NSB

直線運動系列

LINEAR MOTION SERIES

TÜV CERT TÜV CERT TÜV CERT TÜV CERT TÜV CERT TÜV CERT TÜV CERT

NSB Linear Ball Bushing-Interchangeability List

Ball Bushing-Compact Type

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

Ball Bushing-Resin Retainer

NSB	NB	THK	EASE
LM..	SM..G	LM..	SDM..
LM..UU	SM..GUU	LM..UU	SDM..UU
LM..AJ	SM..GAJ	LM..AJ	SDM..AJ
LM..UUAJ	SM..GUUAJ	LM..UUAJN	SDM..UUAJ
LM..OP	SM..GOP	LM..OP	SDM..OP
LM..UUOP	SM..GUUOP	LM..UUOP	SDM..UUOP

The above types are metric dimension series generally used in Japan and other countries.

NSB	NB	THK	EASE
LMB..	SW..G	LMB..	SDB..
LMB..UU	SW..GUU	LMB..UU	SDB..UU
LMB..AJ	SW..GAJ	LMB..AJ	SDB..AJ
LMB..UUAJ	SW..GUUAJ	LMB..UUAJ	SDB..UUAJ
LMB..OP	SW..GOP	LMB..OP	SDB..OP
LMB..UUOP	SW..GUUOP	LMB..UUOP	SDB..UUOP

The above types are inch dimension series generally used in US.

NSB	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.

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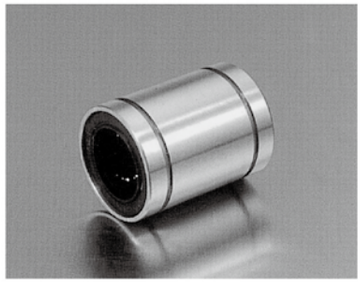
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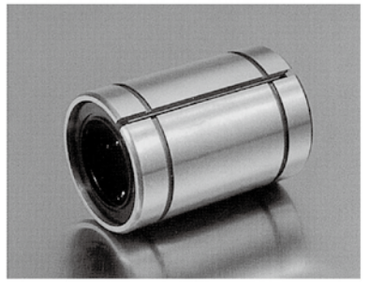
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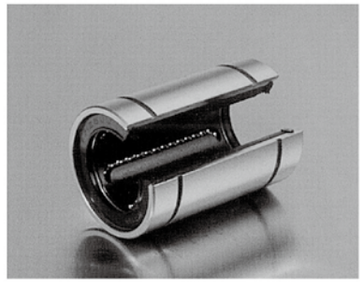
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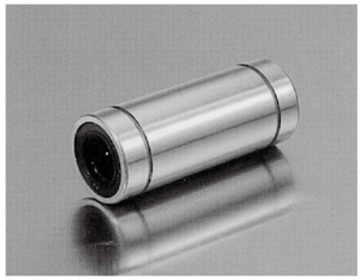
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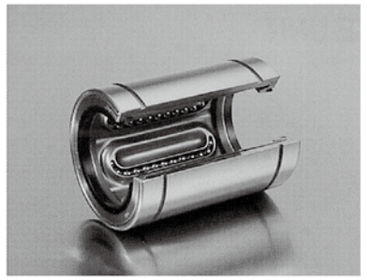
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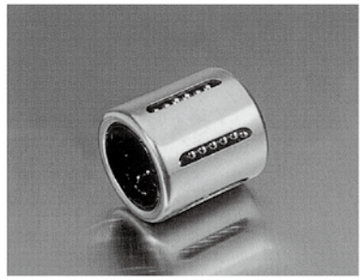
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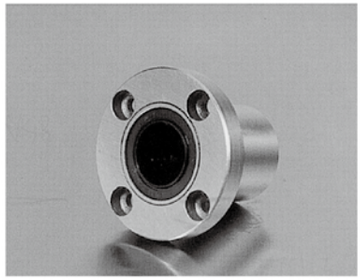
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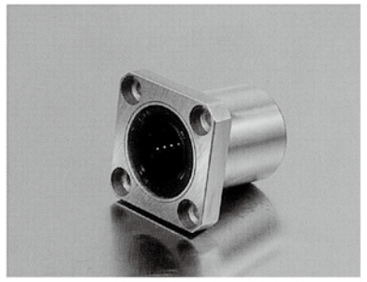
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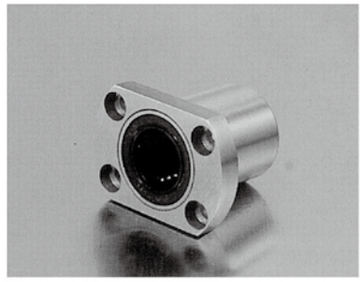
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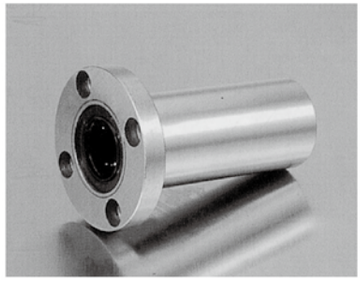
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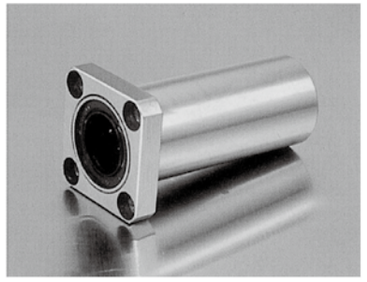
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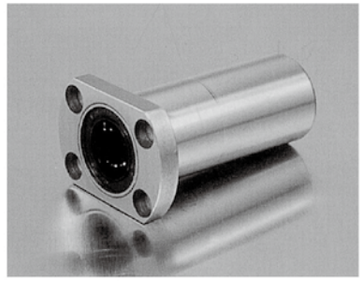
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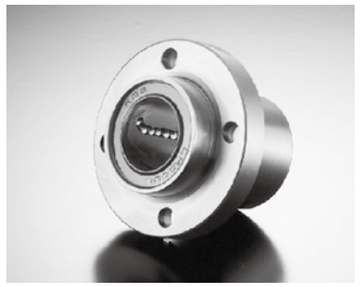
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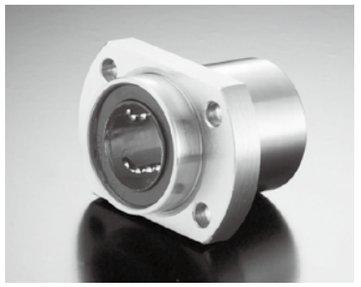
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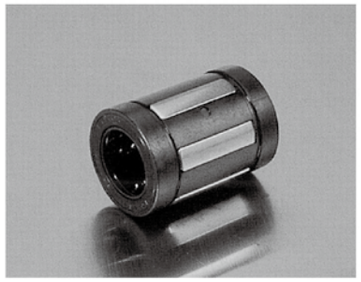

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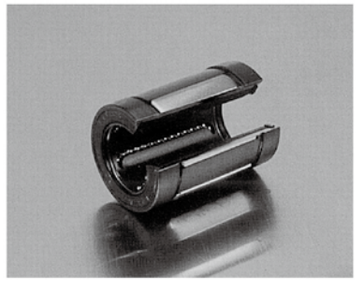

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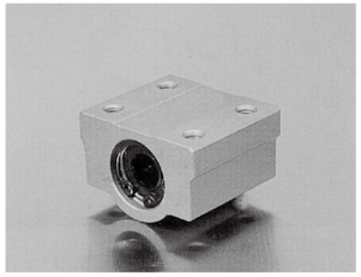
LINEAR BALL BUSHING CASE UNIT



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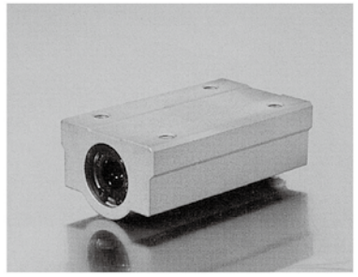

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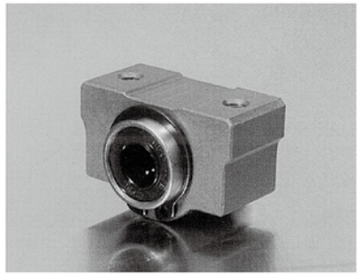

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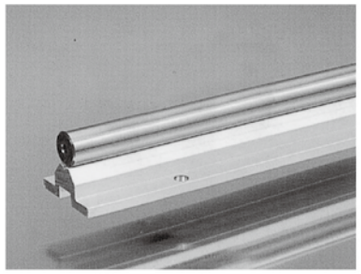

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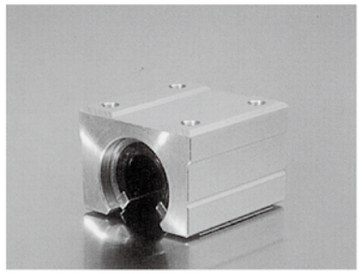

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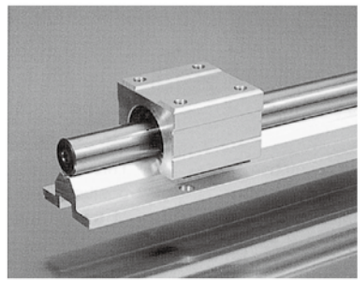

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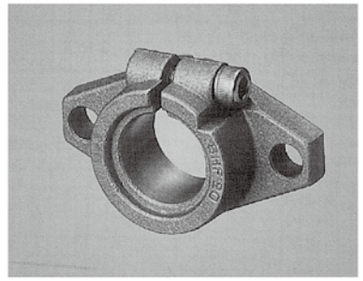
SHAFT SUPPORT



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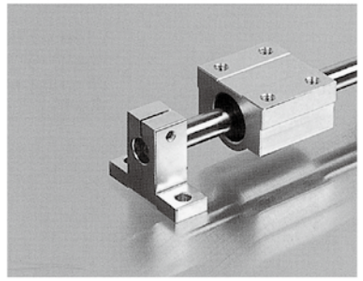

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Load Rating

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 Linear 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 dimensions, 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. The 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 systems 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:

$$L=\left(\frac{f_H \cdot f_T \cdot f_c \, C}{f_w \quad P}\right)^3 \cdot 50$$

L: Rating life（Km） fh: Hardness factor（See Fig.1）
C: Basic dynamic load rating（N）
fr: 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:

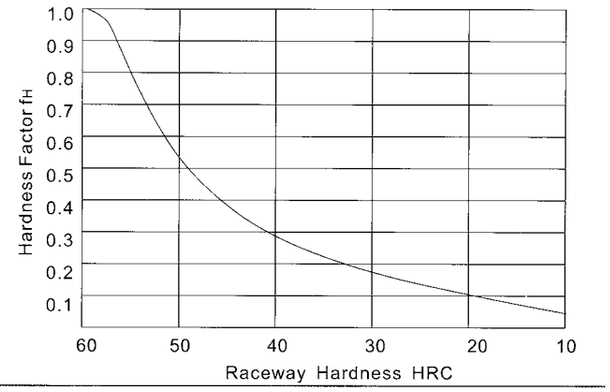
$$L_h=\frac{L \cdot 10^3}{2\ell_s \cdot n_1 \cdot 60}$$

L_h: Rating life in hours（hr）
ℓ_s: Stroke length（m）
L: Rating life（km）
n_1: 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.

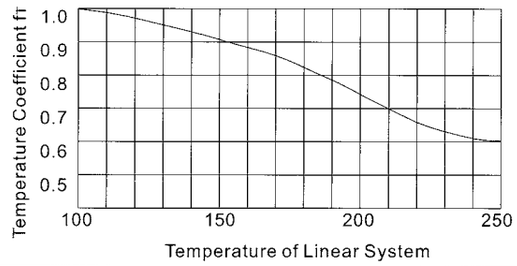
Fig.1 Hardness Factor



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 Conditions	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

Frictional Resistance

The static frictional resistance of the NSB 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 NSB 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 NSB linear system depends on the model. Consult NSB 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℃
Linear Bushing	LM-A LME-A LMB-A	-20 to 110℃

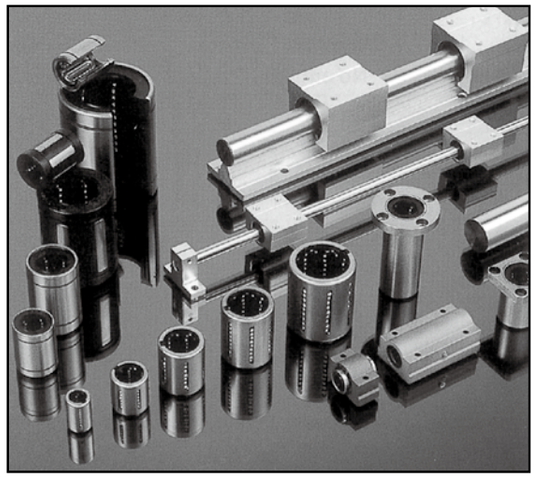
Lubrication and Dust Prevention

Using NSB linear systems without lubrication increases the abrasion of the rolling elements, shortening the life span. The NSB linear systems therefore require appropriate lubrication. For lubrication NSB recommends turbine oil conforming to ISO Standards G32 to G68 or lithium base soap grease No.2. Some KBS 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 NSB 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 inside the outer cylinder by end rings.
- Those parts are assembled 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 NSB 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 NSB 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

NSB 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

NSB 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.

Type and Linear Bushing Number

Example

LM F 25 A UU N AJ

Type

LM	Metric dimension series most widely used in Japan
LME	Metric dimension series generally used in Europe
LMB	Inch dimension series used mainly in USA

Flange Type

F	Round type
K	Square type
H	

Nominal Shaft Diameter

Modification

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

Face Material

N	Face electro NI

Seal

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

Retainer Material

Symbol	Specification
No entry	Synthetics resin
A	Steel

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 life (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)
f_W: Load coefficient
f_H: Hardness factor (See page5)
f_T: Temperatuer coefficient (See page5)
f_C: Contact coefficient (See page5)

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

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

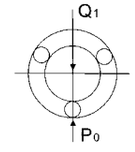
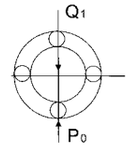
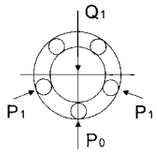
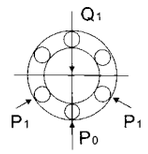
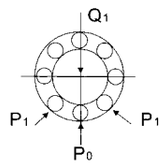
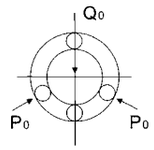
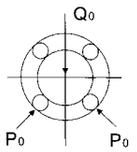
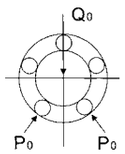
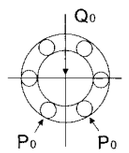
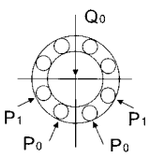
L_h: Lifespan (hr)
L : Rated life (km)
s : Stroke length (m)
n_1: Number of strokes per minute (cpm)

Relation between ball Circuits and load rating

The NSB linear bushing includes ball 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 NSB linear bushing is used with 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:

Table1

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 NSB linear bushing used in the following conditions:

- Linear bushing: LM 20
- 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:

$$L=\left(\frac{f_H \cdot f_T \cdot f_C}{f_W} \cdot \frac{C}{P}\right)^3 \cdot 50 \quad F_H=F_T=F_C=F_W=1.0$$
$$=\left(\frac{882}{490}\right)^3 \times 50=292km$$

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

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

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:

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

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

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

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

Clearance and Fit

When a standard-type NSB 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
LM LMB	High class	g6	h6	H7	J7
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 NSB linear bushing high precision of the shaft and housing is required.

1.Shaft

The rolling balls in the NSB 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.

