Words and Deeds Design

KBS®

KBS Bearings Industry Co.,Ltd.

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KBS®

LINEAR BALL BUSHING

LINEAR BALL BUSHING

Linear ball 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 KBS linear ball bushing is a high precision bushing which offers unlimited linear travel distance with minimum fricitional resistance.

With high performance and a wide range of types , the KBS 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.

KBS®

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KBS Linear Ball Bushing-Interchangeability List

Ball Bushing-Compact Type

KBS	NTN	STAR	INA	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

KBS	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.

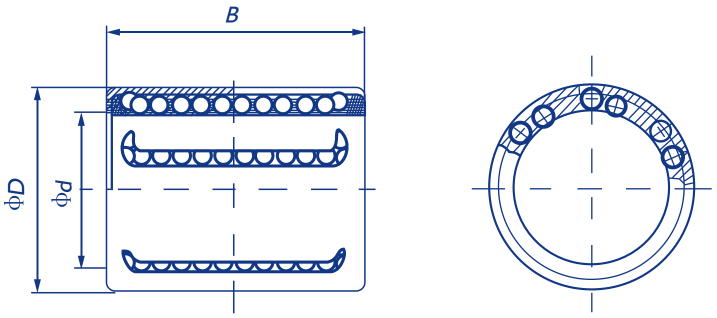
KBS	NB	THK	EASE
LMB..	SW..G	LMB..	SDB..
LMB..UU	SW..GUU	LMB..UU	SDB..UU
LMB..AJ	SW..GAJ	LMB..AJ	SDB..AJ
LMB..UUAJ	SW..GUUAJ	LMB..UUAJ	SDB..UUAJ
LMB..OP	SW..GOP	LMB..OP	SDB..OP
LMB..UUOP	SW..GUUOP	LMB..UUOP	SDB..UUOP

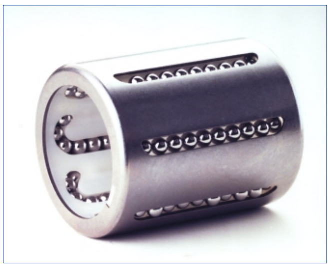
The above types are inch dimension series generally used in US.

KBS	NB	INA	SKF	THK	IKO	THOMSON	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.

Standard Linear Ball Bearing
Steel Drawn Cup/Cage Plastic





	Dimensions [mm]			Load Capacity [N]		Weight [g]
Part-No.	ϕd	ϕD	B	Dyn.	Stat.	
KH-0622	6	12	22	400	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:

KH   ϕ   PP

P=seal one end, PP=seal both ends

Shaft Diameter

Standard Linear Bearing

TECHNICAL INFORMATION

Load Rating

Basic Dynamic Load Rating（C）

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

Allowable Static Moment（M）

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

Static Safety Factor（fs）

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

Basic Static Load Rating（Co）

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

Table 1. Stactic Safety Factors

Condition of use	Low limit of fs
When the shaft has less deflection and shock	1to2
When elastic deformation should be considered with respect to pinch load	2to4
When the equipment is subject to vibration and impacts	3to5

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 system. 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: $$L=\left(\frac{C}{P}\right)^3\cdot 50 \qquad \text{———} \quad (\mathrm{I})$$

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

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

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

L：Rating life（Km） fh:Hardness factor（See Fig.1）
C：Basic dynamic load rating（N）
f_T：Temperatuer coefficient （See Fig.2） P：Load（N）
f_C：Contact coefficient （See Table 2）
f_W：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:

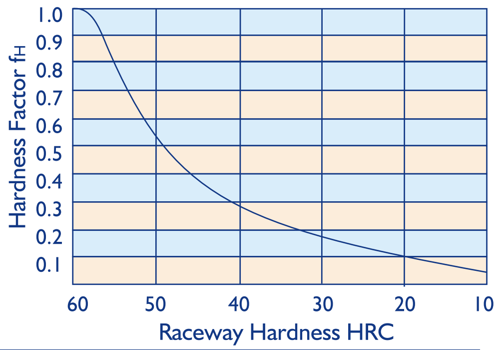
$$L_h=\frac{L\cdot 10^3}{2\ell_s\cdot n_1\cdot 60}$$

L_h：Rating life in hours（hr）
ℓs：Stroke length（m）
L：Rating life （km）
n_1：No.of strokes per minute（cpm）

• Hardness Factor（f_H）

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.

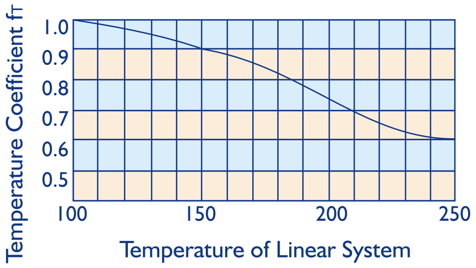
Fig.1 Hardness Factor



• Temperature Coefficient（f_T）

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 of the system.

Table 2 Contact Coefficient

Number of linear systems per 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(15 m/min. or less) without impulsive shock from outside	1.0 to 1.5
Operation at intermediate speed (60 m/min . or less) without impulsive shock	1.5 to 2.0
Operation at high speed (over 60 m/min.) With impulsive shock from outside	2.0 to 3.5

Frictional Resistance

The static frictional resistance of the KBS 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 KBS 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 pre-load. 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 KBS linear system depends on the model . Consult KBS 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 KBS linear systems without lubrication increases the abrasion of the rolling elements, shortening the life span. The KBS linear systems therefore require appropriate lubrication . For lubrication KBS 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 KBS 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 KBS 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 KBS 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

KBS 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

KBS 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.

Types and Linear Bushing Number

Example

LM 25 F A UU 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

Nominal Shaft Diameter

• Flange Type

F	Round type
K	Square type
H	

• Modification

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

• 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:

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

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：Temperature 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 time.

The lifespan can be obtained from the following equation if the stroke length and the number of strokes are constant：

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

L_h：Lifespan（hr）

L：Rated life（km）

ℓ_S：Stroke length（m）

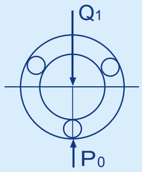
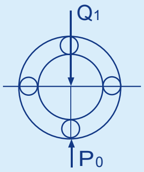
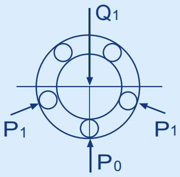
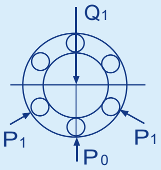
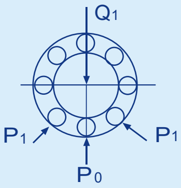
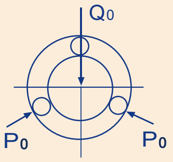
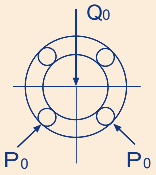
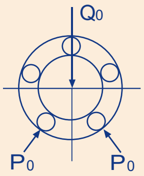
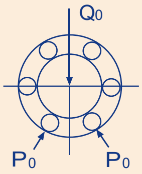
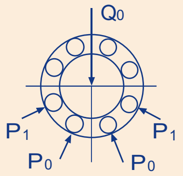
n_1：Number of strokes per minute （cpm）

Relation between ball circuits and load rating

The KBS 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 in the dimension table indicates the load rating when the load is placed on top of one ball circuit. If the KBS linear bushing is used 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:

Table 1

Number of rows Row position load ratio	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 KBS linear bushing used in the following conditions:

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

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

$$L=\left(\frac{f_H \cdot f_T \cdot f_C}{f_w}\cdot\frac{C}{P}\right)^3 \cdot 50 \quad F_H=f_T=f_C=f_w=1.0$$

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

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

$$L_h=\frac{Lx10^3}{2x\ell_s x n_1 x60}=\frac{292x10^3}{2x0.05x50x60}=973hr$$

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:	5 cpm
• Lifespan:	10,000hr
• Total load:	980N

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

$$L=2X\ell_s X n_1 X60XL_h=6,000\ km$$

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

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

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 KBS linear bushing is used with a shaft, inadequate clearance, adjustment may cause early bush failure and /or poor, rough traveling. 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

Division Model		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 KBS linear bushing high precision of the shaft and housing is required.

1. Shaft

The rolling balls in the KBS linear bushing are in point contact with the shaft surface. Therefore, the shaft dimensions, tolerance, surface finish ,and hardness greatly affect the traveling 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.

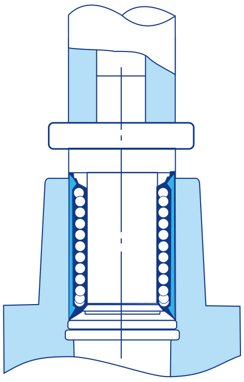
2. Housing

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

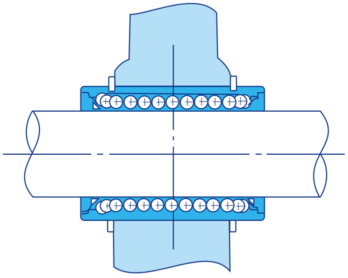


Fig.3

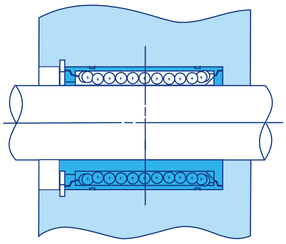


Fig.4

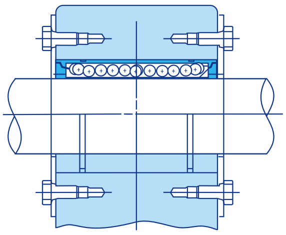


Fig.5

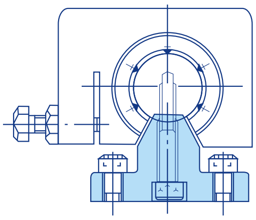
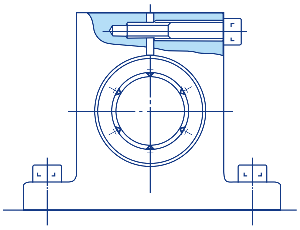


Fig.6

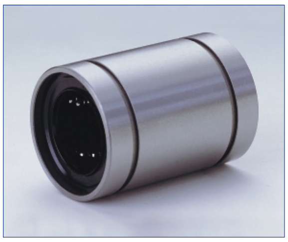


KBS®

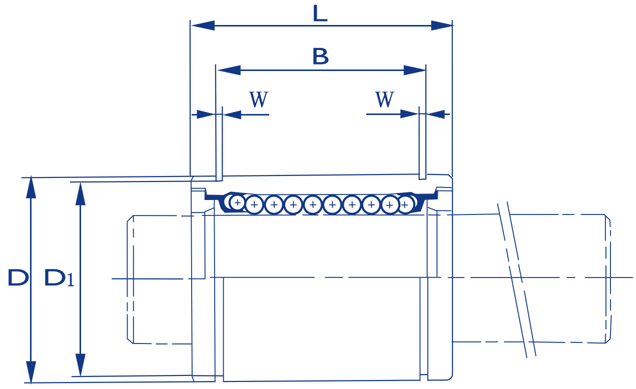
<Built-in Synthetics Resin Retainer>

<Built-in Steel Retainer>

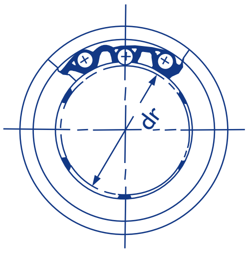
LM <Built-in Synthetics Resin Retainer>



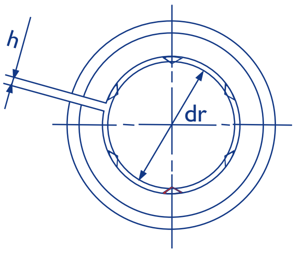
This type is a metric dimension series widely used in Japan and other countries



