity	Squareness	Basic Load Rating		Nominal Part No.
Flange						µm	µm	Dynamic C(N)	Static Co(N)	
Df	t	Dp	X	Y	Z					
28	5	20	3.5	6	3.1	12	12	206	265	LME F 5
32	5	24	3.5	6	3.1	12	12	265	402	LME F 8
42	6	32	4.5	7.5	4.1	12	12	510	784	LME F 12
46	6	36	4.5	7.5	4.1	12	12	578	892	LME F 16
54	8	43	5.5	9	5.1	15	15	862	1,370	LME F 20
62	8	51	5.5	9	5.1	15	15	980	1,570	LME F 25
76	10	62	6.6	11	6.1	15	15	1,570	2,740	LME F 30
98	13	80	9	14	8.1	17	17	2.160	4,020	LME F 40
112	13	94	9	14	8.1	17	17	3.820	7,940	LME F 50
134	18	112	11	17	11.1	20	20	4,700	9,800	LME F 60

SI Unit 1N≒0.102kgf

Linear Ball Bearings Flanged Type

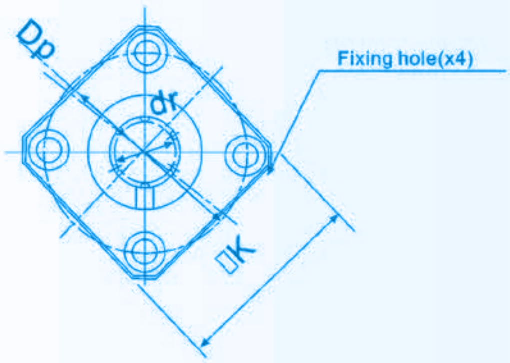
LME K <Built-in Synthetics Resin Retainer>

This type is a metric dimension series generally used in Europe.



Nominal Part No.				Major Dimensions and Tolerance (mm)					
Standard Type	Seal Type	Ball Circuit	Weight g	dr	Tolerance	D	Tolerance	L	Tolerance
LME K 5									
LME K 8	LME K 8 UU	4	33	8	+0.008 / 0	16	0 / -0.013	25	±0.3
LME K 12	LME K 12 UU	4	64	12	+0.008 / 0	22	0 / -0.016	32	±0.3
LME K 16	LME K 16 UU	5	90	16	+0.009 / -0.001	26	0 / -0.016	36	±0.3
LME K 20	LME K 20 UU	5	147	20	+0.009 / -0.001	32	0 / -0.019	45	±0.3
LME K 25	LME K 25 UU	6	295	25	+0.011 / -0.001	40	0 / -0.019	58	±0.3
LME K 30	LME K 30 UU	6	465	30	+0.011 / -0.001	47	0 / -0.019	68	±0.3
LME K 40	LME K 40 UU	6	975	40	+0.013 / -0.002	62	0 / -0.022	80	±0.3
LME K 50	LME K 50 UU	6	1545	50	+0.013 / -0.002	75	0 / -0.022	100	±0.3
LME K 60	LME K 60 UU	6	2780	60	+0.013 / -0.002	90	0 / -0.025	125	±0.3

Linear Ball Bearings Flanged Type



LME K

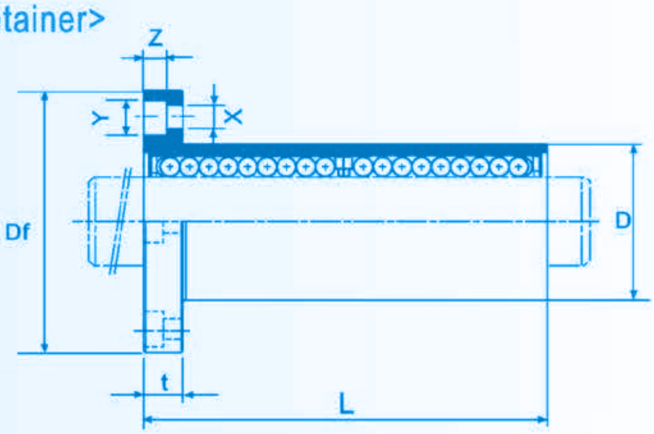
Major Dimensions and Tolerance (mm)							Eccentricity	Squareness	Basic Load Rating		Nominal Part No.
Flange							µm	µm	Dynamic C(N)	Static Co(N)	
Df	K	t	Dp	X	Y	Z					
											LME K 5
32	25	5	24	3.5	6	3.1	12	12	265	402	LME K 8
42	32	6	32	4.5	7.5	4.1	12	12	510	784	LME K 12
46	35	6	36	4.5	7.5	4.1	12	12	578	892	LME K 16
54	42	8	43	5.5	9	5.1	15	15	862	1,370	LME K 20
62	50	8	51	5.5	9	5.1	15	15	980	1,570	LME K 25
76	60	10	62	6.6	11	6.1	15	15	1,570	2,740	LME K 30
98	75	13	80	9	14	8.1	17	17	2,160	4,020	LME K 40
112	88	13	94	9	14	8.1	17	17	3.820	7,940	LME K 50
134	106	18	112	11	17	11.1	20	20	4,700	9,800	LME K 60

SI Unit 1N≒0.102kgf

Linear Ball Bearings Flanged Type

Linear Ball Bearings Flanged Type

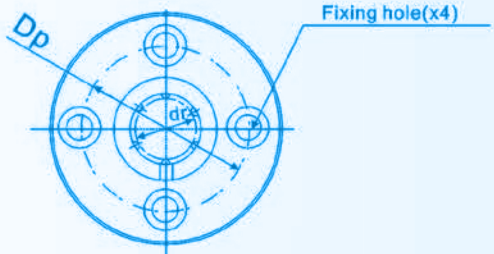
LME F-L <Built-in Synthetics Resin Retainer>



This type is a metric dimension series generally used in Europe.

Nominal Part No.				Major Dimensions and Tolerance (mm)					
Standard Type	Seal Type	Ball Circuit	Weight g	dr	Tolerance	D	Tolerance	L	Tolerance
LME F 8L	LME F 8L UU	4	59	8	+0.009 / -0.001	16	0 / -0.013	46	±0.3
LME F 12L	LME F 12L UU	4	110	12		22	0 / -0.016	61	
LME F 16L	LME F 16L UU	5	160	16	+0.011 / -0.001	26		68	
LME F 20L	LME F 20L UU	5	260	20		32		80	
LME F 25L	LME F 25L UU	6	540	25	+0.013 / -0.002	40	0 / -0.019	112	
LME F 30L	LME F 30L UU	6	815	30		47		123	
LME F 40L	LME F 40L UU	6	1,805	40		62	0 / -0.022	151	
LME F 50L	LME F 50L UU	6	2,820	50	+0.016 / -0.004	75		192	
LME F 60L	LME F 60L UU	6	4,920	60		90	0 / -0.025	209	

Linear Ball Bearings Flanged Type



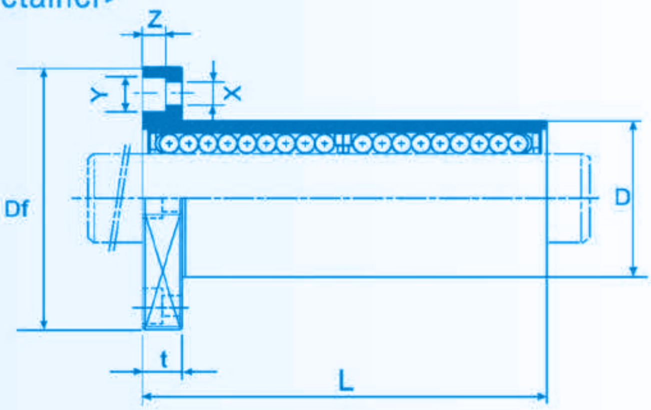
LME F-L

Major Dimensions and Tolerance (mm)						Eccentricity	Squareness	Basic Load Rating		Nominal Part No.
Flange						μm	μm	Dynamic C(N)	Static Co(N)	
Df	t	Dp	X	Y	Z					
32	5	24	3.5	6	3.1	15	15	421	804	LME F 8L
42	6	32	4.5	7.5	4.1	15	15	813	1,570	LME F 12L
46	6	36	4.5	7.5	4.1	15	15	921	1,780	LME F 16L
54	8	43	5.5	9	5.1	17	17	1,370	2,740	LME F 20L
62	8	51	5.5	9	5.1	17	17	1,570	3,140	LME F 25L
76	10	62	6.6	11	6.1	17	17	2,500	5,490	LME F 30L
98	13	80	9	14	8.1	20	20	3,430	8,040	LME F 40L
112	13	94	9	14	8.1	20	20	6,080	15,900	LME F 50L
134	18	112	11	17	11.1	25	25	7,550	20,000	LME F 60L

SI Unit 1N≒0.102kgf

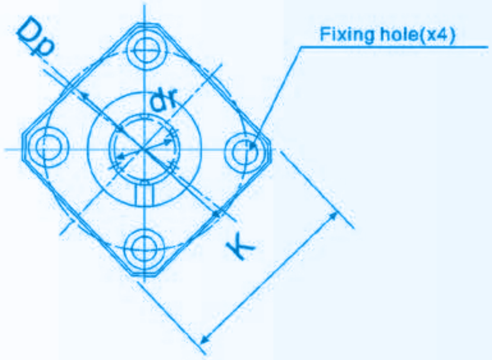
Linear Ball Bearings Flanged Type

LME K-L <Built-in Synthetics Resin Retainer>



This type is a metric dimension series generally used in Europe.

Nominal Part No.				Major Dimensions and Tolerance (mm)					
Standard Type	Seal Type	Ball Circuit	Weight g	dr	Tolerance	D	Tolerance	L	Tolerance
LME K 8L	LME K 8L UU	4	51	8	+0.009 / -0.001	16	0 / -0.013	46	
LME K 12L	LME K 12L UU	4	90	12		22	0 / -0.016	61	
LME K 16L	LME K 16L UU	5	135	16	+0.011 / -0.001	26		68	
LME K 20L	LME K 20L UU	5	225	20		32	0 / -0.019	80	
LME K 25L	LME K 25L UU	6	500	25	+0.013 / -0.002	40		112	±0.3
LME K 30L	LME K 30L UU	6	720	30		47		123	
LME K 40L	LME K 40L UU	6	1,600	40		62	0 / -0.022	151	
LME K 50L	LME K 50L UU	6	2,620	50	+0.016 / -0.004	75		192	
LM EK 60L	LME K 60L UU	6	4,480	60		90	0 / -0.025	209	



LME K-L

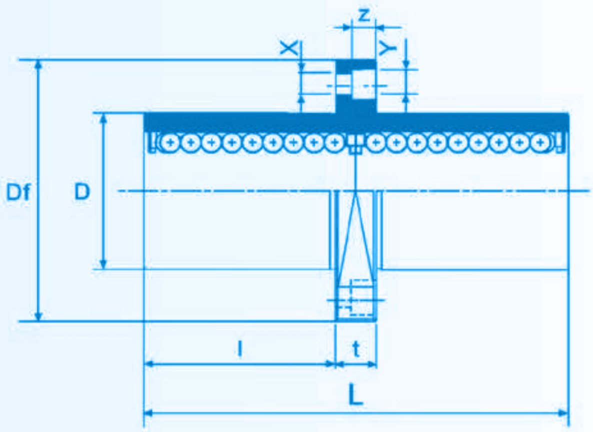
Major Dimensions and Tolerance (mm)							Eccentricity	Squareness	Basic Load Rating		Nominal Part No.
Flange									Dynamic	Static	
Df	K	t	Dp	X	Y	Z	µm	µm	C(N)	Co(N)	
32	25	5	24	3.5	6	3.1	15	15	421	804	LME K 8L
42	32	6	32	4.5	7.5	4.1	15	15	813	1,570	LME K 12L
46	35	6	36	4.5	7.5	4.1	15	15	921	1,780	LME K 16L
54	42	8	43	5.5	9	5.1	17	17	1,370	2,740	LME K 20L
62	50	8	51	5.5	9	5.1	17	17	1,570	3,140	LME K 25L
76	60	10	62	6.6	11	6.1	17	17	2,500	5,490	LME K 30L
98	75	13	80	9	14	8.1	20	20	3,430	8,040	LME K 40L
112	88	13	94	9	14	8.1	20	20	6,080	15,900	LME K 50L
134	106	18	112	11	17	11.1	25	25	7,550	20,000	LME K 60L

SI Unit 1N≒0.102kgf

Linear Ball Bearings Flanged Type

LMEFC <Resin Retainer>

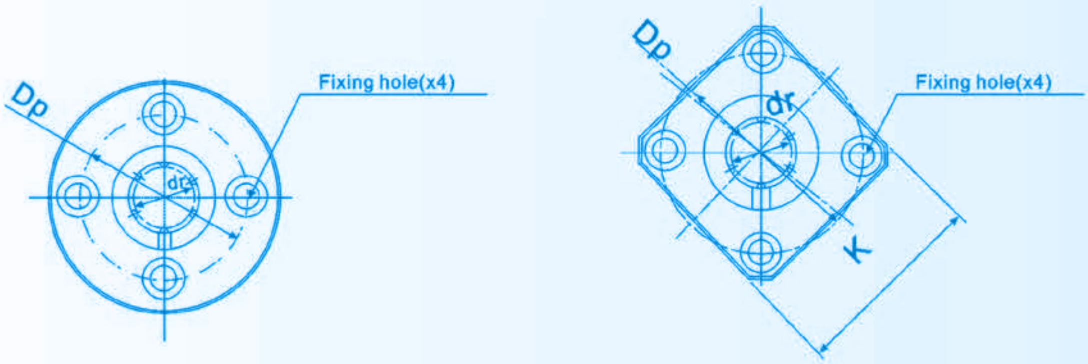
This type is a metric dimension series generally used in Europe.



