SAMICK LINEAR BUSHING SYSTEM

SAMICK LINEAR BUSHING

LINEAR BUSHING

SAMICK Linear Bushing, LM type is the linear motion system with unlimited stroke by applying with LM shaft. Because of the point contact between Balls and LM shaft, minimum friction can be acquired and that can give you the high precision motion.

Components and Features

As shown in Fig 3 SAMICK Linear Bushing serve the alignment of the balls toward the LM shaft by the single retainer and cylinderical shafe of raceway. Outer sleeve is made of high-carbon chrominum bearing steel, and inner and outer grinding process are applied after heat treatment.

Interchangability

The dimensions of SAMICK Linear Bushing are standardized to have full interchangeability. LM shaft is porvided with the cylinderical grinding to have high precision fitting clearance.

Rigid Outer Sleeve

Hardened and precisely ground outer sleeve is made of bearing steel, and can be directly assembled with the needle bearing on outer surface.

High precision Retainer

The single body retainer guids 4~6 ball circuits, and it gives the precision guiding against the balls moving direction and smooth motion.

LM Case Unit

LM Case Unit, SC type is consist of the light aluminum case and LM type Linear Bushing, so the assembly can be finished by simple bolting.
Longer life can be obtained by adjusting the ball circuits orientation of Linear Bushing against the direction of load.

Application

SAMICK Linear Bushing is widly used in precision equipments; computer and peripheral equipments, measuring equipments, auto recording equipments, and 3D measuring equipments, and linear motion systems in machine for mass prodution; multi-axis drilling machines, punching press, tool grinders, auto-gas cutters, printing machines, card selectors, food packing machines, and etc.

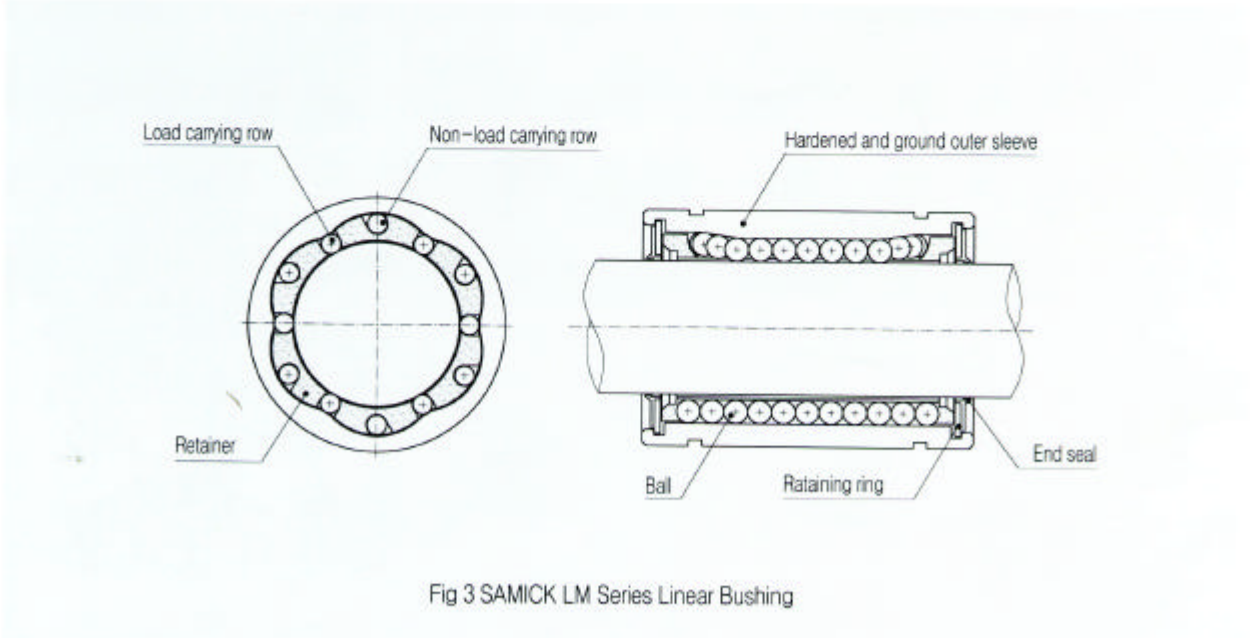


Fig 3 SAMICK LM Series Linear Bushing

Part Number Notation

LM □□ 20 □ UU □□

- **LM** — SAMICK Linear Bushing
- **Model**
  - – : Standard Series
  - E : European Series
- **Plange Option**
  - – : No Flange
  - F : Circular type
  - K : Square type
  - H : Oval type
- **20** — Nominal Shaft Diameter
- **Type**
  - – : Standard
  - L : Long
- **Seal**
  - – : No Seal
  - U : One side Seal
  - UU : Both side Seal
- **Type**
  - – : Closed type
  - OP : Open type
  - AJ : Adjustable type

Standard Tolerance

The tolerance of working bore diameter, outside diameter, and length are specified on the tables in this catalogue, and the value of working bore diameter and outside diameter for adjustable and open types are the obtained value before slotting process.

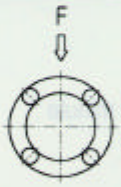
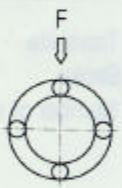
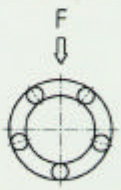
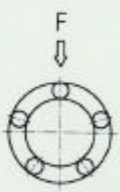
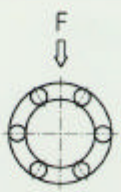
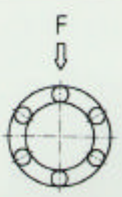
Load rating and Travel Life

The load rating of SAMICK Linear Bushing can be affected by the balls orientation against the load. The basic load rating in the table is the load rating of Linear Bushing when 1 (one) ball circuit are just beneath the load. As shown in Fig 4, If the ball are located on symmetrical position against the load, the load rating will be increased and the travel life will be extended.

$$L = \left[\frac{f_H \cdot f_C \cdot f_T}{f_W} \times \frac{C}{P} \right]^3 \times 50$$

L	: Travel life	(km)
C	: Basic dynamic load rating	(N)
P	: Applied load	(N)
f_H	: Hardness factor	(see Fig 1)
f_W	: Load coefficient	(see Table 3)
f_C	: Contact factor	(see Table 2)
f_T	: Temperature factor	(see Fig 3)

Fig 4 Load ratings and Orientation df Balls

No. of Ball Raw	Orientation of Balls	
	Max. Load rating	Min. Load rating
4		
	F=1.41×C	F=C
5		
	F=1.46×C	F=C
6		
	F=1.26×C	F=C

C : Load rating specified on the table

● If a Linear Bushing or two Linear Bushings laid over one another on one shaft, and the moment load is applied, the calculation of the Equivalent load is required.

$P_U \fallingdotseq K \cdot M$

P_U : Equivalent load (N)
when the moment applied
K : Equivalent factor (see Table 4~6)
M : Applied moment ($N \cdot mm$)
ehere P_U should be upto basic load rating(C_0)

● If the moment load and the raidial load are applied, the travel life can be calculated by the sum of the moment load and the radial load.

From the above equations, the stroke and number of strokes per minute are constant, the travel life can be calculated by following equation.

$$L_h = \frac{L \times 10^3}{2 \times Ls \times N\ell \times 60}$$

L_h : Travel life (hr)
Ls : Stroke (m)
$N\ell$: Number of strokes per minute (cpm)

Calculation Example

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

- Working condition -

Applied load : 850N (P)
Stroke : 0.250m (Ls)
Number of strokes per minute : 60 ($N\ell$)
Shaft hardness : HRC 60 (f_H =1.0)
Operating speed $V = 2 \times Ls \times N\ell$
$= 2 \times 0.250 \times 60$
$= 30 m/min$ (f_H=1.6)

all other factors (fc, fT) are considered as 1.0.

Calculation of expected Travel Life

Since, basic dynamic load rating is based on travel life of 50km and assuming all other factors as 1.0, you can choose the Linear Bushing size that you can expected travel life. Let's try LM40UU with the above working conditions.

$$L = \left(\frac{1.0 \times 1.0 \times 1.0}{1.6} \times \frac{2150}{850} \right)^3 \times 50$$
$$= 197.5 km$$

$$L_h = \frac{197.5 \times 10^3}{2 \times 0.250 \times 60 \times 60}$$
$$= 109.7 hours$$

Choosing a proper Linear Bushing

Let's assume our design travel life is 500hours;
L= 500 X 2 X 0.250 X 10-3 X 60 X 60 = 900km

$$C = \frac{850 \times 1.6}{1.0 \times 1.0 \times 1.0} \times \sqrt[3]{\frac{900}{50}}$$
$$= 3564N$$

So, the proper Linear Bushing for above condition is LM50UU which has 3822N(390kgf) as the basic load rating.

Equivalent factor for Linear Bushing

Table 4 Equivalent factor for LM type

Part Numnber	Equivalent factor : K	
	Single	Double
LM 5	1.253	0.178
LM 6	0.553	0.162
LM 8S	0.708	0.166
LM 8	0.442	0.128
LM 10	0.389	0.101
LM 12	0.389	0.097
LM 13	0.343	0.093
LM 16	0.279	0.084
LM 20	0.257	0.071
LM 25	0.163	0.054
LM 30	0.153	0.049
LM 35	0.143	0.045
LM 40	0.117	0.040
LM 50	0.096	0.032
LM 60	0.093	0.028

note) the Equivalent factor for LMF, LMK, LMH, SC type are same as LM type.

Table 5 Equivalent factor for LM-L type

Part Numnber	Equivalent factor : K
	Single
LM 5L	0.223
LM 6L	0.201
LM 8L	0.151
LM 10L	0.118
LM 12L	0.113
LM 13L	0.107
LM 16L	0.096
LM 20L	0.082
LM 25L	0.060
LM 30L	0.053
LM 35L	0.050
LM 40L	0.043
LM 50L	0.034
LM 60L	0.031

note) the Equivalent factor for LMF-L, LMK-L, LMH-L type are same as LM-L type.

Table 6 Equivalent factor for LME type

Part Numnber	Equivalent factor : K	
	Single	Double
LME 5	0.669	0.123
LME 8	0.514	0.116
LME 12	0.389	0.090
LME 16	0.343	0.081
LME 20	0.291	0.063
LME 25	0.209	0.052
LME 30	0.167	0.045
LME 40	0.127	0.039
LME 50	0.105	0.031
LME 60	0.093	0.024

Short stroke Applications

In applications when the stroke is short, the life of the shaft is shorter than that of the Linear Bushing. In short stroke applications, the required dynamic load rating must be multiplied by the factor Kc found on Fig 5.

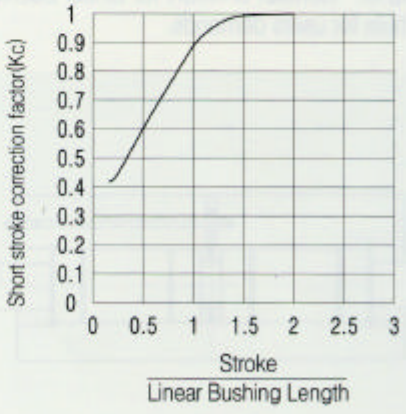


Fig 5 Short stroke correction factor(Kc)

Lubrication and Friction

Lubrication

Usually, Linear Bushing is used with grease lubrication or oil lubrication but in some case, it is used without any lubrication.

Grease Lubrication

Before applying the grease, the anticorrosive oil must be removed by kerosene or organic solvent, and applying the grease after drying. Must applying grease directly on the ball for a both side sealed type (··UU), and applying same as above or applying on the shaft for a without sealed type. Lithium soap radical of viscosity mark No. 2 is recommended for use.

Oil Lubrication

There is no need to remove anticorrosive oil when oil is used for lubrication. ISO viscosity grade VG15~100 oil is usually used according to the temperature.

Operating Temp.	Viscosity
−30℃ ~ 50℃	VG 15 ~ 46
50℃ ~ 80℃	VG 46 ~ 100

The turbine oil, machine oil, and spindle oil are usually used as lubrication oil. Drop the oil on the shaft for lubrication, or supply it through an oil hole provided on the housing (Fig 6). Contact SAMICK for Linear Bushing with lubrication hole for users demands.

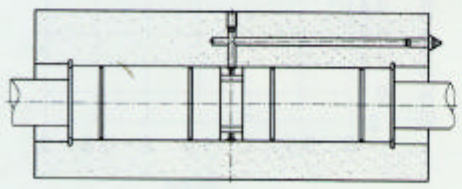


Fig 6

Because the seals remove the oil on shaft, dropping is not recommanded for lubrication for both side seal type.