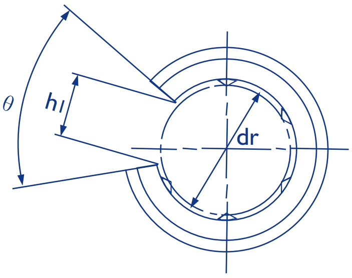
Nominal Part No.							Nominal Shaft Diameter (mm)	
Standard	Type	Seal Type	Ball Circuit	Weight g	Adjustable Type	Open Type	Tolerance	
LM	5	LM 5UU	4	4	——	——	5	0 -0.008
LM	6	LM 6UU	4	8	LM 6-AJ	——	6	
LM	8S	LM 8SUU	4	11	LM 8S-AJ	——	8	
LM	8	LM 8UU	4	16	LM 8-AJ	——	8	
LM	10	LM 10UU	4	30	LM 10-AJ	——	10	0 -0.009
LM	12	LM 12UU	4	31.5	LM 12-AJ	LM 12-OP	12	
LM	13	LM 13UU	4	43	LM 13-AJ	LM 13-OP	13	
LM	16	LM 16UU	5	69	LM 16-AJ	LM 16-OP	16	
LM	20	LM 20UU	5	87	LM 20-AJ	LM 20-OP	20	
LM	25	LM 25UU	6	220	LM 25-AJ	LM 25-OP	25	0 -0.010
LM	30	LM 30UU	6	250	LM 30-AJ	LM 30-OP	30	
LM	35	LM 35UU	6	390	LM 35-AJ	LM 35-OP	35	
							38	0 -0.012
LM	40	LM 40UU	6	585	LM 40-AJ	LM 40-OP	40	
LM	50	LM 50UU	6	1580	LM 50-AJ	LM 50-OP	50	
LM	60	LM 60UU	6	2000	LM 60-AJ	LM 60-OP	60	0 -0.015



LM



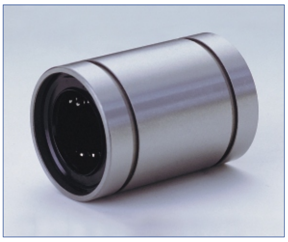
LM • • • AJ



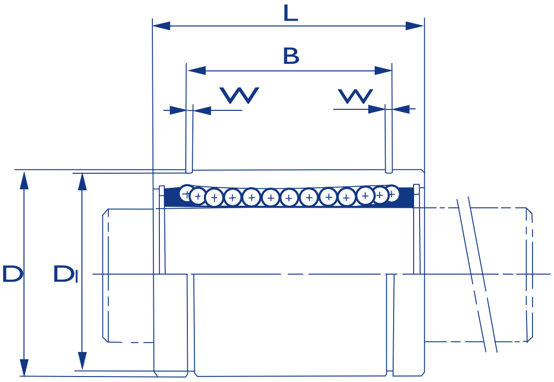
LM • • • OP

Major Dimensions and Tolerance (mm)											Eccentricity (max)	Radial Clearance (max)	Basic Load Rating		Nominal Part No .
D	Tolerance	L	Tolerance	B	Tolerance	W	D1	h	h1	θ	µm	µm	C kgf	Co kgf	
10	0 -0.009	15	0 -0.012	10.2		1.1	9.6	—	—	—	8	-3	17	21	LM 5
12	0 -0.011	19		13.5		1.1	11.5	1	—	—	12	-5	21	27	LM 6
15		17		11.5		1.1	14.3	1	—	—	12	-5	18	23	LM 8S
15		24		17.5		1.1	14.3	1	—	—	12	-5	27	41	LM 8
19	0 -0.013	29	0 -0.2	22	0 -0.2	1,3	18	1			12	-5	38	56	LM 10
21		30		23		1,3	20	1.5	8	80°	12	-5	42	61	LM 12
23		32		23		1.3	22	1.5	9	80°	12	-7	52	79	LM 13
28	0 -0.016	37		26.5		1.6	27	1.5	11	60°	12	-7	79	120	LM 16
32		42		30.5		1.6	30.5	1.5	11	60°	15	-9	88	140	LM 20
40		59		41		1.85	38	2	12	50°	15	-9	100	160	LM 25
45	0 -0.019	64	0 -0.3	44.5	0 -0.3	1.85	43	2.5	15	50°	15	-9	160	280	LM 30
52		70		49.5		2.1	49	2.5	17	50°	20	-13	170	320	LM 35
60	0 -0.022	80		60.5		2.1	57	3	20	50°	20	-13	220	410	LM 40
80		100		74		2.6	76.5	3	25	50°	20	-13	390	810	LM 50
90		110		85		3.15	86.5	3	30	50°	25	-16	480	1020	LM 60

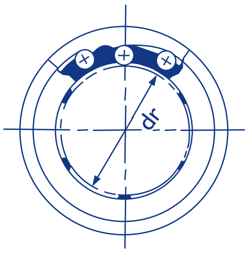
LME <Built-in Synthetics Resin Retainer>



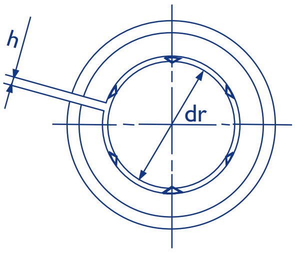
This type is a metric dimension series generally used in Europe .



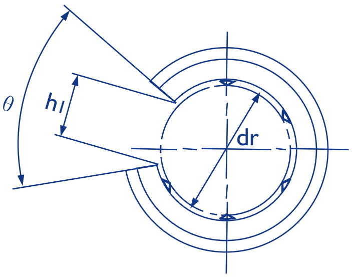
Nominal Part No.						Nominal Shaft Diameter (mm)	
Standard Type	Seal Type	Ball Circuit	Weight g	Adjustable Type	Open Type	Tolerance	
LME 5	LME 5UU	3	11	LME 5-AJ		5	+0.008 0
LME 8	LME 8UU	4	20	LME 8-AJ		8	
LME 12	LME 12UU	4	41	LME 12-AJ	LME 12-OP	12	
LME 16	LME 16UU	5	65	LME 16-AJ	LME 16-OP	16	+0.009 - 0.001
LME 20	LME 20UU	5	91	LME 20-AJ	LME 20-OP	20	
LME 25	LME 25UU	6	215	LME 25-AJ	LME 25-OP	25	+0.011 - 0.001
LME 30	LME 30UU	6	325	LME 30-AJ	LME 30-OP	30	
LME 40	LME 40UU	6	705	LME 40-AJ	LME 40-OP	40	+0.013 - 0.002
LME 50	LME 50UU	6	1130	LME 50-AJ	LME 50-OP	50	
LME 60	LME 60UU	6	2220	LME 60-AJ	LME 60-OP	60	



LME



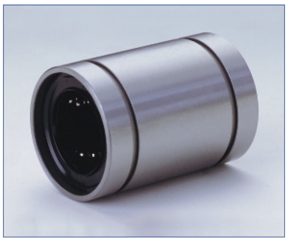
LME • • • AJ



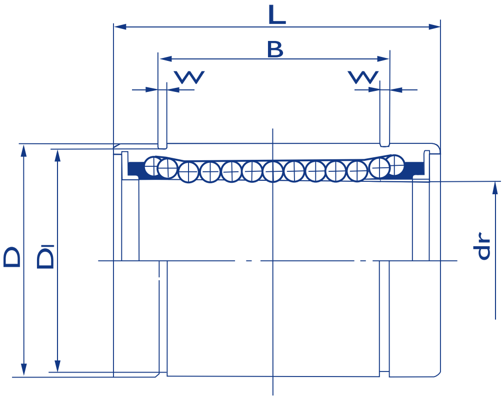
LME • • • OP

Major Dimensions and Tolerance (mm)											Eccentricity (max)	Radial Clearance (max)	Basic Load Rating		Nominal Part No
D	Tolerance	L	Tolerance	B	Tolerance	W	Dl	h	hl	θ	µm	µm	C kgf	Co kgf	
12	0 -0.008	22	0 -0.2	14.5	0 -0.2	1.1	11.5	1			12	-5	21	27	LME 5
16		25		16.5		1.1	15.2	1			12	-5	27	41	LME 8
22	0 -0.009	32		22.9		1.3	21	1.5	7.5	78°	12	-7	52	79	LME 12
26		36		24.9		1.3	24.9	1.5	10	78°	12	-7	59	91	LME 16
32	0 -0.011	45		31.5		1.6	30.3	2	10	60°	15	-9	88	140	LME 20
40		58	0 -0.3	44.1	0 -0.3	1.85	37.5	2	12.5	60°	15	-9	100	160	LME 25
47		68		52.1		1.85	44.5	2	12.5	50°	15	-9	160	280	LME 30
62	0 -0.013	80		60.6		2.15	59	3	16.8	50°	17	-13	220	410	LME 40
75		100		77.6		2.65	72	3	21	50°	17	-13	390	810	LME 50
90	0 -0.015	125	0 -0.4	101.7	0 -0.4	3.15	86.5	3	27.2	54°	20	-16	480	1020	LME 60

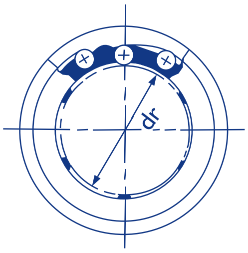
LMB <Built-in Synthetics Resin Retainer>



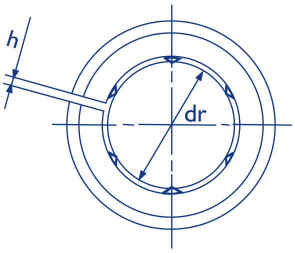
This type is an inch dimension series mainly used in the US .