Nominal shaft diameter mm	Part No.		Major dimensions and tolerance						Flange		
	LMEFC	LMEKC	dr mm	dr Tolerance μm	D mm	D Tolerance μm	L mm	L Tolerance μm	l mm	Df mm	K mm
8	LMEFC8	LMEKC8	8	+9 -1	16	0 -13	45	±300	20.5	32	25
12	LMEFC12	LMEKC12	12		22	0 -16	57		27.5	42	32
16	LMEFC16	LMEKC16	16	+11 -1	26		70		31	46	35
20	LMEFC20	LMEKC20	20		32	0 -19	80		36	54	42
25	LMEFC25	LMEKC25	25	+13 -2	40		112		52	62	50
30	LMEFC30	LMEKC30	30		47		123		56.5	76	60
40	LMEFC40	LMEKC40	40	+16 -4	62	0 -22	151		69	98	75
50	LMEFC50	LMEKC50	50		75		192		89.5	112	88
60	LMEFC60	LMEKC60	60		90	0 -25	209		95.5	134	106

Seal type:
LMEFC10 UU

No entry	No seals
UU	Seals on both sides



LMEFC LMEKC

Major dimensions and tolerance					Eccentricity	Squareness	Basic load rating		Weight	Nominal shaft diameter
Flange										
t mm	Dp mm	X mm	Y mm	Z mm	µm	µm	dynamic C(N)	Static Co(N)	g	mm
5	24	3.5	6	3.1	15	15	421	804	59 / 51	8
6	32	4.5	7.5	4.1			813	1,570	110 / 90	12
6	36	4.5	7.5	4.1			921	1,780	160 / 135	16
8	43	5.5	9	5.1	17	17	1,370	2,740	260 / 225	20
8	51	5.5	9	5.1			1,570	3,140	540 / 500	25
10	62	6.6	11	6.1			2,500	5,490	815 / 720	30
13	80	9	14	8.1	20	20	3,430	8,040	1,805 / 1,600	40
13	94	9	14	8.1			6,080	15,900	2,820 / 2,620	50
18	112	11	17	11.1	25	25	7,550	20,000	4,920 / 4,480	60

SI Unit 1N≒0.102kgf

Linear Ball Bearings Flanged Type

Super Linear Ball Bearings

Super Linear Ball Bushing Features

Higher Load Ratings

Uniquely designed ball plate is made by hardened steel, and the precisely ground groove is slightly larger than the ball size which provides greater contact area between the ball and the ball plate. And, this design provides 3 times higher load ratings of the conventional linear bushing.

Self Alignment

Ball plate has a convex shape to provide a pivot point at the center which allows self alignment up to 0.5° . This self alignment capability eliminates any possibility of edge pressure caused by inaccurate machining, errors on mounting, or shaft deflection.

Longer Travel Life

KBS Super Linear Ball Bushing offer three times the load rating or 27 times travel life of conventional linear bushing.

Smooth And Silent Motion

Super Linear Ball Bushing has extremly smooth motion due to the uniquely designed ball ratainer and the outer sleeve. They are made of engineering polymer, which has light weight, low friction, and high wear-resistance. Due to them, smooth and silent motion can be obtained.

Clearance Adjustment

Super Linear Ball Bushing's ball plates are designed to float in the outer sleeve. This allows the clearance between the balls and shaft to be adjusted for the best applicantion environment by using with the Clearance Adjustable housing.

Interchangeability

Super Linear Ball Bushing is designed to be fully Interchangeable with conventional linear bushing.

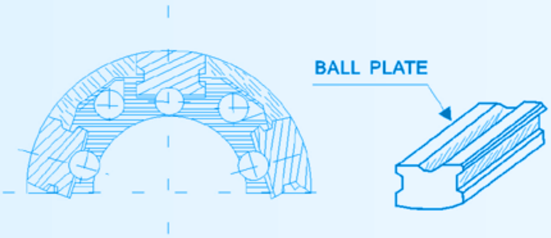


Fig.20.Cross-section of Super Linear Ball Bushing

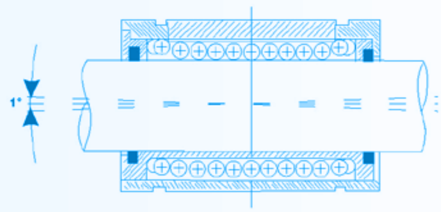


Fig.21.Super Linear Ball Bushing' s self-alignment featlure

Cost Effectiveness

Lower Cost

Self alignment feature can compensate the in accurate machining of the base. so less installation time and lower cost can be obtained.

Higher Load Rating And Longer Travel Life

Compared to the same size conventional linear bushing, Super Linear Ball Bushing offers higher load rating and longer travel life.

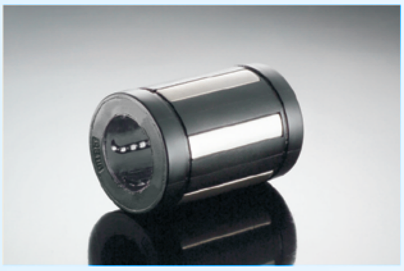
Reduction of Material Cost

Super Linear Ball Bushing's higher load rating enables the use of smaller components, and reducing material cost.

Energy Saving

Super Linear Ball Bushing is deaigned to be light weight, lower inertia, and low friction, So it enables the moving parts to have rapid motion with lower driving power.

Super Linear Ball Bushing

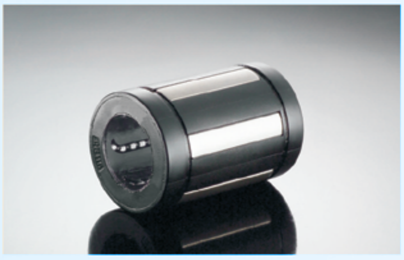


Standard type (not Sealed)

Floating ball plate features offer self alignment and clearance adjustment, and light weight retainer and outer sleeve offers silent operation.

Open Type

One ball circuit is removed from the outer sleeve to be used with bottom supported shaft for deflection free movement. This open type Super Linear Ball Bushing also has self alignment and clearance adjustment.



Standard type (Sealed)

Specially designed integral wiper seals create a free floating action in the outer sleeve. It provides perfect sealing ability during self aligning operation.

Part Number Notation

Super Linear Ball Bushing's part number notation is as follows:

LM □ S | **25** | **UU** | **OP**

Model

- E:ISO Standard(metic)
- B:Imperial Standard(inch)

LM Shaft Diameter

Seal

- - :No seal
- UU :Seals on both sides

Type

- - :Standard Type
- OP:Open Type

Super Linear Ball Bearings

Load Ratings and Travel Life

Super Linear Ball Bushing's load ratings give an influence to travel life with load direction, ball circuit orientation, and hardness of the shaft.

Basic Dynamic Load Rating (C) and Travel life

The travel life of a Super Linear Ball Bushing is determined largely by the quality of the shaft. The basic dynamic load rating is maximum continuous load that can be applied to the Super Linear Ball Bushing with 90% of reliability achieving after 50km operation under normal conditions. The nominal travel life can be calculated by following equation.

$$L=\left(\frac{C}{P}\right)^3\times 50 \qquad L_{100}=\left(\frac{C_{100}}{P}\right)^3\times 100$$

L	:Nominal life of 50km	(km)
L_{100}	:Nominal life of 100km	(km)
C	:Basic dynamic load rating of 50km	(N)
C_{100}	:Basic dynamic load rating of 100km	(N)
P	:Applied load	(N)

Practically, other factors will affect life as follows:

$$L=\left(\frac{f_H}{f_W}\times\frac{C}{P}\right)^3\times 50 \qquad L=\left(\frac{f_H}{f_W}\times\frac{C_{100}}{P}\right)^3\times 100$$

f_H :Hardness factor (See Fig.1)
f_W : Load factor (See Table 3)

From the above equations, when the stroke and frequency are constant, the travel life can be calculated by following equation:

$$L_h=\frac{L}{2\times L_s\times N_\ell\times 60}$$

L_H	:Travel life	(hr)
L_s	:Stroke	(km)
N_ℓ	:Number of strokes per minute	(cpm)

Calculation example:

The Maximum applied load and the travel life are the most important factor for choosing a proper size of Super Linear Bal l Bushing. Belows are the sample calculation of the expecting travel life and choosing a proper size of Super Linear Ball Bushing.

—— Working conditions ——

- Applied load: 250N（P）
- Stroke : 0.250m（Ls）
- Number of strokes per minute : 60（N_ℓ）
- Shaft hardness : HRC 60（f_H=1.0）
- Operating speed :

$$V=2\times L_s\times N_\ell$$
$$=2\times 0.250\times 60$$
$$=30\text{m/min} \qquad (f_W=1.6)$$

other factors（fc、fT）are considered as 1.0

Calculation of expected travel life:

Assuming the basic dynamic load rating is based on travel life of 50km and all other factors are 1.0, you choose the Super Linear Ball Bushing size that you can expect travel life. Let's try LMES20UU with the above working conditions.

$$L=\left(\frac{1.0\times1.0\times1.0}{1.6}\times\frac{2{,}580}{250}\right)^3\times 50$$
$$\fallingdotseq 13{,}417\text{km}$$

$$L_h=\frac{13{,}417\times10^3}{2\times0.250\times60\times60}$$
$$\fallingdotseq 7{,}454\text{ hours}$$

Choosing a proper Super Linear Ball Bushing

Let's assume our design travel life is 15,000 hours:

$$L=15{,}000\times2\times0.250\times10^{-3}\times60\times60=27{,}000\text{km}$$

$$L=\frac{250\times1.6}{1.0\times1.0\times1.0}\times\sqrt[3]{\frac{27{,}000}{50}}$$
$$=3{,}257\text{N}$$

So, the proper Super Linear Ball Bushing for above condition is LMES25UU which has 3,800N as the basic dynamic load rating.

Housing and Shaft

To optimize the performance of the NIKO Super Linear Ball Bushing, high precision shaft and housing are required.

Housing

For Super Linear Ball Bushing's application, housing is required, and the tolorance of housing bore will affect the life and the accuracy of application. See Table 9 and 10.

Shaft

Because the balls in NIKO Super Linear Ball Bushing as rolling elements are running directly on the shaft surface, the hardness, surface finishing, and tolerance of shaft will largely affect the travelling performance of Super Linear Ball Bushing.

The shaft must have following conditions:

1)Hardness

The hardness must be HRC 58 to 64.
The shaft hardness below HRC 58 will lead decreasing of travel life and permissible load.

2) Surface Finishing

The Surface finishing must be 1.6S or better for the smooth operation.

3) Tolerance

The correct tolerance of the shaft diameter is recommended as shown on Table 9 and Table 10.

Fitting

Recommended fittings between Super Linear Ball Bushing and shaft are shown in Table 9 and Table 10.
Please note when the housing bore tolerance is H7, there are tight fit at the both ends of outer sleeve of metric type.