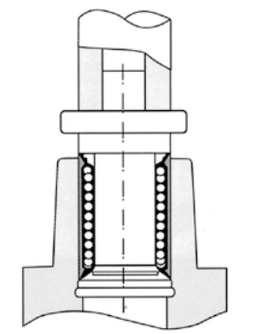
2.Housing

There is a wide range of housings 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

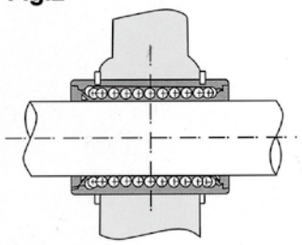


Fig.3

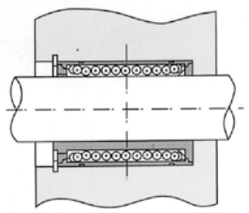


Fig.4

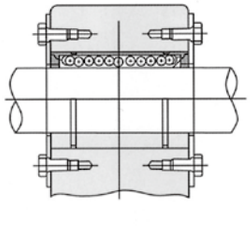


Fig.5

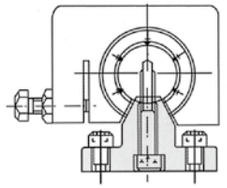
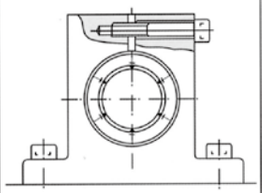


Fig.6



LINEAR BALL BUSHING

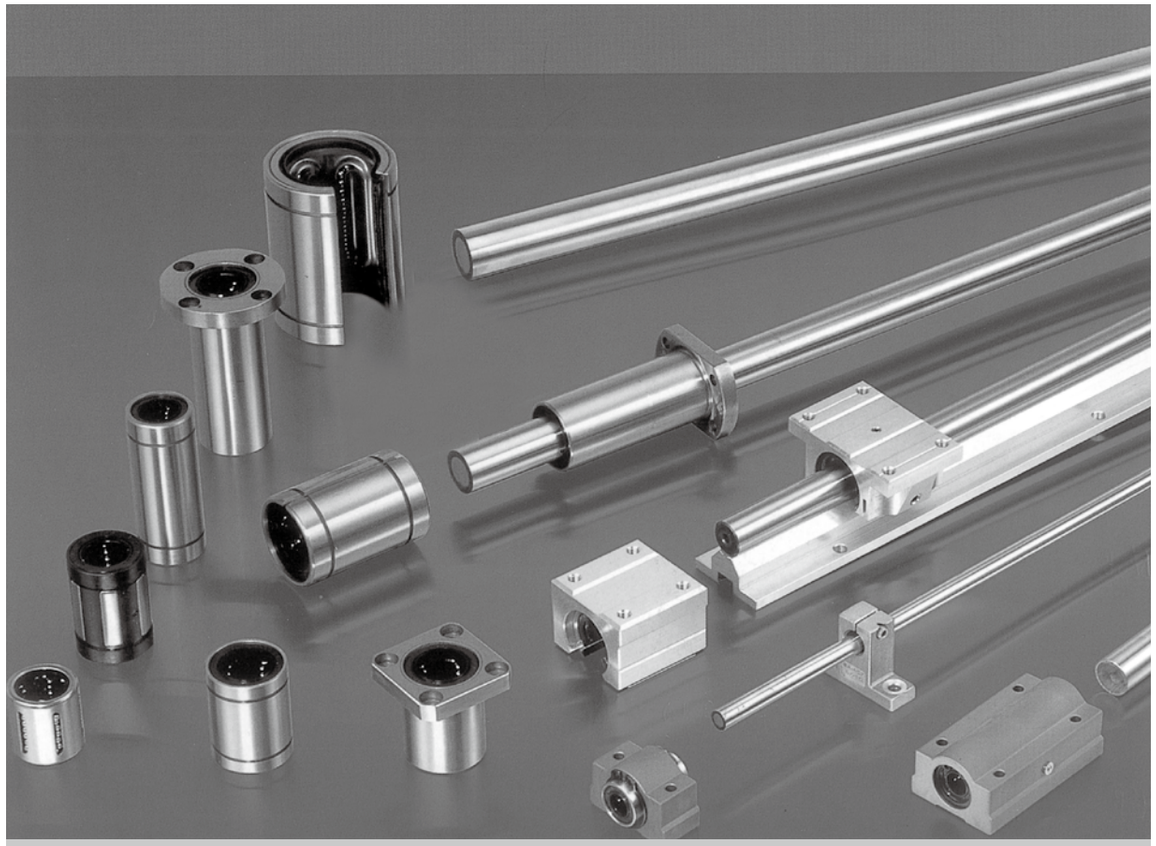
Linear bushing are linear bearings for unlimited backwards and forwards linear movement during which the balls are constantly returned to the loaded zone in closed circuits.

The bearings enable accurate linear guides to be constructed simply and economically.

The **NSB** Linear bushing is a high precision bushing which offers unlimited linear travel distance with minimum frictional resistance.

With high performance and a wide range of types, the **NSB** Linear bushing being used in many fields such as machine tools, industrial machines, electrical equipments, food processing machines, and optical and measuring equipments.

The requisite linear ball bearing for a given linear guidance application is selected on the basis of its load carrying capacity in relation to the load being applied and the requirements in terms of operational life and reliability.



NSB

<NSB Linear Ball System>

<KH seriess>

<LM. LME. LMB seriess>

<LMF. K. H···N seriess>

<LMF. K. H···LM seriess>

全系列防銹處理

<NSB Linear Ball Bushing>
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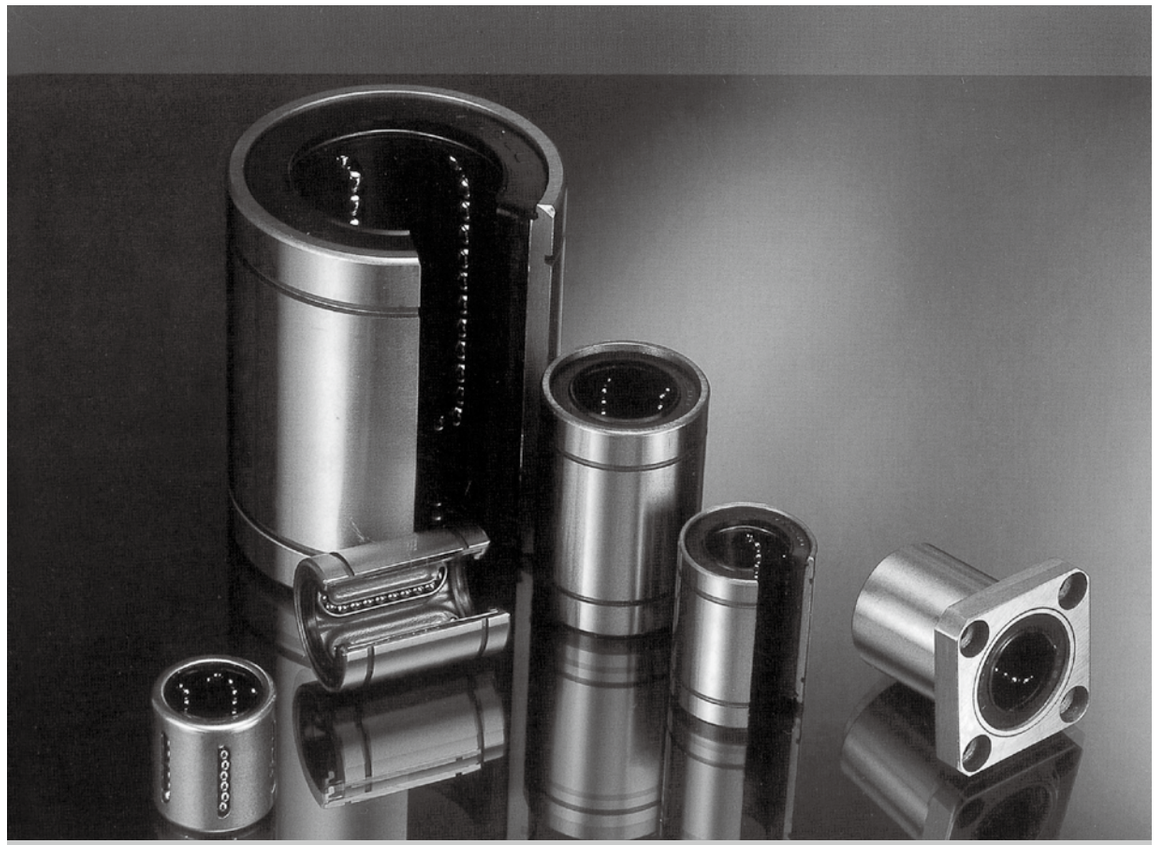
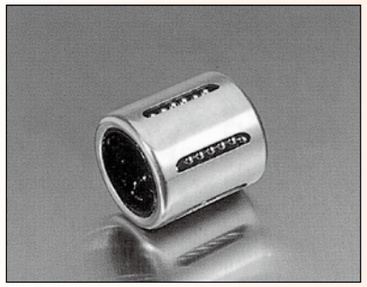
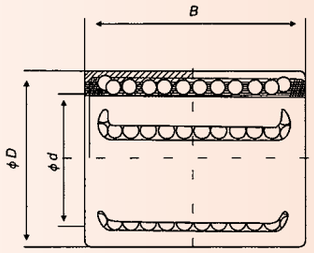
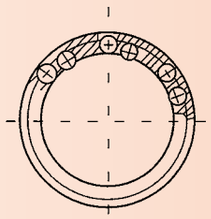


Standard Linear Ball Bearing Steel Drawn Cup/Cage Plastic

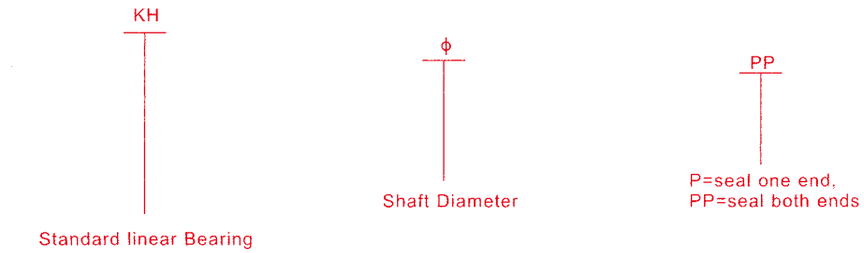




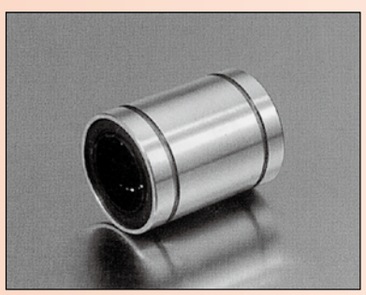


	Dimensions [mm]			Load Capacity [N]		Weight [g]
Part-No.	ϕ d	ϕ D	B	Dyn.	Stat.	
KH-0622	6	12	22	400	239	7
KH-0824	8	15	24	435	280	12
KH-1026	10	17	26	500	370	14.5
KH-1228	12	19	28	620	510	18.5
KH-1428	14	21	28	620	520	20.5
KH-1630	16	24	30	800	620	27.5
KH-2030	20	28	30	950	790	32.5
KH-2540	25	35	40	1990	1670	66
KH-3050	30	40	50	2800	2700	95
KH-4060	40	52	60	4400	4450	182
KH-5070	50	62	70	5500	6300	252

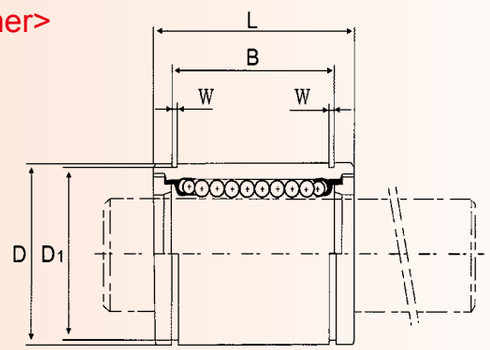
Ordering Example:

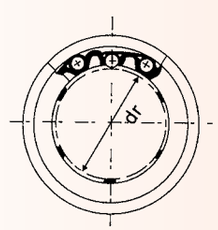


LM <Built-in Synthetics Resin Retainer>

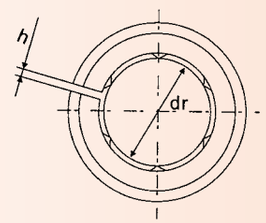


This type is a metric dimension series widely used in Japan and other countries

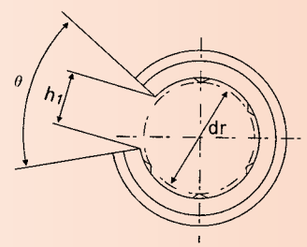




LM



LM • • • AJ

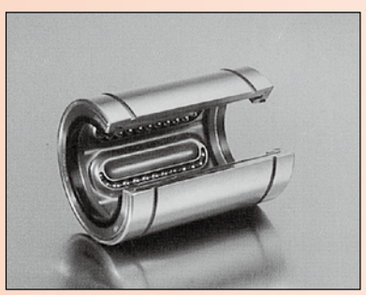


LM • • • OP

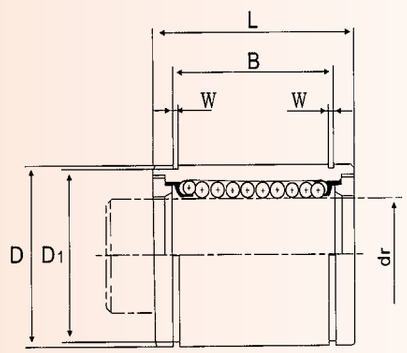
Nominal Part No.						Nominal Shaft Diameter (mm)	Major Dimensions and Tolerance (mm)										Eccentricity (max) μm	Radial Clearance (max) μm	Basic Load Rating		Nominal Part No.
Standard Type	Seal Type	Ball Circuit	Weight g	Adjustable Type	Open Type	Tolerance	D Tolerance	L Tolerance	B Tolerance	W	D1	h	h1	θ					CN	CoN	
LM 5	LM 5UU	4	4	—	—	5 0 -0.008	10 0 -0.009	15 0 -0.012	10.2 —	1.1	9.6	—	—	—			8	-3	167	206	LM 5
LM 6	LM 6UU	4	8	LM 6-AJ	—	6 —	12 0 -0.011	19 —	13.5	1.1	11.5	1	—	—			12	-5	200	260	LM 6
LM 8S	LM 8SUU	4	11	LM 8S-AJ	—	8	15	17	11.5	1.1	14.3	1	—	—			12	-5	170	220	LM 8S
LM 8	LM 8UU	4	16	LM 8-AJ	—	8	15	24	17.5	1.1	14.3	1	—	—			12	-5	260	400	LM 8
LM 10	LM 10UU	4	30	LM 10-AJ	—	10 0 -0.009	19	29	22 0 -0.2	1.3	18	1					12	-5	370	540	LM 10
LM 12	LM 12UU	4	31.5	LM 12-AJ	LM 12-OP	12	21 0 -0.013	30 0 -0.2	23	1.3	20	1.5	8	80°			12	-5	410	590	LM 12
LM 13	LM 13UU	4	43	LM 13-AJ	LM 13-OP	13	23	32	23	1.3	22	1.5	9	80°			12	-7	500	770	LM 13
LM 16	LM 16UU	5	69	LM 16-AJ	LM 16-OP	16 —	28 —	37	26.5	1.6	27	1.5	11	60°			12	-7	770	1170	LM 16
LM 20	LM 20UU	5	87	LM 20-AJ	LM 20-OP	20 —	32 —	42 —	30.5 —	1.6	30.5	1.5	11	60°			15	-9	860	1370	LM 20
LM 25	LM 25UU	6	220	LM 25-AJ	LM 25-OP	25 0 -0.010	40 0 -0.016	59 —	41 —	1.85	38	2	12	50°			15	-9	980	1560	LM 25
LM 30	LM 30UU	6	250	LM 30-AJ	LM 30-OP	30 —	45 —	64	44.5	1.85	43	2.5	15	50°			15	-9	1560	2740	LM 30
LM 35	LM 35UU	6	390	LM 35-AJ	LM 35-OP	35 —	52 0 -0.019	70 0 -0.3	49.5 0 -0.3	2.1	49	2.5	17	50°			20	-13	1660	3130	LM 35
						38 0 -0.012															
LM 40	LM 40UU	6	585	LM 40-AJ	LM 40-OP	40	60 —	80	60.5	2.1	57	3	20	50°			20	-13	2150	4010	LM 40
LM 50	LM 50UU	6	1580	LM 50-AJ	LM 50-OP	50 —	80 0 -0.022	100	74	2.6	76.5	3	25	50°			20	-13	3820	7930	LM 50
LM 60	LM 60UU	6	2000	LM 60-AJ	LM 60-OP	60 0 -0.015	90	110 —	85 —	3.15	86.5	3	30	50°			25	-16	4700	9990	LM 60

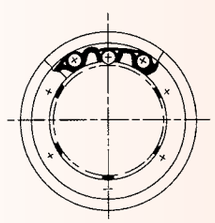
SI Unit 1N=0.102 kgf

LM-A <Built-in Steel Retainer>

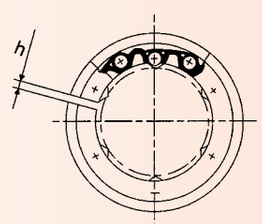


This type is a metric dimension series widely used in Japan and other countries.