Coefficient of Friction

Linear Bushing has balls as rollong elements, so the balls can reduce the frictional resistance. Static friction, in praticular, is very low, and there is just little difference between static and dynamic friction, so, that stick-slip does not occur. Such low friction makes submicron feeding possible. The nomal friction codfficient is on Fig 7, and the friction resistance can be calculated by following equation.

$$F = \mu \cdot P + fs$$

F : Friction resistance force (N)
f : Resistant of seal (0.3~2.4N)
P : Applied load
(Perpendicular load against shaft core) (N)
μ : Friction coefficient(Static or dynamic)

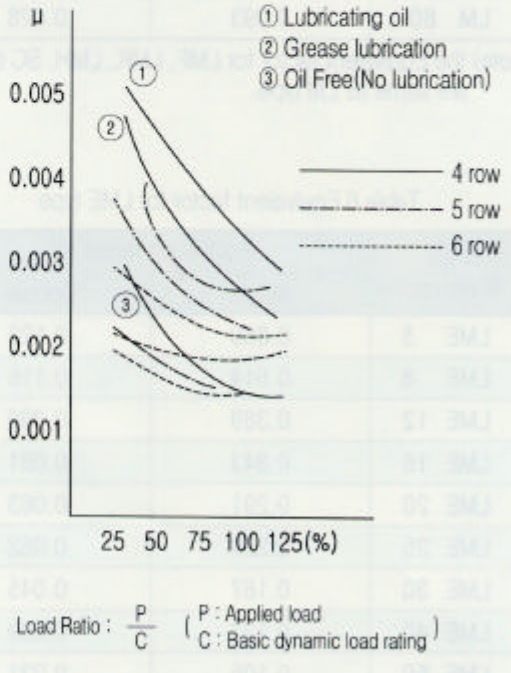


Fig 7 Coefficient of Kinetic Friction

Installation Guid

Tolerance of Housing Bore

Recomended tolerances of Housing bore for SAMICK Linear Bushing are in Table 7. Normal fit is standard, but for without clearance, press fit is also avalible.

Table 7 Tolerance for Housing Bore

Type		Case	
Part Number	Grade	Normal Fit	Pressed Fit
LM	High(H)	H7	J7
LME	–	H7	K6, J6
LMF LMK LMH LM-L LMF-L LMK-L LMH-L	–	H7	J7

Clearance of Outer Sleeve and Shaft

Normal fit is standard for using of Linear Bushing with LM shaft, and for without clearance, Tight fit is also avalable.

Table 8 Tolerance for Shaft Diameter

Type		LM Shaft	
Part Number	Grade	Normal Fit	Tight Fit
LM	High(H)	f6, g6	h6
LME	–	h7	k6
LMF LMK LMH LM-L LMF-L LMK-L LMH-L	–	f6, g6	h6

note) ◆ Negative diametral clearance should not exceed what is specified in the dimension table.
◆ Axial clearance of SC, SCW, SCV type are same as High grade.

Mounting

High holding strength toward LM shaft direction is not required, but just press fit only for mounting is not recommended.
Please see Table 7 for tolerance of Housing Bore.

Standard type

Possible mounting methods are illustrated in Fig 8 and Fig 9. Mount a Linear Brushing with retaining rings and cover plates.

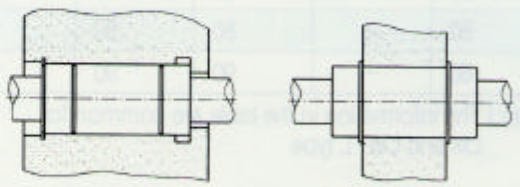


Fig 8 Mounting with retaining rings

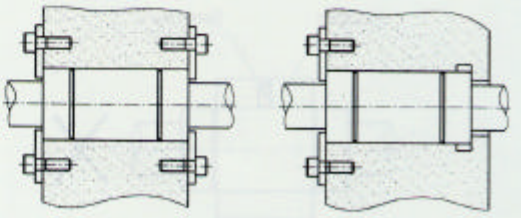


Fig 9 Mounting with cover plates

Retaining ring for Mounting

Retaining rings for mounting LM type SAMICK Linear Bushing are used as showned in the table below.

Table 9 Retaining ring dimensions

Part Number	Retaining ring			
	External (for Shaft)		Internal (for Bore)	
	C Type	NeedleType	C Type	NeedleType
LM 5	10	10	10	10
6	12	12	12	12
8	–	15	15	15
8S	–	15	15	15
10	19	19	19	19
12	21	21	21	21
13	23	22	23	–
16	28	–	28	28
20	32	–	32	32
25	40	40	40	40
30	45	45	45	45
35	52	52	52	52
40	–	60	60	60
50	–	80	80	80
60	–	90	90	90

note) The information in the table are common for LM and LM-L type

Mounting with Setscrew

Mounting a Linear Bushing with a setscrew as shown in Fig 10 will cause deforamtion of the outer sleeve and should be avoided.

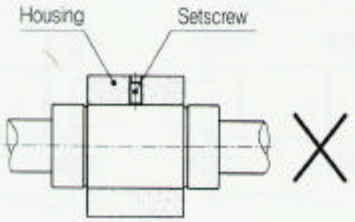
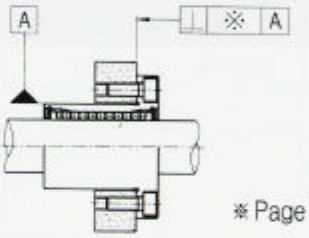


Fig 10 Mounting with Setscrew

Flanged type

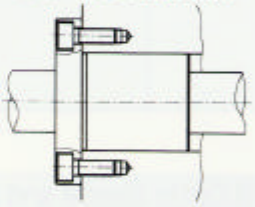
Mounting for LMF, LMK, LMH (Long type also), only mounting the flange with mounting bolt can be all of mounting because of its single body shape.

note) Geometric dimensional tolerance should be considered when outer sleeve is the datum for installation.

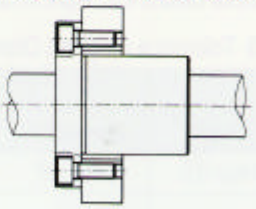


※ Page 36~43

• Mounting from outer sleeve as datum



• Mounting of Flange with mounting bolt



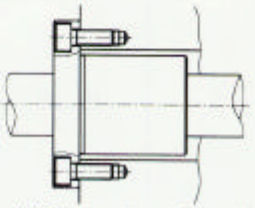


Fig 11 Flanged type Mounting

Mounting of Adjustable type

Adjustment of clearance for adjustable type (...AJ) and LM shaft can be obtained by assemblying with the adjustable type Housing.
In this case, the slotted side of Linear Bushing should be located at 90 ° of open side of housing for equivalent deformation against radial direction. See Fig 12.

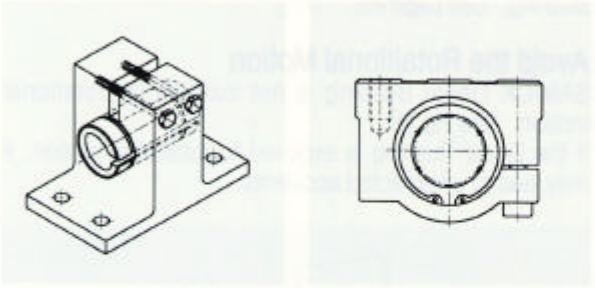


Fig 12 Mounting of adjustable type

Mounting of Open type

Open type (...OP) also can be used with clearance adjustable housing as shown on Fig 13.
Light pre-load is applied for normal using, but heavy pre-load should be avoid.

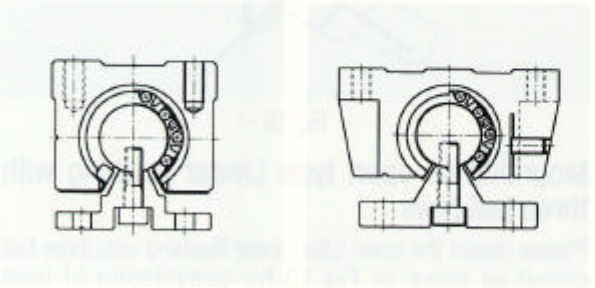


Fig 13 Mounting of Open type

Mounting of Shaft support

Shaft support, SK can be mounted with mounting bolt for table, and LM shaft can be mounted with tightning bolt.

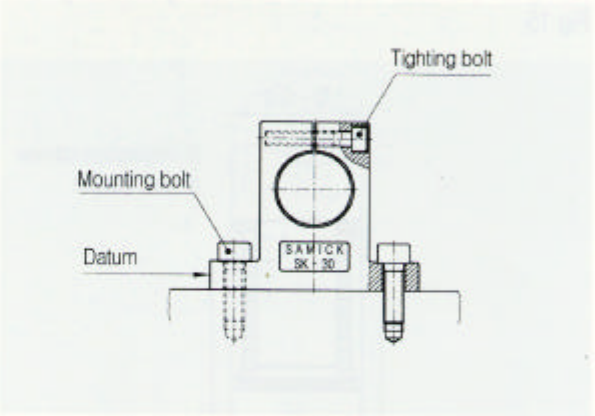


Fig 14 Mounting of Shaft Support

Mounting of LM Case Unit

Mounting of SC type

Mounting of SC, SCW, SCV type from the top and the bottom side with mounting bolt are both available, and it gives you minimum mounting time.

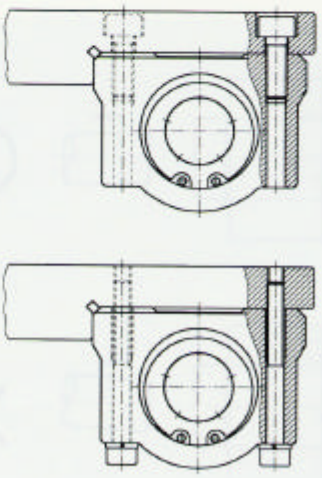


Fig 15 Mounting of Case Unit

Application Tips

Mounting of Linear Bushing

For mounting of a standard type SAMICK Linear Bushing into the Housing, a jig should be used to avoid direct hitting on the outer sleeve or seal during mounting. See Fig 15

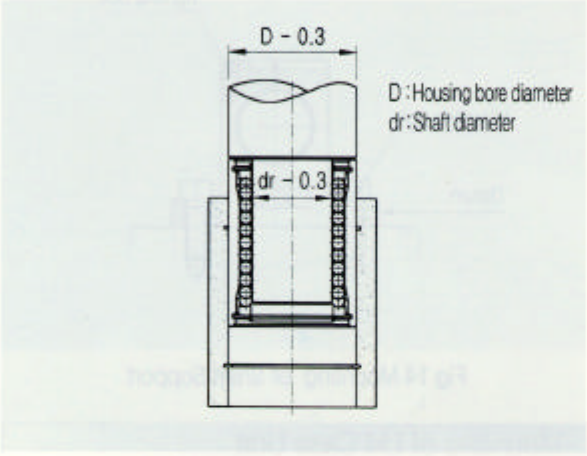


Fig 15 Mounting into houshing

Insertion of Shaft

Care must be thaken to align the bushing and the shaft when inserting a shaft into a Linear Bushing. If the shaft is inserted with slanted, balls may depart from the damaged or deformed retainer. See Fig 16

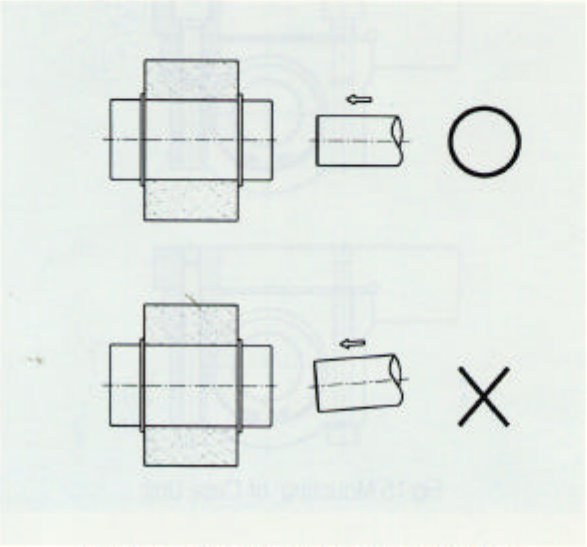


Fig 16 Insertion of shaft into Linear Bushing

When Moment loads applied

External loads should be distributed uniformly on a Linear Bushing. When moment loads are applied, two or more Linear Bushing should be used in one LM shaft, and the distance between two Linear Bushing should be as long as possible. Calculate the equivalant load when the moment loads are applied and choose the proper Linear Bushing. See page 22.

Avoid the Rotaitional Motion

SAMICK Linear Bushing is not suitable for rotational motion. See Fig 18
If the Linear Bushing is exposed to rotaitional motion, it may lead to unexpected accidents.

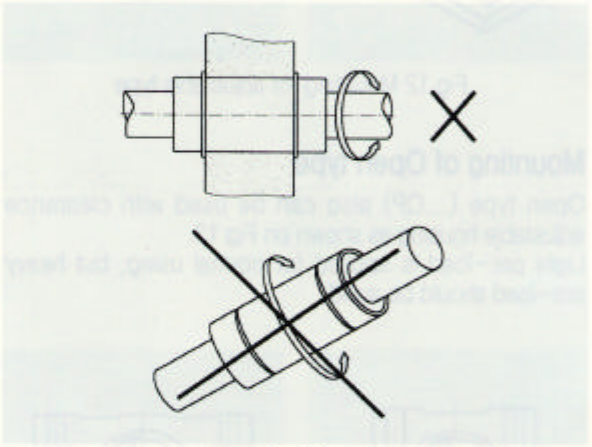


Fig 18

Mounting of open type Linear Bushing with three ball raws

Please mount the open type Linear Bushing with three ball circuit as same as Fig 19 for considering of load distribution.