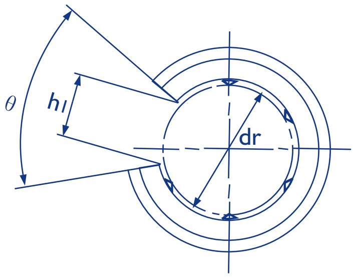
Nominal Shaft Diameter (Inch/mm)	Nominal Part No.							Nominal Shaft Diameter (Inch/mm)	
	Standard	Type	Seal Type	Ball Circuit	Weight g	Adjustable Type	Open Type		Tolerance
1/4 6.350	LMB	4	LMB 4UU	4	8	LMB 4-AJ	——	.2500 6.350	
3/8 9.525	LMB	6	LMB 6UU	4	14	LMB 6-AJ	——	.3750 9.525	0 -.0040
1/2 12.700	LMB	8	LMB 8UU	4	37	LMB 8-AJ	LMB 8-OP	.5000 12.700	0 -0.009
5/8 15.875	LMB	10	LMB 10UU	4	76	LMB 10-AJ	LMB 10-OP	.6250 15.875	
3/4 19.050	LMB	12	LMB 12UU	5	95	LMB 12-AJ	LMB 12-OP	.7500 19.050	0 -.0040
1 25.400	LMB	16	LMB 16UU	6	200	LMB 16-AJ	LMB 16-OP	1.0000 25.400	0 -0.01
1-1/4 31.750	LMB	20	LMB 20UU	6	440	LMB 20-AJ	LMB 20-OP	1.2500 31.750	0 -.0050
1-1/2 38.100	LMB	24	LMB 24UU	6	670	LMB 24-AJ	LMB 24-OP	1.5000 38.100	
2 50.800	LMB	32	LMB 32UU	6	1140	LMB 32-AJ	LMB 32-OP	2.0000 50.800	0 -0.012



LMB



LMB・・・AJ



LMB・・・OP

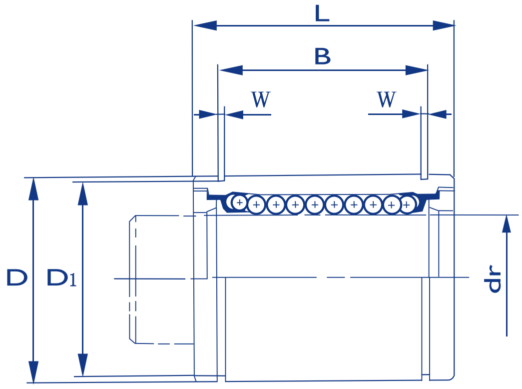
Major Dimensions and Tolerance (Inch/mm)

D	Tolerance	L	Tolerance	B	Tolerance	W	D_1	h	h_1	θ	Eccentricity (max) Inch/μm	Radial Clearance (max) Inch/μm	Basic Load Rating C N	Basic Load Rating Co N	Nominal Part No .
.5000 12.700	0 -.00045 0 -0.011	.7500 19.050		0.5110 12.98		.0390 0.992	.4687 11.906	.04 1	——	——	.0005 12	-.0001 -3	206	265	LMB 4
.6250 15.875	0 -.00050	.8750 22.225	0 -.008	0.6358 16.15	0 -.008	.0390 0.992	.5880 14.935	.04 1	——	——	.0005 12	-.0001 -3	225	314	LMB 6
.8750 22.225		1.2500 31.750		0.9625 24.46		.0459 1.168	.8209 20.853	.06 1.5	.34 7.9375	80^0	.0005 12	-.0001 -4	510	784	LMB 8
1.1250 28.575	0 -0.013	1.5000 38.100	0 -0.2	1.1039 28.04	0 -0.2	.0559 1.422	1.0590 26.899	.06 1.5	.375 9.525	80^0	.0005 12	-.0001 -4	774	1180	LMB 10
1.2500 31.750	0 -.00065	1.6250 41.275		1.1657 29.61		.0559 1.422	1.1760 29.870	.06 1.5	.4375 11.1125	60^0	.0006 15	-.0002 -6	862	1370	LMB 12
1.5625 39.688	0 -0.016	2.2500 57.150	0 -.012	1.7547 44.57	0 -.012	.0679 1.727	1.4687 37.306	.06 1.5	.5625 14.2875	50^0	.0006 15	-.0002 -6	980	1570	LMB 16
2.0000 50.800	0 -.00075	2.6250 66.675		2.0047 50.92		.0679 1.727	1.8859 47.904	.10 2.5	.625 15.875	50^0	.0008 20	-.0003 -8	1570	2740	LMB 20
2.3750 60.325	0 -0.019	3.0000 76.200		2.4118 61.26		.0859 2.184	2.2389 56.870	.12 3	.75 19.05	50^0	.0008 20	-.0003 -8	2180	4020	LMB 24
3.0000 76.200	0 -.00090 0 -0.022	4.0000 101.600	0 -0.3	3.1917 81.07	0 -0.3	.1029 2.616	2.8379 72.085	.12 3	1.0 25.40	50^0	.0010 25	-.0005 -13	3820	7940	LMB 32

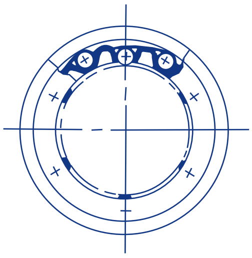
SI Unit 1N≒0.225 lbs
1kg≒2.205 lbs

LM-A <Built-in Steel Retainer>

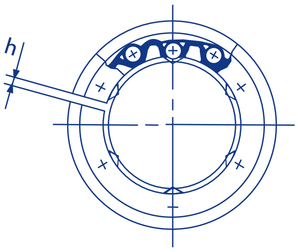
This type is a metric dimension series widely used in Japan and other countries.



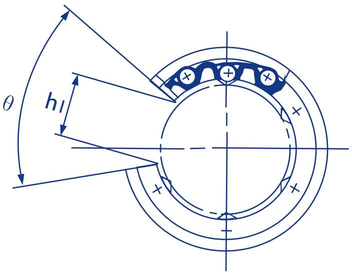
Nominal Part No.						Nominal Shaft Diameter (mm)		
Standard Type	Seal Type	Ball Circuit	Weight g	Adjustable Type	Open Type		Tolerance Precision	Tolerance High
LM 8SA	LM 8SA UU	4	11	—	—	8	0 -0.006	0 -0.009
LM 8A	LM 8A UU	4	17	—	—	8		
LM 10A	LM 10A UU	4	36	—	—	10		
LM 12A	LM 12A UU	4	42	LM 12A-AJ	LM 12A-OP	12		
LM 13A	LM 13A UU	4	49	LM 13A-AJ	LM 13A-OP	13		
LM 16A	LM 16A UU	4	76	LM 16A-AJ	LM 16A-OP	16		
LM 20A	LM 20A UU	5	100	LM 20A-AJ	LM 20A-OP	20	0 -0.007	0 -0.010
LM 25A	LM 25A UU	6	240	LM 25A-AJ	LM 25A-OP	25		
LM 30A	LM 30A UU	6	270	LM 30A-AJ	LM 30A-OP	30		
LM 35A	LM 35A UU	6	425	LM 35A-AJ	LM 35A-OP	35	0 -0.008	0 -0.012
LM 40A	LM 40A UU	6	654	LM 40A-AJ	LM 40A-OP	40		
LM 50A	LM 50A UU	6	1700	LM 50A-AJ	LM 50A-OP	50		
LM 60A	LM 60A UU	6	2000	LM 60A-AJ	LM 60A-OP	60	0 -0.009	0 -0.015



LM-A



LM-A • • • AJ

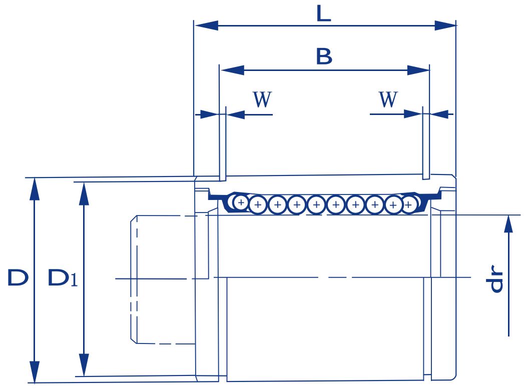


LM-A • • • OP

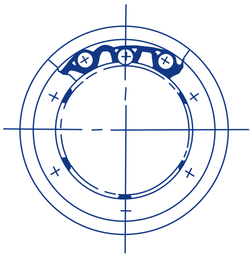
Major Dimensions and Tolerance (mm)											Eccentricity		Radial Clearance (max)	Basic Load Rating		Nominal Part No
D	Tolerance	L	Tolerance	B	Tolerance	W	Dl	h	hl	θ	Precision µm	High µm	µm	Dynamic C N	Static C_o N	
15	0 -0.011	17		11.5		1.1	14.3	—	—	—	8	12	-3	176	216	LM 8SA
15		24		17.5		1.1	14.3	—	—	—	8	12	-3	274	392	LM 8A
19		29		22		1.3	18	—	—	—	8	12	-4	372	549	LM 10A
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
23		32		23		1.3	22	1.5	9	80°	8	12	-4	510	784	LM 13A
28		37		26.5		1.6	27	1.5	11	80°	8	12	-6	774	1,180	LM 16A
32	0 -0.016	42		30.5		1.6	30.5	1.5	11	60°	10	15	-6	882	1,370	LM 20A
40		59		41		1.85	38	2	12	50°	10	15	-6	980	1,570	LM 25A
45		64		44.5		1.85	43	2.5	15	50°	10	15	-8	1,570	2,740	LM 30A
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
60		80		60.5		2.1	57	3	20	50°	12	20	-10	2,160	4,020	LM 40A
80		100		74		2.6	76.5	3	25	50°	12	20	-13	3,820	7,940	LM 50A
90	0 -0.022	110		85		3.15	86.5	3	30	50°	17	25	-13	4,700	10,000	LM 60A

LME-A <Built-in Steel Retainer>

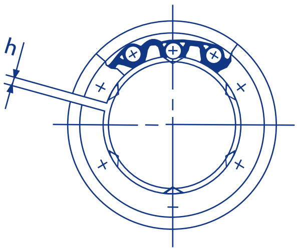
This type is a metric dimension series generally used in Europe .



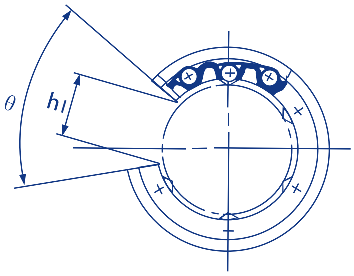
Nominal Part No.						Nominal Shaft Diameter (mm)		
Standard Type	Seal Type	Ball Circuit	Weight g	Adjustable Type	Open Type		Tolerance	
							Precision	High
LME 8A	LME 8A UU	4	22	—	—	8	—	+0.008 0
LME 10A	LME 10A UU	4	36	—	—	10	—	
LME 12A	LME 12A UU	4	45	LME 12A-AJ	LME 12A-OP	12	—	
LME 16A	LME 16A UU	4	60	LME 16A-AJ	LME 16A-OP	16	—	+0.009 -0.001
LME 20A	LME 20A UU	5	102	LME 20A-AJ	LME 20A-OP	20	—	
LME 25A	LME 25A UU	6	235	LME 25A-AJ	LME 25A-OP	25	—	+0.011 -0.001
LME 30A	LME 30A UU	6	360	LME 30A-AJ	LME 30A-OP	30	—	
LME 40A	LME 40A UU	6	770	LME 40A-AJ	LME 40A-OP	40	—	+0.013 -0.002
LME 50A	LME 50A UU	6	1250	LME 50A-AJ	LME 50A-OP	50	—	
LME 60A	LME 60A UU	6	2220	LME 60A-AJ	LME 60A-OP	60	—	



LME-A



LME-A • • • AJ



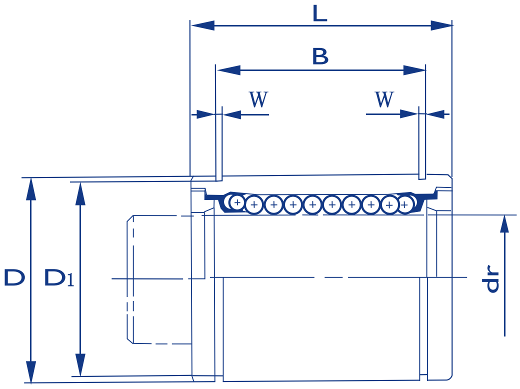
LME-A • • • OP

Major Dimensions and Tolerance (mm)