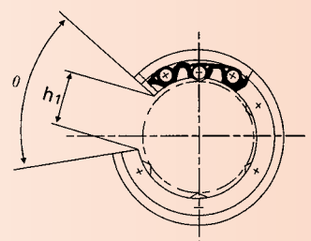




LM-A



LM-A • • • AJ



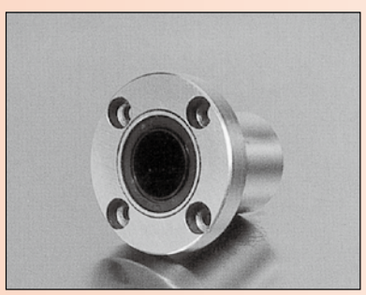
LM-A • • • OP

Nominal Part No.						Nominal Shaft Diameter (mm)		Major Dimensions and Tolerance (mm)									Eccentricity		Radial Clearance (max)	Basic Load Rating		Nominal Part No.
Standard Type	Seal Type	Ball Circuit	Weight g	Adjustable Type	Open Type	Tolerance Precision	High	D	Tolerance	L	Tolerance	B	Tolerance	W	D1	h	h1	θ	Precision μm	High μm	μm	Dynamic CN	Static CoN	
LM 8SA	LM 8SA UU	4	11	———	———	8		15	0 -0.011	17		11.5		1.1	14.3	—	—	—	8	12	-3	176	216	LM 8SA
LM 8A	LM 8A UU	4	17	———	———	8		15		24		17.5		1.1	14.3	—	—	—	8	12	-3	274	392	LM 8A
LM 10A	LM 10A UU	4	36	———	———	10		19		29		22		1.3	18	—	—	—	8	12	-4	372	549	LM 10A
LM 12A	LM 12A UU	4	42	LM 12A-AJ	LM 12A-OP	12	0 -0.006	21	0 -0.013	30	0 -0.2	23	0 -0.2	1.3	20	1.5	8	80°	8	12	-4	510	784	LM 12A
LM 13A	LM 13A UU	4	49	LM 13A-AJ	LM 13A-OP	13		23		32		23		1.3	22	1.5	9	80°	8	12	-4	510	784	LM 13A
LM 16A	LM 16A UU	4	76	LM 16A-AJ	LM 16A-OP	16		28		37		26.5		1.6	27	1.5	11	80°	8	12	-6	774	1,180	LM 16A
LM 20A	LM 20A UU	5	100	LM 20A-AJ	LM 20A-OP	20	0 -0.007	32	0 -0.016	42	0 -0.3	30.5	0 -0.3	1.6	30.5	1.5	11	60°	10	15	-6	882	1,370	LM 20A
LM 25A	LM 25A UU	6	240	LM 25A-AJ	LM 25A-OP	25		40		59		41		1.85	38	2	12	50°	10	15	-6	980	1,570	LM 25A
LM 30A	LM 30A UU	6	270	LM 30A-AJ	LM 30A-OP	30		45		64		44.5		1.85	43	2.5	15	50°	10	15	-8	1,570	2,740	LM 30A
LM 35A	LM 35A UU	6	425	LM 35A-AJ	LM 35A-OP	35	0 -0.008	52	0 -0.019	70	0 -0.3	49.5	0 -0.3	2.1	49	2.5	17	50°	12	20	-8	1,670	3,140	LM 35A
LM 40A	LM 40A UU	6	654	LM 40A-AJ	LM 40A-OP	40		60		80		60.5		2.1	57	3	20	50°	12	20	-10	2,160	4,020	LM 40A
LM 50A	LM 50A UU	6	1700	LM 50A-AJ	LM 50A-OP	50		80		100		74		2.6	76.5	3	25	50°	12	20	-13	3,820	7,940	LM 50A
LM 60A	LM 60A UU	6	2000	LM 60A-AJ	LM 60A-OP	60	0 -0.009	90	0 -0.022	110		85		3.15	86.5	3	30	50°	17	25	-13	4,700	10,000	LM 60A

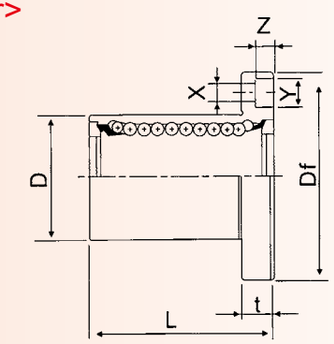
SI Unit 1N≒0.102 kgf

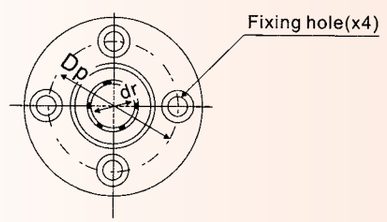
表面防銹處理

LMF-N <Built-in Synthetics Resin Retainer>



This type is a metric dimension series widely used in Japan and other countries.





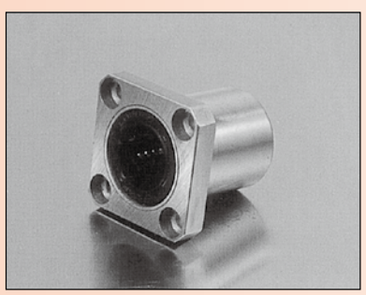
LMF-N

Nominal Part No.				Major Dimensions and Tolerance (mm)			Major Dimensions and Tolerance (mm)						Eccentricity	Squareness	Basic Load Rating		Nominal Part No.
							Flange								Dynamic	Static	
Standard Type	Seal Type	Ball Circuit	Weight g	dr Tolerance	D Tolerance	L Tolerance	Df	t	Dp	X	Y	Z	μm	μm	CN	CoN	
LMF 6 N	LMF 6 UU N	4	24	6	12 0 -0.013	19	28	5	20	3.5	6	3.1	12	12	206	265	LMF 6 N
LMF 8S N	LMF 8S UU N	4	32	8	15	17	32	5	24	3.5	6	3.1	12	12	176	216	LMF 8S N
LMF 8 N	LMF 8 UU N	4	37	8 0 -0.009	15	24	32	5	24	3.5	6	3.1	12	12	274	392	LMF 8 N
LMF 10 N	LMF 10 UU N	4	72	10	19	29	40	6	29	4.5	7.5	4.1	12	12	372	549	LMF 10 N
LMF 12 N	LMF 12 UU N	4	76	12	21 0 -0.016	30	42	6	32	4.5	7.5	4.1	12	12	510	784	LMF 12 N
LMF 13 N	LMF 13 UU N	4	88	13	23	32	43	6	33	4.5	7.5	4.1	12	12	510	784	LMF 13 N
LMF 16 N	LMF 16 UU N	5	120	16	28	37	48	6	38	4.5	7.5	4.1	12	12	774	1,180	LMF 16 N
LMF 20 N	LMF 20 UU N	5	180	20	32	42 +0.3	54	8	43	5.5	9	5.1	15	15	882	1,370	LMF 20 N
LMF 25 N	LMF 25 UU N	6	340	25 0 -0.010	40 0 -0.019	59	62	8	51	5.5	9	5.1	15	15	980	1,570	LMF 25 N
LMF 30 N	LMF 30 UU N	6	470	30	45	64	74	10	60	6.6	11	6.1	15	15	1,570	2,740	LMF 30 N
LMF 35 N	LMF 35 UU N	6	650	35	52	70	82	10	67	6.6	11	6.1	20	20	1,670	3,140	LMF 35 N
LMF 40 N	LMF 40 UU N	6	1,060	40 0 -0.012	60 0 -0.022	80	96	13	78	9	14	8.1	20	20	2,160	4,020	LMF 40 N
LMF 50 N	LMF 50 UU N	6	2,200	50	80	100	116	13	98	9	14	8.1	20	20	3,820	7,940	LMF 50 N
LMF 60 N	LMF 60 UU N	6	3,000	60 0 -0.015	90 0 -0.025	110	134	18	112	11	17	11.1	25	25	4,700	10,000	LMF 60 N

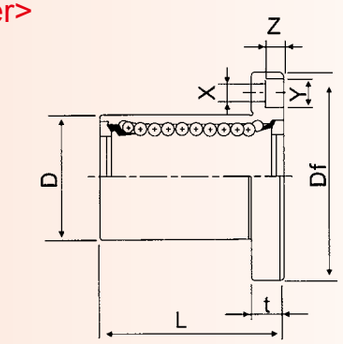
SI Unit 1N≒0.102 kgf

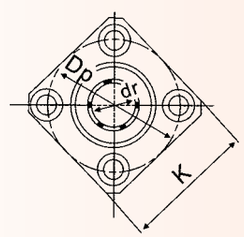
表面防銹處理

LMK-N <Built-in Synthetics Resin Retainer>



This type is a metric dimension series widely used in Japan and other countries.





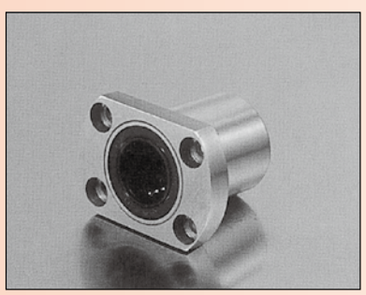
LMK-N

Nominal Part No.				Major Dimensions and Tolerance (mm)			Major Dimensions and Tolerance (mm)							Eccentricity	Squareness	Basic Load Rating		Nominal Part No.
Standard Type	Seal Type	Ball Circuit	Weight g	dr Tolerance	D Tolerance	L Tolerance	Flange Df	k	t	Dp	X	Y	Z	μm	μm	Dynamic CN	Static C0N	
LMK 6 N	**LMK 6 UU N**	4	24	6	12 0 -0.013	19	28	22	5	20	3.5	6	3.1	12	12	206	265	**LMK 6 N**
LMK 8S N	**LMK 8S UU N**	4	32	8	15	17	32	25	5	24	3.5	6	3.1	12	12	176	216	**LMK 8S N**
LMK 8 N	**LMK 8 UU N**	4	37	8	15	24	32	25	5	24	3.5	6	3.1	12	12	274	392	**LMK 8 N**
LMK 10 N	**LMK 10 UU N**	4	72	10 0 -0.009	19	29	40	30	6	29	4.5	7.5	4.1	12	12	372	549	**LMK 10 N**
LMK 12 N	**LMK 12 UU N**	4	76	12	21 0 -0.016	30	42	32	6	32	4.5	7.5	4.1	12	12	510	784	**LMK 12 N**
LMK 13 N	**LMK 13 UU N**	4	88	13	23	32	43	34	6	33	4.5	7.5	4.1	12	12	510	784	**LMK 13 N**
LMK 16 N	**LMK 16 UU N**	5	120	16	28	37	48	37	6	38	4.5	7.5	4.1	12	12	774	1,180	**LMK 16 N**
LMK 20 N	**LMK 20 UU N**	5	180	20	32	42 ±0.3	54	42	8	43	5.5	9	5.1	15	15	882	1,370	**LMK 20 N**
LMK 25 N	**LMK 25 UU N**	6	340	25 0 -0.010	40 0 -0.019	59	62	50	8	51	5.5	9	5.1	15	15	980	1,570	**LMK 25 N**
LMK 30 N	**LMK 30 UU N**	6	470	30	45	64	74	58	10	60	6.6	11	6.1	15	15	1,570	2,740	**LMK 30 N**
LMK 35 N	**LMK 35 UU N**	6	650	35	52	70	82	64	10	67	6.6	11	6.1	20	20	1,670	3,140	**LMK 35 N**
LMK 40 N	**LMK 40 UU N**	6	1,060	40 0 -0.012	60 0 -0.022	80	96	75	13	78	9	14	8.1	20	20	2,160	4,020	**LMK 40 N**
LMK 50 N	**LMK 50 UU N**	6	2,200	50	80	100	116	92	13	98	9	14	8.1	20	20	3,820	7,940	**LMK 50 N**
LMK 60 N	**LMK 60 UU N**	6	3,000	60 0 -0.015	90 0 -0.025	110	134	106	18	112	11	17	11.1	25	25	4,700	10,000	**LMK 60 N**

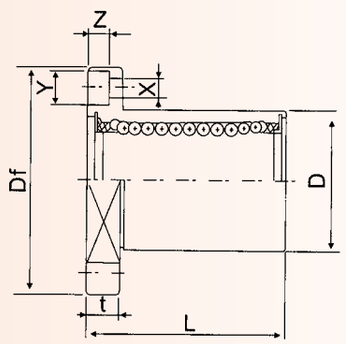
SI Unit 1N≒0.102 kgf

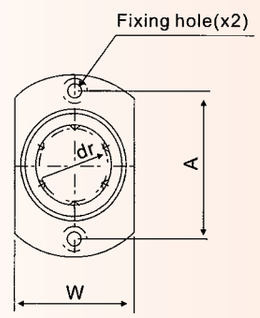
表面防銹處理

LMH-N <Built-in Synthetics Resin Retainer>

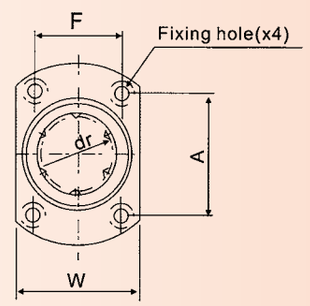


This type is a metric dimension series widely used in Japan and other countries.





dr≤13

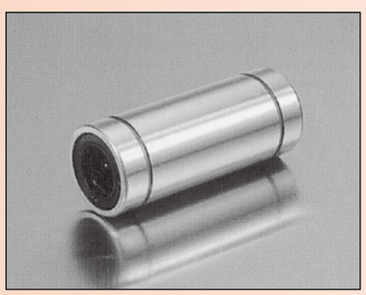


dr≥16

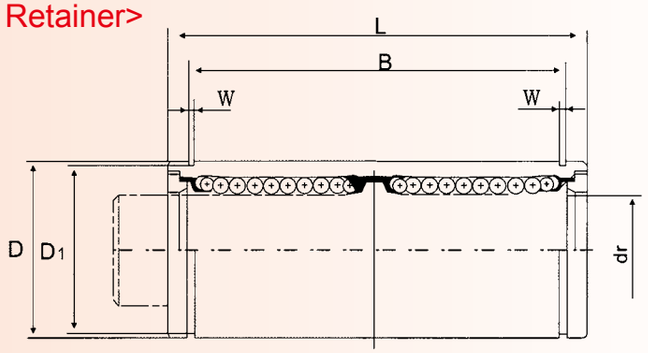
Nominal Part No.				Major Dimensions and Tolerance (mm)			Major Dimensions and Tolerance (mm)								Eccentricity	Squareness	Basic Load Rating		Nominal Part No.
Standard Type	Seal Type	Ball Circuit	Weight g	dr	D	L	Flange								μm	μm	Dynamic CN	Static C₀N	
				Tolerance	Tolerance	Tolerance	Df	w	t	A	F	X	Y	Z					
LMH 6 N	LMH 6 UU N	4	21	6	12	19	28	18	5	20	—	3.5	6	3.1	12	12	206	265	LMH 6 N
LMH 8 N	LMH 8 UU N	4	33	8	15	24	32	21	5	24	—	3.5	6	3.1	12	12	274	392	LMH 8 N
LMH 10 N	LMH 10 UU N	4	64	10	19	29	40	25	6	29	—	4.5	7.5	4.1	12	12	372	549	LMH 10 N
LMH 12 N	LMH 12 UU N	4	68	12 0 -0.009	21 0 -0.016	30 ±0.3	42	27	6	32	—	4.5	7.5	4.1	12	12	510	784	LMH 12 N
LMH 13 N	LMH 13 UU N	4	81	13	23	32	43	29	6	33	—	4.5	7.5	4.1	12	12	510	784	LMH 13 N
LMH 16 N	LMH 16 UU N	5	112	16	28	37	48	34	6	31	22	4.5	7.5	4.1	12	12	774	1,180	LMH 16 N
LMH 20 N	LMH 20 UU N	5	167	20	32	42	54	38	8	36	24	5.5	9	5.1	15	15	882	1,370	LMH 20 N
LMH 25 N	LMH 25 UU N	6	325	25 0 -0.010	40 0 -0.019	59	62	46	8	40	32	5.5	9	5.1	15	15	980	1,570	LMH 25 N
LMH 30 N	LMH 30 UU N	6	388	30	45	64	74	51	10	49	35	6.6	11	6.1	15	15	1,570	2,740	LMH 30 N

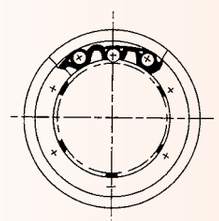
SI Unit 1N≒0.102 kgf

LM-L <Built-in Synthetics Resin Retainer>



This type is a metric dimension series
widely used in Japan and other countries.