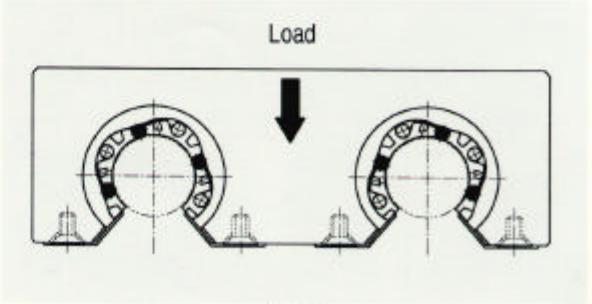
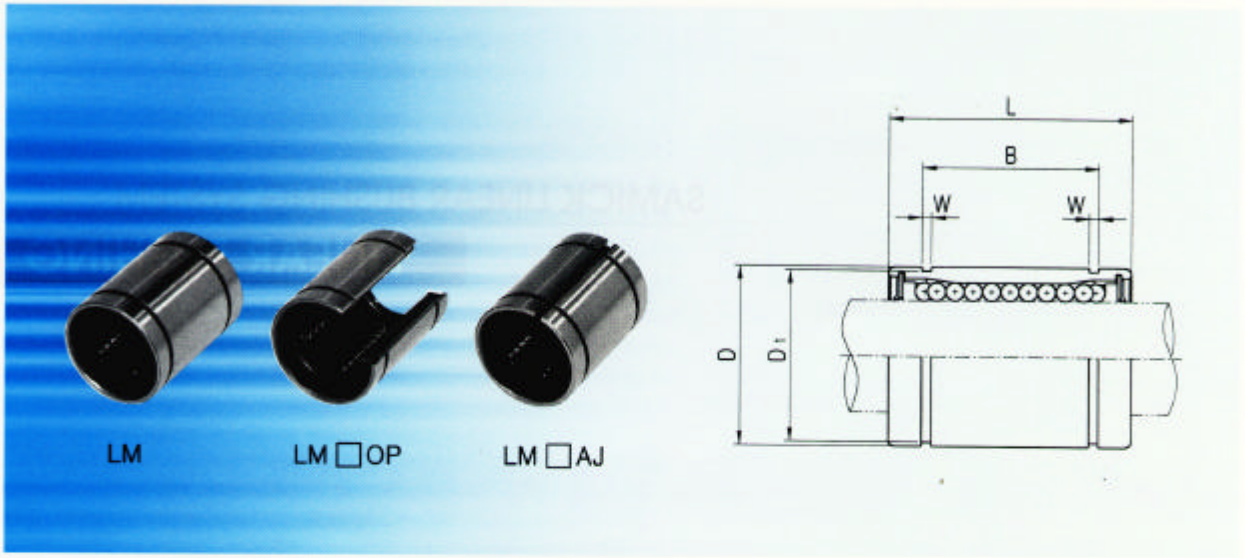


Fig 19

SAMICK LINEAR BUSHING SYSTEM

LINEAR BUSHING

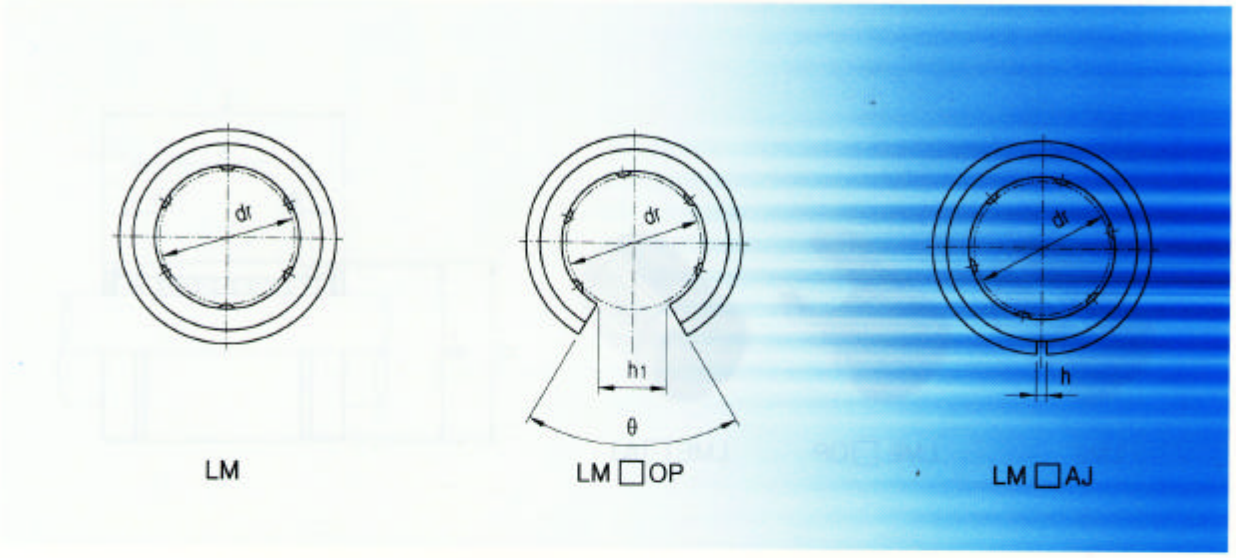
Linear Bushing LM Series



LM Series						Basic Load Ratings		Working Bore Diameter	
Standard type		Open type		Adjustable type					
Part number	No. of Ball circuit	Part number	No. of Ball circuit	Part number	No. of Ball circuit	Dynamic C (N)	Static C_0 (N)	dr (mm)	Tol. (μm)
LM6UU	4	–	–	LM6UUAJ	4	200	260	6	0 −9
LM8SUU	4	–	–	LM8SUUAJ	4	170	220	8	
LM8UU	4	–	–	LM8UUAJ	4	260	400	8	
LM10UU	4	–	–	LM10UUAJ	4	370	540	10	
LM12UU	4	LM12UUOP	3	LM12UUAJ	4	410	590	12	
LM13UU	4	LM13UUOP	3	LM13UUAJ	4	500	770	13	
LM16UU	5	LM16UUOP	4	LM16UUAJ	5	770	1170	16	
LM20UU	5	LM20UUOP	4	LM20UUAJ	5	860	1370	20	0 −10
LM25UU	6	LM25UUOP	5	LM25UUAJ	6	980	1560	25	
LM30UU	6	LM30UUOP	5	LM30UUAJ	6	1560	2740	30	
LM35UU	6	LM35UUOP	5	LM35UUAJ	6	1660	3130	35	0 −12
LM40UU	6	LM40UUOP	5	LM40UUAJ	6	2150	4010	40	
LM50UU	6	LM50UUOP	5	LM50UUAJ	6	3820	7930	50	
LM60UU	6	LM60UUOP	5	LM60UUAJ	6	4700	9990	60	0 −15

note) Plating and RAYDENT treatments are available

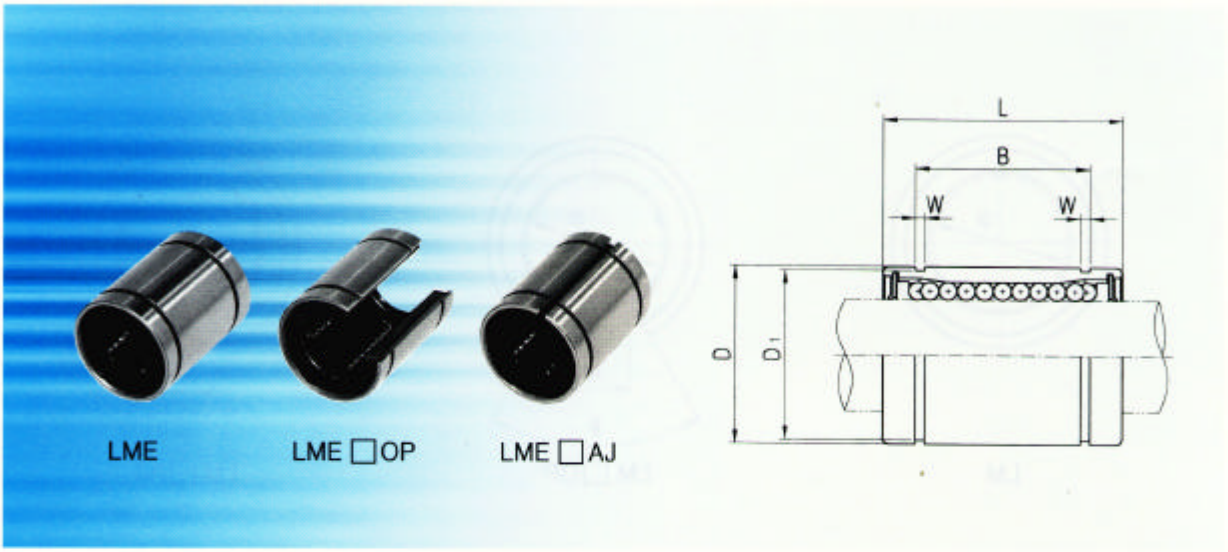
1N≒0.102kgf



Dimensions(mm)											Wgt.* (gf)	Allowable Diametral Clearance (μm)	Part Number
D (mm)	Tol. (μm)	L (mm)	Tol. (mm)	B (mm)	Tol. (mm)	W	D_1	h	h_1	θ (°)			
12	0 −11	19	0 −0.2	13.5	0 −0.2	1.1	11.5	1	–	–	8	−5	LM6UU
15		17		11.5		1.1	14.3	1	–	–	11	−5	LM8SUU
15		24		17.5		1.1	14.3	1	–	–	16	−5	LM8UU
19	0 −13	29		22		1.3	18	1	–	–	30	−5	LM10UU
21		30		23		1.3	20	1.5	8	80°	31.5	−5	LM12UU
23		32		23		1.3	22	1.5	9	80°	43	−7	LM13UU
28		37		26.5		1.6	27	1.5	11	80°	69	−7	LM16UU
32	0 −16	42		30.5		1.6	30.5	1.5	11	60°	87	−9	LM20UU
40		59	0 −0.3	41	0 −0.3	1.85	38	2	12	50°	220	−9	LM25UU
45		64		44.5		1.85	43	2.5	15	50°	250	−9	LM30UU
52	0 −19	70		49.5		2.1	49	2.5	17	50°	390	−13	LM35UU
60		80		60.5		2.1	57	3	20	50°	585	−13	LM40UU
80		100		74		2.6	76.5	3	25	50°	1580	−13	LM50UU
90	0 −22	110		85		3.15	86.5	3	30	50°	2000	−16	LM60UU

* : the value of Standard type

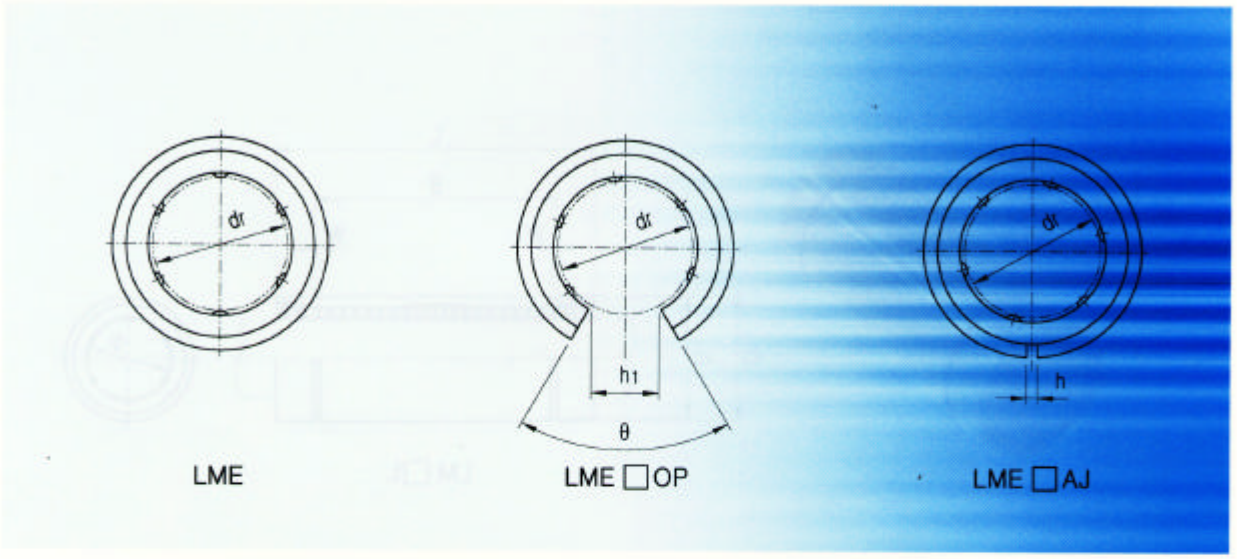
Linear Bushing LME Series



LME Series						Basic Load Ratings		Working Bore Diameter	
Standard type		Open type		Adjustable type					
Part number	No. of Ball circuit	Part number	No. of Ball circuit	Part number	No. of Ball circuit	Dynamic C (N)	Static C_0 (N)	dr (mm)	Tol. (μm)
LME5UU	4	–	–	LME5UUAJ	4	200	260	5	+8 0
LME8UU	4	–	–	LME8UUAJ	4	260	400	8	
LME12UU	4	LME12UUOP	3	LME12UUAJ	4	500	770	12	
LME16UU	5	LME16UUOP	4	LME16UUAJ	5	570	890	16	+9 −1
LME20UU	5	LME20UUOP	4	LME20UUAJ	5	860	1370	20	
LME25UU	6	LME25UUOP	5	LME25UUAJ	6	980	1560	25	+11 −1
LME30UU	6	LME30UUOP	5	LME30UUAJ	6	1560	2740	30	
LME40UU	6	LME40UUOP	5	LME40UUAJ	6	2150	4010	40	+13 −2
LME50UU	6	LME50UUOP	5	LME50UUAJ	6	3820	7930	50	
LME60UU	6	LME60UUOP	5	LME60UUAJ	6	4700	9990	60	