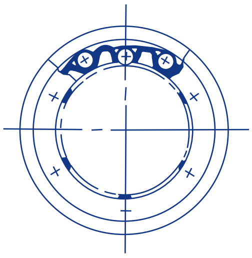
D	Tolerance	L	Tolerance	B	Tolerance	W	D1	h	h1	θ	Eccentricity µm	Radial Clearance (max) µm	Basic Load Rating Dynamic C N	Basic Load Rating Static CoN	Nominal Part No
16	0 -0.008	25	0 -0.2	16.5	0 -0.2	1.1	15.2	—	—	—	12	-3	265	402	LME 8A
19	0 -0.009	29		22		1.3	18	—	—	—	12	-4	372	549	LME 10A
22		32		22.9		1.3	21	1.5	7.5	78°	12	-4	510	784	LME 12A
26		36		24.9		1.3	24.9	1.5	10	78°	12	-4	578	892	LME 16A
32	0 -0.011	45	0 -0.3	31.5	0 -0.3	1.6	30.3	2	10	60°	15	-6	862	1,370	LME 20A
40		58		44.1		1.85	37.5	2	12.5	60°	15	-6	980	1,570	LME 25A
47		68		52.1		1.85	44.5	2	12.5	50°	15	-8	1,570	2,740	LME 30A
62	0 -0.013	80		60.6		2.15	59	3	16.8	50°	17	-8	2,160	4,020	LME 40A
75		100		77.6		2.65	72	3	21	50°	17	-13	3,820	7,940	LME 50A
90	0 -0.015	125	0 -0.4	101.7	0 -0.4	3.15	86.5	3	27.2	54°	20	-13	4,700	9,800	LME 60A

LMB-A <Built-in Steel Retainer>

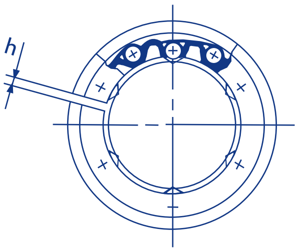
This type is an inch dimension series mainly used in the US.



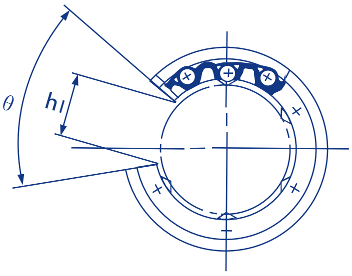
Nominal Shaft Diameter Inch/mm	Nominal Part No.							Nominal Shaft Diameter (Inch/mm)		
								dr		
									Tolerance	
	Standard	Type	Seal Type	Ball Circuit	Weight g	Adjustable Type	Open Type		Precision	High
3/8 9.525	LMB	6A	LMB 6A UU	4	15	—	—	.3750 9.525	0 -.00025 0 -0.006	0 -.00040 0 -0.009
1/2 12.700	LMB	8A	LMB 8A UU	4	42	LMB 8A-AJ	LMB 8A-OP	.5000 12.700		
5/8 15.875	LMB	10A	LMB 10A UU	4	85	LMB 10A-AJ	LMB 10A-OP	.625 15.875		
3/4 19.050	LMB	12A	LMB 12A UU	5	104	LMB 12A-AJ	LMB 12A-OP	.7500 19.050	0 -.00030 0 -0.007	0 -.00040 0 -0.010
1 25.400	LMB	16A	LMB 16A UU	6	220	LMB 16A-AJ	LMB 16A-OP	1.0000 25.400		
1-1/4 31.750	LMB	20A	LMB 20A UU	6	465	LMB 20A-AJ	LMB 20A-OP	1.2500 31.750	0 -.00035 0 -0.008	0 -.00050 0 -0.012
1-1/2 38.100	LMB	24A	LMB 24A UU	6	720	LMB 24A-AJ	LMB 24A-OP	1.5000 38.100		
2 50.800	LMB	32A	LMB 32A UU	6	1,310	LMB 32A-AJ	LMB 32A-OP	2.0000 50.800		



LMB-A



LMB-A • • • AJ



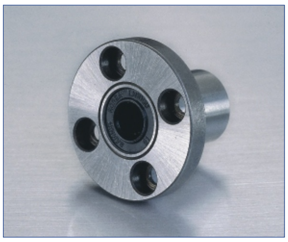
LMB-A • • • OP

Major Dimensions and Tolerance (Inch/mm)

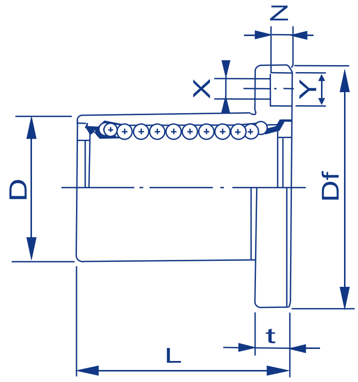
D		L		B		W	D1	h	h1	θ	Eccentricity Inch/μm		Radial Clearance (Max)	Basic Load Rating		Nominal shaft diameter
	Tolerance		Tolerance		Tolerance						Precision	High	Inch/μm	Dynamic C N	Static C₀N	Inch/mm
.6250 15.875	0 -.00050	.8750 22.225	0 -.008	.6358 16.15	0 -.008	.0390 0.992	.5880 14.935	—	—	—	.0003 8	.0005 12	-.0001 -3	225	314	3/8 9.525
.8750 22.225	0 -0.013	1.2500 31.750		.9625 24.46		.0459 1.168	.8209 20.853	.06 1.5	.34 7.9375	80°	.0003 8	.0005 12	-.0001 -4	510	784	1/2 12.700
1.1250 28.575		1.5000 38.100	0 -0.2	1.1039 28.04	0 -0.2	.0559 1.422	1.0590 26.899	.06 1.5	.375 9.525	80°	.0003 8	.0005 12	-.0001 -4	774	1,180	5/8 15.875
1.2500 31.750	0 -.00065	1.6250 41.275		1.1657 29.61		.0599 1.422	1.1760 29.870	.06 1.5	.4375 11.1125	60°	.0004 10	.0006 15	-.0002 -6	862	1,370	3/4 19.050
1.5625 39.688	0 -0.016	2.2500 57.150		1.7547 44.57		.0679 1.727	1.4687 37.306	.06 1.5	.5625 14.2875	50°	.0004 10	.0006 15	-.0002 -6	980	1,570	1 25.400
2.0000 50.800	0 -.00075	2.6250 66.675	0 -.012	2.0047 50.92	0 -.012	.0679 1.727	1.8859 47.904	.10 2.5	.625 15.875	50°	.0005 12	.0008 20	-.0003 -8	1,570	2,740	1-1/4 31.750
2.3750 60.325	0 -0.019	3.0000 76.200	0 -0.3	2.4118 61.26	0 -0.3	0.859 2.184	2.2389 56.870	.12 3	.75 19.05	50°	.0005 12	.0008 20	-.0003 -8	2,180	4,020	1-1/2 38.100
3.0000 76.200	0 -0.0009 0 -0.022	4.0000 101.600		3.1917 81.07		.1029 2.616	2.8379 72.085	.12 3	1.0 25.40	50°	.0007 17	.0010 25	-.0005 -13	3,820	7,940	2 50.800

SI Unit 1N≒0.225 lbs
1kg≒2.205 lbs

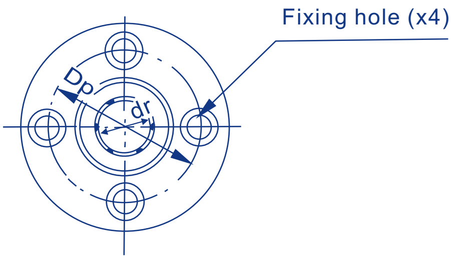
LMF <Built-in Synthetics Resin Retainer>



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



Nominal Part No.					Major Dimensions (mm)					
Standard	Type	Seal Type	Ball Circuit	Weight g	dr	Tolerance	D	Tolerance	L	Tolerance
LMF	6	LMF 6UU	4	24	6	0 -0.009	12	0 -0.013	19	-0.3
LMF	8S	LMF 8SUU	4	32	8		15		17	
LMF	8	LMF 8UU	4	37	8		15		24	
LMF	10	LMF 10UU	4	72	10		19	0 -0.016	29	
LMF	12	LMF 12UU	4	76	12		21		30	
LMF	13	LMF 13UU	4	88	13		23		32	
LMF	16	LMF 16UU	5	120	16		28		37	
LMF	20	LMF 20UU	5	180	20	0 -0.010	32	0 -0.019	42	
LMF	25	LMF 25UU	6	340	25		40		59	
LMF	30	LMF 30UU	6	470	30		45		64	
LMF	35	LMF 35UU	6	650	35	0 -0.012	52	0 -0.022	70	
LMF	40	LMF 40UU	6	1,060	40		60		80	
LMF	50	LMF 50UU	6	2,200	50		80		100	
LMF	60	LMF 60UU	6	3,000	60	0 -0.015	90	0 -0.025	110	



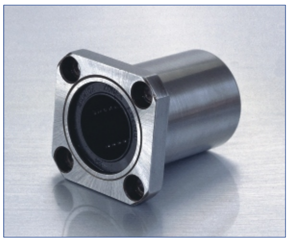
LMF

and Tolerance

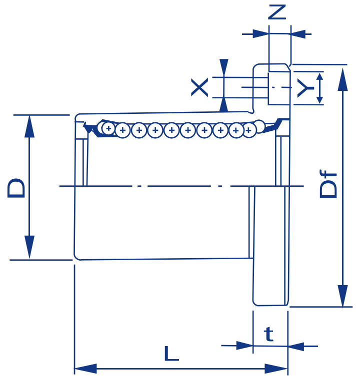
Flange						Eccentricity	Squareness	Basic Load Rating		Nominal Part No
Df	t	Dp	X	Y	Z	µm	µm	Dynamic CN	Static CoN	
28	5	20	3.5	6.5	3.1	12	12	206	265	LMF 6
32	5	24	3.5	6.5	3.1	12	12	176	216	LMF 8S
32	5	24	3.5	6.5	3.1	12	12	274	392	LMF 8
40	6	29	4.5	8	4.1	12	12	372	549	LMF 10
42	6	32	4.5	8	4.1	12	12	510	784	LMF 12
43	6	33	4.5	8	4.1	12	12	510	784	LMF 13
48	6	38	4.5	8	4.1	12	12	774	1,180	LMF 16
54	8	43	5.5	9.5	5.1	15	15	882	1,370	LMF 20
62	8	51	5.5	9.5	5.1	15	15	980	1,570	LMF 25
74	10	60	6.6	11	6.1	15	15	1,570	2,740	LMF 30
82	10	67	6.6	11	6.1	20	20	1,670	3,140	LMF 35
96	13	78	9	14	8.1	20	20	2,160	4,020	LMF 40
116	13	98	9	14	8.1	20	20	3,820	7,940	LMF 50
134	18	112	11	17.5	11.1	25	25	4,700	10,000	LMF 60

SI Unit 1N≒0.102 kgf

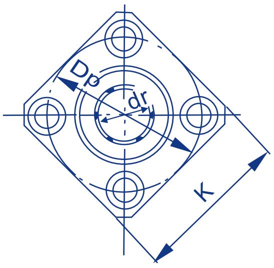
LMK < Built-in Synthetics Resin Retainer>