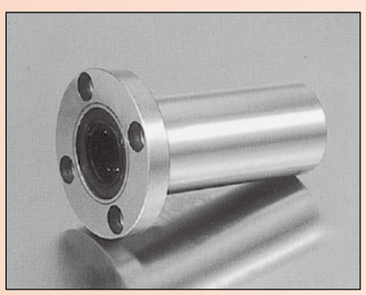
LM-L

Nominal Part No.				Nominal Shaft Diameter (mm)		Major Dimensions and Tolerance (mm)								Eccentricity (max)	Basic Load Rating		Nominal Part No.
Standard Type	Seal Type	Ball Circuit	Weight g	Tolerance		D	Tolerance	L	Tolerance	B	Tolerance	W	Di	μm	Dynamic CN	Static CoN	
LM 6L	LM 6L UU	4	16	6		12	0 -0.013	35		27		1.1	11.5	15	323	530	LM 6L N
LM 8L	LM 8L UU	4	31	8		15		45		35		1.1	14.3	15	431	784	LM 8L N
LM 10L	LM 10LUU	4	62	10	0 -0.010	19		55		44		1.3	18	15	588	1,100	LM 10L N
LM 12L	LM 12L UU	4	80	12		21	0 -0.016	57	0 -0.3	46	0 -0.3	1.3	20	15	657	1,200	LM 12L N
LM 13L	LM 13L UU	4	90	13		23		61		46		1.3	22	15	813	1,570	LM 13L N
LM 16L	LM 16L UU	5	145	16		28		70		53		1.6	27	15	1,230	2,350	LM 16L N
LM 20L	LM 20L UU	5	180	20		32	0 -0.019	80		61		1.6	30.5	20	1,400	2,750	LM 20L N
LM 25L	LM 25L UU	6	440	25	0 -0.012	40		112		82		1.85	38	20	1,560	3,140	LM 25L N
LM 30L	LM 30L UU	6	580	30		45		123		89		1.85	43	20	2,490	5,490	LM 30L N
LM 35L	LM 35L UU	6	795	35		52	0 -0.022	135	0 -0.4	99	0 -0.4	2.1	49	25	2,650	6,270	LM 35L N
LM 40L	LM 40L UU	6	1,170	40	0 -0.015	60		154		121		2.1	57	25	3,430	8,040	LM 40L N
LM 50L	LM 50L UU	6	3,100	50		80		192		148		2.6	76.5	25	6,080	15,900	LM 50L N
LM 60L	LM 60L UU	6	3,500	60	0 -0.020	90	0 -0.025	211		170		3.15	86.5	25	7,650	20,000	LM 60L N

SI Unit 1N=0.102 kgf

表面防銹處理

LMF-LN <Built-in Synthetics Resin Retainer>



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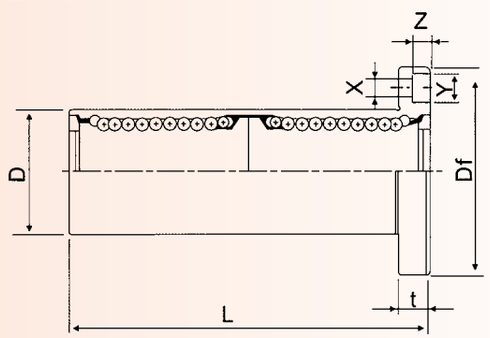
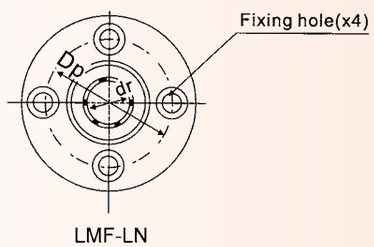




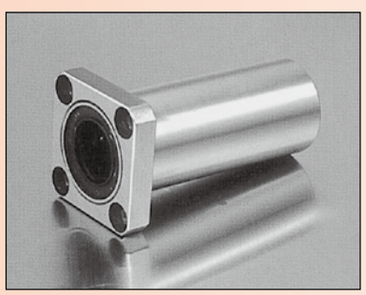
LMF-LN

Nominal Part No.				Major Dimensions and Tolerance (mm)			Major Dimensions and Tolerance (mm)						Eccentricity	Squareness	Basic Load Rating		Nominal Part No.
Standard Type	Seal Type	Ball Circuit	Weight g	dr Tolerance	D Tolerance	L Tolerance	Flange Df	t	Dp	X	Y	Z	μm	μm	Dynamic CN	Static CoN	
LMF 6L N	LMF 6L UU N	4	31	6	12	35	28	5	20	3.5	6.5	3.1	15	15	323	530	LMF 6L N
LMF 8L N	LMF 8L UU N	4	51	8	15	45	32	5	24	3.5	6.5	3.1	15	15	431	784	LMF 8L N
LMF 10L N	LMF 10L UU N	4	98	10	19	55	40	6	29	4.5	8	4.1	15	15	588	1,100	LMF 10L N
LMF 12L N	LMF 12L UU N	4	110	12	21	57	42	6	32	4.5	8	4.1	15	15	813	1,570	LMF 12L N
LMF 13L N	LMF 13L UU N	4	130	13	23	61	43	6	33	4.5	8	4.1	15	15	813	1,570	LMF 13L N
LMF 16L N	LMF 16L UU N	5	190	16	28	70	48	6	38	4.5	8	4.1	15	15	1,230	2,350	LMF 16L N
LMF 20L N	LMF 20L UU N	5	260	20	32	80	54	8	43	5.5	9.5	5.1	20	20	1,400	2,740	LMF 20L N
LMF 25L N	LMF 25L UU N	6	540	25	40	112	62	8	51	5.5	9.5	5.1	20	20	1,560	3,140	LMF 25L N
LMF 30L N	LMF 30L UU N	6	680	30	45	123	74	10	60	6.6	11	6.1	20	20	2,490	5,490	LMF 30L N
LMF 35L N	LMF 35L UU N	6	1,020	35	52	135	82	10	67	6.6	11	6.1	25	25	2,650	6,270	LMF 35L N
LMF 40L N	LMF 40L UU N	6	1,570	40	60	151	96	13	78	9	14	8.1	25	25	3,430	8,040	LMF 40L N
LMF 50L N	LMF 50L UU N	6	3,600	50	80	192	116	13	98	9	14	8.1	25	25	6,080	15,900	LMF 50L N
LMF 60L N	LMF 60L UU N	6	4,500	60	90	209	134	18	112	11	17.5	11.1	30	30	7,550	20,000	LMF 60L N

SI Unit 1N≒0.102 kgf

表面防銹處理

LMK-LN <Built-in Synthetics Resin Retainer>



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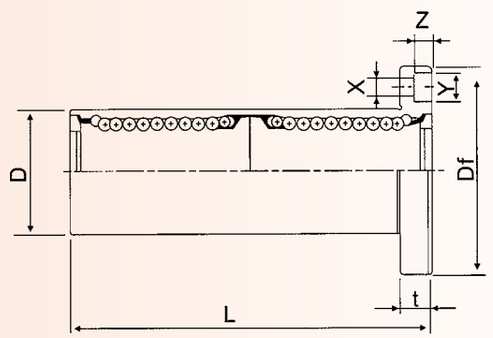
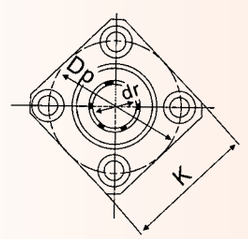




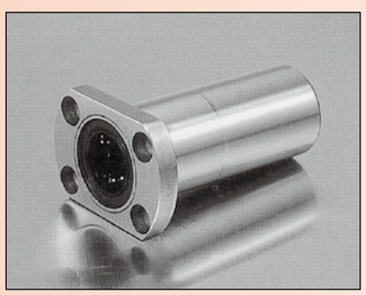
LMK-LN

Nominal Part No.				Major Dimensions and Tolerance (mm)			Major Dimensions and Tolerance (mm)						Eccentricity	Squareness	Basic Load Rating		Nominal Part No.
Standard Type	Seal Type	Ball Circuit	Weight g	d_r Tolerance	D Tolerance	L Tolerance	Flange Df	t	Dp	X	Y	Z	μm	μm	Dynamic CN	Static C_0N	
LMK 6L N	LMK 6L UU N	4	31	6	12	35	28	5	20	3.5	6.5	3.1	15	15	323	530	LMK 6L N
LMK 8L N	LMK 8L UU N	4	51	8	15	45	32	5	24	3.5	6.5	3.1	15	15	431	784	LMK 8L N
LMK 10L N	LMK 10L UU N	4	98	10	19	55	40	6	29	4.5	8	4.1	15	15	588	1,100	LMK 10L N
LMK 12L N	LMK 12L UU N	4	110	12	21	57	42	6	32	4.5	8	4.1	15	15	813	1,570	LMK 12L N
LMK 13L N	LMK 13L UU N	4	130	13	23	61	43	6	33	4.5	8	4.1	15	15	813	1,570	LMK 13L N
LMK 16L N	LMK 16L UU N	5	190	16	28	70	48	6	38	4.5	8	4.1	15	15	1,230	2,350	LMK 16L N
LMK 20L N	LMK 20L UU N	5	260	20	32	80	54	8	43	5.5	9.5	5.1	20	20	1,400	2,740	LMK 20L N
LMK 25L N	LMK 25L UU N	6	540	25	40	112	62	8	51	5.5	9.5	5.1	20	20	1,560	3,140	LMK 25L N
LMK 30L N	LMK 30L UU N	6	680	30	45	123	74	10	60	6.6	11	6.1	20	20	2,490	5,490	LMK 30L N
LMK 35L N	LMK 35L UU N	6	1,020	35	52	135	82	10	67	6.6	11	6.1	25	25	2,650	6,270	LMK 35L N
LMK 40L N	LMK 40L UU N	6	1,570	40	60	151	96	13	78	9	14	8.1	25	25	3,430	8,040	LMK 40L N
LMK 50L N	LMK 50L UU N	6	3,600	50	80	192	116	13	98	9	14	8.1	25	25	6,080	15,900	LMK 50L N
LMK 60L N	LMK 60L UU N	6	4,500	60	90	209	134	18	112	11	17.5	11.1	30	30	7,550	20,000	LMK 60L N

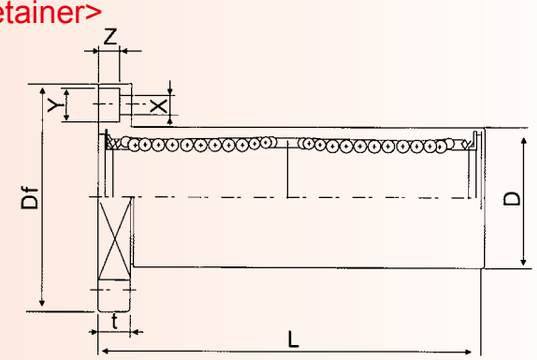
SI Unit 1N=0.102 kgf

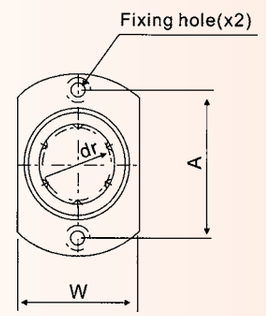
表面防銹處理

LMH-LN <Built-in Synthetics Resin Retainer>

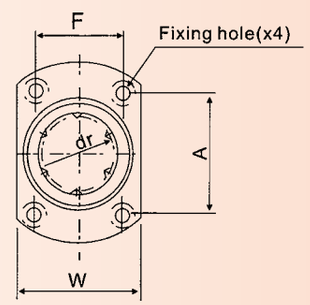


This type is a metric dimension series
widely used in Japan and other countries.





dr≤13



dr≥16

Nominal Part No.				Major Dimensions and Tolerance (mm)			Major Dimensions and Tolerance (mm)								Eccentricity	Squareness	Basic Load Rating		Nominal Part No.
Standard Type	Seal Type	Ball Circuit	Weight g	d_r Tolerance	D Tolerance	L Tolerance	Flange Df	W	t	A	F	X	Y	Z	μm	μm	Dynamic CN	Static C_0N	
LMH 6L N	LMH 6L UU N	4	28	6	12 0 -0.013	35	28	18	5	20	—	3.5	6.5	3.1	15	15	323	529	LMH 6L N
LMH 8L N	LMH 8L UU N	4	47	8	15	45	32	21	5	24	—	3.5	6.5	3.1	15	15	431	784	LMH 8L N
LMH 10L N	LMH 10L UU N	4	90	10	19	55	40	25	6	29	—	4.5	8	4.1	15	15	588	1,100	LMH 10L N
LMH 12L N	LMH 12L UU N	4	102	12 0 -0.010	21 0 -0.016	57	42	27	6	32	—	4.5	8	4.1	15	15	813	1,570	LMH 12L N
LMH 13L N	LMH 13L UU N	4	123	13	23	61 -0.3	43	29	6	33	—	4.5	8	4.1	15	15	813	1,570	LMH 13L N
LMH 16L N	LMH 16L UU N	5	182	16	28	70	48	34	6	31	22	4.5	8	4.1	15	15	1,230	2,350	LMH 16L N
LMH 20L N	LMH 20L UU N	5	247	20	32	80	54	38	8	36	24	5.5	9.5	5.1	20	20	1,400	2,740	LMH 20L N
LMH 25L N	LMH 25L UU N	6	525	25 0 -0.012	40 0 -0.019	112	62	46	8	40	32	5.5	9.5	5.1	20	20	1,560	3,140	LMH 25L N
LMH 30L N	LMH 30L UU N	6	645	30	45	123	74	51	10	49	35	6.6	11	6.1	20	20	2,490	5,490	LMH 30L N

S! Unit 1N≒0.102 kgf

<NSB Linear Ball Bushing System>

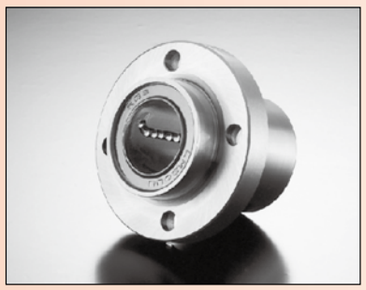
<FLANGED SLIDE BUSH>
<Intermediate Position Flange Type>
<Flange Type With Pilot End>

NSB

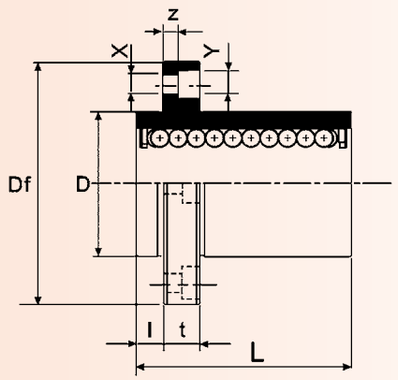
<NSB Linear Ball Bushing System>

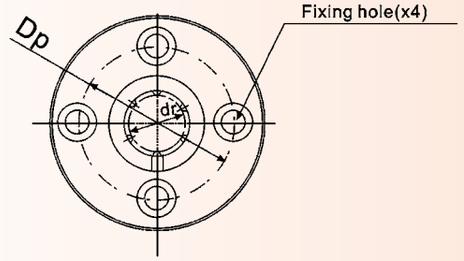
<FLANGED SLIDE BUSH>
<Intermediate Position Flange Type>
<Flange Type With Pilot End>

LMF-UU-E <Resin Retainer>

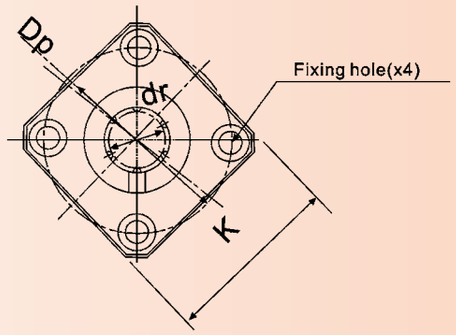


This type is a metric dimension series widely used in Japan and other countries.