note) Plating and RAYDENT treatments are available

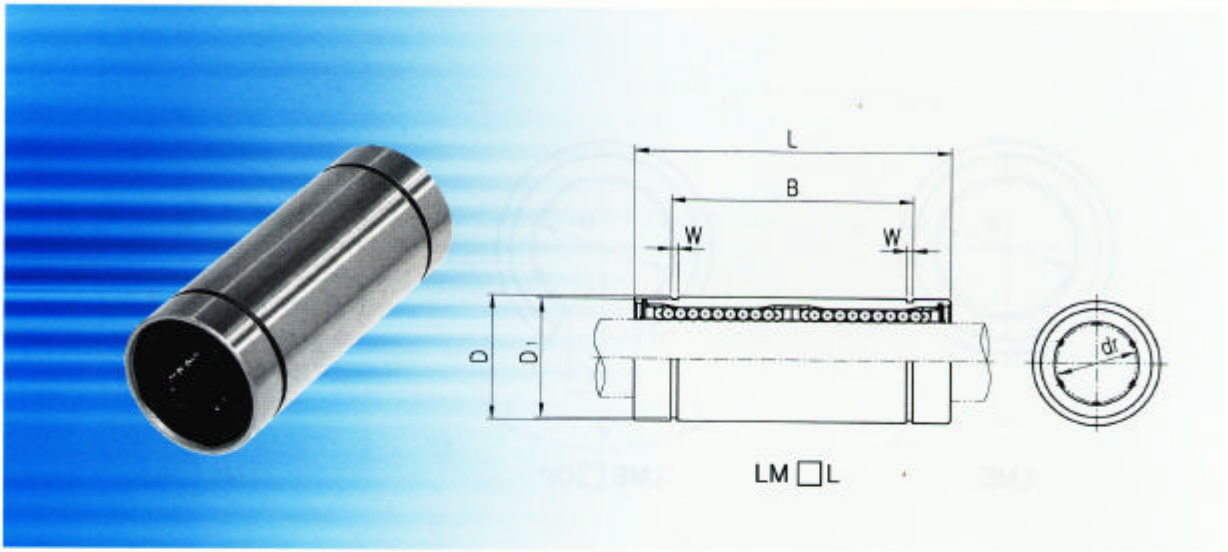
1N≒0.102kgf



Dimensions(mm)											Wgt.* (g)	Allowable Diametral Clearance (μm)	Part Number
D (mm)	Tol. (μm)	L (mm)	Tol. (mm)	B (mm)	Tol. (mm)	W	D_1	h	h_1	θ (°)			
12	0 −8	22	0 −0.2	14.5	0 −0.2	1.1	11.5	1	–	–	12	−5	LME5UU
16		25		16.5		1.1	15.2	1	–	–	20	−5	LME8UU
22	0 −9	32		22.9		1.3	21	1.5	7.5	78°	41	−7	LME12UU
26		36		24.9		1.3	24.9	1.5	10	78°	57	−7	LME16UU
32	0 −11	45		31.5		1.6	30.3	2	10	60°	91	−9	LME20UU
40		58	0 −0.3	44.1	0 −0.3	1.85	37.5	2	12.5	60°	215	−9	LME25UU
47		68		52.1		1.85	44.5	2	12.5	50°	325	−9	LME30UU
62	0 −13	80		60.6		2.15	59	3	16.8	50°	705	−13	LME40UU
75		100		77.6		2.65	72	3	21	50°	1130	−13	LME50UU
90	0 −15	125	0 −0.4	101.7	0 −0.4	3.15	86.5	3	27.2	54°	2220	−16	LME60UU

* : the value of Standard type

Linear Bushing LM□L Series

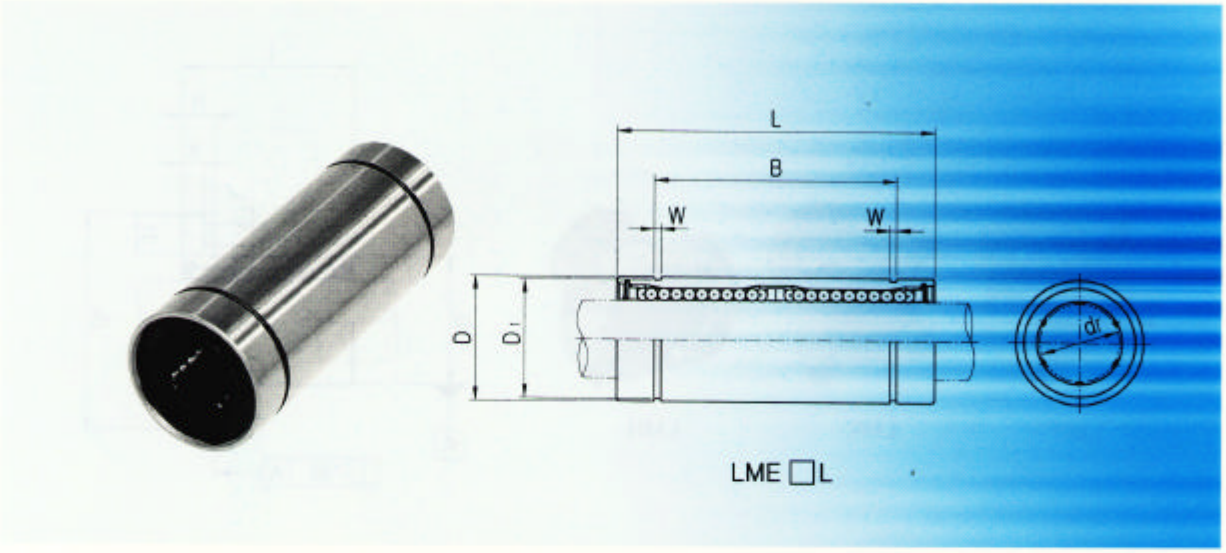


LM□L Series		Working Bore Diameter		Dimensions(mm)								Wgt. (gf)	Basic Load Ratings	
Part number	No. of Ball circuit	dr (mm)	Tol. (㎛)	D (mm)	Tol. (㎛)	L (mm)	Tol. (mm)	B (mm)	Tol. (mm)	W	D1		Dynamic C (N)	Static C0 (N)
LM6LUU	4	6	0 −10	12	0 −13	35	0 −0.3	27	0 −0.3	1.1	11.5	16	320	520
LM8LUU	4	8		15		45		35		1.1	14.3	31	430	780
LM10LUU	4	10		19	0 −16	55		44		1.3	18	62	580	1100
LM12LUU	4	12		21		57		46		1.3	20	80	650	1200
LM13LUU	4	13		23		61		46		1.3	22	90	810	1570
LM16LUU	5	16		28		70		53		1.6	27	145	1230	2350
LM20LUU	5	20	0 −12	32	0 −19	80		61		1.6	30.5	180	1400	2750
LM25LUU	6	25		40		112		82		1.85	38	440	1560	3140
LM30LUU	6	30		45		123		89		1.85	43	580	2490	5490
LM35LUU	6	35	0 −15	52	0 −22	135	0 −0.4	99	0 −0.4	2.1	49	795	2650	6470
LM40LUU	6	40		60		154		121		2.1	57	1170	3430	8040
LM50LUU	6	50		80		192		148		2.6	76.5	3100	6080	15900
LM60LUU	6	60	0 −20	90	0 −25	211		170		3.15	86.5	3500	7650	20000

note) Plating and RAYDENT treatments are available

1N≒0.102kgf

Linear Bushing LME□L Series

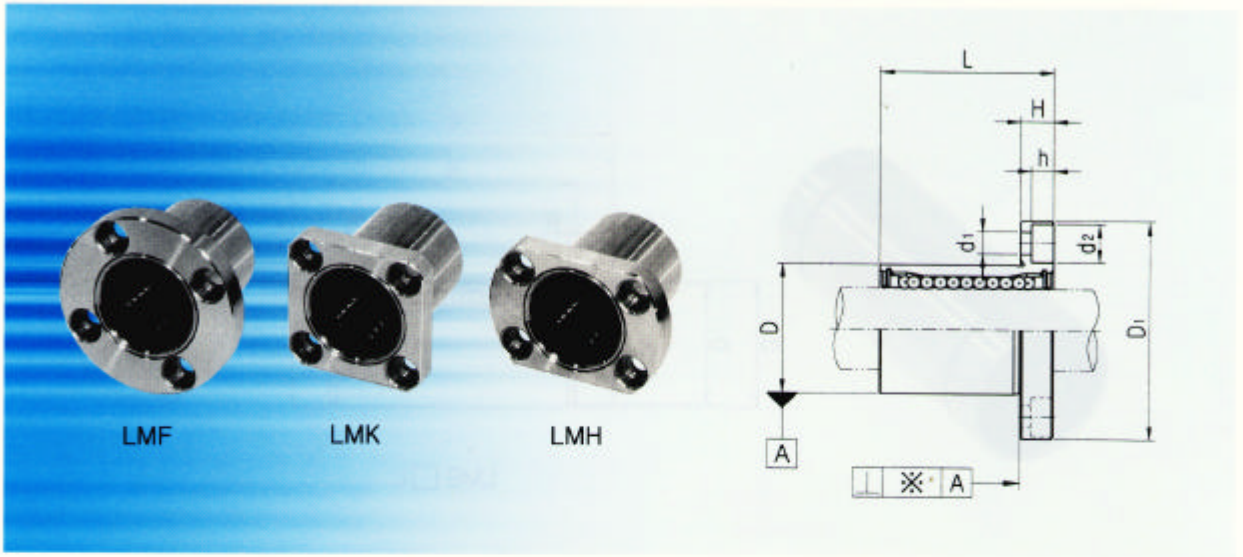


LME□L Series		Working Bore Diameter		Dimensions(mm)								Wgt. (gf)	Basic Load Ratings	
Part number	No. of Ball circuit	dr (mm)	Tol. (μm)	D (mm)	D Tol. (μm)	L (mm)	L Tol. (mm)	B (mm)	B Tol. (mm)	W	D1		Dynamic C (N)	Static C0 (N)
LME8LUU	4	8	+9 −1	16	0 / −9	45	0 −0.3	33	0 −0.3	1.1	15.2	31	430	780
LME12LUU	4	12		22	0 −11	57		45.8		1.3	21	80	650	1200
LME16LUU	5	16	+11 −1	26		70		49.8		1.3	24.9	145	1230	2350
LME20LUU	5	20		32	0 −13	80		61		1.6	30.3	180	1400	2750
LME25LUU	6	25	+13 −2	40		112	0 −0.4	82	0 −0.4	1.85	38	440	1560	3140
LME30LUU	6	30		47		123		104.2		1.85	44.5	580	2490	5490
LME40LUU	6	40	+16 −4	62	0 −15	154		121.2		2.15	59	1170	3430	8040
LME50LUU	6	50		75		192		155.2		2.65	72	3100	6080	15900
LME60LUU	6	60		90	0 −20	211		170		3.15	86.5	3500	7650	20000