Table 9 Recommended toleranced between shaft and housing (ISO Standard)

Part Number	shaft		Housing	
	Shaft Dia. d(mm)	Tol.(h6) μm	Housing Bore D(mm)	Tol.(H7) μm
LMES10	10	0 -9	19	+21 0
LMES12	12	0 -11	22	
LMES16	16		26	
LMES20	20	0 -13	32	+25 0
LMES25	25		40	
LMES30	30		47	
LMES40	40	0 -16	62	+30 0
LMES50	50		75	

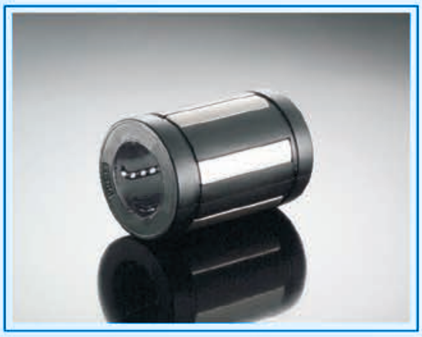
Table 10 Recommended toleranced between shaft and housing (Imperial Standard)

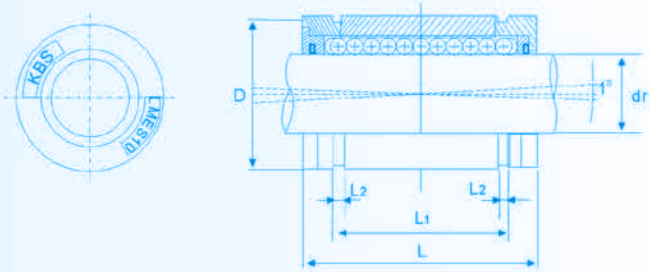
unit: inch

Part Number	shaft		Housing	
	Shaft Dia.	Tol.(g6)	Housing Bore	Tol.(h7)
LMBS4	.2500	-.0002 to -.0006	.5000	0 to +.0007
LMBS6	.3750	-.0002 to -.0006	.6250	0 to +.0007
LMBS8	.5000	-.0002 to -.0007	.8750	0 to +.0008
LMBS10	.6250	-.0002 to -.0007	1.1250	0 to +.0008
LMBS12	.7500	-.0003 to -.0008	1.2500	0 to +.0010
LMBS16	1.0000	-.0003 to -.0008	1.5625	0 to +.0010
LMBS20	1.2500	-.0004 to -.0010	2.0000	0 to +.0012
LMBS24	1.5000	-.0004 to -.0010	2.3750	0 to +.0012
LMBS32	2.0000	-.0004 to -.0012	3.0000	0 to +.0012

Super Linear Ball Bearings

LMES Series





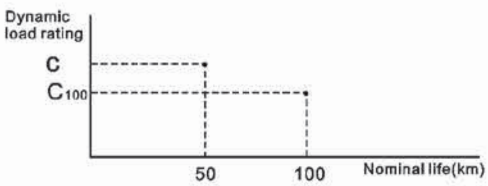
Shaft Dia. (mm)	Standard Type				Dimensions (mm)				Diameteral Clearance		Basic Load Ratings	
	Part number		No.of Ball circuit	Wgt. (g)	D[1]	L ±0.2	L_1 ±0.2	L_2 min	dr (mm)	Tol. (μm)	Dynamic C (N)	Static Co (N)
	w/o seal	with seal										
10	LMES 10	LMES 10UU	5	17	19	29	21.7	1.35	10	+8 0	750	550
12	LMES 12	LMES 12UU	5	23	22	32	22.7	1.35	12		1230	1100
16	LMES 16	LMES 16UU	5	28	26	36	24.7	1.35	16	+9 1	1550	1250
20	LMES 20	LMES 20UU	6	61	32	45	31.3	1.65	20		2580	1670
25	LMES 25	LMES 25UU	6	122	40	58	43.8	1.90	25	+11 1	3800	2750
30	LMES 30	LMES 30UU	6	185	47	68	51.8	1.90	30		4710	2800
40	LMES 40	LMES 40UU	6	360	62	80	60.4	2.20	40	+13 2	6500	5720
50	LMES 50	LMES 50UU	6	580	75	100	77.4	2.70	50		11460	7940

[1] Based on nominal housing bore

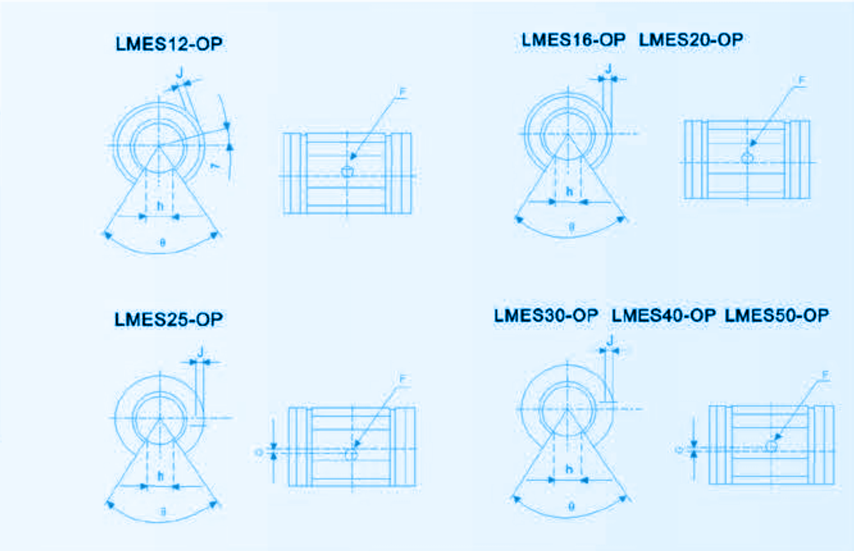
note）Reference of dynamic load rating
Dynamic load rating is based on the nominal life of 50km. In case of 100km, C on the table need to be devided by 1.26.

ex）LME20　C：2,580N　C_{100}：2,040N

$$L=\left(\frac{C}{P}\right)^3 \times 50km \qquad L=\left(\frac{C_{100}}{P}\right)^3 \times 100km$$



Super Linear Ball Bearings

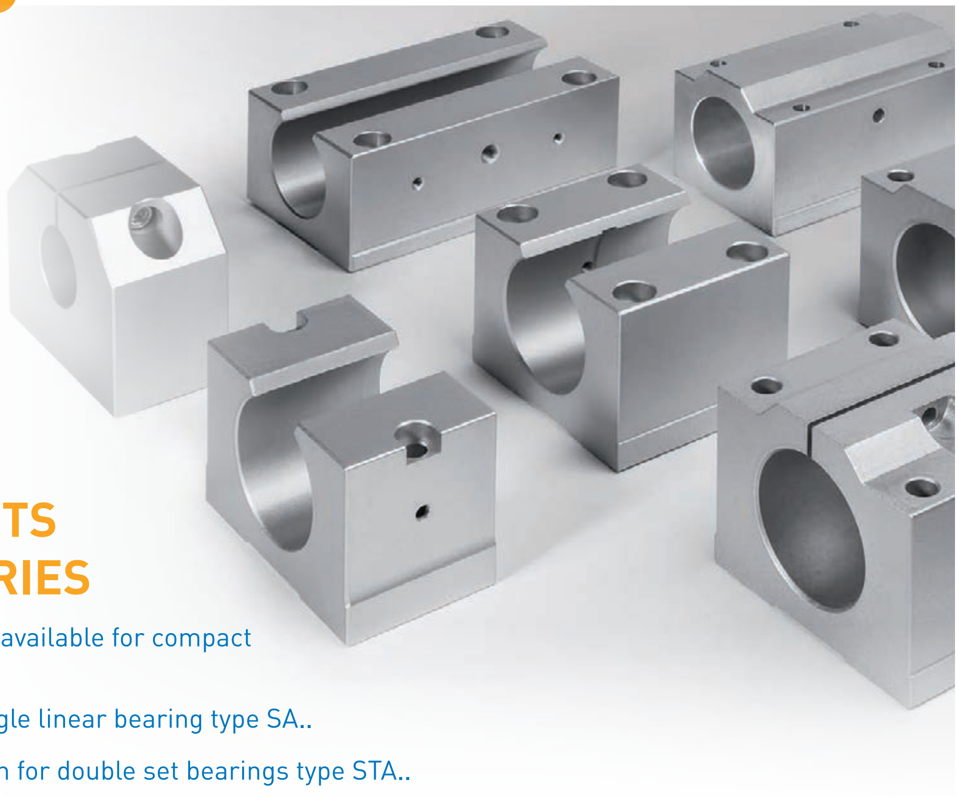


Shaft Dia. (mm)	Open Type				Dimensions (mm)								Basic Load Ratings	
	Part number		No.of Ball circuit	Wgt. (g)	D[1)]	L ±0.2	L2	h	θ (°)	F	G	J	Dynamic C (N)	Static Co (N)
	w/o seal	with seal												
12	LMES 12OP	LMES 12UUOP	4	18	22	32	1.35	6.5	66		—	0.7	1290	1260
16	LMES 16OP	LMES 16UUOP	4	22	26	36	1.35	9	68		—	0.7	1640	1320
20	LMES 20OP	LMES 20UUOP	5	51	32	45	1.65	9	55		—	0.9	2630	1720
25	LMES 25OP	LMES 25UUOP	5	102	40	58	1.90	11.5	57	3.0	1.5	1.4	3910	2850
30	LMES 30OP	LMES 30UUOP	5	155	47	68	1.90	14	57		2.0	2.2	4850	2900
40	LMES 40OP	LMES 40UUOP	5	300	62	80	2.20	19.5	56		1.5	2.7	6700	5900
50	LMES 50OP	LMES 50UUOP	5	480	75	100	2.70	22.5	54		2.5	2.3	11700	8100

1N≒0.102kgf

Super Linear Ball Bearings

Linear ball bearings housing units



HOUSING UNITS COMPACT SERIES

Aluminium housings are available for compact linear bearings type KH..

1. Close execution for single linear bearing type SA..

2. Tandem close execution for double set bearings type STA..

Lubrication is carried out through a separate lubrication nipple in the housing and the corresponding circumferential machined slot.

Assembly. Bearings are pressed fitted with interference.

Linear bearings are locked in housings DIN 912.

HOUSING UNITS HEAVY SERIES

Linear ball bearing (LME..) and housing units, are available with integrated bearings.

Aluminium housings are available in a closed design, with a segment cutout for supported shafts and with or without slot for snap ring fitting.

Aluminium supports:

1. Two hole execution for single bearing S2B (closed), S2O (open).

2. Four hole execution for single bearing SB (closed), SJ (closed, adjustable), SO (open), SOJ (open, adjustable).

3. Cutout execution for single bearing SLO (open).

4. Tandem execution for double single bearing SBT (closed), SOT (open)

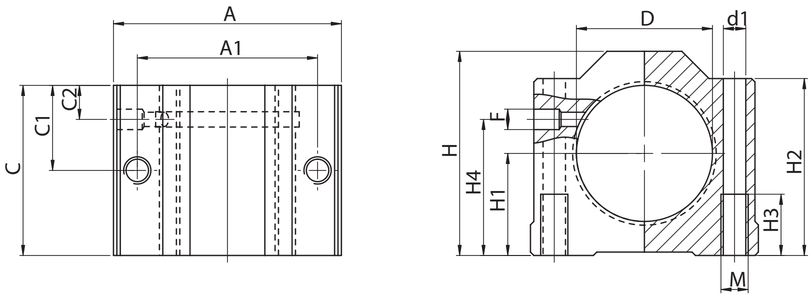
Lubrication is carried out through a nipple in the bearing (AS) and the corresponding circumferential slot machined in the housing.

Assembly. Linear bearings are locked in housings with Hexagon Socket Screw with cone point DIN 914

Executions S2B,S2J with snap ring DIN 471

Type SA

Linear ball bearing housing



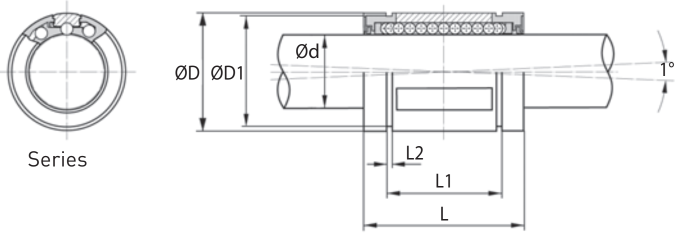
Type	Ø d	Ø D	A	C	H	A1	C1	H1	H2	H3	H4	C2	M	d1	F°-0,1	Weight
Dimensions (mm)						+ -0,15		+ 0,010 - 0,014								gr
SA - 12 - AS	12	19	40	28	33	29	14	17	28	11	21	6	M5	4,3	6	60
SA - 14 - AS	14	21	45	28	38	34	14	18	33	11	25	6	M5	4,3	6	85
SA - 16 - AS	16	24	45	30	38	34	15	19	33	11	25	7	M5	4,3	6	80
SA - 20 - AS	20	28	53	30	45	40	15	23	39	13	30	7	M6	5,3	6	115
SA - 25 - AS	25	35	62	40	54	48	20	27	46	18	35	9	M8	6,6	6	200
SA - 30 - AS	30	40	67	50	60	53	25	30	52	18	40	10	M8	6,6	6	310
SA - 40 - AS	40	52	87	60	76	69	30	39	66	22	52	11	M10	8,4	6	600
SA - 50 - AS	50	62	103	70	92	82	35	47	80	26	62	13	M12	10,5	6	1025

Reference

SA - 25 - KH..PP - AS

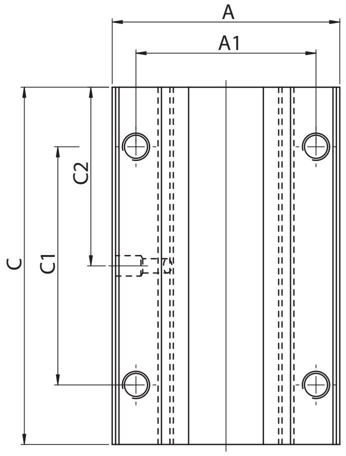
- Lubrication hole (AS)
- KH..PP
- Size (25)
- Series (SA)