LMF···UU-E



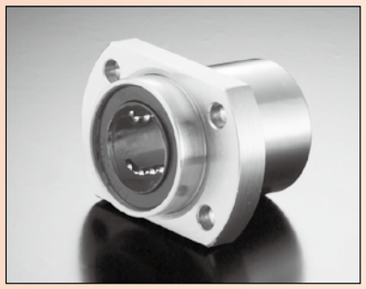
LMK···UU-E

Nominal shaft diameter mm	Part No.		Major dimensions and tolerance						Flange				Major dimensions and tolerance	Flange				Eccentricity	Squareness	Basic load rating		Weight	Nominal shaft diameter mm
	LMF···UU-E	LMK···UU-E	dr mm	dr Tolerance μm	D mm	D Tolerance μm	L mm	L Tolerance μm	l mm	Df mm	K mm	t mm	Dp mm	X mm	Y mm	Z mm	μm	μm	dynamic C(N)	Static Co(N)	g	
6	LMF6UU-E	LMK6UU-E	6	0 -9	12	0 -13	19	±300	5	28	22	5	20	3.5	6	3.1	12	12	206	265	24 18	6
8	LMF8UU-E	LMK8UU-E	8		15		24		5	32	25	5	24	3.5	6	3.1			274	392	37 29	8
10	LMF10UU-E	LMK10UU-E	10		19	0 -16	29		6	40	30	6	29	4.5	7.5	4.1			372	549	72 52	10
12	LMF12UU-E	LMK12UU-E	12		21		30		6	42	32	6	32	4.5	7.5	4.1			510	784	76 57	12
13	LMF13UU-E	LMK13UU-E	13		23		32		6	43	34	6	33	4.5	7.5	4.1			510	784	88 72	13
16	LMF16UU-E	LMK16UU-E	16		28		37		6	48	37	6	38	4.5	7.5	4.1			774	1,180	120 104	16
20	LMF20UU-E	LMK20UU-E	20	0 -10	32	0 -19	42		8	54	42	8	43	5.5	9	5.1	15	15	882	1,370	180 145	20
25	LMF25UU-E	LMK25UU-E	25		40		59		8	62	50	8	51	5.5	9	5.1			980	1,570	340 300	25
30	LMF30UU-E	LMK30UU-E	30		45		64		10	74	58	10	60	6.6	11	6.1			1,570	2,740	470 375	30
35	LMF35UU-E	LMK35UU-E	35	0 -12	52	0 -22	70		10	82	64	10	67	6.6	11	6.1	20	20	1,670	3,140	650 560	35
40	LMF40UU-E	LMK40UU-E	40		60		80		13	96	75	13	78	9	14	8.1			2,160	4,020	1,060 880	40
50	LMF50UU-E	LMK50UU-E	50		80		100		13	116	92	13	98	9	14	8.1			3,820	7,940	2,200 2,000	50
60	LMF60UU-E	LMK60UU-E	60	0 -15	90	0 -25	110		18	134	106	18	112	11	17	11.1	25	25	4,700	10,000	3,000 2,560	60

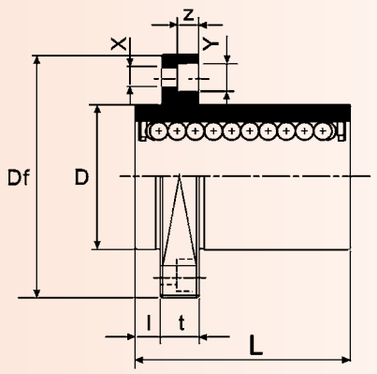
Note: All sizes of LMF-E/LMK-E type are sealed on both sides.

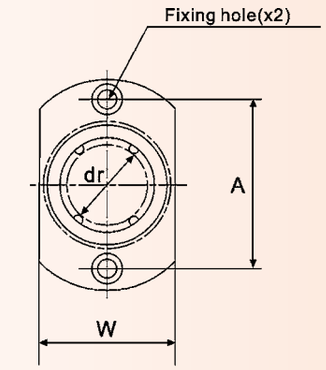
SI Unit 1N≒0.102kgf

LMH-UU-E <Resin Retainer>

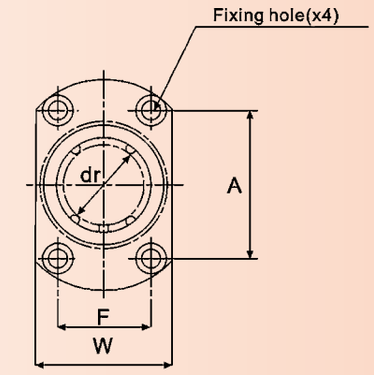


This type is a metric dimension series widely used in Japan and other countries.





dr≤13



dr≥16

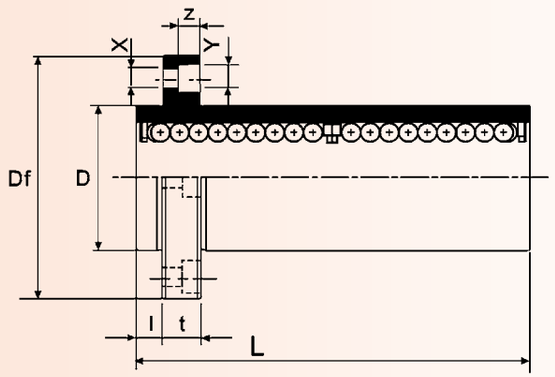
Nominal shaft diameter mm	Part No.	Major dimensions and tolerance						Major dimensions and tolerance								Eccentricity	Squareness	Basic load rating		Weight	Nominal shaft diameter mm
			dr		D		L	Flange						Flange							
	LMH···UU-E	mm	Tolerance μm	mm	Tolerance μm	mm	Tolerance μm	l mm	Df mm	W mm	t mm	A mm	F mm	X mm	Y mm	Z mm	μm	μm	dynamic C(N)	Static Co(N)	g	
6	LMH6UU-E	6	0 -9	12	0 -13	19	±300	5	28	18	5	20	—	3.5	6	3.1	12	12	206	265	21	6
8	LMH8UU-E	8		15		24		5	32	21	5	24	—	3.5	6	3.1			274	392	33	8
10	LMH10UU-E	10		19	0 -16	29		6	40	25	6	29	—	4.5	7.5	4.1			372	549	64	10
12	LMH12UU-E	12		21		30		6	42	27	6	32	—	4.5	7.5	4.1			510	784	68	12
13	LMH13UU-E	13		23		32		6	43	29	6	33	—	4.5	7.5	4.1			510	784	81	13
16	LMH16UU-E	16		28		37		6	48	34	6	31	22	4.5	7.5	4.1			774	1,180	112	16
20	LMH20UU-E	20	0 -10	32	0 -19	42		8	54	38	8	36	24	5.5	9	5.1	15	15	882	1,370	167	20
25	LMH25UU-E	25		40		59		8	62	46	8	40	32	5.5	9	5.1			980	1,570	325	25
30	LMH30UU-E	30		45		64		10	74	51	10	49	35	6.6	11	6.1			1,570	2,740	388	30

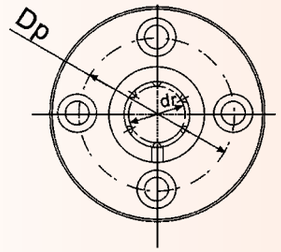
Note: All sizes of LMH-E type are sealed on both sides.

SI Unit 1N≒0.102kgf

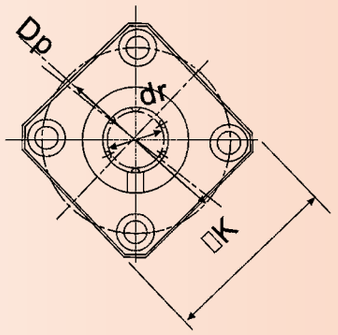
LMF-LUU-E <Resin Retainer>

This type is a metric dimension series widely used in Japan and other countries.





LMF···LUU-E



LMK···LUU-E

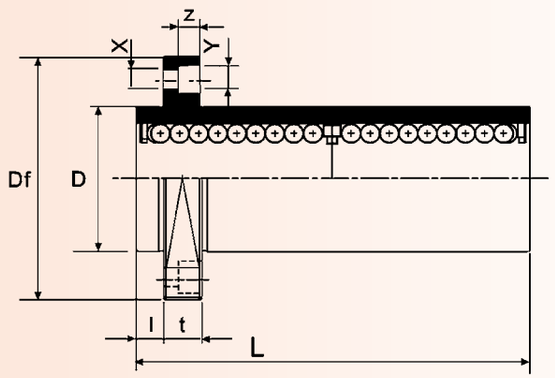
Nominal shaft diameter mm	Part No.		Major dimensions and tolerance						Major dimensions and tolerance								Eccentricity	Squareness	Basic load rating		Weight	Nominal shaft diameter mm
			dr		D		L		Flange				Flange									
	LMF···LUU-E	LMK···LUU-E	mm	Tolerance μm	mm	Tolerance μm	mm	Tolerance μm	l mm	Df mm	K mm	t mm	Dp mm	X mm	Y mm	Z mm	μm	μm	dynamic C(N)	Static Co(N)	g	
6	LMF6LUU-E	LMK6LUU-E	6	0 -10	12	0 -13	35	±300	5	28	22	5	20	3.5	6	3.1	15	15	323	530	31 25	6
8	LMF8LUU-E	LMK8LUU-E	8		15		45		5	32	25	5	24	3.5	6	3.1			431	784	51 43	8
10	LMF10LUU-E	LMK10LUU-E	10		19	0 -16	55		6	40	30	6	29	4.5	7.5	4.1			588	1,100	98 78	10
12	LMF12LUU-E	LMK12LUU-E	12		21		57		6	42	32	6	32	4.5	7.5	4.1			813	1,570	110 90	12
13	LMF13LUU-E	LMK13LUU-E	13		23		61		6	43	34	6	33	4.5	7.5	4.1			813	1,570	130 108	13
16	LMF16LUU-E	LMK16LUU-E	16		28		70		6	48	37	6	38	4.5	7.5	4.1			1,230	2,350	190 165	16
20	LMF20LUU-E	LMK20LUU-E	20	0 -12	32	0 -19	80		8	54	42	8	43	5.5	9	5.1	20	20	1,400	2,740	260 225	20
25	LMF25LUU-E	LMK25LUU-E	25		40		112		8	62	50	8	51	5.5	9	5.1			1,560	3,140	540 500	25
30	LMF30LUU-E	LMK30LUU-E	30		45		123		10	74	58	10	60	6.6	11	6.1			2,490	5,490	680 590	30
35	LMF35LUU-E	LMK35LUU-E	35	0 -15	52	0 -22	135		10	82	64	10	67	6.6	11	6.1	25	25	2,650	6,270	1,020 930	35
40	LMF40LUU-E	LMK40LUU-E	40		60		151		13	96	75	13	78	9	14	8.1			3,430	8,040	1,570 1,380	40
50	LMF50LUU-E	LMK50LUU-E	50		80		192		13	116	92	13	98	9	14	8.1			6,080	15,900	3,600 3,400	50
60	LMF60LUU-E	LMK60LUU-E	60	0 -20	90	0 -25	209		18	134	106	18	112	11	17	11.1	30	30	7,550	20,000	4,500 4,060	60

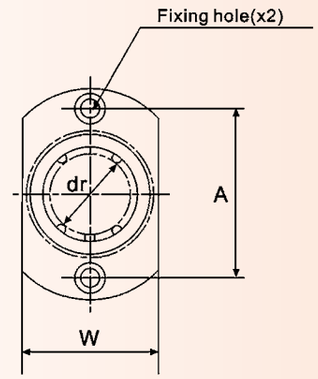
Note: All sizes of LMF-E/LMK-E type are sealed on both sides.

SI Unit 1N≒0.102kgf

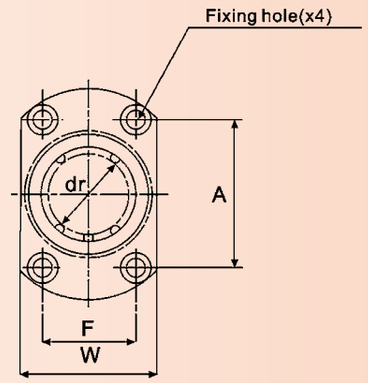
LMH-LUU-E <Resin Retainer>

This type is a metric dimension series
widely used in Japan and other countries.





dr≤13



dr≥16

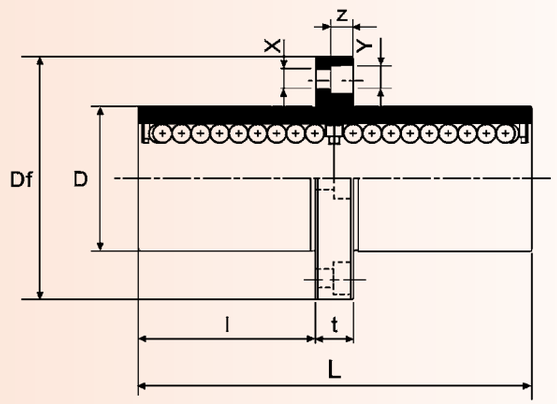
Nominal shaft diameter mm	Part No.	Major dimensions and tolerance						Major dimensions and tolerance								Eccentricity	Squareness	Basic load rating		Weight	Nominal shaft diameter mm
			dr		D		L	Flange						Flange							
	LMH···LUU-E	mm	Tolerance μm	mm	Tolerance μm	mm	Tolerance μm	l mm	Df mm	W mm	t mm	A mm	F mm	X mm	Y mm	Z mm	μm	μm	dynamic C(N)	Static Co(N)	g	
6	LMH6LUU-E	6	0 -10	12	0 -13	35	±300	5	28	18	5	20	—	3.5	6	3.1	15	15	323	530	28	6
8	LMH8LUU-E	8		15		45		5	32	21	5	24	—	3.5	6	3.1			431	784	47	8
10	LMH10LUU-E	10		19	0 -16	55		6	40	25	6	29	—	4.5	7.5	4.1			588	1,100	90	10
12	LMH12LUU-E	12		21		57		6	42	27	6	32	—	4.5	7.5	4.1			813	1,570	102	12
13	LMH13LUU-E	13		23		61		6	43	29	6	33	—	4.5	7.5	4.1			813	1,570	123	13
16	LMH16LUU-E	16		28		70		6	48	34	6	31	22	4.5	7.5	4.1			1,230	2,350	182	16
20	LMH20LUU-E	20	0 -12	32	0 -19	80		8	54	38	8	36	24	5.5	9	5.1	20	20	1,400	2,740	247	20
25	LMH25LUU-E	25		40		112		8	62	46	8	40	32	5.5	9	5.1			1,560	3,140	525	25
30	LMH30LUU-E	30		45		123		10	74	51	10	49	35	6.6	11	8.1			2,490	5,490	645	30

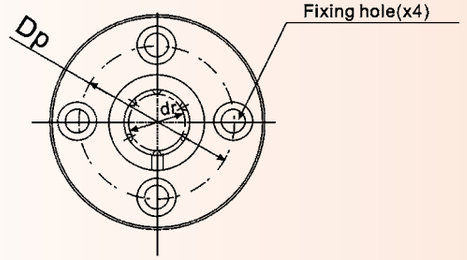
Note: All sizes of LMH-E type are sealed on both sides.