note) Plating and RAYDENT treatments are available

1N≒0.102kgf

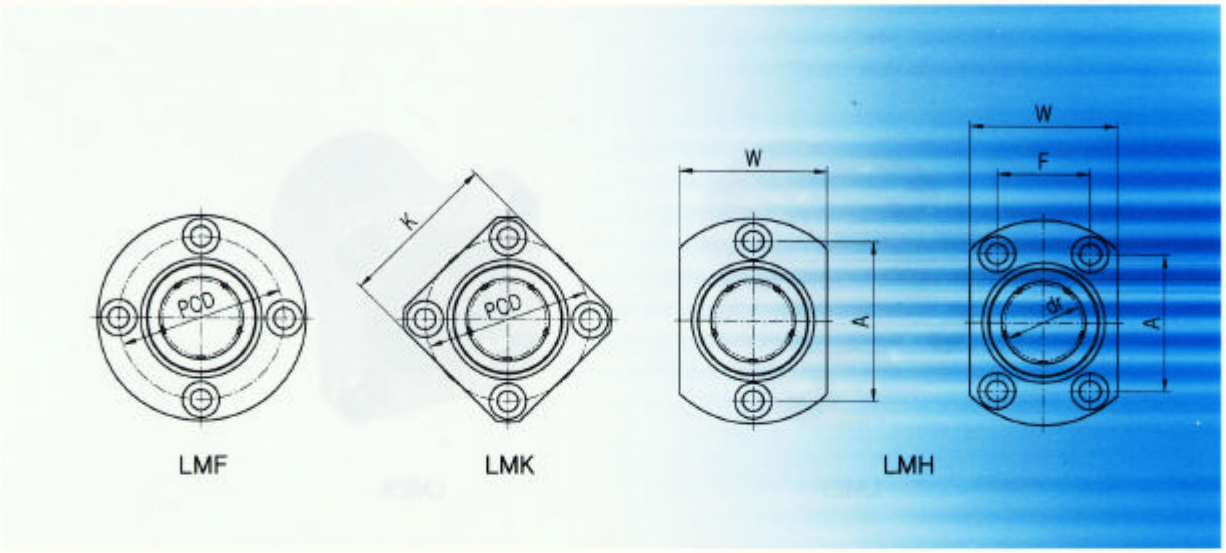
Linear Bushing LMF/K/H Series



Part number			No. of Ball circuit	Wgt.* (gr)	Allowable Diametral Clearance (μm)	Basic Load Ratings		Working Bore Diameter	
Circular type	Square type	Oval type				Dynamic C (N)	Static C_0 (N)	dr (mm)	Tol. (μm)
LMF6UU	LMK6UU	LMH6UU	4	26.5	−5	200	260	6	0 −9
LMF8SUU	LMK8SUU	–	4	34	−5	170	220	8	
LMF8UU	LMK8UU	LMH8UU	4	40	−5	260	400	8	
LMF10UU	LMK10UU	LMH10UU	4	78	−5	370	540	10	
LMF12UU	LMK12UU	LMH12UU	4	76	−5	410	590	12	
LMF13UU	LMK13UU	LMH13UU	4	94	−7	500	770	13	
LMF16UU	LMK16UU	LMH16UU	5	134	−7	770	1170	16	
LMF20UU	LMK20UU	LMH20UU	5	180	−9	860	1370	20	0 −10
LMF25UU	LMK25UU	LMH25UU	6	340	−9	980	1560	25	
LMF30UU	LMK30UU	LMH30UU	6	460	−9	1560	2740	30	
LMF35UU	LMK35UU	–	6	795	−13	1660	3130	35	0 −12
LMF40UU	LMK40UU	–	6	1054	−13	2150	4010	40	
LMF50UU	LMK50UU	–	6	2200	−13	3820	7930	50	
LMF60UU	LMK60UU	–	6	2960	−16	4700	9990	60	0 −15

note) Plating and RAYDENT treatments are available

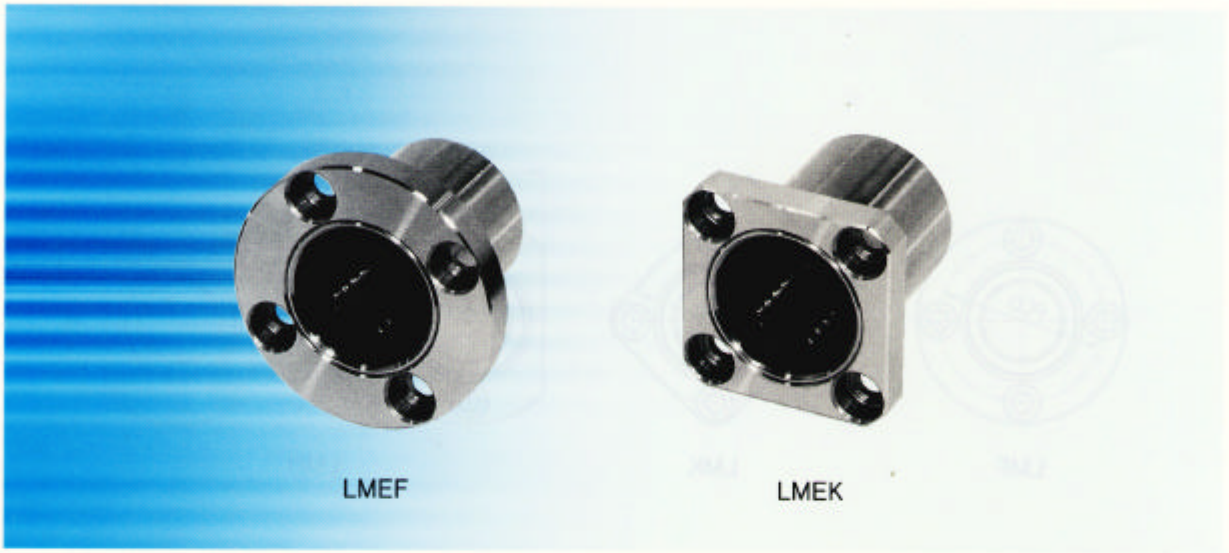
1N≒0.102kgf



Dimensions(mm)														Part number
D (mm)	Tol. (μm)	L (mm)	Tol. (mm)	D_1 (mm)	Tol. (mm)	H	PCD	K	W	A	F	Squareness * (μm)	$d_1 \times d_2 \times h$	
12	0 −11	19	0 −0.2	28	0 −0.2	5	20	22	18	20	–	12	3.4×6.5×3.3	LMF/K/H 6UU
15		17		32		5	24	25	–	–	–	12	3.4×6.5×3.3	LMF/K 8SUU
15		24		32		5	24	25	21	24	–	12	3.4×6.5×3.3	LMF/K/H 8UU
19	0 −13	29		40		6	29	30	25	29	–	12	4.5×8×4.4	LMF/K/H 10UU
21		30		42		6	32	32	27	32	–	12	4.5×8×4.4	LMF/K/H 12UU
23		32		43		6	33	34	29	33	–	12	4.5×8×4.4	LMF/K/H 13UU
28		37		48		6	38	37	34	31	22	12	4.5×8×4.4	LMF/K/H 16UU
32	0 −16	42		54		8	43	42	38	36	24	15	5.5×9.5×5.4	LMF/K/H 20UU
40		59	0 −0.3	62		8	51	50	46	40	32	15	5.5×9.5×5.4	LMF/K/H 25UU
45		64		74		10	60	58	51	49	35	15	6.6×11×6.5	LMF/K/H 30UU
52	0 −19	70		82		10	67	64	–	–	–	20	6.6×11×6.5	LMF/K 35UU
60		80		96	0 −0.3	13	78	75	–	–	–	20	9×14×8.6	LMF/K 40UU
80		100		116		13	98	92	–	–	–	20	9×14×8.6	LMF/K 50UU
90	0 −22	110		134		18	112	106	–	–	–	25	11×17.5×10.8	LMF/K 60UU

* : the value of Circular type

Linear Bushing LMEF/K Series

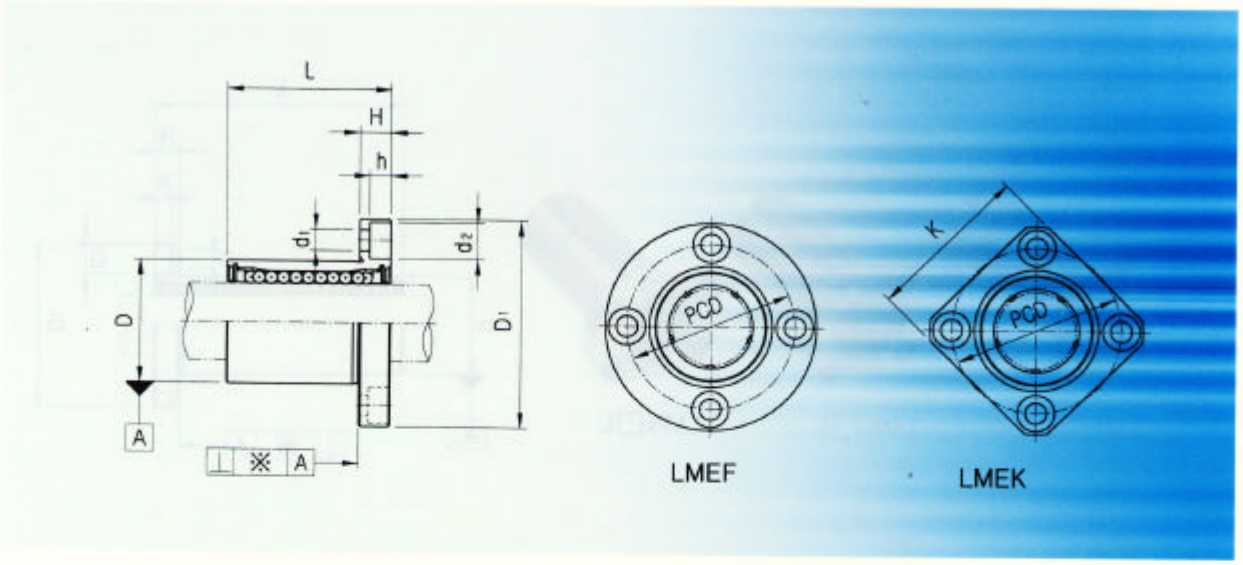


LMEF LMEK

Part number		No. of Ball circuit	Wgt.* (g)	Allowable Diametral Clearance (μm)	Basic Load Ratings		Working Bore Diameter	
Circular type	Square type				Dynamic C (N)	Static C_0 (N)	dr (mm)	Tol. (μm)
LMEF8UU	LMEK8UU	4	44	−5	260	400	8	+8 0
LMEF12UU	LMEK12UU	4	86	−5	500	770	12	
LMEF16UU	LMEK16UU	5	120	−7	570	890	16	+9 −1
LMEF20UU	LMEK20UU	5	184	−9	860	1370	20	
LMEF25UU	LMEK25UU	6	335	−9	980	1560	25	+11 −1
LMEF30UU	LMEK30UU	6	545	−9	1560	2740	30	
LMEF40UU	LMEK40UU	6	1185	−13	2150	4010	40	+13 −2
LMEF50UU	LMEK50UU	6	1730	−13	3820	7930	50	
LMEF60UU	LMEK60UU	6	3180	−16	4700	9990	60	

note) Plating and RAYDENT treatments are available

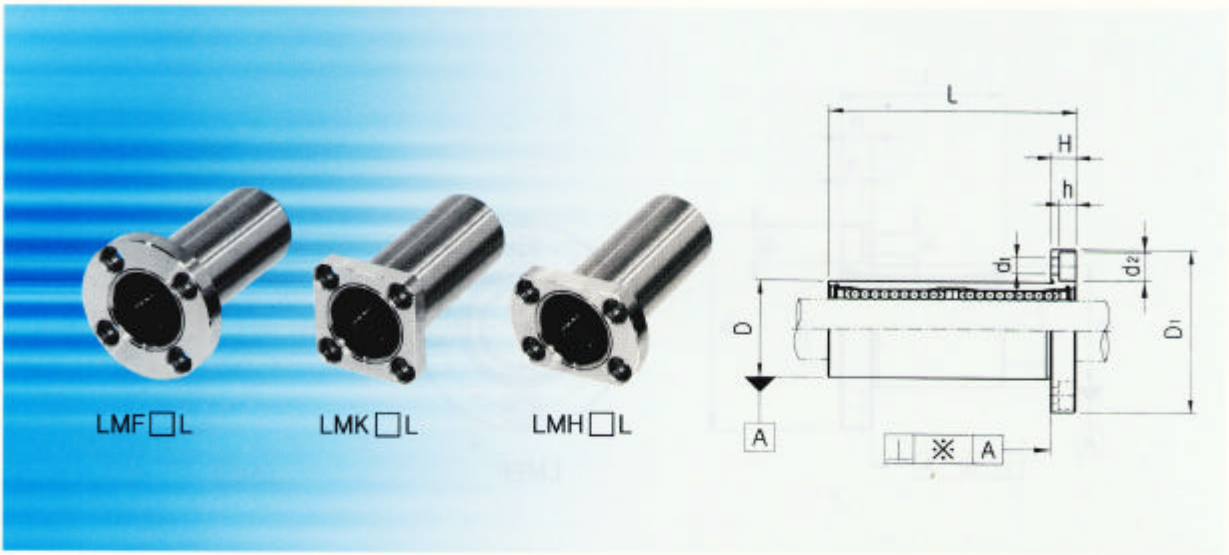
1N≒0.102kgf



Dimensions (mm)											Part number
D (mm)	D Tol. (μm)	L (mm)	L Tol. (mm)	D_1 (mm)	D_1 Tol. (mm)	H	PCD	K	Squareness ※ (μm)	$d_1 \times d_2 \times h$	
16	0 / −8	25	0 −0.2	32	0 −0.2	5	24	25	12	3.4×6.5×3.3	LMEF/K 8UU
22	0 −9	32		42		6	32	32	12	4.5×8×4.4	LMEF/K 12UU
26		36		46		6	36	35	12	4.5×8×4.4	LMEF/K 16UU
32	0 −11	45		54		8	43	42	15	5.5×9.5×5.4	LMEF/K 20UU
40		58	0 −0.3	62		8	51	50	15	5.5×9.5×5.4	LMEF/K 25UU
47		68		76		10	62	60	15	6.6×11×6.5	LMEF/K 30UU
62	0 −13	80		98		13	80	75	20	9×14×8.6	LMEF/K 40UU
75		100		112	0 −0.3	13	94	88	20	9×14×8.6	LMEF/K 50UU
90	0 −15	125	0 −0.4	134		18	112	106	25	11×17.5×10.8	LMEF/K 60UU