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



Nominal Part No.					Major Dimensions (mm)					
Standard	Type	Seal Type	Ball Circuit	Weight g	dr	Tolerance	D	Tolerance	L	Tolerance
LMK	6	LMK 6UU	4	24	6	0 -0.009	12	0 -0.013	19	-0.3
LMK	8S	LMK 8SUU	4	32	8		15		17	
LMK	8	LMK 8UU	4	37	8		15		24	
LMK	10	LMK 10UU	4	72	10		19	0 -0.016	29	
LMK	12	LMK 12UU	4	76	12		21		30	
LMK	13	LMK 13UU	4	88	13		23		32	
LMK	16	LMK 16UU	5	120	16		28		37	
LMK	20	LMK 20UU	5	180	20	0 -0.010	32	0 -0.019	42	
LMK	25	LMK 25UU	6	340	25		40		59	
LMK	30	LMK 30UU	6	470	30		45		64	
LMK	35	LMK 35UU	6	650	35	0 -0.012	52	0 -0.022	70	
LMK	40	LMK 40UU	6	1,060	40		60		80	
LMK	50	LMK 50UU	6	2,200	50		80		100	
LMK	60	LMK 60UU	6	3,000	60	0 -0.015	90	0 -0.025	110	



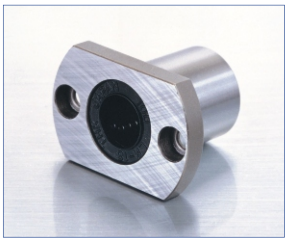
LMK

and Tolerance

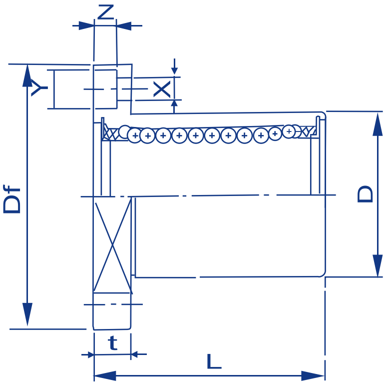
Flange							Eccentricity	Squareness	Basic Load Rating		Nominal Part No
Df	K	t	Dp	X	Y	Z	µm	µm	Dynamic CN	Static CoN	
28	22	5	20	3.5	6.5	3.1	12	12	206	265	LMK 6
32	25	5	24	3.5	6.5	3.1	12	12	176	216	LMK 8S
32	25	5	24	3.5	6.5	3.1	12	12	274	392	LMK 8
40	30	6	29	4.5	8	4.1	12	12	372	549	LMK 10
42	32	6	32	4.5	8	4.1	12	12	510	784	LMK 12
43	34	6	33	4.5	8	4.1	12	12	510	784	LMK 13
48	37	6	38	4.5	8	4.1	12	12	774	1,180	LMK 16
54	42	8	43	5.5	9.5	5.1	15	15	882	1,370	LMK 20
62	50	8	51	5.5	9.5	5.1	15	15	980	1,570	LMK 25
74	58	10	60	6.6	11	6.1	15	15	1,570	2,740	LMK 30
82	64	10	67	6.6	11	6.1	20	20	1,670	3,140	LMK 35
96	75	13	78	9	14	8.1	20	20	2,160	4,020	LMK 40
116	92	13	98	9	14	8.1	20	20	3,820	7,940	LMK 50
134	106	18	112	11	17.5	11.1	25	25	4,700	10,000	LMK 60

SI Unit 1N≒0.102 kgf

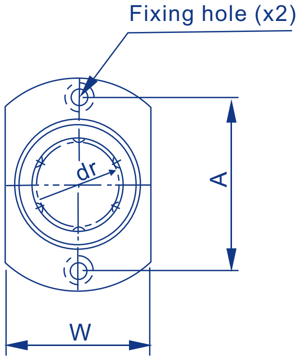
LMH < Built-in Synthetics Resin Retainer>



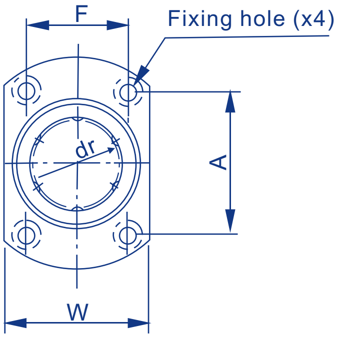
This type is a metric dimension series widely used in Japan and other countries



Nominal Part No.					Major Dimensions (mm)					
Standard	Type	Seal Type	Ball Circuit	Weight g	dr	Tolerance	D	Tolerance	L	Tolerance
LMH	6	LMH 6UU	4	21	6	0 -0.009	12	0 -0.013	19	-0.3
LMH	8	LMH 8UU	4	33	8		15		24	
LMH	10	LMH 10UU	4	64	10		19	0 -0.016	29	
LMH	12	LMH 12UU	4	68	12		21		30	
LMH	13	LMH 13UU	4	81	13		23		32	
LMH	16	LMH 16UU	5	112	16		28		37	
LMH	20	LMH 20UU	5	167	20	0 -0.010	32	0 -0.019	42	
LMH	25	LMH 25UU	6	325	25		40		59	
LMH	30	LMH 30UU	6	388	30		45		64	



LMH 13 or less



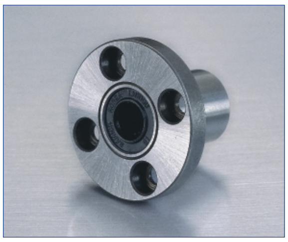
LMH 16 or more

and Tolerance

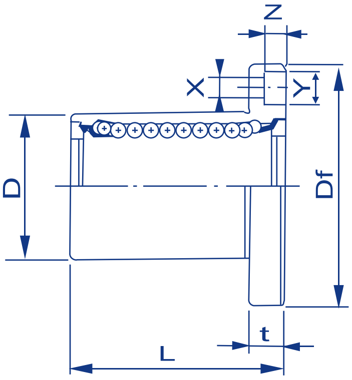
Flange								Eccentricity µm	Squareness µm	Basic Load Rating		Nominal Part No
Df	W	t	A	F	X	Y	Z			Dynamic CN	static CoN	
28	18	5	20	—	3.5	6.5	3.1	12	12	206	265	LMH 6
32	21	5	24	—	3.5	6.5	3.1	12	12	274	392	LMH 8
40	25	6	29	—	4.5	8	4.1	12	12	372	549	LMH 10
42	27	6	32	—	4.5	8	4.1	12	12	510	784	LMH 12
43	29	6	33	—	4.5	8	4.1	12	12	510	784	LMH 13
48	34	6	31	22	4.5	8	4.1	12	12	774	1,180	LMH 16
54	38	8	36	24	5.5	9.5	5.1	15	15	882	1,370	LMH 20
62	46	8	40	32	5.5	9.5	5.1	15	15	980	1,570	LMH 25
74	51	10	49	35	6.6	11	6.1	15	15	1,570	2,740	LMH 30

SI Unit 1N=0.102 kgf

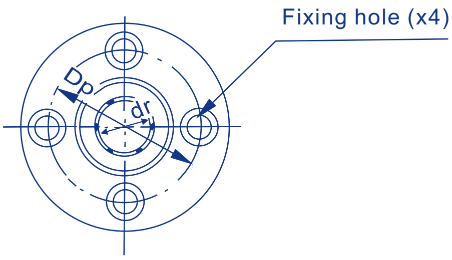
LME F <Built-in Synthetics Resin Retainer>



This type is a metric dimension series generally used in Europe



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



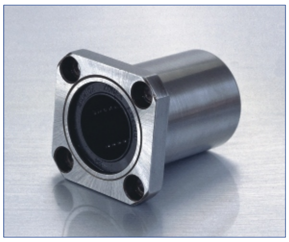
LME F

and Tolerance

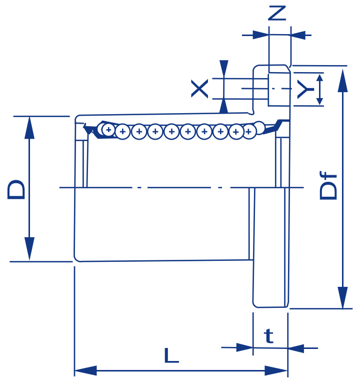
Flange						Eccentricity	Squareness	Basic Load Rating		Nominal Part No
Df	t	Dp	X	Y	Z	µm	µm	Dynamic CN	Static CoN	
										LME F 5
32	5	24	3.5	6.5	3.1	12	12	265	402	LME F 8
42	6	32	4.5	8	4.1	12	12	510	784	LME F 12
46	6	36	4.5	8	4.1	12	12	578	892	LME F 16
54	8	43	5.5	9.5	5.1	15	15	862	1,370	LME F 20
62	8	51	5.5	9.5	5.1	15	15	980	1,570	LME F 25
76	10	62	6.6	11	6.1	15	15	1,570	2,740	LME F 30
98	13	80	9	14	8.1	17	17	2,160	4,020	LME F 40
112	13	94	9	14	8.1	17	17	3,820	7,940	LME F 50
134	18	112	11	17.5	11.1	20	20	4,700	9,800	LME F 60

SI Unit 1N=0.102 kgf

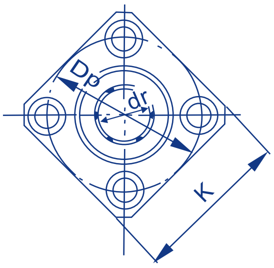
LME K <Built-in Synthetics Resin Retainer>



This type is a metric dimension series generally used in Europe



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



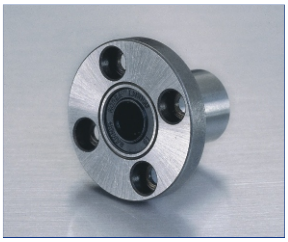
LME K

and Tolerance

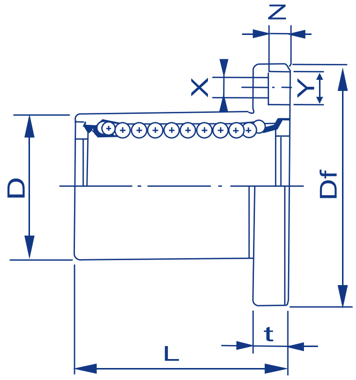
Flange							Eccentricity μm	Squareness μm	Basic Load Rating		Nominal Part No
Df	K	t	Dp	X	Y	Z			Dynamic CN	Static CoN	
											LME K 5
32	25	5	24	3.5	6.5	3.1	12	12	265	402	LME K 8
42	32	6	32	4.5	8	4.1	12	12	510	784	LME K 12
46	35	6	36	4.5	8	4.1	12	12	578	892	LME K 16
54	42	8	43	5.5	9.5	5.1	15	15	862	1,370	LME K 20
62	50	8	51	5.5	9.5	5.1	15	15	980	1,570	LME K 25
76	60	10	62	6.6	11	6.1	15	15	1,570	2,740	LME K 30
98	75	13	80	9	14	8.1	17	17	2,160	4,020	LME K 40
112	88	13	94	9	14	8.1	17	17	3,820	7,940	LME K 50
134	106	18	112	11	17.5	11.1	20	20	4,700	9,800	LME K 60

SI Unit 1N=0.102 kgf

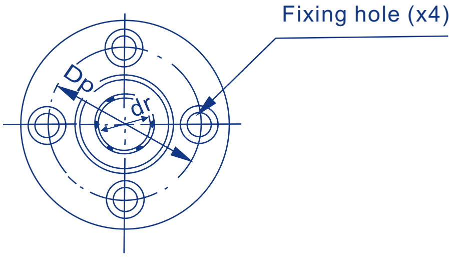
LMB F <Built-in Synthetics Resin Retainer>



This type is an inch dimension series mainly used in the US.