SI Unit 1N≒0.102kgf

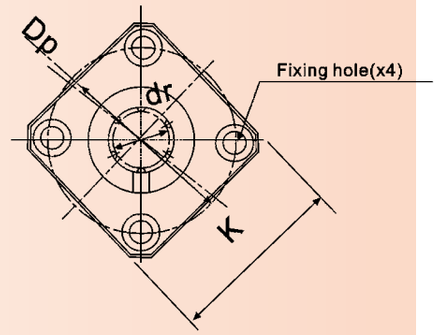
LMFC <Resin Retainer>

This type is a metric dimension series widely used in Japan and other countries.





LMFC



LMKC

Nominal shaft diameter mm	Part No.		Major dimensions and tolerance						Major dimensions and tolerance								Eccentricity	Squareness	Basic load rating		Weight	Nominal shaft diameter mm
			dr		D		L		Flange				Flange									
	LMFC	LMKC	mm	Tolerance μm	mm	Tolerance μm	mm	Tolerance μm	l mm	Df mm	K mm	t mm	Dp mm	X mm	Y mm	Z mm	μm	μm	dynamic C(N)	Static Co(N)	g	
6	LMFC6	LMKC6	6	0 -10	12	0 -13	35	±300	15	28	22	5	20	3.5	6	3.1	15	15	323	530	31 25	6
8	LMFC8	LMKC8	8		15		45		20	32	25	5	24	3.5	6	3.1			431	784	51 43	8
10	LMFC10	LMKC10	10		19	0 -16	55		24.5	40	30	6	29	4.5	7.5	4.1			588	1,100	98 78	10
12	LMFC12	LMKC12	12		21		57		25.5	42	32	6	32	4.5	7.5	4.1			813	1,570	110 90	12
13	LMFC13	LMKC13	13		23		61		27.5	43	34	6	33	4.5	7.5	4.1			813	1,570	130 108	13
16	LMFC16	LMKC16	16		28		70		32	48	37	6	38	4.5	7.5	4.1			1,230	2,350	190 165	16
20	LMFC20	LMKC20	20	0 -12	32	0 -19	80		36	54	42	8	43	5.5	9	5.1	20	20	1,400	2,740	260 225	20
25	LMFC25	LMKC25	25		40		112		52	62	50	8	51	5.5	9	5.1			1,560	3,140	540 500	25
30	LMFC30	LMKC30	30		45		123		56.5	74	58	10	60	6.6	11	6.1			2,490	5,490	680 590	30
35	LMFC35	LMKC35	35	0 -15	52	0 -22	135		62.5	82	64	10	67	6.6	11	6.1	25	25	2,650	6,270	1,020 930	35
40	LMFC40	LMKC40	40		60		151		69	96	75	13	78	9	14	8.1			3,430	8,040	1,570 1,380	40
50	LMFC50	LMKC50	50		80		192		89.5	116	92	13	98	9	14	8.1			6,080	15,900	3,600 3,400	50
60	LMFC60	LMKC60	60	0 -20	90	0 -25	209		95.5	134	106	18	112	11	17	11.1	30	30	7,550	20,000	4,500 4,060	60

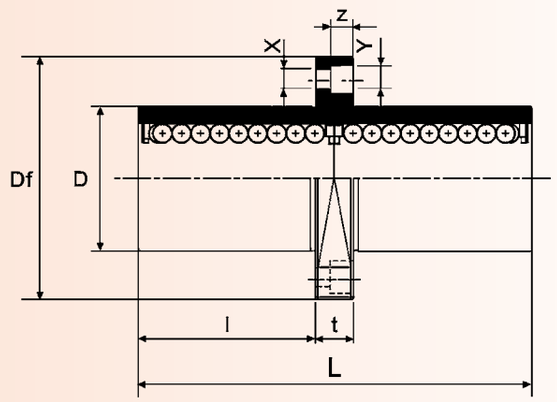
Seal type:
LMFC10 UU

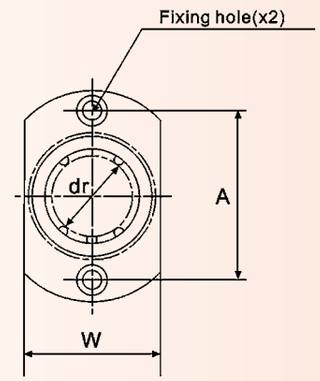
No entry	No seals
UU	Seals on both sides

SI Unit 1N≒0.102kgf

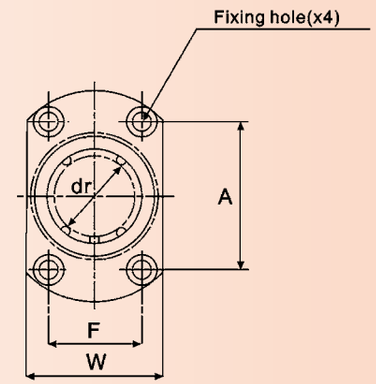
LMHC <Resin Retainer>

This type is a metric dimension series widely used in Japan and other countries.





dr≤13



dr≥16

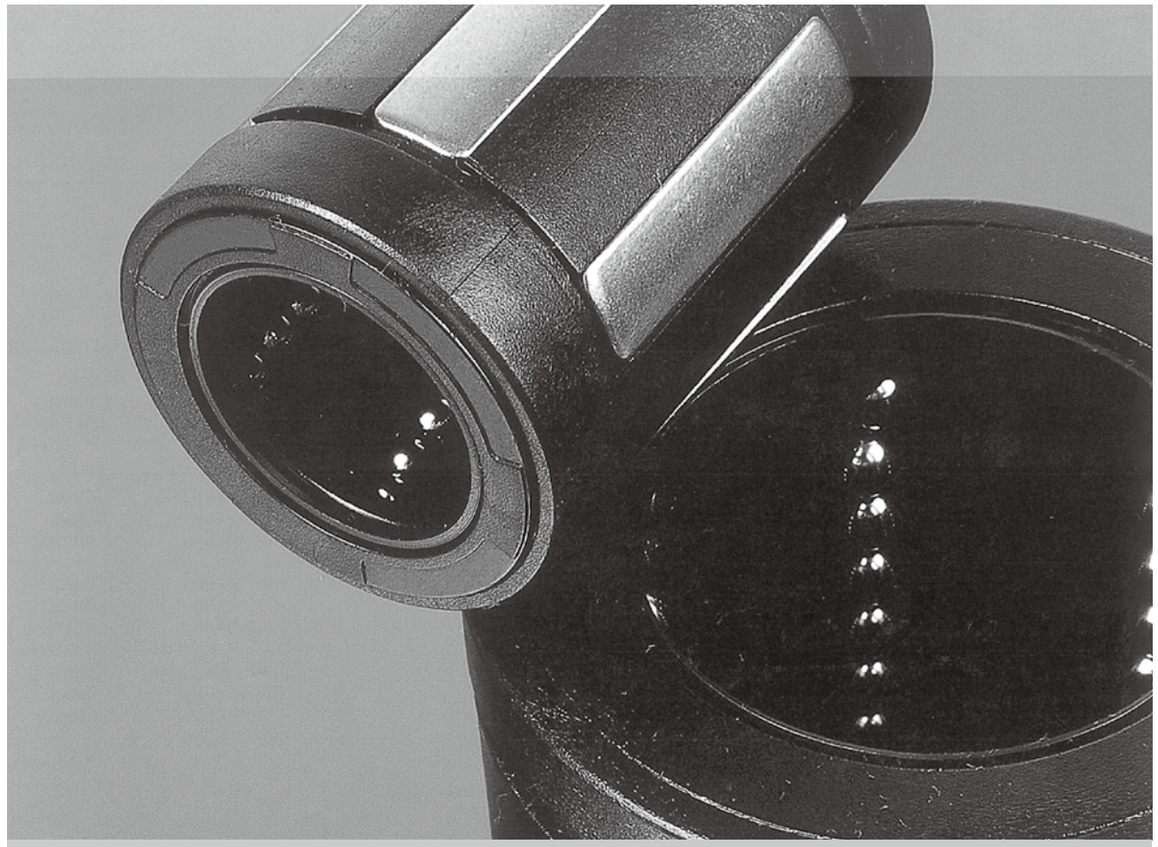
Nominal shaft diameter mm	Part No.	Major dimensions and tolerance						Major dimensions and tolerance								Eccentricity	Squareness	Basic load rating		Weight	Nominal shaft diameter mm
			dr		D		L	Flange													
	LMHC	mm	Tolerance μm	mm	Tolerance μm	mm	Tolerance μm	l mm	Df mm	W mm	t mm	A mm	F mm	X mm	Y mm	Z mm	μm	μm	dynamic C(N)	Static Co(N)	g	
6	LMHC6	6	0 -10	12	0 -13	35	±300	15	28	18	5	20	—	3.5	6	3.1	15	15	323	529	28	6
8	LMHC8	8		15		45		20	32	21	5	24	—	3.5	6	3.1			431	784	47	8
10	LMHC10	10		19	0 -16	55		24.5	40	25	6	29	—	4.5	7.5	4.1			588	1,100	90	10
12	LMHC12	12		21		57		25.5	42	27	6	32	—	4.5	7.5	4.1			813	1,570	102	12
13	LMHC13	13		23		61		27.5	43	29	6	33	—	4.5	7.5	4.1			813	1,570	123	13
16	LMHC16	16		28		70		32	48	34	6	31	22	4.5	7.5	4.1			1,230	2,350	182	16
20	LMHC20	20	0 -12	32	0 -19	80		36	54	38	8	36	24	5.5	9	5.1	20	20	1,400	2,740	247	20
25	LMHC25	25		40		112		52	62	46	8	40	32	5.5	9	5.1			1,560	3,140	525	25
30	LMHC30	30		45		123		56.5	74	51	10	49	35	6.6	11	6.1			2,490	5,490	645	30

Note: All sizes of LMHC type are sealed on both sides.

SI Unit 1N≒0.102kgf

<NSB Linear Ball Bushing System>
<Super Linear Ball Bushing>

NSB offers Super Linear Ball Bushing as a new standard in linear motion bearings. This Super Linear Ball Bushing has 3 times load rating and 27 times travel life of conventional linear bushings. Also, NSB Super Linear Ball Bushing offers Alignment which can give you less installation time and can prolong the travel life by reducing the friction between the shaft and balls. Super Linear Ball Bushing is designed to meet any customer′s demands such as factory automation equipments, industrial machines, electrical equipments, measuring instruments, and etc. NSB Super Linear Ball Bushing will give you the benefit of total cost reduction and improvement of your machine performance.



NSB

<NSB Linear Ball Bushing System>
<Super Linear Ball Bushing>

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
NSB 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 retainer 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 application environment by using with the Clearance Adjustable housing.

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

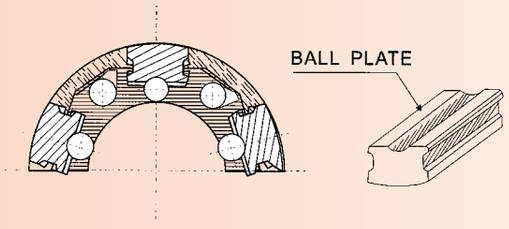


Fig.20. Cross-section of Super Linear Ball Bushing

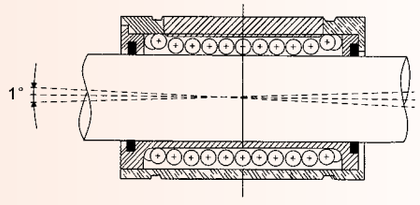


Fig.21. Super Linear Ball Bushing's self-alignment feature

Cost Effectiveness

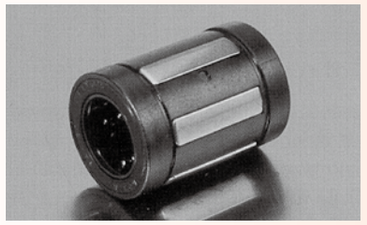
Lower Cost
Self alignment feature can compensate the inaccurate machining of the base. so less installation time and lower cost can be obtained.

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.

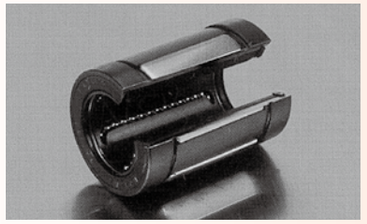
Reduction of Material Cost
Super Linear Ball Bushing's higher load rating enables the use of smaller components, and reducing material cost.

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

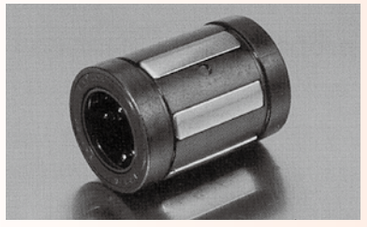
Super Linear Ball Bushing



Standard type (not Sealed)
Floating ball plate features offer self alignment and clearance adjustment, and light weight retainer and outer sleeve offers silent operation.



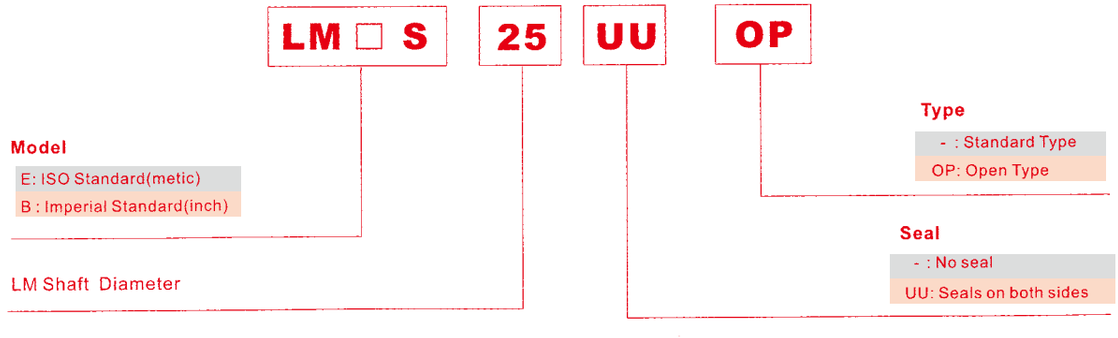
Open Type
One ball circuit is removed from the outer sleeve to be used with bottom supported shaft for deflection free movement. This open type Super Linear Ball Bushing also has self alignment and clearance adjustment.



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:



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:

$$L_h=\frac{L}{2\times L_S\times N_t\times 60}$$

L_h: Travel life (hr)
L_S: Stroke (km)
N_t: 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 Ball 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 (L_S)
- Number of strokes per minute : 60 (N_t)
- Shaft hardness : HRC 60 (f_H=1.0)
- Operating speed :

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

other factors(f_C,f_T) 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.