* : the value of Circular type

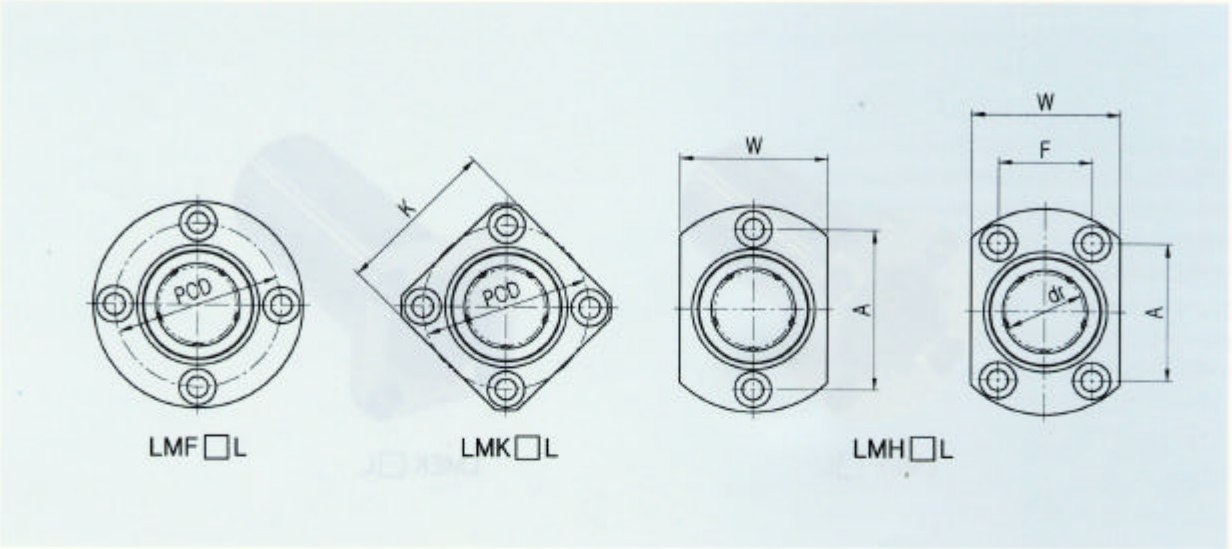
Linear Bushing LMF/K/H□L Series



Part number			No. of Ball circuit	Wgt.* (gf)	Allowable Diametral Clearance (μm)	Basic Load Ratings		Working Bore Diameter	
Circular type	Square type	Oval type				Dynamic C (N)	Static C0 (N)	dr (mm)	Tol. (μm)
LMF6LUU	LMK6LUU	LMH6LUU	4	31	−5	320	520	6	0 −10
LMF8LUU	LMK8LUU	LMH8LUU	4	53	−5	430	780	8	
LMF10LUU	LMK10LUU	LMH10LUU	4	105	−5	580	1100	10	
LMF12LUU	LMK12LUU	LMH12LUU	4	100	−5	650	1200	12	
LMF13LUU	LMK13LUU	LMH13LUU	4	130	−7	810	1570	13	
LMF16LUU	LMK16LUU	LMH16LUU	5	187	−7	1230	2350	16	
LMF20LUU	LMK20LUU	LMH20LUU	5	260	−9	1400	2750	20	0 −12
LMF25LUU	LMK25LUU	LMH25LUU	6	515	−9	1560	3140	25	
LMF30LUU	LMK30LUU	LMH30LUU	6	655	−9	2490	5490	30	
LMF35LUU	LMK35LUU	–	6	970	−13	2650	6470	35	0 −15
LMF40LUU	LMK40LUU	–	6	1560	−13	3430	8040	40	
LMF50LUU	LMK50LUU	–	6	3500	−13	6080	15900	50	
LMF60LUU	LMK60LUU	–	6	4500	−16	7650	20000	60	0 −20

note) Plating and RAYDENT treatments are available

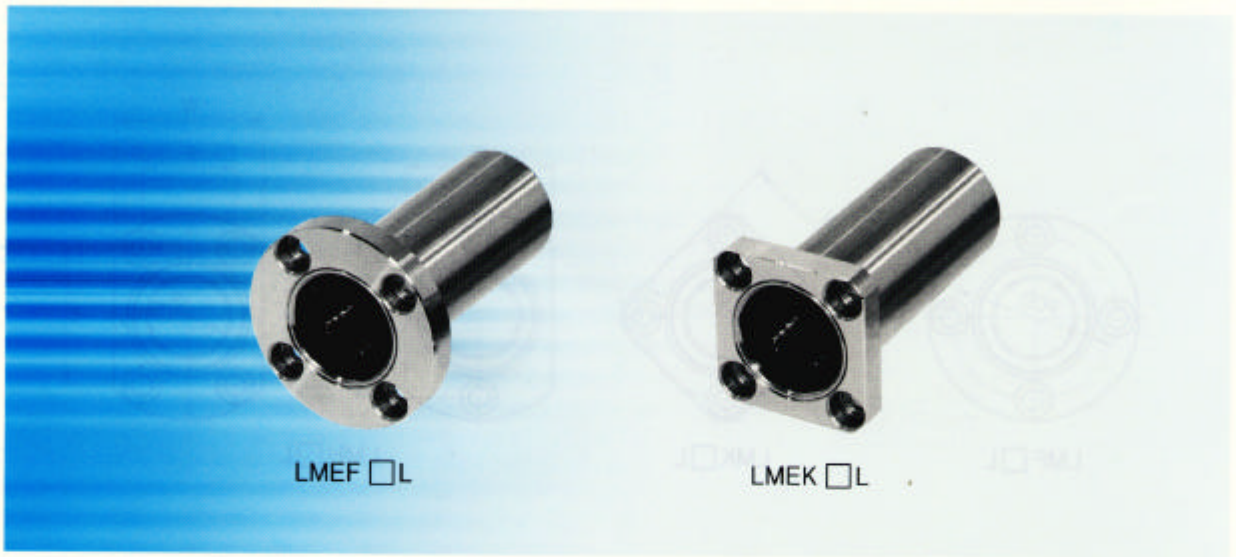
1N≒0.102kgf



Dimensions(mm)														Part number
D (mm)	Tol. (μm)	L (mm)	Tol. (mm)	D_1 (mm)	Tol. (mm)	H	PCD	K	W	A	F	Squareness * (μm)	$d_1 \times d_2 \times h$	
12	0 −13	35		28		5	20	22	18	20	–	15	3.4×6.5×3.3	LMF/K/H 6LUU
15		45		32		5	24	25	21	24	–	15	3.4×6.5×3.3	LMF/K/H 8LUU
19	0 −16	55	0 −0.3	40	0 −0.2	6	29	30	25	29	–	15	4.5×8×4.4	LMF/K/H 10LUU
21		57		42		6	32	32	27	32	–	15	4.5×8×4.4	LMF/K/H 12LUU
23		61		43		6	33	34	29	33	–	15	4.5×8×4.4	LMF/K/H 13LUU
28		70		48		6	38	37	34	31	22	15	4.5×8×4.4	LMF/K/H 16LUU
32	0 −19	80		54		8	43	42	38	36	24	20	5.5×9.5×5.4	LMF/K/H 20LUU
40		112		62		8	51	50	46	40	32	20	5.5×9.5×5.4	LMF/K/H 25LUU
45		123		74		10	60	58	51	49	35	20	6.6×11×6.5	LMF/K/H 30LUU
52	0 −22	135	0 −0.4	82		10	67	64	–	–	–	25	6.6×11×6.5	LMF/K 35LUU
60		154		96	0 −0.3	13	78	75	–	–	–	25	9×14×8.6	LMF/K 40LUU
80		192		116		13	98	92	–	–	–	25	9×14×8.6	LMF/K 50LUU
90	0 −25	211		134		18	112	106	–	–	–	25	11×17.5×10.8	LMF/K 60LUU

* : the value of Circular type

Linear Bushing LMEF/K□L Series



Part number		No. of Ball circuit	Wgt.* (gf)	Allowable Diametral Clearance (μm)	Basic Load Ratings		Working Bore Diameter	
Circular type	Square type				Dynamic C (N)	Static C_0 (N)	dr (mm)	Tol. (μm)
LMEF8LUU	LMEK8LUU	4	53	−5	430	780	8	+9 −1
LMEF12LUU	LMEK12LUU	4	100	−5	650	1200	12	
LMEF16LUU	LMEK16LUU	5	187	−7	1230	2350	16	+11 −1
LMEF20LUU	LMEK20LUU	5	260	−9	1400	2750	20	
LMEF25LUU	LMEK25LUU	6	515	−9	1560	3140	25	+13 −2
LMEF30LUU	LMEK30LUU	6	655	−9	2490	5490	30	
LMEF40LUU	LMEK40LUU	6	1560	−13	3430	8040	40	+16 −4
LMEF50LUU	LMEK50LUU	6	3500	−13	6080	15900	50	
LMEF60LUU	LMEK60LUU	6	4500	−16	7650	20000	60	

note) Plating and RAYDENT treatments are available

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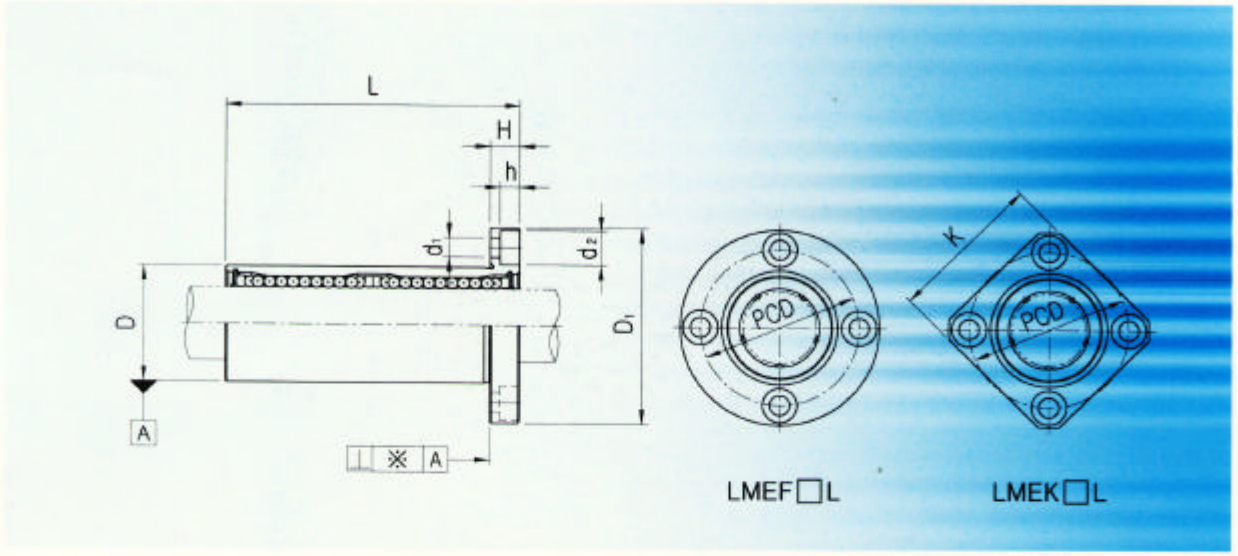


Dimensions(mm)											Part number
D (mm)	D Tol. (μm)	L (mm)	L Tol. (mm)	D_1 (mm)	D_1 Tol. (mm)	H	PCD	K	Squareness * (μm)	$d_1 \times d_2 \times h$	
16	0 / −9	45	0 −0.3	32	0 −0.2	5	24	25	15	3.4×6.5×3.3	LMEF/K 8LUU
22	0 −11	57		42		6	32	32	15	4.5×8×4.4	LMEF/K 12LUU
26		70		46		6	36	35	15	4.5×8×4.4	LMEF/K 16LUU
32	0 −13	80		54		8	43	42	17	5.5×9.5×5.4	LMEF/K 20LUU
40		112	0 −0.4	62		8	51	50	17	5.5×9.5×5.4	LMEF/K 25LUU
47		123		76		10	62	60	17	6.6×11×6.5	LMEF/K 30LUU
62	0 −15	154		98	0 −0.3	13	80	75	20	9×14×8.6	LMEF/K 40LUU
75		192		112		13	94	88	20	9×14×8.6	LMEF/K 50LUU
90	0 −20	211		134		18	112	106	25	11×17.5×10.8	LMEF/K 60LUU

* : the value of Circular type

SAMICK LINEAR BUSHING SYSTEM

SAMICK CASE UNIT

SAMICK Linear Bushing Case Unit

SAMICK offer various type of Linear Bushing Case Unit for designing of linear motion system. Precisely machined Aluminum Cases are standarized for providing Interchangeablity and 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)□W type
Double standard type Linear Bushing assembled type aluminum Case Unit.