Nominal Shaft Diameter Inch/mm	Nominal Part No.							
	Standard Type	Seal Type	Ball Circuit	Weight g	dr	Tolerance	D	Tolerance
1/4 6.350	LMB F 4	LMB F 4UU	4	32	.2500 6.350	0 -.00040 0 -0.009	.5000 12.700	0 -.00050 0 -13
3/8 9.525	LMB F 6	LMB F 6UU	4	47	.3750 9.525		.6250 15.875	0 -.00065 0 -0.016
1/2 12.700	LMB F 8	LMB F 8UU	4	88	.5000 12.700		.8750 22.225	
5/8 15.875	LMB F 10	LMB F 10UU	4	140	.6250 15.875		1.1250 28.575	
3/4 19.050	LMB F 12	LMB F 12UU	4	190	.7500 19.050	0 -.00040 0 -0.01	1.2500 31.750	0 -.00075 0 -0.019
1 25.400	LMB F 16	LMB F 16UU	5	325	1.0000 25.400		1.5625 39.688	
1-1/4 31.750	LMB F 20	LMB F 20UU	5	665	1.2500 31.750	0 -.00050 0 -0.012	2.0000 50.800	0 -.0009 0 -0.022
1-1/2 38.100	LMB F 24	LMB F 24UU	6	1,100	1.5000 38.100		2.3750 60.325	
2 50.800	LMB F 32	LMB F 32UU	6	1,760	2.0000 50.800		3.0000 76.200	0 -.00100 0 -0.025
2-1/2 63.500	LMB F 40	LMB F 40UU	6	3,570	2.5000 63.500	0 -.00060 0 -0.015	3.7500 95.250	
3 76.200	LMB F 48	LMB F 48UU	6	5,600	3.0000 76.200		4.5000 114.300	
4 101.600	LMB F 64	LMB F 64UU	6	12,000	4.0000 101.600	0 -.00080 0 -0.020	6.0000 152.400	0 -.00115 0 -0.029

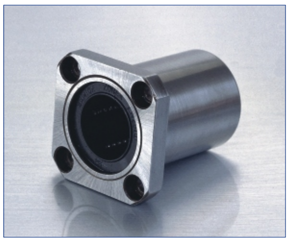


LMB F

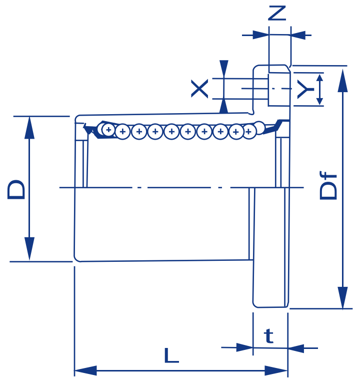
Major Dimensions and Tolerance (Inch/mm)								Eccentricity	Squareness	Basic Load Rating		Nominal shaft diameter
L		Flange								Dynamic	Static	
	Tolerance	Df	t	Dp	X	Y	Z	Inch/µm	Inch/µm	C N	C₀ N	Inch/mm
.7500 19.050		1.2500 31.750	0.219 5.556	.8750 22.225	.1560 3.969	.2500 6.350	.1410 3.572	.0005 12	.0005 12	206	265	1/4 6.350
.8750 22.225		1.5000 38.100	.2500 6.350	1.0620 26.988	.1875 4.763	.2970 7.541	.1720 4.366	.0005 12	.0005 12	225	314	3/8 9.525
1.2500 31.750		1.7500 44.450	.2500 6.350	1.312 33.338	.1875 4.763	.2970 7.541	.1720 4.366	.0005 12	.0005 12	510	784	1/2 12.700
1.5000 38.100		2.0000 50.800	.2500 6.350	1.5620 39.688	.1875 4.763	.2970 7.541	.1720 4.366	.0005 12	.0005 12	774	1,180	5/8 15.875
1.6250 41.275	-0.012	2.1875 55.563	.3125 7.938	1.7180 43.660	.2187 5.556	.3440 8.731	.2030 5.159	.0006 15	.0006 15	862	1,370	3/4 19.050
2.2500 57.150	-0.3	2.5000 63.500	.3125 7.938	2.0310 51.594	.2187 5.556	.3440 8.731	.2030 5.159	.0006 15	.0006 15	980	1,570	1 25.400
2.6250 66.675		3.1250 79.375	.3750 9.525	2.5625 65.088	.2812 7.144	.4060 10.319	.2656 6.747	.0008 20	.0008 20	1,570	2,740	1-1/4 31.750
3.0000 76.200		3.7500 95.250	.5000 12.700	3.0625 77.788	.3440 8.731	.5000 12.700	.3280 8.334	.0010 25	.0010 25	2,180	4,020	1-1/2 38.100
4.0000 101.600		4.3750 111.125	.5000 12.700	3.6875 93.662	.3440 8.731	.5000 12.700	.3280 8.334	.0010 25	.0010 25	3,820	7,940	2 50.800
5.0000 127.000		5.3750 136.525	.7500 19.050	4.5625 115.887	.4062 10.319	.6250 15.875	.3750 9.525	.0010 25	.0010 25	4,700	10,000	2-1/2 63.500
6.0000 152.400		6.1250 155.575	.7500 19.050	5.3125 134.937	.4062 10.319	.6250 15.875	.3750 9.525	.0010 25	.0010 25	7,350	16,000	3 76.200
8.0000 203.200		8.0000 203.200	.8750 22.225	7.0000 177.800	.5000 12.700	.7125 18.097	.5000 12.700	.0012 30	.0012 30	14,100	34,800	4 101.600

SI Unit 1N≒0.225 lbs
1kg≒2.205 lbs

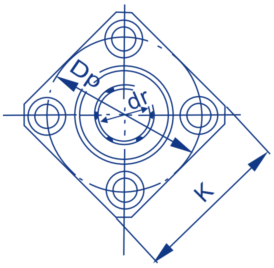
LMB K <Built-in Synthetics Resin Retainer>



This type is an inch dimension series mainly used in the US.



Nominal Shaft Diameter Inch/mm	Nominal Part No.							
	Standard Type	Seal Type	Ball Circuit	Weight g	dr	Tolerance	D	Tolerance
1/4 6.350	LMB K 4	LMB K 4UU	4	32	.2500 6.350	0 -.0004 0 -0.009	.5000 12.700	0 -.00050 0 -13
3/8 9.525	LMB K 6	LMB K 6UU	4	47	.3750 9.525		.6250 15.875	0 -.00065 0 -0.016
1/2 12.700	LMB K 8	LMB K 8UU	4	88	.5000 12.700		.8750 22.225	
5/8 15.875	LMB K 10	LMB K 10UU	4	140	.6250 15.875		1.1250 28.575	
3/4 19.050	LMB K 12	LMB K 12UU	4	190	.7500 19.050	0 -.0004	1.2500 31.750	0 -.00075
1 25.400	LMB K 16	LMB K 16UU	5	325	1.0000 25.400	0 -0.01	1.5625 39.688	0 -0.019
1-1/4 31.750	LMB K 20	LMB K 20UU	5	665	1.2500 31.750	0 -.0005 0 -0.012	2.0000 50.800	0 -.0009
1-1/2 38.100	LMB K 24	LMB K 24UU	6	1,100	1.5000 38.100		2.3750 60.325	0 -0.022
2 50.800	LMB K 32	LMB K 32UU	6	1,760	2.0000 50.800		3.0000 76.200	0 -.00100 0 -0.025
2-1/2 63.500	LMB K 40	LMB K 40UU	6	3,570	2.5000 63.500	0 -.0006	3.7500 95.250	
3 76.200	LMB K 48	LMB K 48UU	6	5,600	3.0000 76.200	0 -0.015	4.5000 114.300	
4 101.600	LMB K 64	LMB K 64UU	6	12,000	4.0000 101.600	0 -.00080 0 -0.02	6.0000 152.400	0 -.00115 0 -0.029



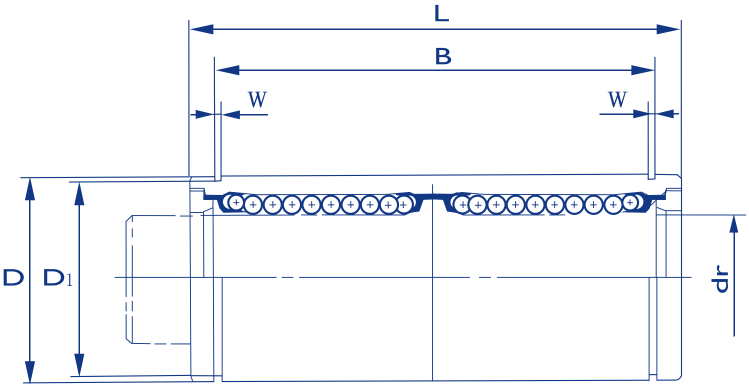
LMB K

Major Dimensions and Tolerance (Inch/mm)									Eccentricity Inch/µm	Squareness Inch/µm	Basic Load Rating		Nominal shaft diameter Inch/mm
L		Flange									Dynamic C N	Static C_o N	
	Tolerance	Df	K	t	Dp	X	Y	Z					
.7500 19.050		1.2500 31.750	1.0000 25.400	0.219 5.556	.8750 22.225	.1560 3.969	.2500 6.350	.1410 3.572	.0005 12	.0005 12	206	265	1/4 6.350
.8750 22.225		1.5000 38.100	1.2500 31.750	.2500 6.350	1.0620 26.988	.1875 4.763	.2970 7.541	.1720 4.366	.0005 12	.0005 12	225	314	3/8 9.525
1.2500 31.750		1.7500 44.450	1.3750 34.925	.2500 6.350	1.312 33.338	.1875 4.763	.2970 7.541	.1720 4.366	.0005 12	.0005 12	510	784	1/2 12.700
1.5000 38.100		2.0000 50.800	1.5000 38.100	.2500 6.350	1.5620 39.688	.1875 4.763	.2970 7.541	.1720 4.366	.0005 12	.0005 12	774	1,180	5/8 15.875
1.6250 41.275	-0.012	2.1875 55.563	1.6875 42.863	.3125 7.938	1.7180 43.660	.2187 5.556	.3440 8.731	.2030 5.159	.0006 15	.0006 15	862	1,370	3/4 19.050
2.2500 57.150	-0.3	2.5000 63.500	2.0000 50.800	.3125 7.938	2.0310 51.594	.2187 5.556	.3440 8.731	.2030 5.159	.0006 15	.0006 15	980	1,570	1 25.400
2.6250 66.675		3.1250 79.375	2.5000 63.500	.3750 9.525	2.5625 65.088	.2812 7.144	.4060 10.319	.2656 6.747	.0008 20	.0008 20	1,570	2,740	1-1/4 31.750
3.0000 76.200		3.7500 95.250	3.0000 76.200	.5000 12.700	3.0625 77.788	.3440 8.731	.5000 12.700	.3280 8.334	.0010 25	.0010 25	2,180	4,020	1-1/2 38.100
4.0000 101.600		4.3750 111.125	3.5000 88.900	.5000 12.700	3.6875 93.662	.3440 8.731	.5000 12.700	.3280 8.334	.0010 25	.0010 25	3,820	7,940	2 50.800
5.0000 127.000		5.3750 136.525	4.3750 111.125	.7500 19.050	4.5625 115.887	.4062 10.319	.6250 15.875	.3750 9.525	.0010 25	.0010 25	4,700	10,000	2-1/2 63.500
6.0000 152.400		6.1250 155.575	5.0000 127.000	.7500 19.050	5.3125 134.937	.4062 10.319	.6250 15.875	.3750 9.525	.0010 25	.0010 25	7,350	16,000	3 76.200
8.0000 203.200		8.0000 203.200	6.7500 171.450	.8750 22.225	7.0000 177.800	.5000 12.700	.7125 18.097	.5000 12.700	.0012 30	.0012 30	14,100	34,800	4 101.600