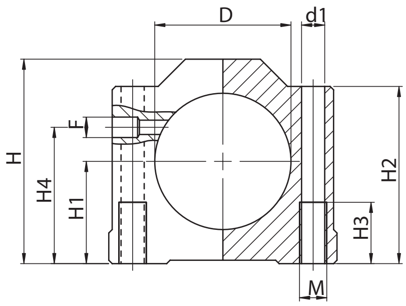
- Lock screw DIN 9112-8.8 Spring lock washer DIN 7980
- Load according to linear bushing specification



Type STA

Linear ball bearing housing





Dimensions (mm)

Type	Ø d	Ø D	A	C	H	A1 + - 0,15	C1	H1 + 0,010 - 0,014	H2	H3	M	d1	H4	C2	F°-0,1	Weight gr
STA - 12 - AS	12	19	40	60	33	29	35	17	28	11	M5	4,3	21	30	6	140
STA - 14 - AS	14	21	45	60	38	34	40	18	33	11	M5	4,3	25	30	6	180
STA - 16 - AS	16	24	45	65	38	34	40	19	33	11	M5	4,3	25	32,5	6	175
STA - 20 - AS	20	28	53	65	45	40	45	23	39	13	M6	5,3	30	32,5	6	250
STA - 25 - AS	25	35	62	85	54	48	55	27	46	18	M8	6,6	35	42,5	6	440
STA - 30 - AS	30	40	67	105	60	53	70	30	52	18	M8	6,6	40	52,5	6	650
STA - 40 - AS	40	52	87	125	76	69	85	39	66	22	M10	8,4	52	62,5	6	1270
STA - 50 - AS	50	62	103	145	92	82	100	47	80	26	M12	10,5	62	72,5	6	2130

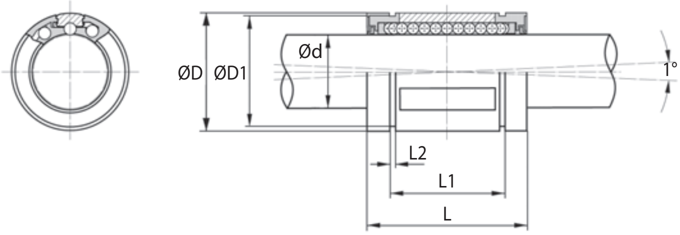
Linear ball bearings housing units

Reference

STA - 25 - KH..PP - AS

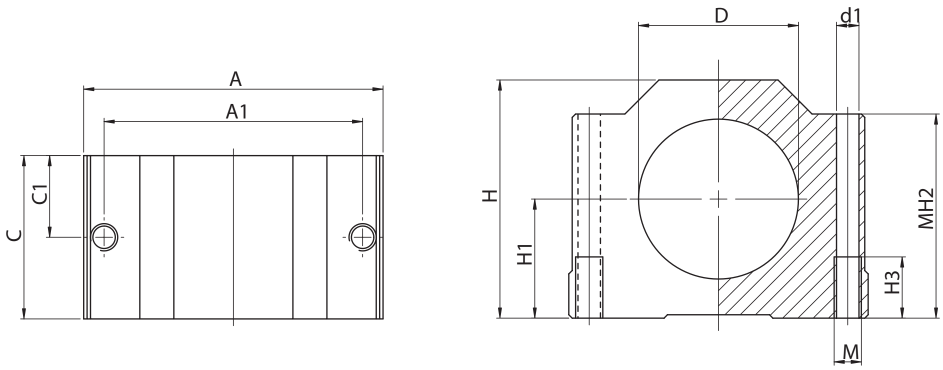
- Lubrication hole
- KH..PP
- Size
- Series

- Lock screw DIN 9112-8.8 Spring lock washer DIN 7980
- Load according to linear bushing specification



Type S2B

Linear ball bearing housing



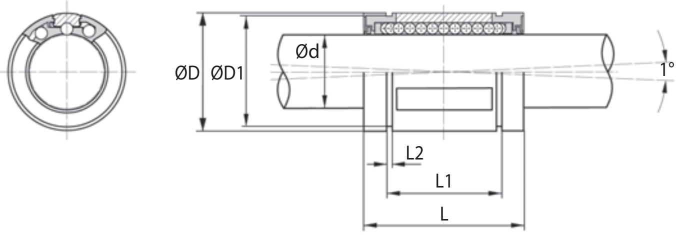
Dimensions (mm)													**Weight**
Type	**Ø d**	**Ø D**	**A**	**C**	**H**	**A1** **+ - 0,15**	**C1**	**H1** **+ - 0,015**	**H2**	**H3**	**M**	**d1**	**gr**
S2B - 12 - AS	12	22	52	20	38	42	10	20	30	13	M6	5,3	65
S2B - 16 - AS	16	26	56	22	40	46	11	20	32	13	M6	5,3	80
S2B - 20 - AS	20	32	70	28	50	58	14	25	41	18	M8	6,6	160
S2B - 25 - AS	25	40	80	40	60	68	20	30	50	18	M8	6,6	320
S2B - 30 - AS	30	47	88	48	70	76	24	35	60	18	M8	6,6	490
S2B - 40 - AS	40	62	108	56	85	94	28	45	74	22	M10	8,4	800
S2B - 50 - AS	50	75	135	72	102	116	36	50	87	27	M12	10,5	1540
S2B - 60 - AS	60	90	165	95	120	140	47,5	60	106	35	M16	13,5	2960

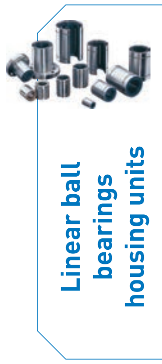
Reference

S2B - 25 - LME..UU - AS

- Lubrication hole
- LME..UU
- Size
- Series

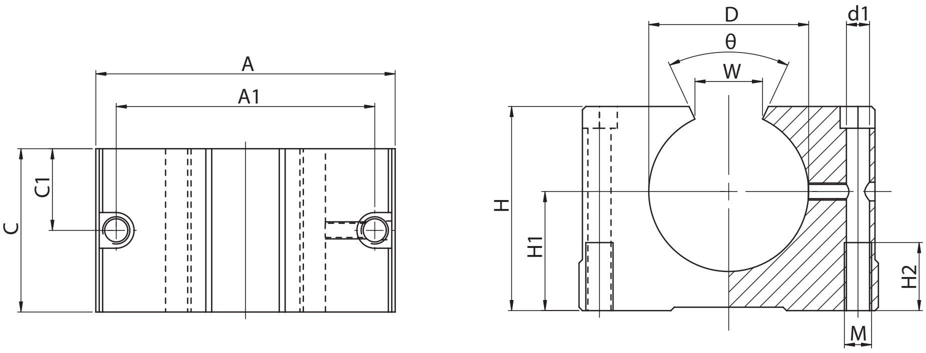
- Lock screw DIN 9112-8.8 Spring lock washer DIN 7980
- Load according to linear bushing specification





Type S20

Linear ball bearing housing



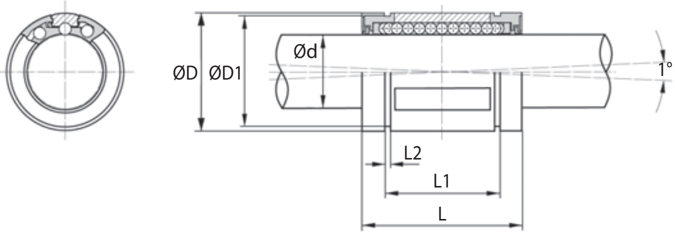
Dimensions (mm)														Weight
Type	Ø d	Ø D	A	C	H	A1 + - 0,15	C1	H1 + - 0,015	H2	M	d1	W	Ø	gr
S2O - 12 - AS	12	22	52	20	30	42	10	20	13	M6	5,5	7,5	78°	50
S2O - 16 - AS	16	26	56	22	32	46	11	20	13	M6	5,5	10	78°	60
S2O - 20 - AS	20	32	70	28	41	58	14	25	18	M8	6,6	10	60°	140
S2O - 25 - AS	25	40	80	40	50	68	20	30	18	M8	6,6	12,5	60°	280
S2O - 30 - AS	30	47	88	48	60	76	24	35	18	M8	6,6	12,5	50°	420
S2O - 40 - AS	40	62	108	56	74	94	28	45	22	M10	8,4	16,8	50°	710
S2O - 50 - AS	50	75	135	72	87	116	36	50	27	M12	10,5	21	50°	1340
S2O - 60 - AS	60	90	165	95	106	140	47,5	60	35	M16	13,5	27,2	54°	2670

Linear ball bearings housing units

Reference

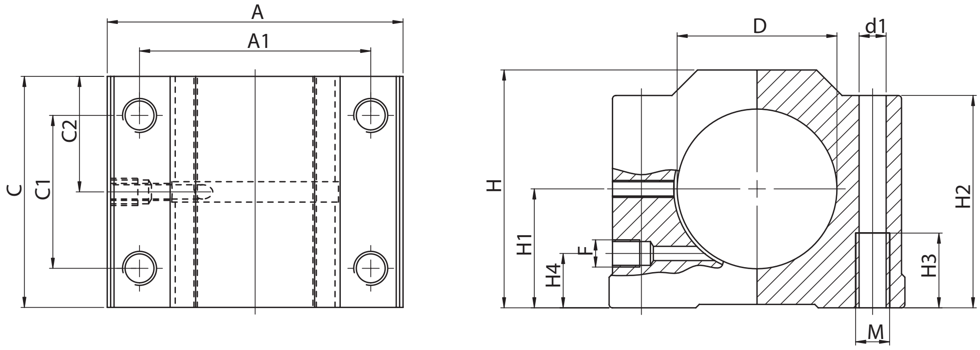
S2O - 25 - LME..UUOP - AS
- Lubrication hole
- LME..UUOP
- Size
- Series

- Lock screw DIN 9112-8.8 Spring lock washer DIN 7980
- Load according to linear bushing specification



Type SB

Linear ball bearing housing



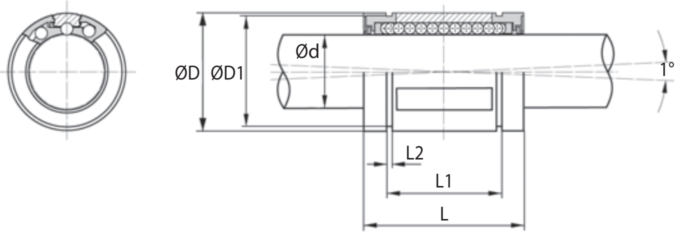
Type	Ø d	Ø D	A	C	H	A1	C1	H1	H2	H3	M	d1	H4	C2	F	Weight
	Dimensions (mm)															
						+ - 0,15	+ - 0,15	+ 0,008 - 0,016								g r
SB - 12 - AS	12	22	43	32	35	32	23	18	31	11	M5	4,3	8	16	M6x1	70
SB - 16 - AS	16	26	53	36	42	40	26	22	37	13	M6	5,3	12	18	M8x1	130
SB - 20 - AS	20	32	60	45	50	45	32	25	44	18	M8	6,6	13	22,5	M8x1	210
SB - 25 - AS	25	40	78	58	60	60	40	30	52,5	22	M10	8,4	15	29	M8x1	430
SB - 30 - AS	30	47	87	68	70	68	45	35	62,5	22	M10	8,4	16	34	M8x1	670
SB - 40 - AS	40	62	108	80	90	86	58	45	80	26	M12	10,5	20	40	M8x1	1220
SB - 50 - AS	50	75	132	100	101	108	50	50	88	34	M16	13,5	22	50	M8x1	1940
SB - 60 - AS	60	90	160	125	120	132	65	60	105	38	M16	13,5	25	80	M8x1	3570

Reference

SB - 25 - LME..UU - AS

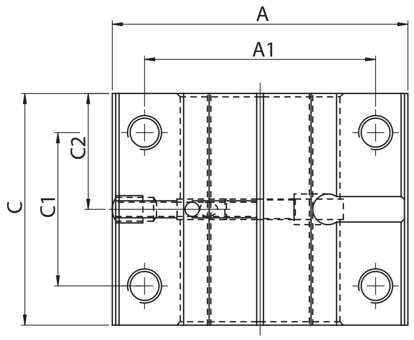
- AS: Lubrication hole
- LME..UU: LME..UU
- 25: Size
- SB: Series

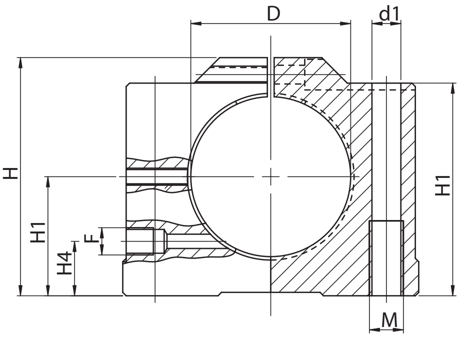
- Lock screw DIN 9112-8.8 Spring lock washer DIN 7980
- Load according to linear bushing specification