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

● SCJ type
Clearance adjustable type aluminum Case Unit by slotting in axial direction.
If high precise positioning is required, SCJ type can minimize the effect of clearnace between shaft and case.

* assembled Linear Bushing is orientated to have maximum load rating against top of Case Unit.

★SCE, SCE□W, SCE□V type are for European user

Part Number Notation

SC□ 20□UU(N)

Case Unit

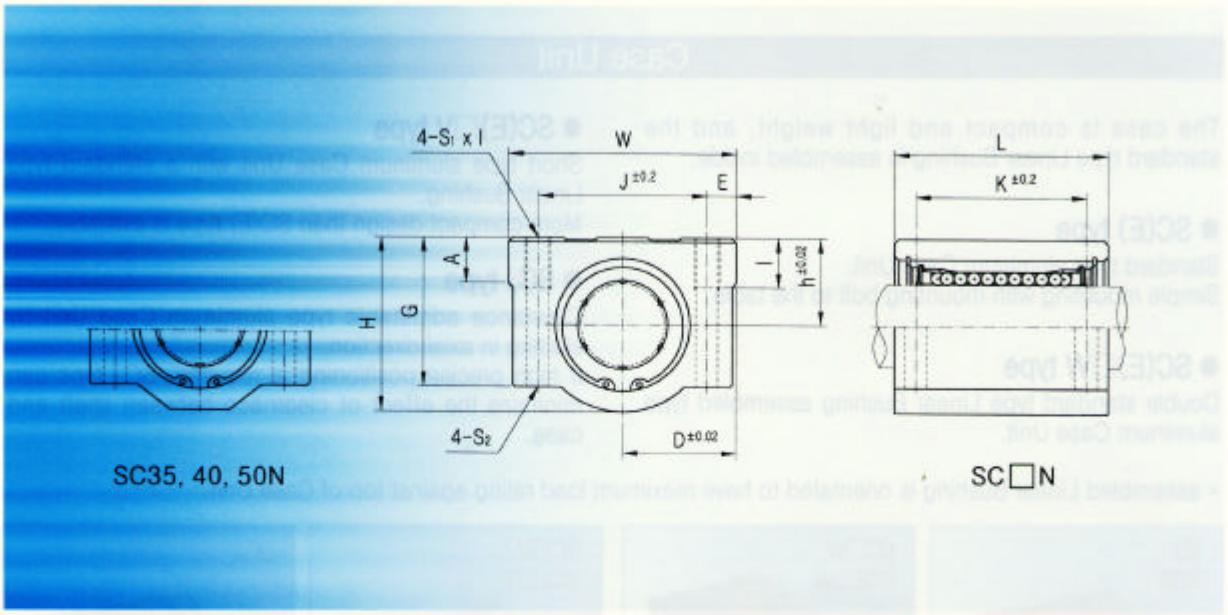
Model
– : Asian standard type
E : European type
J : Clearance adjustable type

LM Shaft Dia.

Seal
– – : No seal
UU : Seals on both sides

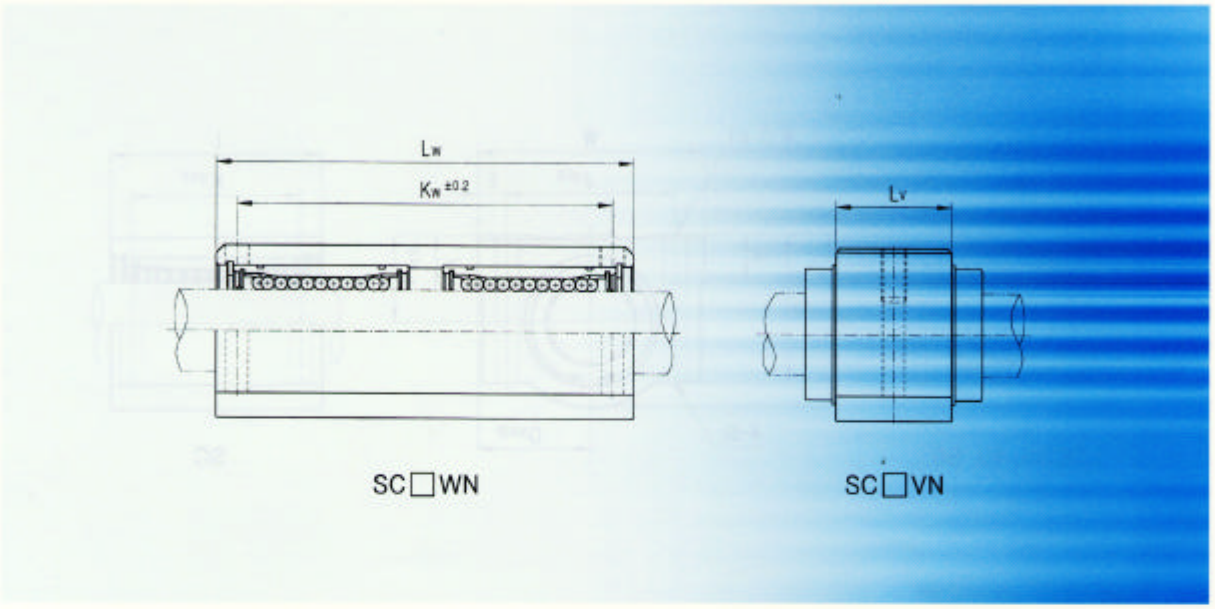
Type
– : Standard type
W : Long type
V : Short type

Linear Bushing Case Unit SC Series



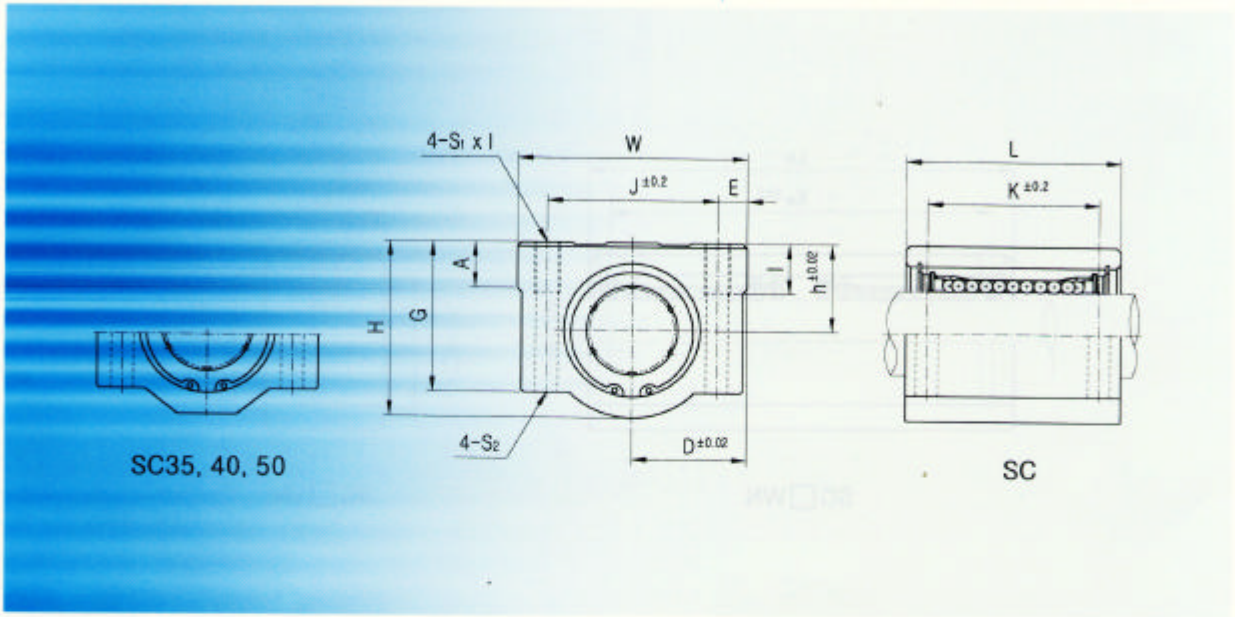
Standard Type					Long Type					Short Type				
Part number	Installed L/B	Load Ratings C(N)	Load Ratings C0(N)	Wgt. (g)	Part number	Installed L/B	Load Ratings C(N)	Load Ratings C0(N)	Wgt. (g)	Part number	Installed L/B	Load Ratings C(N)	Load Ratings C0(N)	Wgt. (g)
SC8UUN	LM8UU	260	400	56	SC8WUUN	2×LM8UU	410	800	94	SC8VUUN	LM8UU	260	400	36
SC10UUN	LM10UU	370	540	90	SC10WUUN	2×LM10UU	590	1080	147	SC10VUUN	LM10UU	370	540	63
SC12UUN	LM12UU	410	590	112	SC12WUUN	2×LM12UU	650	1180	220	SC12VUUN	LM12UU	410	590	74
SC13UUN	LM13UU	500	770	123	SC13WUUN	2×LM13UU	800	1540	245	SC13VUUN	LM13UU	500	770	85
SC16UUN	LM16UU	770	1170	189	SC16WUUN	2×LM16UU	1230	2340	376	SC16VUUN	LM16UU	770	1170	132
SC20UUN	LM20UU	860	1370	237	SC20WUUN	2×LM20UU	1370	2740	476	SC20VUUN	LM20UU	860	1370	170
SC25UUN	LM25UU	980	1560	555	SC25WUUN	2×LM25UU	1560	3120	1115	SC25VUUN	LM25UU	980	1560	405
SC30UUN	LM30UU	1560	2740	685	SC30WUUN	2×LM30UU	2490	5480	1375	SC30VUUN	LM30UU	1560	2740	495
SC35UUN	LM35UU	1660	3130	1100	SC35WUUN	2×LM35UU	2650	6260	2200	SC35VUUN	LM35UU	1660	3130	790
SC40UUN	LM40UU	2150	4010	1600	SC40WUUN	2×LM40UU	3440	8020	3200	SC40VUUN	LM40UU	2150	4010	1220
SC50UUN	LM50UU	3820	7930	3350	SC50WUUN	2×LM50UU	6110	15860	6720	SC50VUUN	LM50UU	3820	7930	2300

1N≒0.102kgf



Shaft Dia.	Dimensions(mm)															Part number
	Common										SC		SC□W		SC□V	
	h	D	W	H	G	A	J	E	$S_1 \times l$	S_2	K	L	Kw	Lw	Lv	
ø 8	11	17	34	22	18	6	24	5	M4×8	ø 3.4	18	30	42	58	15.4	SC8UUN
ø 10	13	20	40	26	21	8	28	6	M5×12	ø 4.3	21	35	46	68	19.5	SC10UUN
ø 12	15	21	42	28	24	7.4	30.5	5.75	M5×12	ø 4.3	26	36	50	70	20.5	SC12UUN
ø 13	15	22	44	30	24.5	8	33	5.5	M5×12	ø 4.3	26	39	50	75	20.5	SC13UUN
ø 16	19	25	50	38.5	32.5	9	36	7	M5×12	ø 4.3	34	44	60	85	23.5	SC16UUN
ø 20	21	27	54	41	35	11	40	7	M6×12	ø 5.2	40	50	70	96	27.4	SC20UUN
ø 25	26	38	76	51.5	41	12	54	11	M8×18	ø 6.8	50	67	100	130	37.4	SC25UUN
ø 30	30	39	78	59.5	49	15	58	10	M8×18	ø 6.8	58	72	110	140	40.9	SC30UUN
ø 35	34	45	90	68	54	18	70	10	M8×18	ø 6.8	60	80	120	155	45.4	SC35UUN
ø 40	40	51	102	78	62	20	80	11	M10×25	ø 8.6	60	90	140	175	56.4	SC40UUN
ø 50	52	61	122	102	80	24	100	11	M10×25	ø 8.6	80	110	160	215	68.9	SC50UUN

Linear Bushing Case Unit SC Series



Standard Type					Long Type					Short Type				
Part number	Installed L/B	Load Ratings C(N)	Load Ratings C0(N)	Wgt. (gf)	Part number	Installed L/B	Load Ratings C(N)	Load Ratings C0(N)	Wgt. (gf)	Part number	Installed L/B	Load Ratings C(N)	Load Ratings C0(N)	Wgt. (gf)
SC8UU	LM8UU	260	400	56	SC8WUU	2×LM8UU	410	800	94	SC8VUU	LM8UU	260	400	36
SC10UU	LM10UU	370	540	90	SC10WUU	2×LM10UU	590	1080	147	SC10VUU	LM10UU	370	540	63
SC12UU	LM12UU	410	590	112	SC12WUU	2×LM12UU	650	1180	220	SC12VUU	LM12UU	410	590	74
SC13UU	LM13UU	500	770	123	SC13WUU	2×LM13UU	800	1540	245	SC13VUU	LM13UU	500	770	85
SC16UU	LM16UU	770	1170	189	SC16WUU	2×LM16UU	1230	2340	376	SC16VUU	LM16UU	770	1170	132
SC20UU	LM20UU	860	1370	237	SC20WUU	2×LM20UU	1370	2740	476	SC20VUU	LM20UU	860	1370	170
SC25UU	LM25UU	980	1560	555	SC25WUU	2×LM25UU	1560	3120	1115	SC25VUU	LM25UU	980	1560	405
SC30UU	LM30UU	1560	2740	685	SC30WUU	2×LM30UU	2490	5480	1375	SC30VUU	LM30UU	1560	2740	495
SC35UU	LM35UU	1660	3130	1100	SC35WUU	2×LM35UU	2650	6260	2200	SC35VUU	LM35UU	1660	3130	790
SC40UU	LM40UU	2150	4010	1600	SC40WUU	2×LM40UU	3440	8020	3200	SC40VUU	LM40UU	2150	4010	1220
SC50UU	LM50UU	3820	7930	3350	SC50WUU	2×LM50UU	6110	15860	6720	SC50VUU	LM50UU	3820	7930	2300