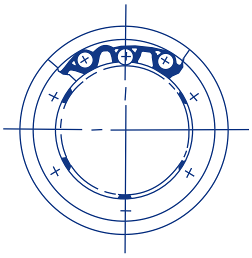
SI Unit 1N≒0.225 lbs
1kg≒2.205 lbs

LM-L < Built-in Synthetics Resin Retainer>

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



Nominal Part No.				Nominal Shaft Diameter (mm)	
Standard Type	Seal Type	Ball Circuit	Weight g		Tolerance
LM 6L	LM 6L UU	4	16	6	0 -0.010
LM 8L	LM 8L UU	4	31	8	
LM 10L	LM 10L UU	4	62	10	
LM 12L	LM 12L UU	4	80	12	
LM 13L	LM 13L UU	4	90	13	
LM 16L	LM 16L UU	5	145	16	
LM 20L	LM 20L UU	5	180	20	0 -0.012
LM 25L	LM 25L UU	6	440	25	
LM 30L	LM 30L UU	6	580	30	
LM 35L	LM 35L UU	6	795	35	0 -0.015
LM 40L	LM 40L UU	6	1,170	40	
LM 50L	LM 50L UU	6	3,100	50	
LM 60L	LM 60L UU	6	3,500	60	0 -0.020



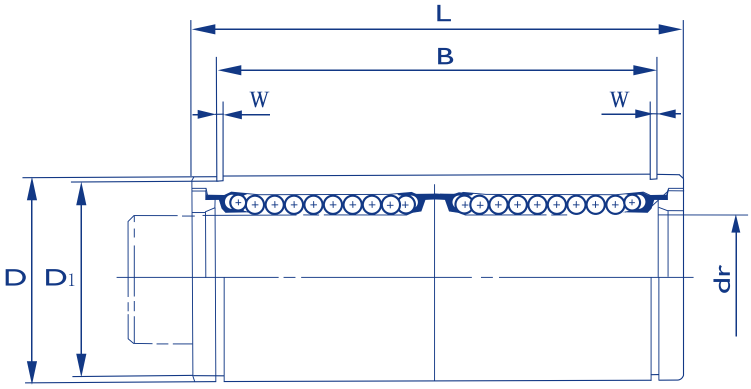
LM-L

Major Dimensions and Tolerance (mm)								Eccentricity (max)	Basic Load Rating		Nominal Part No
D	Tolerance	L	Tolerance	B	Tolerance	W	DI	µm	Dynamic C N	Static C_o N	
12	0 -0.013	35	0 -0.3	27	0 -0.3	1.1	11.5	15	323	530	LM 6L
15		45		35		1.1	14.3	15	431	784	LM 8L
19		55		44		1.3	18	15	588	1,100	LM 10L
21	0 -0.016	57		46		1.3	20	15	657	1,200	LM 12L
23		61		46		1.3	22	15	813	1,570	LM 13L
28		70		53		1.6	27	15	1,230	2,350	LM 16L
32	0 -0.019	80		61		1.6	30.5	20	1,400	2,750	LM 20L
40		112	0 -0.4	82	0 -0.4	1.85	38	20	1,560	3,140	LM 25L
45		123		89		1.85	43	20	2,490	5,490	LM 30L
52	0 -0.022	135		99		2.1	49	25	2,650	6,270	LM 35L
60		154		121		2.1	57	25	3,430	8,040	LM 40L
80		192		148		2.6	76.5	25	6,080	15,900	LM 50L
90	0 -0.025	211		170		3.15	86.5	25	7,650	20,000	LM 60L

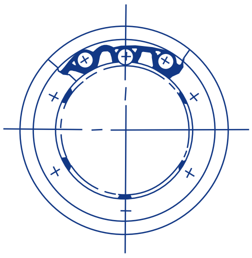
SI Unit 1N≒0.102 kgf

LME-L <Built-in Synthetics Resin Retainer>

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



Nominal Part No .				Nominal Shaft Diameter (mm)	
Standard Type	Seal Type	Ball Circuit	Weight g		Tolerance
LME 8L	LME 8L UU	4	40	8	+0.009 -0.001
LME 12L	LME 12L UU	4	80	12	
LME 16L	LME 16L UU	5	115	16	+0.011 -0.001
LME 20L	LME 20L UU	5	180	20	
LME 25L	LME 25L UU	6	430	25	+0.013 -0.002
LME 30L	LME 30L UU	6	615	30	
LME 40L	LME 40L UU	6	1,400	40	+0.016 -0.004
LME 50L	LME 50L UU	6	2,320	50	
LME 60L	LME 60L UU	6	3,920	60	



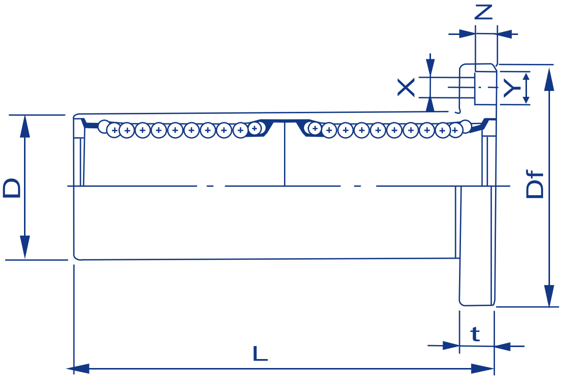
LME-L

Major Dimensions and Tolerance (mm)								Eccentricity (max) μm	Basic Load Rating		Nominal Part No
D	Tolerance	L	Tolerance	B	Tolerance	W	DI		Dynamic C N	Static C_o N	
16	0 -0.009	46	0 -0.3	33	0 -0.3	1.1	15.2	15	421	804	LME 8L
22	0 -0.011	61		45.8		1.3	21	15	813	1,570	LME 12L
26		68		49.8		1.3	24.9	15	921	1,780	LME 16L
32	0 -0.013	80		61		1.6	30.5	17	1,370	2,740	LME 20L
40		112	0 -0.4	82	0 -0.4	1.85	37.5	17	1,570	3,140	LME 25L
47		123		104.2		1.85	44.5	17	2,500	5,490	LME 30L
62	0 -0.015	151		121.2		2.15	59	20	3,430	8,040	LME 40L
75		192		155.2		2.65	72	20	6,080	15,900	LME 50L
90	0 -0.020	209		170		3.15	86.5	25	7,550	20,000	LME 60L

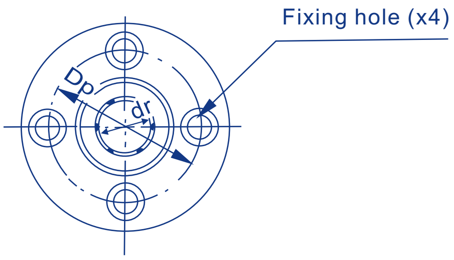
SI Unit 1N≒0.102 kgf

LMF-L <Built-in Synthetics Resin Retainer>

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



Nominal Part No.					Major Dimensions (mm)					
Standard	Type	Seal Type	Ball Circuit	Weight g	dr	Tolerance	D	Tolerance	L	Tolerance
LMF	6L	LMF 6L UU	4	31	6	0 -0.010	12	0 -0.013	35	-0.3
LMF	8L	LMF 8L UU	4	51	8		15		45	
LMF	10L	LMF 10L UU	4	98	10		19	0 -0.016	55	
LMF	12L	LMF 12L UU	4	110	12		21		57	
LMF	13L	LMF 13L UU	4	130	13		23		61	
LMF	16L	LMF 16L UU	5	190	16		28		70	
LMF	20L	LMF 20L UU	5	260	20	0 -0.012	32	0 -0.019	80	
LMF	25L	LMF 25L UU	6	540	25		40		112	
LMF	30L	LMF 30L UU	6	680	30		45		123	
LMF	35L	LMF 35L UU	6	1,020	35	0 -0.015	52	0 -0.022	135	
LMF	40L	LMF 40L UU	6	1,570	40		60		151	
LMF	50L	LMF 50L UU	6	3,600	50		80		192	
LMF	60L	LMF 60L UU	6	4,500	60	0 -0.020	90	0 -0.025	209	



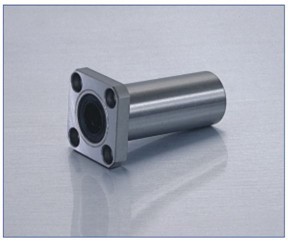
LMF-L

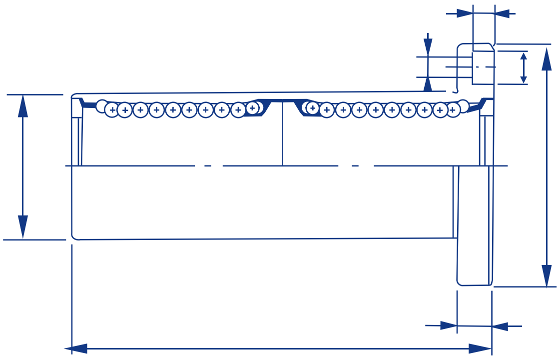
and Tolerance

Flange						Eccentricity	Squareness	Basic Load Rating		Nominal Part No
Df	t	Dp	X	Y	Z	µm	µm	Dynamic CN	Static CoN	
28	5	20	3.5	6.5	3.1	15	15	323	530	LMF 6L
32	5	24	3.5	6.5	3.1	15	15	431	784	LMF 8L
40	6	29	4.5	8	4.1	15	15	588	1,100	LMF 10L
42	6	32	4.5	8	4.1	15	15	813	1,570	LMF 12L
43	6	33	4.5	8	4.1	15	15	813	1,570	LMF 13L
48	6	38	4.5	8	4.1	15	15	1,230	2,350	LMF 16L
54	8	43	5.5	9.5	5.1	20	20	1,400	2,740	LMF 20L
62	8	51	5.5	9.5	5.1	20	20	1,560	3,140	LMF 25L
74	10	60	6.6	11	6.1	20	20	2,490	5,490	LMF 30L
82	10	67	6.6	11	6.1	25	25	2,650	6,270	LMF 35L
96	13	78	9	14	8.1	25	25	3,430	8,040	LMF 40L
116	13	98	9	14	8.1	25	25	6,080	15,900	LMF 50L
134	18	112	11	17.5	11.1	30	30	7,550	20,000	LMF 60L