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

$$L_h=\frac{13,417\times 10^3}{2\times 0.250\times 60\times 60}$$
$$\fallingdotseq 7,454\text{ hours}$$

Choosing a proper Super Linear Ball Bushing

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

$$L = 15,000\times 2\times 0.250\times 10^{-3}\times 60\times 60=27,000\text{ km}$$

$$L=\frac{250\times 1.6}{1.0\times 1.0\times 1.0}\times\sqrt[3]{\frac{27,000}{50}}$$
$$= 3,257N$$

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 NSB 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 NSB 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)

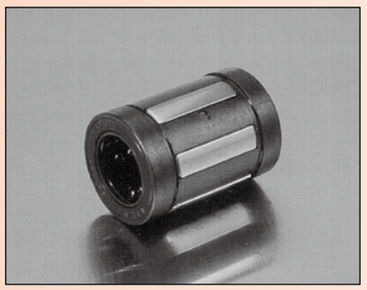
Part Number	shaft		Housing	
	shaft Dia. d(mm)	Tol.(h6) μm	Housing Bore D(mm)	Tol. (H7) μm
LMES10	10	0 -9	19	+21 0
LMES12	12	0 -11	22	
LMES16	16		26	
LMES20	20	0 -13	32	+25 0
LMES25	25		40	
LMES30	30		47	
LMES40	40	0 -16	62	+30 0
LMES50	50		75	

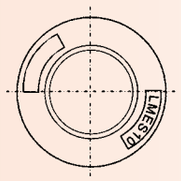
Table 10 Recommended toleranced between shaft and housing (Imperial Standard)

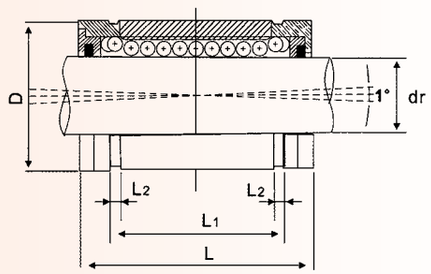
unit: inch

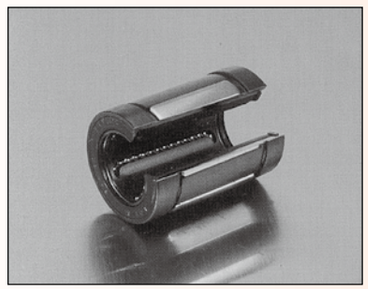
Part Number	shaft		Housing	
	shaft Dia.	Tol.(g6)	Housing Bore	Tol. (h7)
LMBS4	.2500	-.0002 to -.0006	.5000	0 to +.0007
LMBS6	.3750	-.0002 to -.0006	.6250	0 to +.0007
LMBS8	.5000	-.0002 to -.0007	.8750	0 to +.0008
LMBS10	.6250	-.0002 to -.0007	1.1250	0 to +.0008
LMBS12	.7500	-.0003 to -.0008	1.2500	0 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

LMES Series

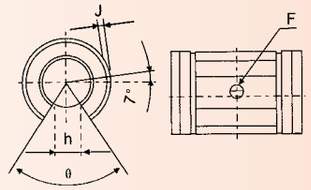




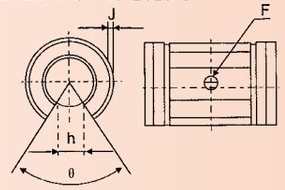




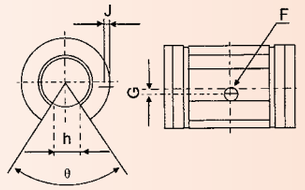
LMES12-OP



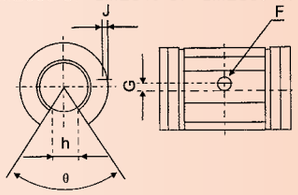
LMES16-OP LMES20-OP



LMES25-OP



LMES30-OP LMES40-OP LMES50-OP



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 C_0(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

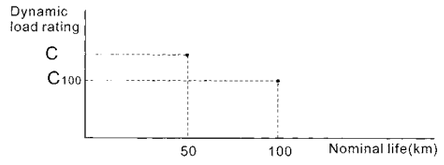
[1]Based on nominal housing bore

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

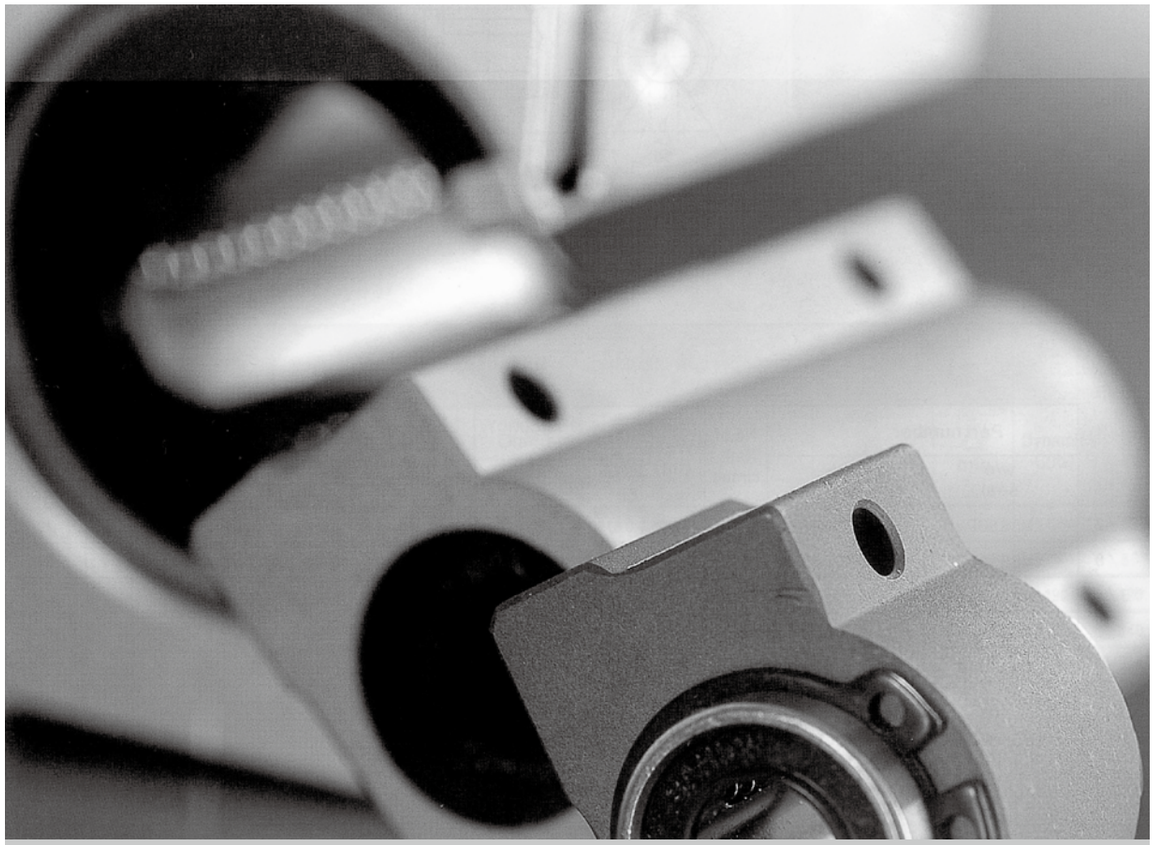
$L=(\frac{C}{P})^3\times 50km$ $L=(\frac{C_{100}}{P})^3\times 100km$



Shaft Dia. (mm)	Open Type				Dimensions (mm)								Basic Load Ratings	
	Part number		No.of Ball circuit	Wgt. (g)	D[1]	L ±0.2	L_2	h	θ (°)	F	G	J	Dynamic C(N)	Static C_0(N)
	w/o seal	with seal												
12	LMES 12OP	LMES 12UUOP	4	18	22	32	1.35	6.5	66	3.0	-	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		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=0.102 kgf

<NSB Linear Ball Bushing System>
<NSB Case Unit>



NSB offer various types Linear Bushing Case Units for designing of linear motion systems. Precisely machined Aluminum Cases are standardized for providing interchangeablity, less cost and less designing time.

Case Unit

The case is compact and light weight, and the standard type Linear Bushing is assembled inside.

SC（E） type

Standard type Aluminum Case Unit.
Simple mounting with mounting bolt to the table.

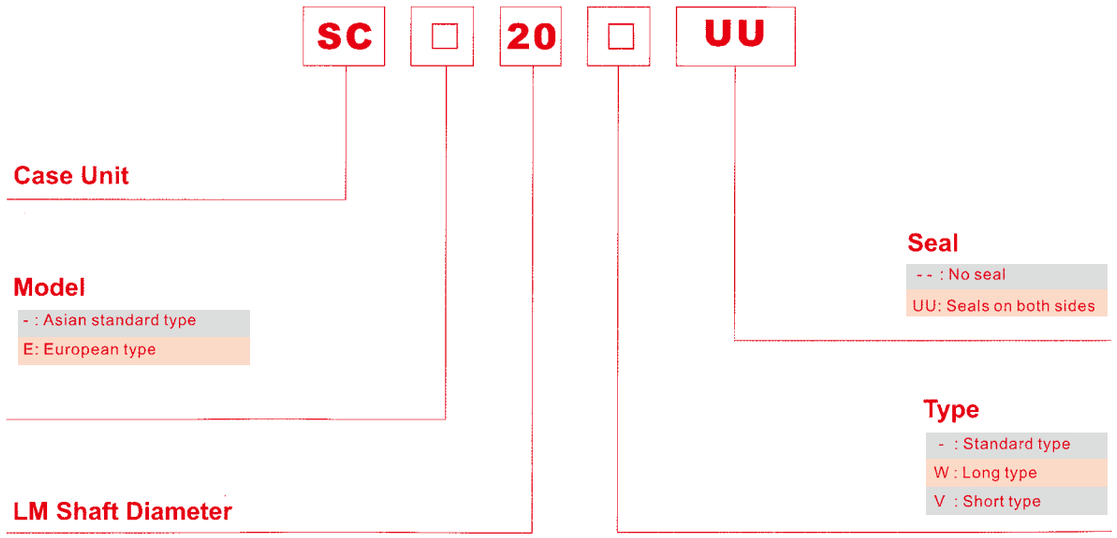
SC（E）□V type

Short type Aluminum Case Unit with a standard type Linear Bushing.
More compact design than SC(E) type is available.

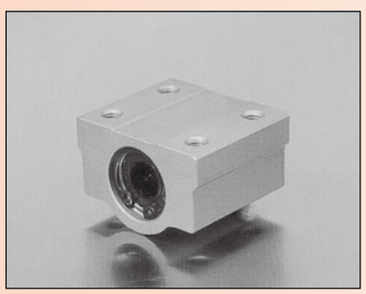
SC（E）□W type

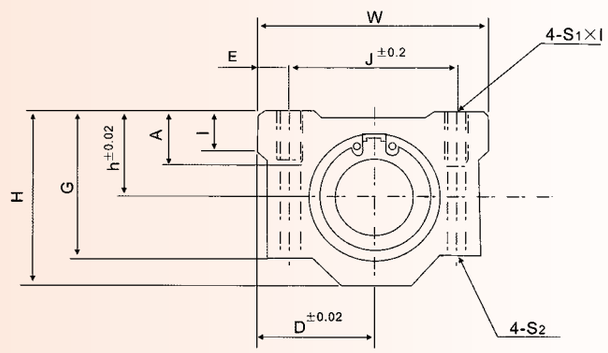
Assembled with double standard type Linear Bushing in a long Aluminum Case.

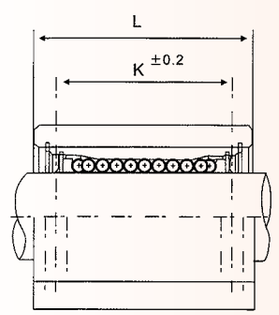
Part Number Notation



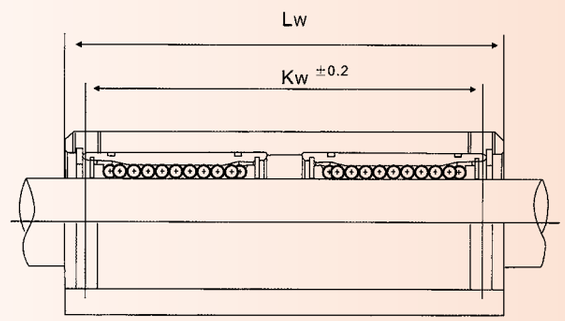
SC Series



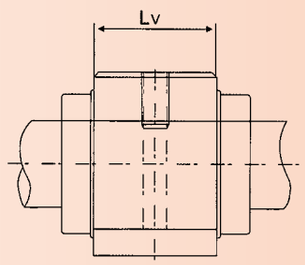




SC□N



SC□WN



SC□VN

Standard Type					Long Type					Short Type					Dimensions(mm)																Part Number
Part Number	Installed L/B	Load Ratings		Wgt (gf)	Part Number	Installed L/B	Load Ratings		Wgt (gf)	Part Number	Installed L/B	Load Ratings		Wgt. (gf)	Shaft Dia.	Common											SC		SC□W		SC□V	
		C(N)	C0(N)				C(N)	C0(N)				C(N)	C0(N)			h	D	W	H	G	A	J	E	S1×I	S2	K	L	Kw	Lw	Lv	
SC8UU	LM8UU	260	400	56	**SC8WUU**	2×LM8UU	410	800	94	**SC8VUU**	LM8UU	260	400	36	φ8	11	17	34	22	18	6	24	5	M4×8	φ3.4	18	30	42	58	15.4	**SC8UU**
SC10UU	LM10UU	370	540	90	**SC10WUU**	2×LM10UU	590	1080	147	**SC10VUU**	LM10UU	370	540	63	φ10	13	20	40	26	21	8	28	6	M5×12	φ4.3	21	35	46	68	19.5	**SC10UU**
SC12UU	LM12UU	410	590	112	**SC12WUU**	2×LM12UU	650	1180	220	**SC12VUU**	LM12UU	410	590	74	φ12	15	21	42	28	24	7.4	30.5	5.75	M5×12	φ4.3	26	36	50	70	20.5	**SC12UU**
SC13UU	LM13UU	500	770	123	**SC13WUU**	2×LM13UU	800	1540	245	**SC13VUU**	LM13UU	500	770	85	φ13	15	22	44	30	24.5	8	33	5.5	M5×12	φ4.3	26	39	50	75	20.5	**SC13UU**
SC16UU	LM16UU	770	1170	189	**SC16WUU**	2×LM16UU	1230	2340	376	**SC16VUU**	LM16UU	770	1170	132	φ16	19	25	50	38.5	32.5	9	36	7	M5×12	φ4.3	34	44	60	85	23.5	**SC16UU**
SC20UU	LM20UU	860	1370	237	**SC20WUU**	2×LM20UU	1370	2740	476	**SC20VUU**	LM20UU	860	1370	170	φ20	21	27	54	41	35	11	40	7	M6×12	φ5.2	40	50	70	96	27.4	**SC20UU**
SC25UU	LM25UU	980	1560	555	**SC25WUU**	2×LM25UU	1560	3120	1115	**SC25VUU**	LM25UU	980	1560	405	φ25	26	38	76	51.5	41	12	54	11	M8×18	φ6.8	50	67	100	130	37.4	**SC25UU**
SC30UU	LM30UU	1560	2740	685	**SC30WUU**	2×LM30UU	2490	5480	1375	**SC30VUU**	LM30UU	1560	2740	495	φ30	30	39	78	59.5	49	15	58	10	M8×18	φ6.8	58	72	110	140	40.9	**SC30UU**
SC35UU	LM35UU	1660	3130	1100	**SC35WUU**	2×LM35UU	2650	6260	2200	**SC35VUU**	LM35UU	1660	3130	790	φ35	34	45	90	68	54	18	70	10	M8×18	φ6.8	60	80	120	155	45.4	**SC35UU**
SC40UU	LM40UU	2150	4010	1600	**SC40WUU**	2×LM40UU	3440	8020	3200	**SC40VUU**	LM40UU	2150	4010	1220	φ40	40	51	102	78	62	20	80	11	M10×25	φ8.6	60	90	140	175	56.4	**SC40UU**
SC50UU	LM50UU	3820	7930	3350	**SC50WUU**	2×LM50UU	6110	15860	6720	**SC50VUU**	LM50UU	3820	7930	2300	φ50	52	61	122	102	80	24	100	11	M10×25	φ8.6	80	110	160	215	68.9	**SC50UU**