Type SJ

Linear ball bearing housing





Dimensions (mm)																Weight
Type	Ø d	Ø D	A	C	H	A1 + - 0,15	C1 + - 0,10	H1 + 0,008 - 0,016	H2	H3	C2	M	d1	H4	F	gr
SJ - 12 - AS	12	22	43	32	35	32	23	18	31	11	16	M5	4,3	8	M6x1	80
SJ - 16 - AS	16	26	53	36	42	40	26	22	37	13	18	M6	5,3	12	M8x1	130
SJ - 20 - AS	20	32	60	45	50	45	32	25	44	18	22,5	M8	6,6	13	M8x1	210
SJ - 25 - AS	25	40	78	58	60	60	40	30	52,5	22	29	M10	8,4	15	M8x1	420
SJ - 30 - AS	30	47	87	68	70	68	45	35	62,5	22	34	M10	8,4	16	M8x1	660
SJ - 40 - AS	40	62	108	80	90	86	58	45	80	26	40	M12	10,5	20	M8x1	1170
SJ - 50 - AS	50	75	132	100	101	108	50	50	88	34	50	M16	13,5	22	M8x1	1950
SJ - 60 - AS	60	90	160	125	120	132	65	60	105	38	62,5	M16	13,5	25	M8x1	3640

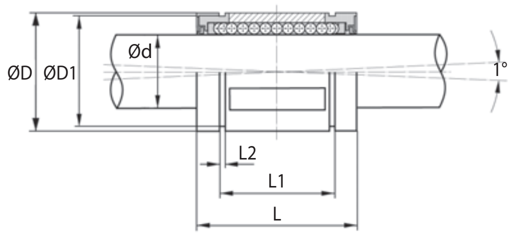
Linear ball bearings housing units

Reference

SJ - 25 - LME..UUAJ - AS

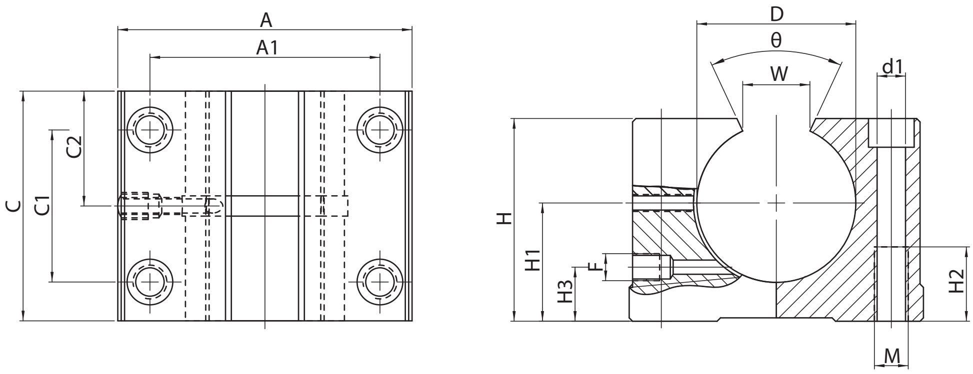
- Lubrication hole
- LME..UUAJ
- Size
- Series

- Lock screw DIN 9112-8.8 Spring lock washer DIN 7980
- Load according to linear bushing specification



Type SO

Linear ball bearing housing



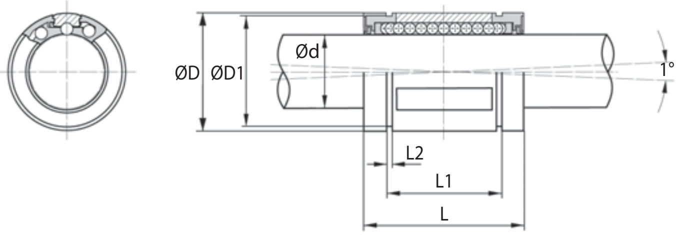
Type	Ø d	Ø D	A	C	H	A1	C1	H1	H2	M	d1	W	Ø	H3	F	Weight
Dimensions (mm)						+ - 0,15	+ - 0,10	+ 0,008 - 0,016								gr
SO - 12	12	22	43	32	28	32	23	18	11	M5	4,3	7,5	78°	8	M6x1	60
SO - 16	16	26	53	36	35	40	26	22	13	M6	5,3	10	78°	12	M8x1	110
SO - 20	20	32	60	45	42	45	32	25	18	M8	6,6	10	60°	13	M8x1	170
SO - 25	25	40	78	58	51	60	40	30	22	M10	8,4	12,5	60°	15	M8x1	360
SO - 30	30	47	87	68	60	68	45	35	22	M10	8,4	12,5	50°	16	M8x1	560
SO - 40	40	62	108	80	77	86	58	45	26	M12	10,5	16,8	50°	20	M8x1	1000
SO - 50	50	75	132	100	88	108	50	50	34	M16	13,5	21	50°	22	M8x1	1680
SO - 60	60	90	160	125	105	132	65	60	38	M16	13,5	27,2	54°	25	M8x1	3170

Reference

SO - 25 - LME..UUOP - AS

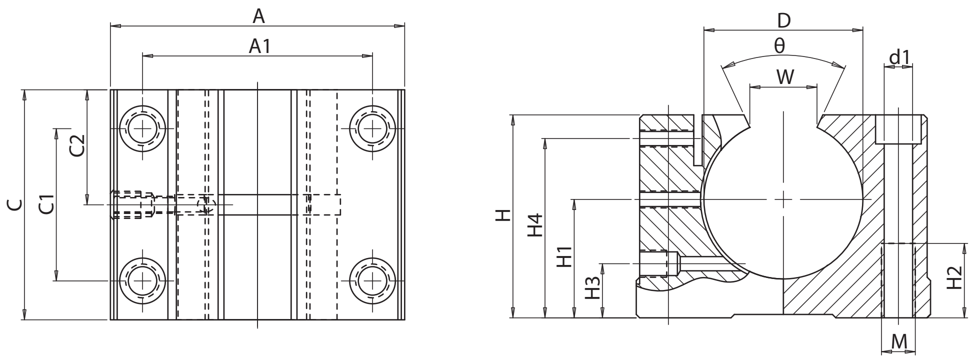
- Lubrication hole (AS)
- LME..UUOP
- Size (25)
- Series (SO)

- Lock screw DIN 9112-8.8 Spring lock washer DIN 7980
- Load according to linear bushing specification



Type SOJ

Linear ball bearing housing



Type	Ø d	Ø D	A	C	H	A1	C1	H1	H2	M	d1	W	Ø	H3	F	gr
						Dimensions (mm)										Weight
						+ - 0,15	+ - 0,10	+ 0,008 - 0,016								
SOJ - 12	12	22	43	32	28	32	23	18	11	M5	4,3	7,5	78°	8	M6x1	60
SOJ - 16	16	26	53	36	35	40	26	22	13	M6	5,3	10	78°	12	M8x1	100
SOJ - 20	20	32	60	45	42	45	32	25	18	M8	6,6	10	60°	13	M8x1	170
SOJ - 25	25	40	78	58	51	60	40	30	22	M10	8,4	12,5	60°	15	M8x1	350
SOJ - 30	30	47	87	68	60	68	45	35	22	M10	8,4	12,5	50°	16	M8x1	550
SOJ - 40	40	62	108	80	77	86	58	45	26	M12	10,5	16,8	50°	20	M8x1	1000
SOJ - 50	50	75	132	100	88	108	50	50	34	M16	13,5	21	50°	22	M8x1	1700
SOJ - 60	60	90	160	125	105	132	65	60	38	M16	13,5	27,2	54°	25	M8x1	3220

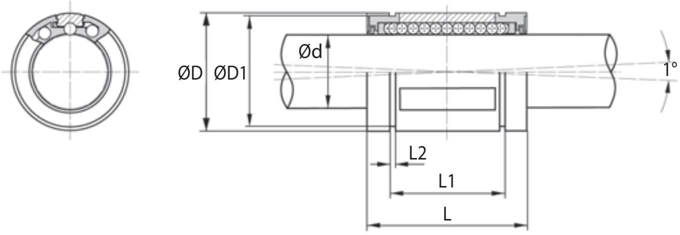
Linear ball bearings housing units

Reference

SOJ - 25 - LME..UUOP - AS

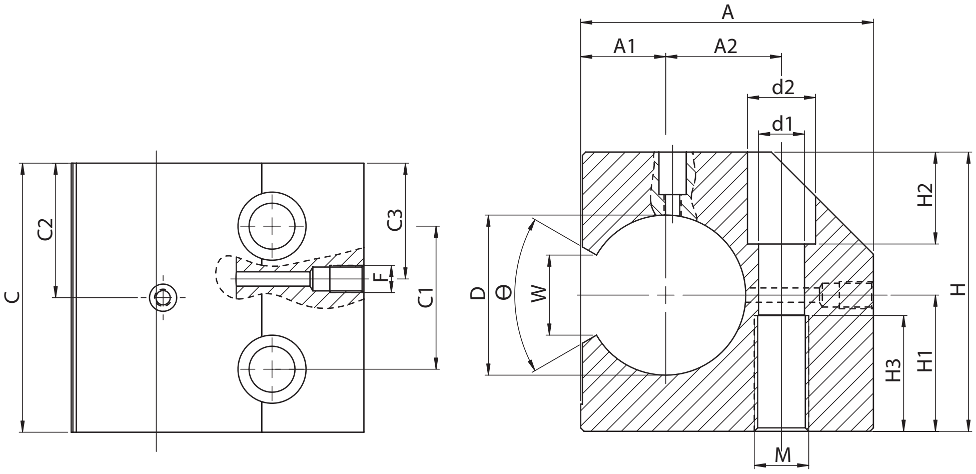
- Lubrication hole
- LME..UUOP
- Size
- Series

- Lock screw DIN 9112-8.8 Spring lock washer DIN 7980
- Load according to linear bushing specification



Type SLO

Linear ball bearing housing



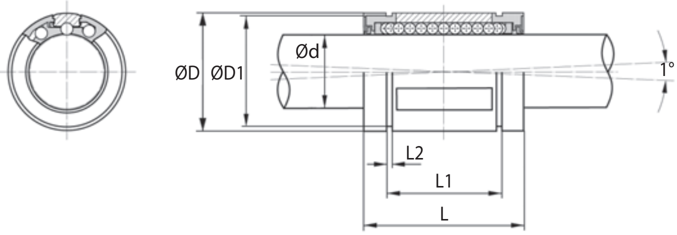
Type	Ø d	Ø D	A	C	H	A1	A2	C1	C2	C3	H1	H2	H3	M	d1	d2	W	0	F	Weight gr
Dimensions (mm)								+ - 0,15			+ 0,008 - 0,016									
SLO - 20 - AS	20	32	65	47	60	17	22	30	23,5	27	30	18	20	M10	8,4	15	10	60°	M8x1	420
SLO - 25 - AS	25	40	75	58	72	21	28	36	29	33,5	35	22	22	M12	10,5	18	12,5	60°	M8x1	800
SLO - 30 - AS	30	47	86	68	82	25	34	42	34	39,5	40	26	26	M16	13,5	20	12,5	50°	M8x1	1200
SLO - 40 - AS	40	62	110	80	100	32	43	48	40	45,5	45	30	30	M20	17,5	24	16,8	50°	M8x1	2000

Reference

SLO - 25 - LME..UUOP - AS

- Lubrication hole
- LME..UUOP
- Size
- Series

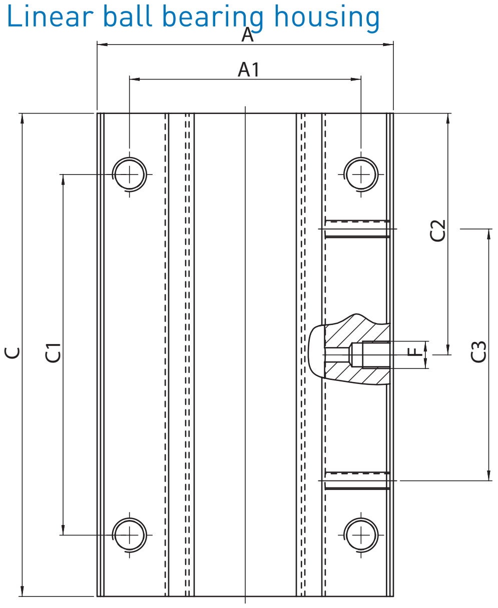
- Lock screw DIN 9112-8.8 Spring lock washer DIN 7980
- Load according to linear bushing specification