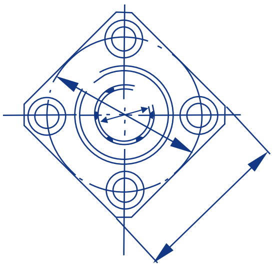
SI Unit 1N≒0.102 kgf

LMK-L <Built-in Synthetics Resin Retainer>





Nominal Part No.					Major Dimensions (mm)					
Standard	Type	Seal Type	Ball Circuit	Weight g	dr	Tolerance	D	Tolerance	L	Tolerance
LMK	6L	LMK 6L UU	4	25	6		12		35	
LMK	8L	LMK 8L UU	4	43	8		15	0 -0.013	45	
LMK	10L	LMK 10L UU	4	78	10		19		55	
LMK	12L	LMK 12L UU	4	90	12	0 -0.010	21		57	
LMK	13L	LMK 13L UU	4	108	13		23	0 -0.016	61	
LMK	16L	LMK 16L UU	5	165	16		28		70	
LMK	20L	LMK 20L UU	5	225	20		32		80	-0.3
LMK	25L	LMK 25L UU	6	500	25	0 -0.012	40	0 -0.019	112	
LMK	30L	LMK 30L UU	6	590	30		45		123	
LMK	35L	LMK 35L UU	6	930	35		52		135	
LMK	40L	LMK 40L UU	6	1,380	40	0 -0.015	60	0 -0.022	151	
LMK	50L	LMK 50L UU	6	3,400	50		80		192	
LMK	60L	LMK 60L UU	6	4,060	60	0 -0.020	90	0 -0.025	209	



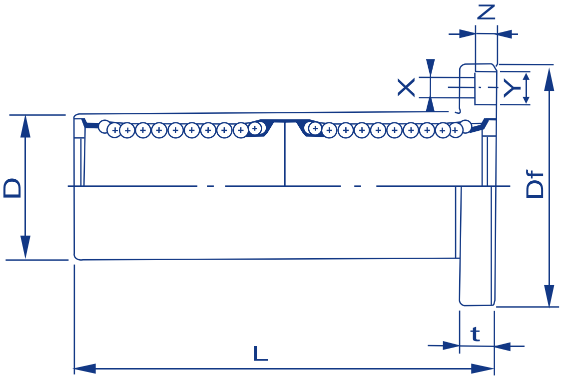
and Tolerance

Flange							Eccentricity	Squareness	Basic Load Rating		Nominal Part No
Df	K	t	Dp	X	Y	Z	µm	µm	Dynamic CN	Static CoN	
28	22	5	20	3.5	6.5	3.1	15	15	323	530	LMK 6L
32	25	5	24	3.5	6.5	3.1	15	15	431	784	LMK 8L
40	30	6	29	4.5	8	4.1	15	15	588	1,100	LMK 10L
42	32	6	32	4.5	8	4.1	15	15	813	1,570	LMK 12L
43	34	6	33	4.5	8	4.1	15	15	813	1,570	LMK 13L
48	37	6	38	4.5	8	4.1	15	15	1,230	2,350	LMK 16L
54	42	8	43	5.5	9.5	5.1	20	20	1,400	2,740	LMK 20L
62	50	8	51	5.5	9.5	5.1	20	20	1,560	3,140	LMK 25L
74	58	10	60	6.6	11	6.1	20	20	2,490	5,490	LMK 30L
82	64	10	67	6.6	11	6.1	25	25	2,650	6,270	LMK 35L
96	75	13	78	9	14	8.1	25	25	3,430	8,040	LMK 40L
116	92	13	98	9	14	8.1	25	25	6,080	15,900	LMK 50L
134	106	18	112	11	17.5	11.1	30	30	7,550	20,000	LMK 60L

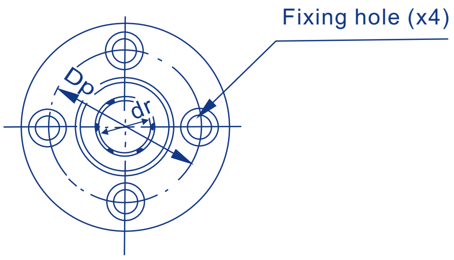
SI Unit 1N≒0.102 kgf

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

This type is a metric dimension series generally used in Europe



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



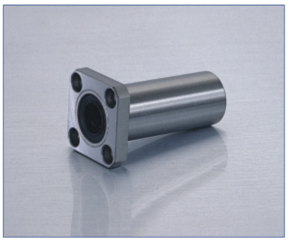
LME F-L

and Tolerance

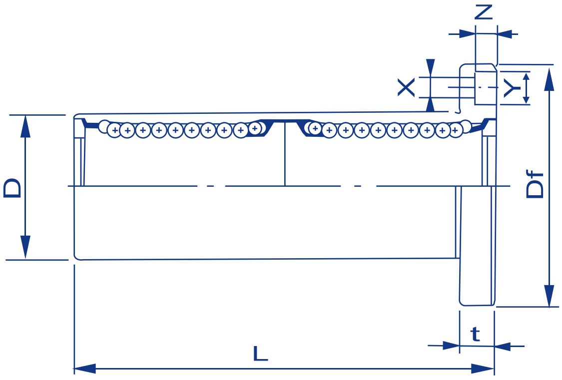
Flange						Eccentricity	Squareness	Basic Load Rating		Nominal Part No
Df	t	Dp	X	Y	Z	µm	µm	Dynamic CN	Static CoN	
32	5	24	3.5	6.5	3.1	15	15	421	804	LME F 8L
42	6	32	4.5	8	4.1	15	15	813	1,570	LME F 12L
46	6	36	4.5	8	4.1	15	15	921	1,780	LME F 16L
54	8	43	5.5	9.5	5.1	17	17	1,370	2,740	LME F 20L
62	8	51	5.5	9.5	5.1	17	17	1,570	3,140	LME F 25L
76	10	62	6.6	11	6.1	17	17	2,500	5,490	LME F 30L
98	13	80	9	14	8.1	20	20	3,430	8,040	LME F 40L
112	13	94	9	14	8.1	20	20	6,080	15,900	LME F 50L
134	18	112	11	17.5	11.1	25	25	7,550	20,000	LME F 60L

SI Unit 1N=0.102 kgf

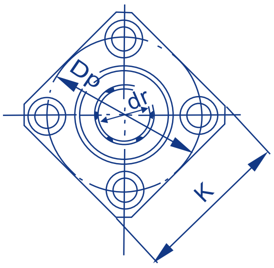
LME K-L <Built-in Synthetics Resin Retainer>



This type is a metric dimension series generally used in Europe



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



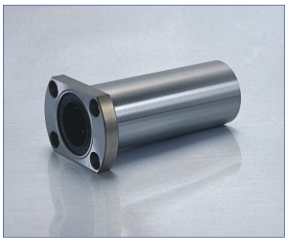
LME K-L

and Tolerance

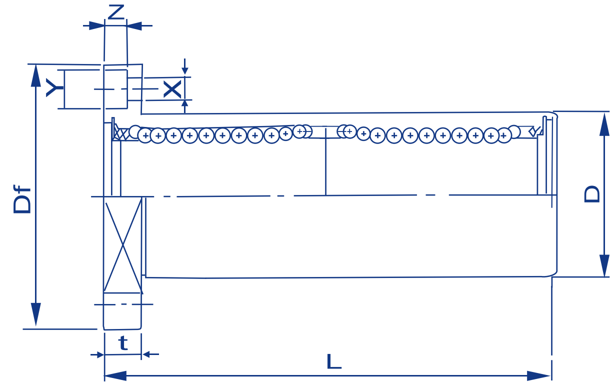
Flange							Eccentricity	Squareness	Basic Load Rating		Nominal Part No
Df	K	t	Dp	X	Y	Z	µm	µm	Dynamic CN	Static CoN	
32	25	5	24	3.5	6.5	3.1	15	15	421	804	LME K 8L
42	32	6	32	4.5	8	4.1	15	15	813	1,570	LME K 12L
46	35	6	36	4.5	8	4.1	15	15	921	1,780	LME K 16L
54	42	8	43	5.5	9.5	5.1	17	17	1,370	2,740	LME K 20L
62	50	8	51	5.5	9.5	5.1	17	17	1,570	3,140	LME K 25L
76	60	10	62	6.6	11	6.1	17	17	2,500	5,490	LME K 30L
98	75	13	80	9	14	8.1	20	20	3,430	8,040	LME K 40L
112	88	13	94	9	14	8.1	20	20	6,080	15,900	LME K 50L
134	106	18	112	11	17.5	11.1	25	25	7,550	20,000	LME K 60L

SI Unit 1N=0.102 kgf

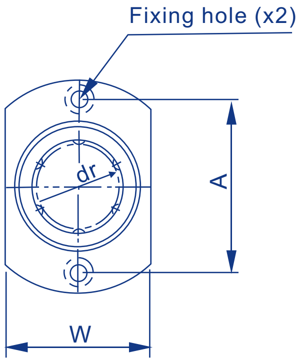
LMH-L < Built-in Synthetics Resin Retainer>



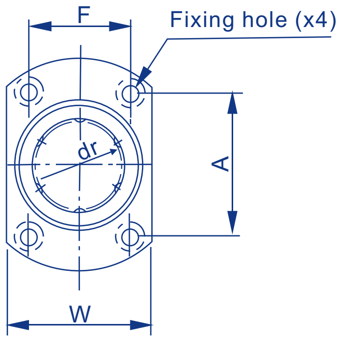
This type is a metric dimension series widely used in Japan and other countries



Nominal Part No.					Major Dimensions (mm)					
Standard	Type	Seal Type	Ball Circuit	Weight g	dr	Tolerance	D	Tolerance	L	Tolerance
LMH	6L	LMH 6L UU	4	28	6	0 -0.010	12	0 -0.013	35	-0.3
LMH	8L	LMH 8L UU	4	47	8		15		45	
LMH	10L	LMH 10L UU	4	90	10		19	0 -0.016	55	
LMH	12L	LMH 12L UU	4	102	12		21		57	
LMH	13L	LMH 13L UU	4	123	13		23		61	
LMH	16L	LMH 16L UU	5	182	16		28		70	
LMH	20L	LMH 20L UU	5	247	20	0 -0.012	32	0 -0.019	80	
LMH	25L	LMH 25L UU	6	525	25		40		112	
LMH	30L	LMH 30L UU	6	645	30		45		123	



LMH-L 13 or less



LMH-L 16 or more

and Tolerance

Flange								Eccentricity µm	Squareness µm	Basic Load Rating		Nominal Part No
Df	W	t	A	F	X	Y	Z			Dynamic CN	static CoN	
28	18	5	20	—	3.5	6.5	3.1	15	15	323	529	LMH 6L
32	21	5	24	—	3.5	6.5	3.1	15	15	431	784	LMH 8L
40	25	6	29	—	4.5	8	4.1	15	15	588	1,100	LMH 10L
42	27	6	32	—	4.5	8	4.1	15	15	813	1,570	LMH 12L
43	29	6	33	—	4.5	8	4.1	15	15	813	1,570	LMH 13L
48	34	6	31	22	4.5	8	4.1	15	15	1,230	2,350	LMH 16L
54	38	8	36	24	5.5	9.5	5.1	20	20	1,400	2,740	LMH 20L
62	46	8	40	32	5.5	9.5	5.1	20	20	1,560	3,140	LMH 25L
74	51	10	49	35	6.6	11	6.1	20	20	2,490	5,490	LMH 30L

SI Unit 1N≒0.102 kgf

KBS®

AGENT