1N≒0.102 kgf

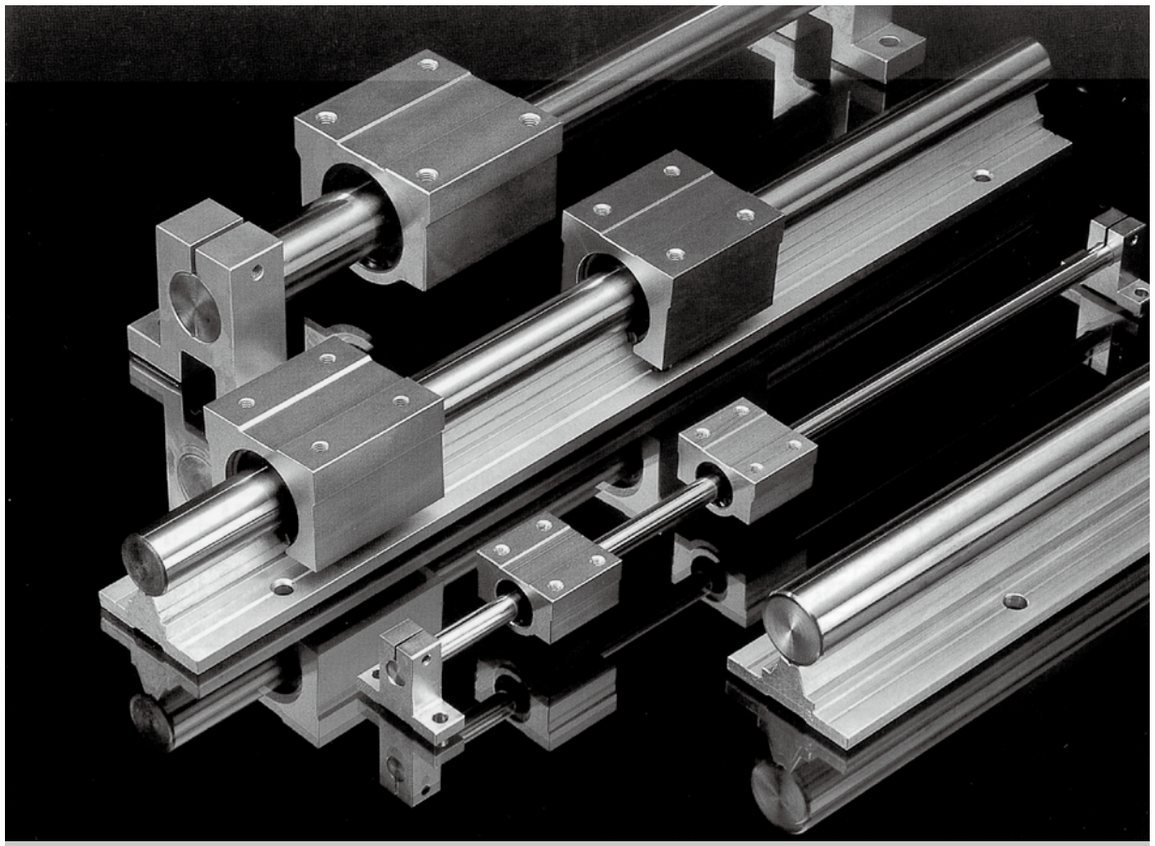
<NSB Linear Ball Bushing System>
<NSB Support Rail Unit>

NSB Support Rail Unit is assembled by of Support Rail, LM Shaft, and Open type Linear Bushing installed Case. All components are standardized for providing interchangeability, and less cost and less designing time.

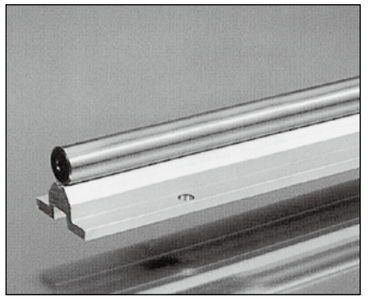
Support Rail （SBS）
Support Rail provides maximum rigidity and stiffness to the shaft throughout the whole stroke, and ensure the performance of the unit.

Case （SBR）
Effective for High load or long stroke application with maximum rigidity and excelent motion in combination with Open type Linear Bushing. Moreover, preload can be applied on TBR&SMD series for high precision performance.

Support Rail Unit （SBR-S）
SBR-S and TBR-S type are optimum guide units for high precision and deflection free sliding system with smooth motion and maximum rigidity, and less cost and time.



SBC Series

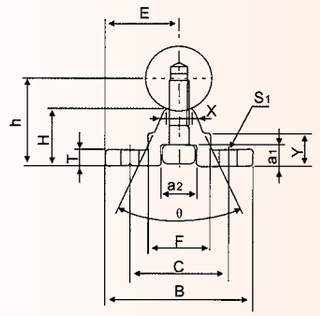


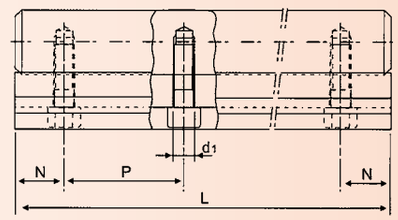
Part Number Notation

SB □ □ -1000L

- SB: Support Rail for SBR Unit
- □ (Shaft): S: Shaft include; - : Shaft not include
- □: LM Shaft Diameter.
- -1000L: Support Rail Length*

*Standard lengths are recommended on the table below. Drawing should be received with the order for customer design.





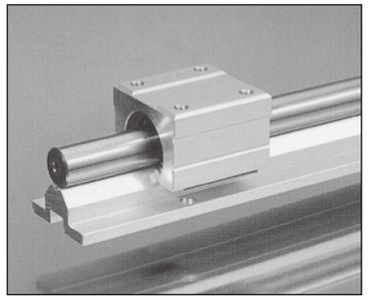
Part Number	Shaft Dia.	Dimensions (mm)														Wgt. (kg/m)
		E	h	B	H	T	F	X	Y	C	θ	S1	a1	a2	d1	
SBS16	φ16	20	25	40	17.8	5	18.5	8	11.7	30	80°	φ5.5	6	9.5	5.5	2.56
SBS20	φ20	22.5	27	45	17.7	5	19	8	10	30	50°	φ5.5	6.5	11	6.6	3.50
SBS25	φ25	27.5	33	55	21	6	21.5	8	12	35	50°	φ6.6	6.5	11	6.6	5.30
SBS30	φ30	30	37	60	22.8	7	26.5	10.3	13	40	50°	φ6.6	8.5	14	9	7.38
SBS35	φ35	32.5	43	65	26.6	8	28	13	15.5	45	50°	φ9	8.5	14	9	9.68
SBS40	φ40	37.5	48	75	29.4	9	38	16	17	55	50°	φ9	8.5	14	9	12.69
SBS50	φ50	47.5	62	95	38.8	11	45	20	21	70	50°	φ11	12.5	19	11	20.46

Standard Length of Support Rail and Dimensions

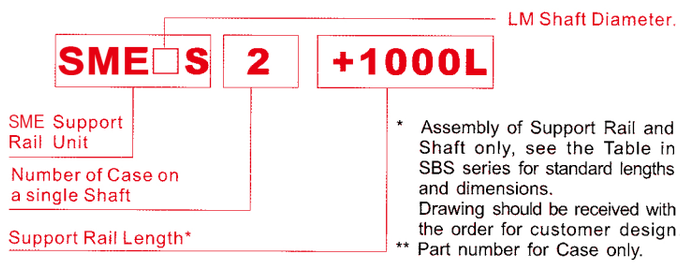
Part Number	SBS16	SBS20	SBS25	SBS30	SBS35	SBS40	SBS50
Standard Length (L)	190	340	250	450	460	460	470
	340	640	450	850	660	660	670
	640	940	850	1250	860	860	870
	940	1240	1250	1450	1060	1060	1070
						1260	1270
N	20	20	25	25	30	30	35
Pitch(P)	150	150	200	200	200	200	200
Max.Length	1390	1390	1850	1850	1860	1860	2070

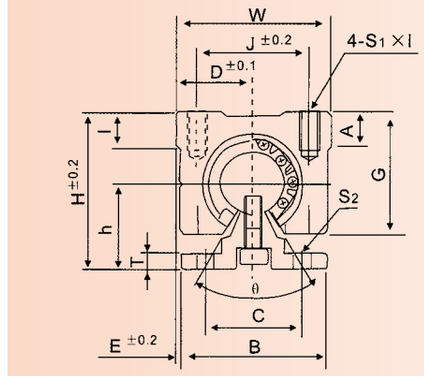
<NSB Linear Ball Bushing System>
<NSB Shaft Support>

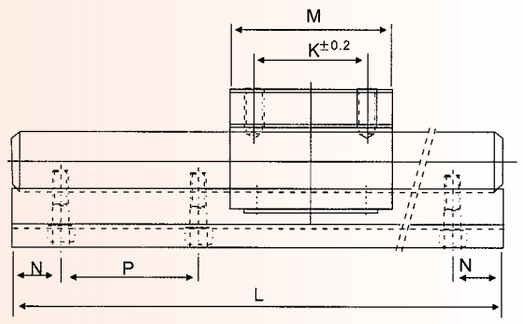
SME□S Series



Part Number Notation







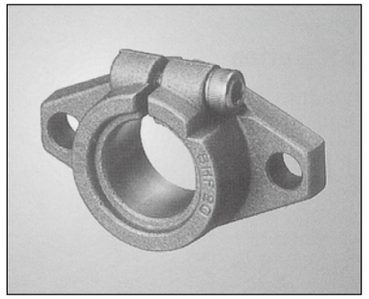
Part Number		Shaft Dia.	Basic Load Ratings		Weight		Dimensions (mm)				
Unit	Case**		Dynamic C(N)	Static Co(N)	Case (kgf)	Rail (kgf/ m)	D	h	H	E	θ
SME 16S	SME 16UU	φ16	770	1170	0.15	2.55	22.5	25	45	2.5	80°
SME 20S	SME 20UU	φ20	860	1370	0.20	3.50	24	27	50	1.5	60°
SME 25S	SME 25UU	φ25	980	1560	0.45	5.30	30	33	60	2.5	50°
SME 30S	SME 30UU	φ30	1560	2740	0.63	7.40	35	37	70	5	50°
SME 35S	SME 35UU	φ35	1660	3130	0.92	10.05	40	43	80	7.5	50°
SME 40S	SME 40UU	φ40	2150	4010	1.33	13.10	45	48	90	7.5	50°
SME 50S	SME 50UU	φ50	3820	7930	3.00	20.65	60	62	115	12.5	50°

Part Number	Dimensions (mm)												
	W	G	A	B	T	M	S1×l	J	K	S2	C	N	P
SME 16S	45	33	9	40	5	45	M5×12	32	30	φ5.5	30	20	150
SME 20S	48	39	11	45	5	50	M6×12	35	35	φ5.5	30	20	150
SME 25S	60	47	14	55	6	65	M6×12	40	40	φ6.6	35	25	200
SME 30S	70	56	15	60	7	70	M8×18	50	50	φ6.6	40	25	200
SME 35S	80	63	18	65	8	80	M8×18	55	55	φ9	45	30	200
SME 40S	90	72	20	75	9	90	M10×20	65	65	φ9	55	30	200
SME 50S	120	91	25	95	11	110	M10×20	94	80	φ11	70	35	200

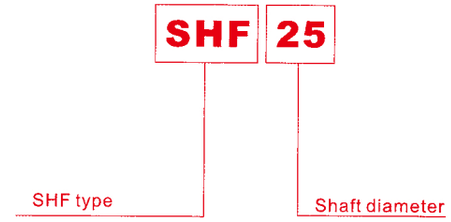
*:Standard

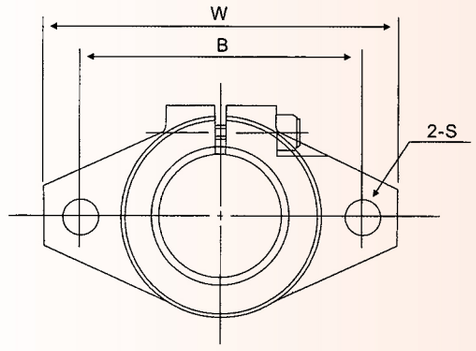
1N≒0.102 kgf

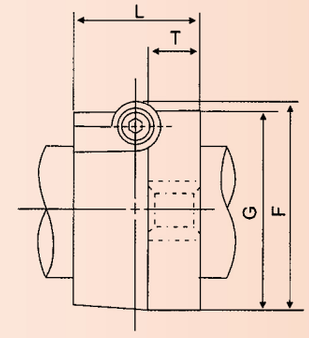
SHF Type



Part number structure example



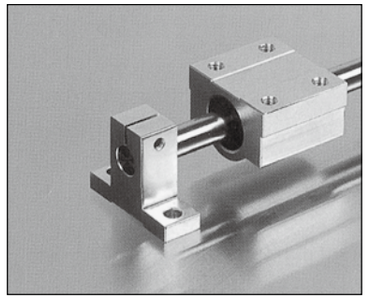




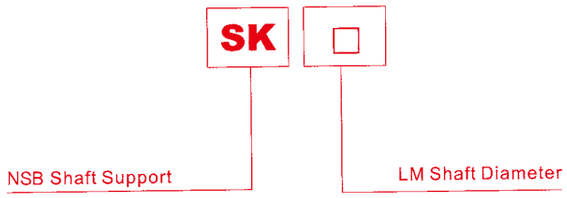
Part Number	Shaft Diameter mm	Major Dimensions							Adjusting Bolt Size	Mass g
		W mm	L mm	T mm	F mm	G mm	B mm	S (Bolt Size) mm		
SHF10	10	43	10	5	24	20	32	5.5(M 5)	M 4	13
SHF12	12	47	13	7	28	25	36	5.5(M 5)	M 4	20
SHF13	13	47	13	7	28	25	36	5.5(M 5)	M 4	20
SHF16	16	50	16	8	31	28	40	5.5(M 5)	M 4	27
SHF20	20	60	20	8	37	34	48	7(M 6)	M 5	40
SHF25	25	70	25	10	42	40	56	7(M 6)	M 5	60
SHF30	30	80	30	12	50	46	64	9(M 8)	M 6	110
SHF35	35	92	35	14	58	50	72	12(M 10)	M 8	380
SHF40	40	102	40	16	67	56	80	12(M 10)	M 10	510
SHF50	50	122	50	19	83	70	96	14(M 12)	M 12	890
SHF60	60	140	60	23	95	82	112	14(M 12)	M 12	1,500

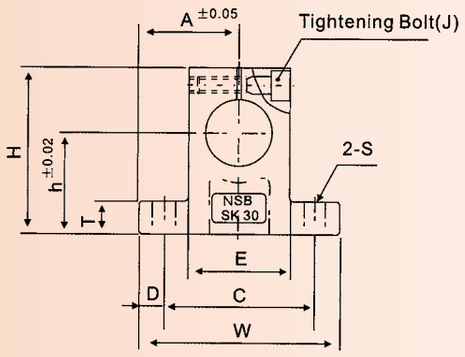
Shaft Support

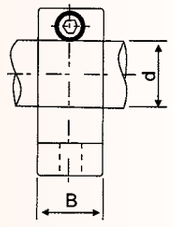
Support for Shaft ends. NSB Shaft Support is made of Aluminium with compact design, and able to fix the LM Shaft by tightening bolt at the axial direction slot.



NSB Shaft Support SK Series







Part Number	Shaft Dia.	Dimensions (mm)											Wgt. (gf)
		h	A	W	H	T	E	D	C	B	S	J	
SK8	ϕ8	20	21	42	32.8	6	18	5	32	14	ϕ5.5	M4	24
SK10	ϕ10	20	21	42	32.8	6	18	5	32	14	ϕ5.5	M4	24
SK12	ϕ12	23	21	42	38	6	20	5	32	14	ϕ5.5	M4	30
SK13	ϕ13	23	21	42	38	6	20	5	32	14	ϕ5.5	M4	30
SK16	ϕ16	27	24	48	44	8	25	5	38	16	ϕ5.5	M4	40
SK20	ϕ20	31	30	60	51	10	30	7.5	45	20	ϕ6.6	M5	70
SK25	ϕ25	35	35	70	60	12	38	7	56	24	ϕ6.6	M6	130
SK30	ϕ30	42	42	84	70	12	44	10	64	28	ϕ9	M6	180
SK35	ϕ35	50	49	98	85	15	50	12	74	32	ϕ11	M8	270
SK40	ϕ40	60	57	114	96	15	60	12	90	36	ϕ11	M8	420

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