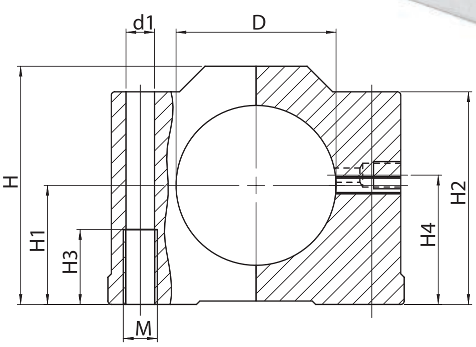


Linear ball bearings housing units

Type SBT

Linear ball bearing housing





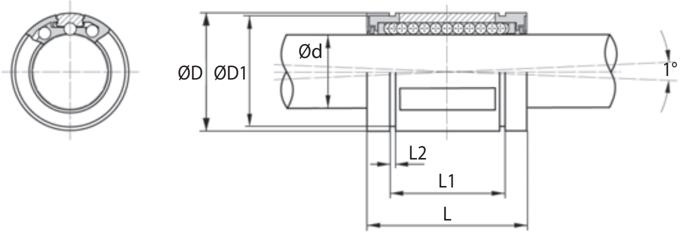
Type	Ø d	Ø D	A	C	H	A1 + - 0,15	C1 + - 0,15	H1 + 0,008 - 0,016	H2	H3	M	d1	C2	C3	F	Weight gr
	Dimensions (mm)															
SBT - 12 - AS	12	22	43	70	35	32	56	18	31	11	M5	4,3	35	38	M6x1	180
SBT - 16 - AS	16	26	53	78	42	40	64	22	37	13	M6	5,3	39	42	M8x1	300
SBT - 20 - AS	20	32	60	96	50	45	76	25	44	18	M8	6,6	48	51	M8x1	480
SBT - 25 - AS	25	40	78	122	60	60	94	30	52,5	22	M10	8,4	61	64	M8x1	960
SBT - 30 - AS	30	47	87	142	70	68	106	35	62,5	22	M10	8,4	71	74	M8x1	1440
SBT - 40 - AS	40	62	108	166	90	86	124	45	80	26	M12	10,5	83	86	M8x1	2620
SBT - 50 - AS	50	75	132	212	101	108	160	50	88	34	M16	13,5	106	112	M8x1	4360
SBT - 60 - AS	60	90	160	260	120	132	200	60	105	38	M16	13,5	130	135	M8x1	7630

Reference

SBT - 25 - LME..UU - AS

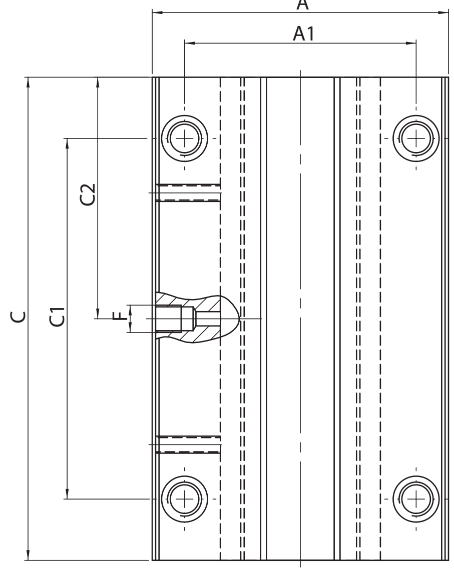
- Lubrication hole
- LME..UU
- Size
- Series

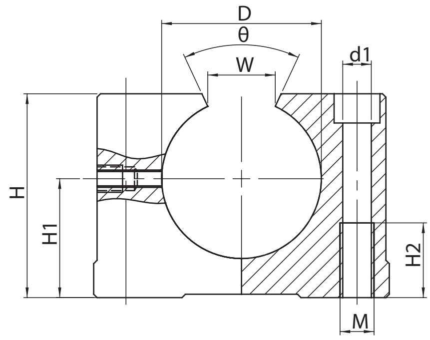
- Lock screw DIN 9112-8.8 Spring lock washer DIN 7980
- Load according to linear bushing specification



Type SOT

Linear ball bearing housing





Type	Ø d	Ø D	A	C	H	A1 + - 0,15	C1 + - 0,10	H1 + 0,008 - 0,016	H2	M	d1	W	0	C2	F	Weight gr
SOT - 12 - AS	12	22	43	70	28	32	56	18	11	M5	4,3	7,5	78°	35	M6x1	140
SOT - 16 - AS	16	26	53	78	35	40	64	22	13	M6	5,3	10	78°	39	M8x1	250
SOT - 20 - AS	20	32	60	96	42	45	76	25	18	M8	6,6	10	60°	48	M8x1	370
SOT - 25 - AS	25	40	78	122	51	60	94	30	22	M10	8,4	12,5	60°	61	M8x1	800
SOT - 30 - AS	30	47	87	142	60	68	106	35	22	M10	8,4	12,5	50°	71	M8x1	1220
SOT - 40 - AS	40	62	108	166	77	86	124	45	26	M12	10,5	16,8	50°	83	M8x1	2170
SOT - 50 - AS	50	75	132	212	88	108	160	50	34	M16	13,5	21	50°	106	M8x1	3220
SOT - 60 - AS	60	90	160	260	105	132	200	60	38	M16	13,5	27,2	54°	130	M8x1	6930

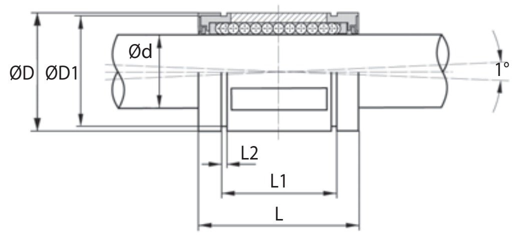
Dimensions (mm)

Reference

SOT - 25 - LME..UUOP - AS

- Lubrication hole
- LME..UUOP
- Size
- Series

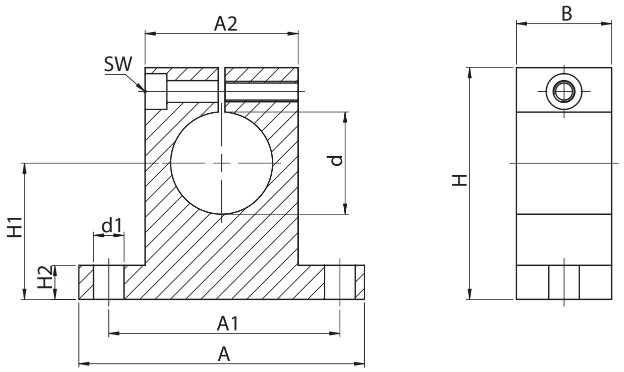
- Lock screw DIN 9112-8.8 Spring lock washer DIN 7980
- Load according to linear bushing specification

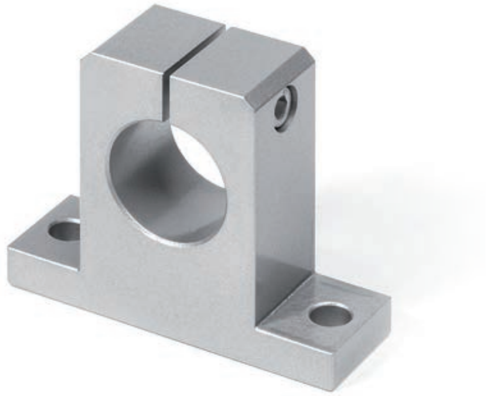


Linear ball bearings housing units

Type SGWA

Shaft support

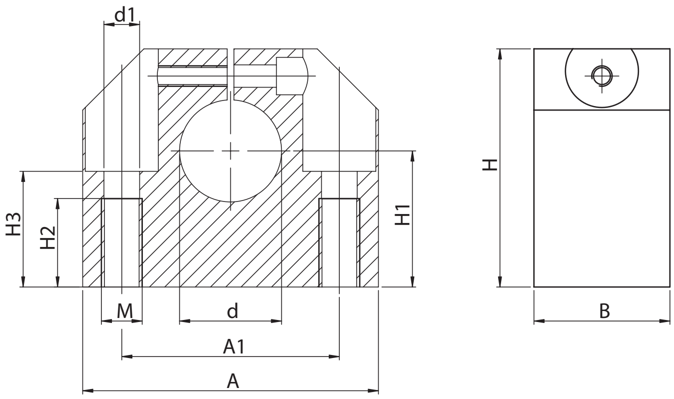




Type	Ø d	A	B	H	H1	A1 + - 0,15	A2	d1	SW	H2	Weight gr
	Dimensions (mm)										
FGWA - 08	8	32	10	27	15	25	16	4,5	M3	5	10
FGWA - 12	12	42	12	35	20	32	20	5,5	M3	5,5	20
FGWA - 16	16	50	16	42	25	40	28	5,5	M3	6,5	30
FGWA - 20	20	60	20	50	30	45	32	5,5	M4	8	70
FGWA - 25	25	74	25	59	35	60	38	6,6	M5	9	140
FGWA - 30	30	84	28	68	40	68	45	9	M6	10	200
FGWA - 40	40	108	32	86	50	86	56	11	M8	12	480
FGWA - 50	50	130	40	100	60	108	80	11	M8	14	1900
FGWA - 60	60	160	48	124	75	132	100	13,5	M8	15	3600

Type FGWH

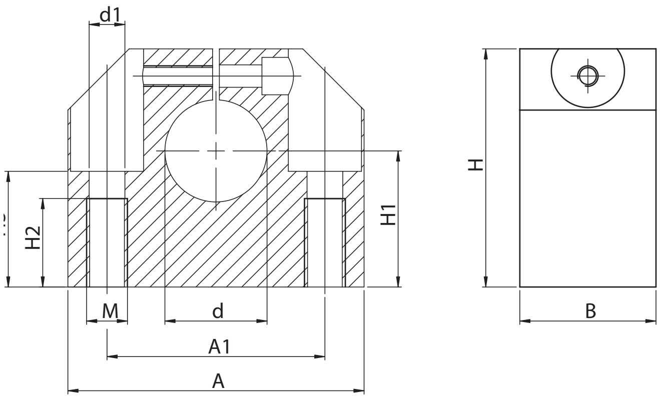
Shaft support



Dimensions (mm)											Weight
Type	Ø d	A	B	H	H1 + - 0,01	A1 + - 0,15	d1	M	H2	H3	gr
FGWH - 06	6	32	16	27	15	22	4,2	M5	11	13	30
FGWH - 08	8	32	16	27	16	22	4,2	M5	11	13	30
FGWH - 10	10	40	18	33	18	27	5,2	M6	13	16	50
FGWH - 12	12	40	18	33	19	27	5,2	M6	13	16	50
FGWH - 14	14	45	20	38	20	32	5,2	M6	13	18	70
FGWH - 16	16	45	20	38	22	32	5,2	M6	13	18	70
FGWH - 20	20	53	24	45	25	39	6,8	M8	18	22	120
FGWH - 25	25	62	28	54	31	44	8,6	M10	22	26	170
FGWH - 30	30	67	30	60	34	49	8,6	M10	22	29	220
FGWH - 40	40	87	40	76	42	66	10,3	M12	26	38	480
FGWH - 50	50	103	50	92	50	80	14,25	M16	34	46	820

Type FGWN

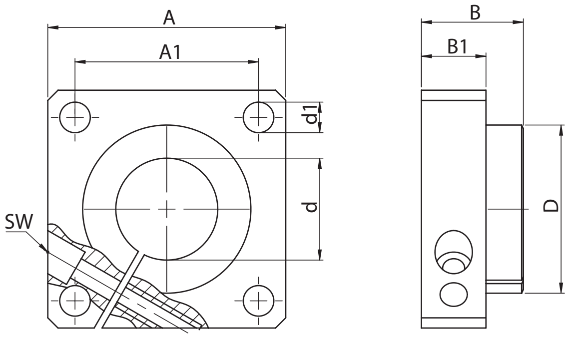
Shaft support

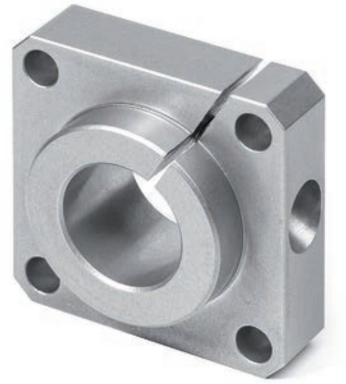


	Dimensions (mm)										Weight
Type	Ø d	A	B	H	H1 + - 0,01	A1 + - 0,15	d1	M	H2	H3	gr
FGWN - 08	8	32	18	28	15	22	3,3	M4	9	13	40
FGWN - 12	12	43	20	35	20	30	5,2	M6	13	16,5	100
FGWN - 16	16	53	24	42	25	38	6,8	M8	18	21	150
FGWN - 20	20	60	30	50	30	42	8,6	M10	22	25	230
FGWN - 25	25	78	38	60	35	56	10,3	M12	26	30	410
FGWN - 30	30	87	40	70	40	64	10,3	M12	26	34	530
FGWN - 40	40	108	48	90	50	82	14,25	M16	34	44	990
FGWN - 50	50	132	58	105	60	100	17,5	M20	43	49	1250

Type SFWR

Shaft support

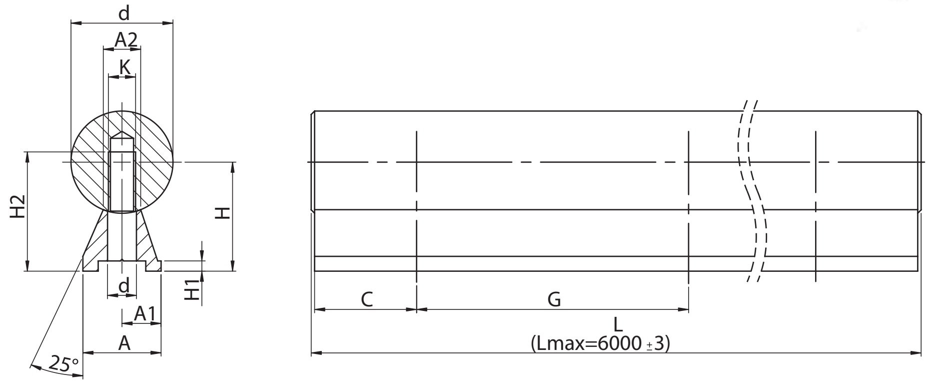




	Dimensions (mm)								Weight
Type	**Ø d**	**A**	**B**	**D**	**A1**	**d1**	**B1**	**SW**	**gr**
SFWR - 12	12	40	20	23,5	30	5,5	12	3	60
SFWR - 16	16	50	20	27,5	35	5,5	12	3	80
SFWR - 20	20	50	23	33,5	38	6,6	14	4	100
SFWR - 25	25	60	25	42	42	6,6	16	5	150
SFWR - 30	30	70	30	49,5	54	9	19	6	300
SFWR - 40	40	100	40	65	68	11	26	8	700
SFWR - 50	50	100	50	75	75	11	36	8	1200

Type FTSU

Support rail



Type	Ø d	A	H + - 0,2	A1	A2	H1	K	d2	H2	C	G	gr
	Dimensions (mm)											**Weight**
FTSU - 12	12	11	14,5	5,5	5,4	3	M4	4,5	16	37,5	75	440
FTSU - 16	16	14	18	7	7	3	M5	5,5	19	37,5	75	560
FTSU - 20	20	17	22	8,5	8,1	3	M6	6,6	23	37,5	75	810
FTSU - 25	25	21	26	10,5	10,3	3	M8	9	28,5	37,5	75	1060
FTSU - 30	30	23	30	11,5	11	3	M10	11	32	50	100	1250
FTSU - 40	40	30	39	15	15	4	M12	13,5	39,5	50	100	2160
FTSU - 50	50	35	46	17,5	19	5	M14	15,5	46	50	100	2680

Reference

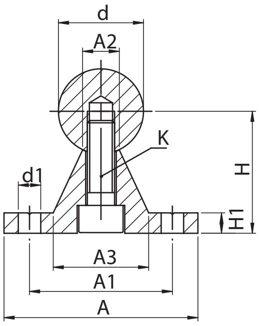
FTSU - 25 - G — Aluminium support
- Pitch
- Size
- Series

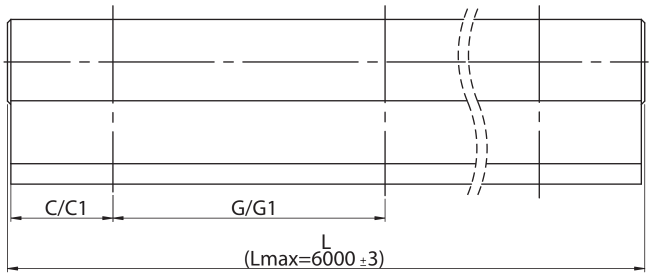
FTSU - 25 - W - 500 — Shaft + Aluminium support
- Length mm
- W, WRA, WRB, WV, WH, WHV
- Size
- Series

- Weight without shaft.
- Depending in length aluminium supports can have different dimensions.
- "C, C1" distance to center of first/last hole.
- Other pitches under request.

Type FTSN

Support rail





	Dimensions (mm)													Weight
Type	Ø d	A	H + - 0,2	A2	A3	H1	A1	d1	C	C1	G	G1	K	gr
FTSN - 12	12	40	22	5,4	15	5	29	4,5	37,5	60	75	120	M4X20	520
FTSN - 16	16	45	26	7	19	5	33	5,5	50	75	100	150	M5X20	640
FTSN - 20	20	52	32	8,1	23	6	37	6,6	50	75	100	150	M6X25	900
FTSN - 25	25	57	36	10,3	26	6	42	6,6	60	100	120	200	M8X30	1080
FTSN - 30	30	69	42	11	29	7	51	9	75	100	150	200	M10X35	1430
FTSN - 40	40	73	50	11	36	8	55	9	100	150	200	300	M10X40	1810
FTSN - 50	50	84	60	19	40	9	63	11	100	150	200	300	M12X45	2450

Reference

FTSN - 25 - G — Aluminium support
- Pitch
- Size
- Series

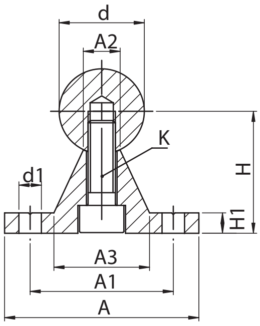
FTSN - 25 - W - 500 — Shaft + Aluminium support
- Length mm
- W, WRA, WRB, WV, WH, WHV
- Size
- Series

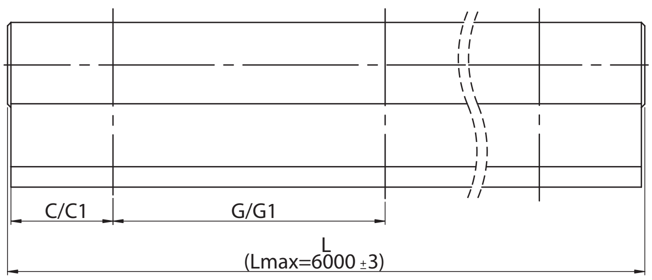
- Weight without shaft.
- Depending in length aluminium supports can have different dimensions.
- "C, C1" distance to center of first/last hole.
- Other pitches under request.

Linear ball bearings housing units

Type FTSW

Support rail





	Dimensions (mm)											Weight
Type	Ø d	A	H + - 0,2	A2	A3	H1	A1	d1	C	G	K	gr
FTSW - 12	12	40	22	6	19,5	5	29	4,5	60	120	M4X20	90
FTSW - 16	16	54	32	7,5	24,2	6	41	5,5	75	150	M5X25	150
FTSW - 20	20	54	34,02	7,5	24,2	6	41	5,5	75	150	M5X30	150
FTSW - 25	25	65	39,66	10	29,8	6	51	6,6	75	150	M6X35	2
FTSW - 30	30	65	42,19	10	29,8	6	51	6,6	75	150	M6X35	2
FTSW - 40	40	85	60	17	46	10	65	9	75	150	M10X50	350
FTSW - 50	50	85	65,05	17	46	10	65	9	75	150	M10X50	350

Reference

FTSW - 25 - G   Aluminium support

- Pitch
- Size
- Series

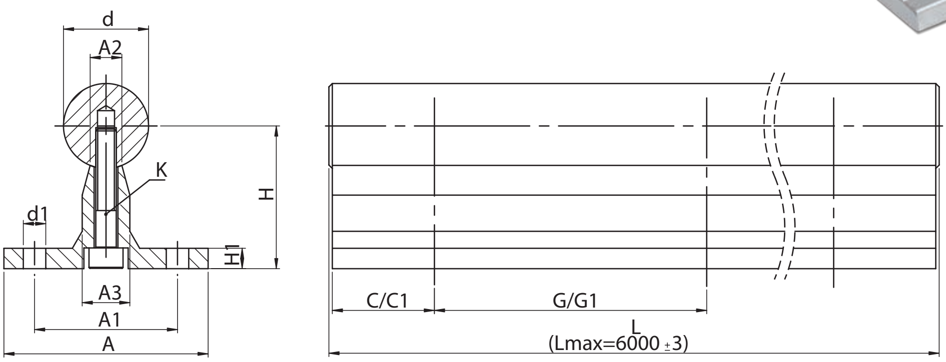
FTSW - 25 - W - 500   Shaft + Aluminium support

- Length mm
- W, WRA, WRB, WV, WH, WHV
- Size
- Series

- Weight without shaft.
- Depending in length aluminium supports can have different dimensions.
- "C, C1" distance to center of first/last hole.
- Other pitches under request.

Type FTSWA

Support rail



Type	Ø d	A	H + - 0,2	A1	A2	A3	H1	d1	C	C1	G	G1	K	Weight gr
FTSWA - 12	12	43	28	29	5,4	9	5	4,5	37,5	60	75	120	M4X18	90
FTSWA - 16	16	48	30	33	7	10	5	5,5	50	75	100	150	M5X25	1
FTSWA - 20	20	56	38	37	8,1	11	6	6,6	50	75	100	150	M6X30	1480
FTSWA - 25	25	60	42	42	10,3	14	6	6,6	60	100	120	200	M8X35	170
FTSWA - 30	30	74	53	51	11	14	8	9	75	100	150	200	M10X40	2470
FTSWA - 40	40	78	60	55	15	18	8	9	100	150	200	300	M10X45	2910
FTSWA - 50	50	90	75	63	19	22	10	11	100	150	200	300	M12X55	410

Dimensions (mm)

Reference

FTSWA - 25 - G — Aluminium support
- Pitch
- Size
- Series

FTSWA - 25 - W - 500 — Shaft + Aluminium support
- Length mm
- W, WRA, WRB, WV, WH, WHV
- Size
- Series

- Weight without shaft.
- Depending in length aluminium supports can have different dimensions.
- "C, C1" distance to center of first/last hole.
- Other pitches under request.

PRECISION LINEAR SHAFTS

Precision linear axes are treated depending on the type of steel and the depth of quenching at frequencies from 3 to 400 KHz.

Through the induction hardening process, a surface hardness is obtained that guarantees high resistance to wear. The interior of the shaft maintains the mechanical and resilience properties. The shafts are subsequently ground and super-finished.

We hope that the information that we provide below will help you in the development of your projects, as well as those responsible for procurement.

FIELDS OF USE OF PRECISION LINEAR SHAFTS.

They are mainly used as a guide for linear bearings, sheaves and bushes, in applications such as:

- Packaging machines.
- Woodworking machines.
- Machine tools.
- Gym machines.
- Protection systems for machinery.
- Door opening systems.
- Food and pharmaceutical industry.
- Printing machines.
- Instrumentation and dimensional control.
- Assembly line systems

TYPES		Pag.
W	Hardened and rectified shafts.	5
WV	Hardened, chromed and rectified shafts.	6
WRB	Stainless steel shafts (X46) hardened and rectified.	9

Technical specifications

Steel correspondence table*

Euronorm	DIN	Werkstoff Nr.	AFNOR	BS	UNI	JIS	ASTM
C53 EN 10083 -2	Cf53 DIN 17212	1.1213	XC48TS	070MS	C53	—	1050
X46Cr13 EN 10088-3	X46Cr13 DIN 17440	1.4034	Z44Cr13	420S45	X40Cr14	—	420C

*) The correspondences listed above are indicative, steels produced according to different standards are not always the same.

Chemical composition*

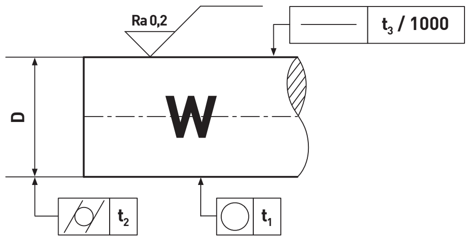
Steel		C	Si	Mn	P	S	Cr	Ni	Mo	V	N
Cf53	min	0,50	0,15	0,40							
	max	0,57	0,35	0,70	0,025	0,035					
X46Cr13	min	0,42					12,5				
	max	0,50	1,0	1,0	0,045	0,030	14,4				

*) % by weight

Mechanical Characteristics

Product code	Steel	Diameter	Breaking load (Rm)	Elastic load $(Rp_{0.2})$	Stretching (A5)	Core Hardness	Surface Hardness
		mm	MPa	MPa	%	HB	HRC
W	Cf53	Ø ≤ 18	700 - 850	min. 475	min. 10	max. 223	62±2
WV		18 ← Ø ≤ 100	610 - 760	min. 340	min. 16		
WRB	X46Cr13	Ø ≤ 60	650 - 800			max. 245	55±3

*) On request, as an alternative to Cf53



Ground tempered linear shafts CF53

Diameter D mm	Weight Kg/m	Code	Standard length L mm	Depth hardness (SHD) DIN ISO 15787 mm	Standard Tolerance h6 µm	Roundness t_1 µm	Parallelism t_2 µm	Straightness t_3 mm/m
4	0,10	W 4	4000	0,5 - 0,8	0/-8	4	6	0,16
5	0,15	W 5	6000	0,5 - 0,8	0/-8	4	6	0,16
6	0,22	W 6	6000	0,5 - 0,8	0/-8	4	6	0,16
8	0,39	W 8	6000	0,6 - 0,9	0/-9	4	6	0,16
10	0,62	W 10	6000	0,7 - 1,0	0/-9	4	6	0,12
12	0,89	W 12	6000	0,8 - 1,2	0/-11	5	8	0,12
13	1,04	W 13	6000	0,8 - 1,2	0/-11	5	8	0,12
14	1,21	W 14	6000	0,9 - 1,3	0/-11	5	8	0,12
15	1,39	W 15	6000	1,0 - 1,4	0/-11	5	8	0,12
16	1,58	W 16	6000	1,1 - 1,5	0/-11	5	8	0,1
18	2,00	W 18	6000	1,1 - 1,5	0/-11	5	8	0,1
20	2,46	W 20	6000	1,2 - 1,5	0/-13	6	8	0,1
22	2,98	W 22	6000	1,2 - 1,5	0/-13	6	8	0,1
24	3,55	W 24	6000	1,4 - 1,6	0/-13	6	8	0,1
25	3,85	W 25	6000	1,5 - 1,7	0/-13	6	9	0,1
28	4,83	W 28	6000	1,5 - 1,8	0/-13	6	9	0,1
30	5,55	W 30	6000	1,5 - 1,9	0/-13	6	9	0,1
32	6,31	W 32	6000	1,5 - 1,9	0/-16	7	11	0,1
35	7,55	W 35	6000	1,5 - 1,9	0/-16	7	11	0,1
40	9,86	W 40	6000	1,6 - 2,0	0/-16	7	11	0,1
45	12,48	W 45	6000	1,6 - 2,0	0/-16	7	11	0,1
50	15,41	W 50	6000	2,2 - 2,6	0/-16	7	11	0,1
55	18,64	W 55	6000	2,2 - 2,6	0/-19	8	13	0,1
60	22,18	W 60	6000/7000	2,2 - 2,6	0/-19	8	13	0,1
65	26,03	W 65	6000/7000	2,2 - 2,6	0/-19	8	13	0,1
70	30,19	W 70	6000/7000	2,2 - 2,6	0/-19	8	13	0,1
75	34,66	W 75	6000/7000	2,2 - 2,6	0/-19	8	13	0,1
80	39,44	W 80	6000/7000	2,2 - 2,6	0/-19	8	13	0,1
90	49,91	W 90	6000/7000	2,2 - 3,2	0/-22	9	13	0,2
100	61,62	W 100	6000/7000	2,2 - 3,2	0/-22	9	13	0,2
120	88,73	W 120	6000/7000	2,5 - 4,0	0/-22	10	16	0,2

Data

Surface hardness
62±2 HRC

Surface roughness
Ra max 0,2 µm

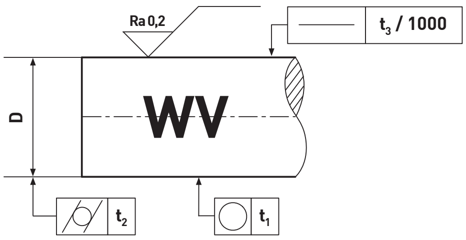
Tolerance length
0/+200 mm

Packing

Standard
Protection oil

Upon request
Carton tube, wooden box,
Branorost,
Lamiflex

Ground tempered chromed linear shafts CF53



Diameter D mm	Weight Kg/m	Code	Standard length L mm	Depth hardness (SHD) DIN ISO 15787 mm	Standard Tolerance h7 µm	Roundness t_1 µm	Parallelism t_2 µm	Straightness t_3 mm/m
4	*0,10*	**WV 4**	4000	0,5 - 0,8	0/-12	6	10	0,16
5	*0,15*	**WV 5**	6000	0,5 - 0,8	0/-12	6	10	0,16
6	*0,22*	**WV 6**	6000	0,5 - 0,8	0/-12	6	10	0,16
8	*0,39*	**WV 8**	6000	0,6 - 0,9	0/-15	6	10	0,16
10	*0,62*	**WV 10**	6000	0,7 - 1,0	0/-15	6	10	0,12
12	*0,89*	**WV 12**	6000	0,8 - 1,2	0/-18	8	12	0,12
13	*1,04*	**WV 13**	6000	0,8 - 1,2	0/-18	8	12	0,12
14	*1,21*	**WV 14**	6000	0,9 - 1,3	0/-18	8	12	0,12
15	*1,39*	**WV 15**	6000	1,0 - 1,4	0/-18	8	12	0,12
16	*1,58*	**WV 16**	6000	1,1 - 1,5	0/-18	8	12	0,1
18	*2,00*	**WV 18**	6000	1,1 - 1,5	0/-18	8	12	0,1
20	*2,46*	**WV 20**	6000	1,2 - 1,5	0/-21	9	12	0,1
22	*2,98*	**WV 22**	6000	1,2 - 1,5	0/-21	9	12	0,1
24	*3,55*	**WV 24**	6000	1,4 - 1,6	0/-21	9	12	0,1
25	*3,85*	**WV 25**	6000	1,5 - 1,7	0/-21	9	12	0,1
28	*4,83*	**WV 28**	6000	1,5 - 1,8	0/-21	9	12	0,1
30	*5,55*	**WV 30**	6000	1,5 - 1,9	0/-21	11	12	0,1
32	*6,31*	**WV 32**	6000	1,5 - 1,9	0/-25	11	15	0,1
35	*7,55*	**WV 35**	6000	1,5 - 1,9	0/-25	11	15	0,1
40	*9,86*	**WV 40**	6000	1,6 - 2,0	0/-25	11	15	0,1
45	*12,48*	**WV 45**	6000	1,6 - 2,0	0/-25	11	15	0,1
50	*15,41*	**WV 50**	6000	2,2 - 2,6	0/-25	11	15	0,1
55	*18,64*	**WV 55**	6000	2,2 - 2,6	0/-30	12	15	0,1
60	*22,18*	**WV 60**	6000/7000	2,2 - 2,6	0/-30	12	15	0,1
65	*26,03*	**WV 65**	6000/7000	2,2 - 2,6	0/-30	12	15	0,1
70	*30,19*	**WV 70**	6000/7000	2,2 - 2,6	0/-30	12	15	0,1
75	*34,66*	**WV 75**	6000/7000	2,2 - 2,6	0/-30	12	15	0,1
80	*39,44*	**WV 80**	6000/7000	2,2 - 2,6	0/-30	12	15	0,1
90	*49,91*	**WV 90**	6000/7000	2,2 - 3,2	0/-35	14	17	0,2
100	*61,62*	**WV 100**	6000/7000	2,2 - 3,2	0/-35	14	17	0,2
120	*88,73*	**WV 120**	6000/7000	2,5 - 4,0	0/-35	14	17	0,2

Data

Surface hardness
62±2 HRC

Surface roughness
Ra max 0,2 µm

Tolerance length
0/+200 mm

Chrome depth
min. 10 µm

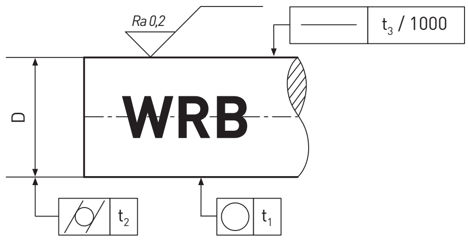
Chrome hardness
min. 900 HV $_{(0.1)}$

Packing

Standard
Extruded plastic coating

Upon request
Carton tube, wooden box,
Branorost, Lamiflex

Ground tempered stainless linear shafts X46CR13



Diameter D	Weight	Code	Standard length L	Depth hardness (SHD) DIN ISO 15787	Standard Tolerance h6	Roundness t_1	Parallelism t_2	Straightness t_3
mm	Kg/m		mm	mm	µm	µm	µm	mm/m
5	*0,15*	**WRB 5**	6000	0,5 - 0,8	0/-8	4	5	0,16
6	*0,22*	**WRB 6**	6000	0,5 - 0,8	0/-8	4	6	0,16
8	*0,39*	**WRB 8**	6000	0,6 - 0,9	0/-9	4	6	0,16
10	*0,62*	**WRB 10**	6000	0,7 - 1,0	0/-9	4	6	0,16
12	*0,89*	**WRB 12**	6000	0,8 - 1,2	0/-11	5	8	0,12
14	*1,21*	**WRB 14**	6000	0,9 - 1,3	0/-11	5	8	0,12
15	*1,39*	**WRB 15**	6000	1,0 - 1,4	0/-11	5	8	0,12
16	*1,58*	**WRB 16**	6000	1,1 - 1,5	0/-11	5	8	0,12
20	*2,46*	**WRB 20**	6000	1,2 - 1,5	0/-13	6	9	0,1
25	*3,85*	**WRB 25**	6000	1,5 - 1,7	0/-13	6	9	0,1
30	*5,55*	**WRB 30**	6000	1,5 - 1,9	0/-13	6	9	0,1
40	*9,86*	**WRB 40**	6000	1,6 - 2,0	0/-16	8	11	0,1
50	*15,41*	**WRB 50**	6000	2,2 - 2,6	0/-16	8	11	0,1
60	*22,18*	**WRB 60**	6000/7000	2,2 - 2,6	0/-19	9	13	0,1

Data

Surface hardness
55±3 HRC

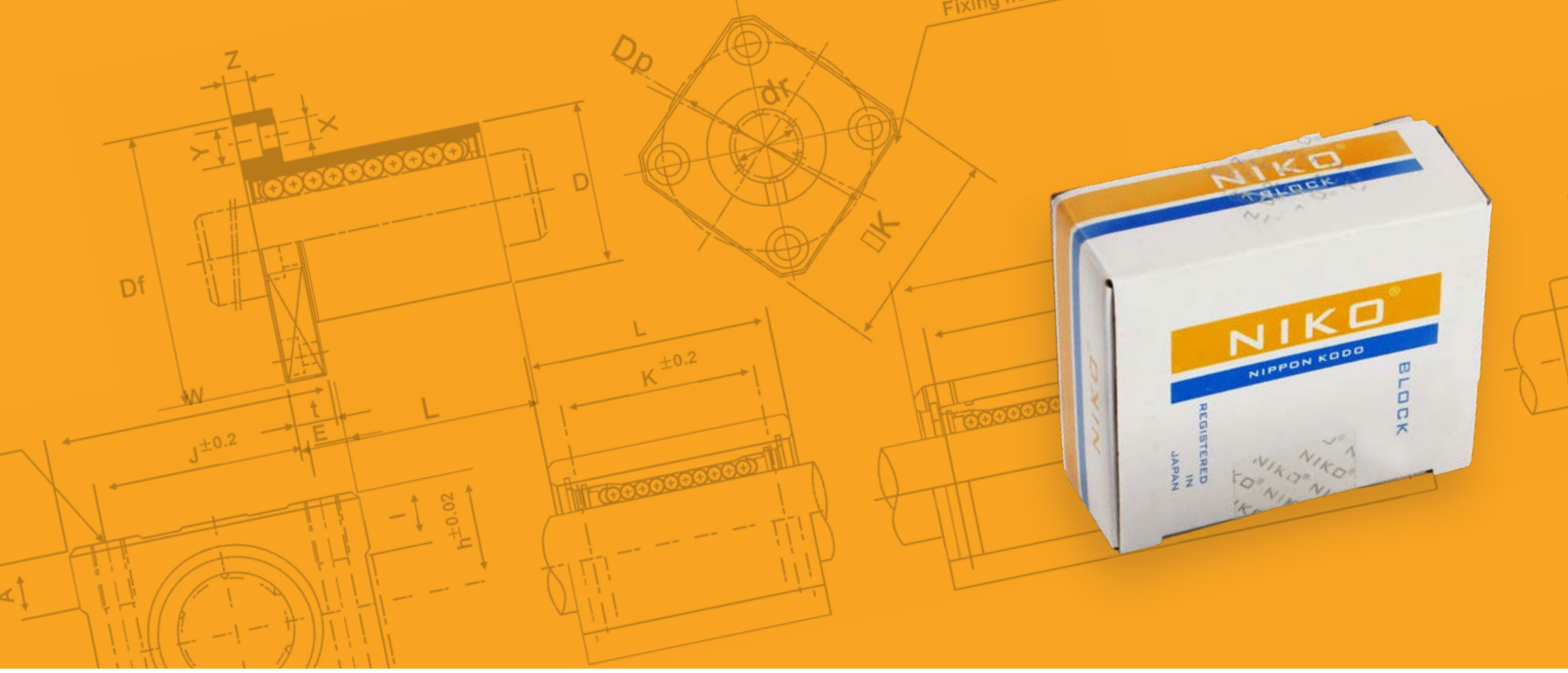
Surface roughness
Ra max 0,2 µm

Tolerance length
0/+200 mm

Packing

Standard
Protection oil

Upon request
Carton tube, wooden box,
Branorost,
Lamiflex



10 A. M., 10-DICIEMBRE-2020

NIKO®
NIPPON KODO
AUTOMATION TECHNOLOGY

Grandeur Imazato Bldg. No. 1~4, 4-Chome, Imazato, Nagaokakyo-City 617-0814, Kyoto, Japan
Tel.: +81-75-959-0221 ● niko@nipponkodojapan.com ● www.nipponkodobearings.com

AGELCO, S.L. ● Parcela 4, nº 94 - Pol. Lastaola ● 20120 Hernani (Gipuzkoa) - Spain
Tel.: +34 843 980 771 ● comercial@gecopowertek.com ● www.gecopowertek.com