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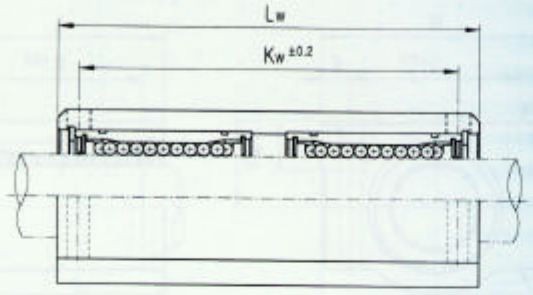
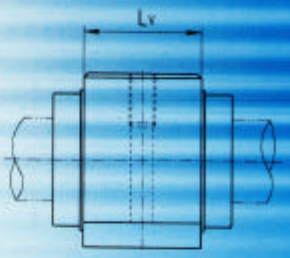


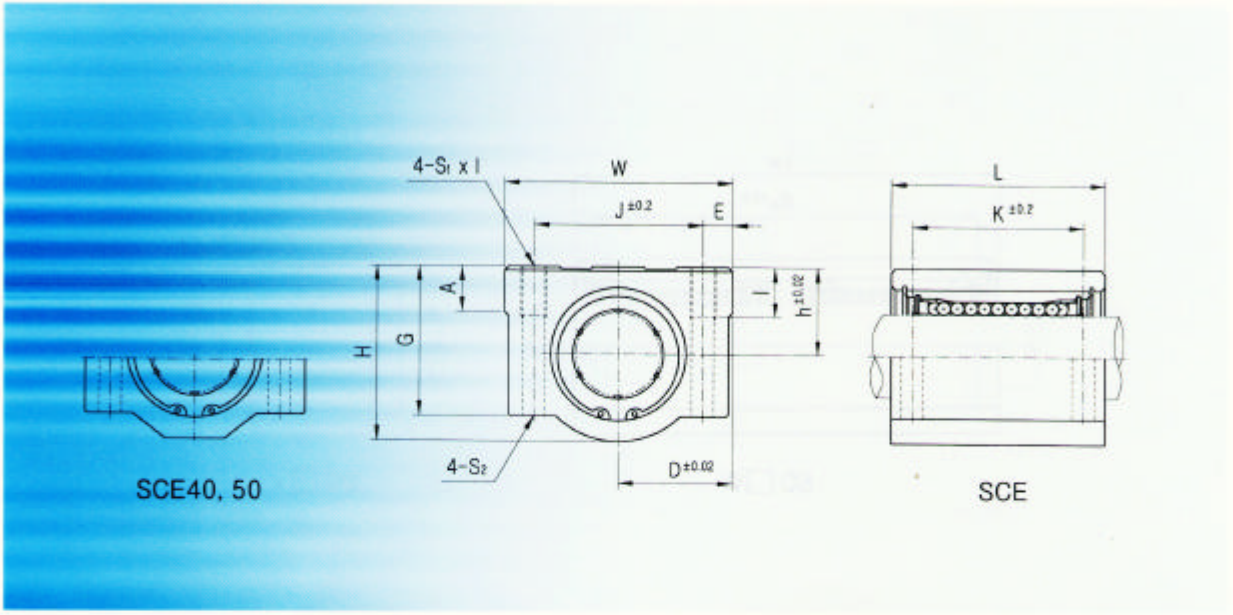
SC □W



SC □V

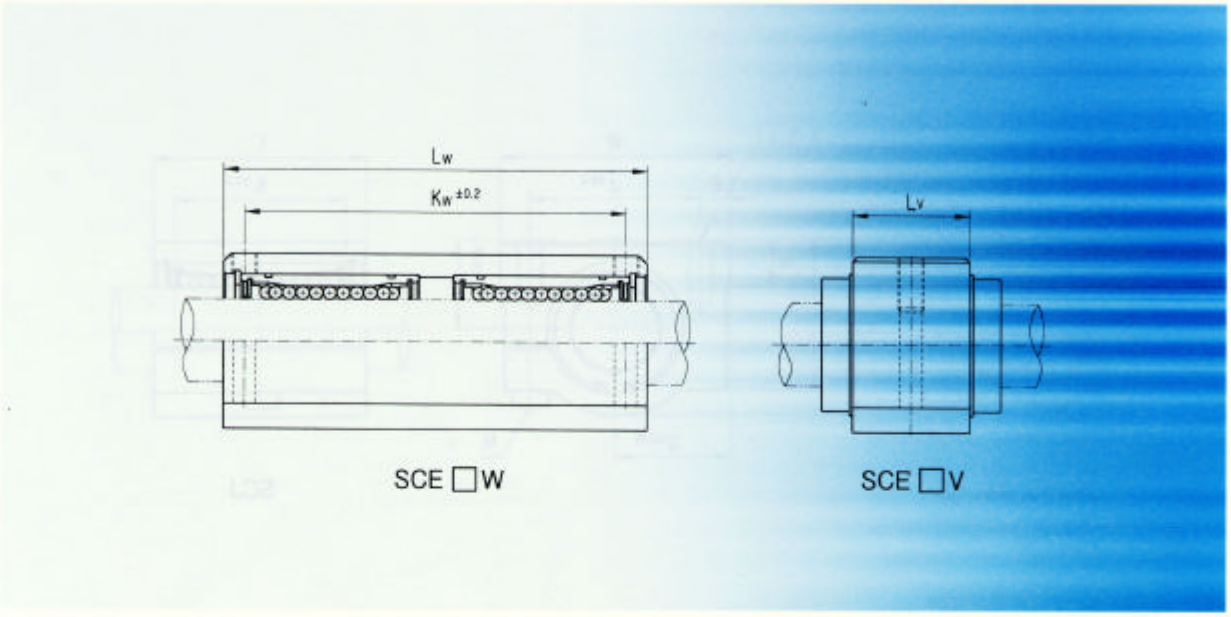
Shaft Dia.	Dimensions(mm)															Part number
	Common										SCE		SCE□W		SC□V	
	h	D	W	H	G	A	J	E	S1×l	S2	K	L	Kw	Lw	Lv	
ø 8	11	17	34	22	18	6	24	5	M4×8	ø 3.4	18	30	42	58	15.4	SC8UU
ø 10	13	20	40	26	21	8	28	6	M5×10	ø 4.3	21	35	46	68	19.5	SC10UU
ø 12	15	22	44	30	24.5	8	33	5.5	M5×10	ø 4.3	26	39	64	77	20.5	SC12UU
ø 13	15	22	44	30	24.5	8	33	5.5	M5×10	ø 4.3	26	39	64	77	20.5	SC13UU
ø 16	19	25	50	38.5	32.5	9	36	7	M5×12	ø 4.3	34	44	79	89	23.5	SC16UU
ø 20	21	27	54	41	35	11	40	7	M6×12	ø 5.2	40	50	90	100	27.4	SC20UU
ø 25	26	38	76	51.5	41	12	54	11	M8×18	ø 6.8	50	67	119	136	37.4	SC25UU
ø 30	30	39	78	59.5	49	15	58	10	M8×18	ø 6.8	58	72	132	146	40.9	SC30UU
ø 35	34	45	90	68	54	18	70	10	M8×18	ø 6.8	60	80	140	160	45.4	SC35UU
ø 40	40	51	102	78	62	20	80	11	M10×25	ø 8.6	60	90	150	180	56.4	SC40UU
ø 50	52	61	122	102	80	24	100	11	M10×25	ø 8.6	80	110	200	230	68.9	SC50UU

Linear Bushing Case Unit SCE Series



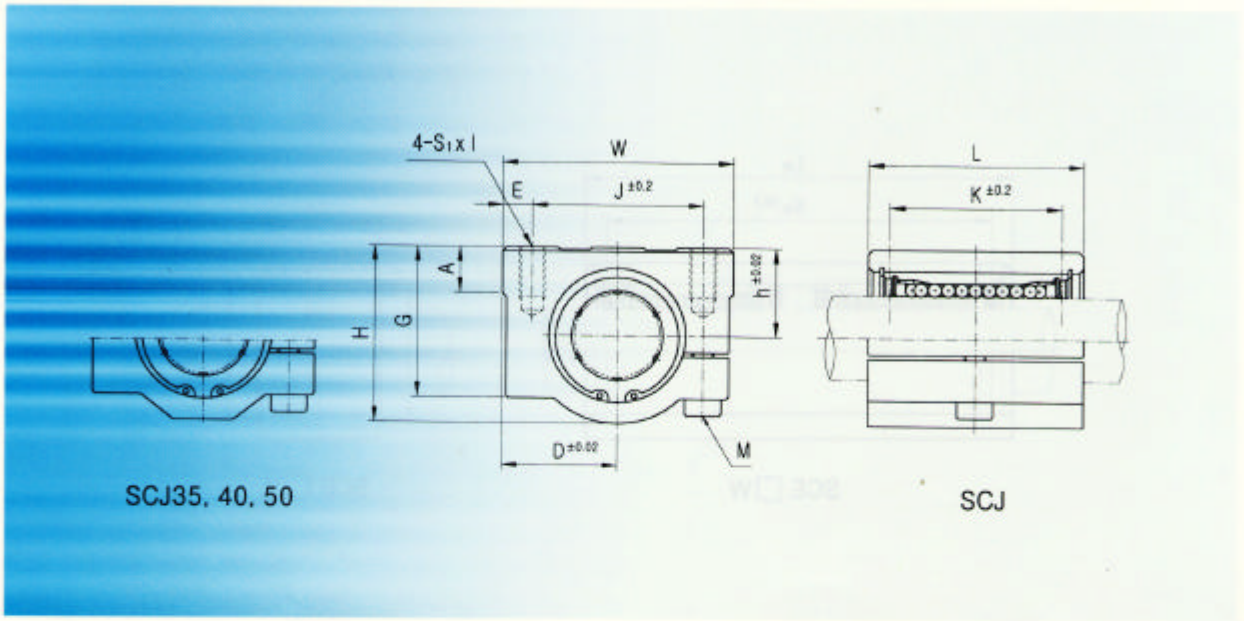
Standard Type					Long Type					Short Type				
Part number	Installed L/B	Load Ratings		Wgt. (gf)	Part number	Installed L/B	Load Ratings		Wgt. (gf)	Part number	Installed L/B	Load Ratings		Wgt. (gf)
		C0(N)	C(N)				C0(N)	C(N)				C0(N)	C(N)	
SCE8UU	LME8UU	260	400	60	SCE8WUU	2×LME8UU	410	800	98	SCE8VUU	LME8UU	260	400	40
SCE12UU	LME12UU	410	590	118	SCE12WUU	2×LMEI2UU	650	1180	232	SCE12VUU	LME12UU	410	590	82
SCE16UU	LME16UU	770	1170	180	SCE16WUU	2×LME16UU	1230	2340	360	SCE16VUU	LME16UU	770	1170	122
SCE20UU	LME20UU	860	1370	245	SCE20WUU	2×LME20UU	1370	2740	490	SCE20VUU	LME20UU	860	1370	176
SCE25UU	LME25UU	980	1560	550	SCE25WUU	2×LME25UU	1560	3120	1100	SCE25VUU	LME25UU	980	1560	400
SCE30UU	LME30UU	1560	2740	760	SCE30WUU	2×LME30UU	2490	5480	1525	SCE30VUU	LME30UU	1560	2740	570
SCE40UU	LME40UU	2150	4010	1700	SCE40WUU	2×LME40UU	3440	8020	3400	SCE40VUU	LME40UU	2150	4010	1320
SCE50UU	LME50UU	3820	7930	2950	SCE50WUU	2×LME50UU	6110	15860	5920	SCE50VUU	LME50UU	3820	7930	1900

1N≒0.102kgf



Shaft Dia.	Dimensions(mm)															Part number
	Common										SCE		SCE□W		SC□V	
	h	D	W	H	G	A	J	E	S1×l	S2	K	L	Kw	Lw	Lv	
ø 8	11	17	34	22	18	6	24	5	M4×8	ø 3.4	18	30	42	58	14.4	SCE8UU
ø 12	15	22	44	30	24.5	8	33	5.5	M5×10	ø 4.3	26	39	64	77	20.3	SCE12UU
ø 16	19	25	50	38.5	32.5	9	36	7	M5×12	ø 4.3	34	44	79	89	22.3	SCE16UU
ø 20	21	27	54	41	35	11	40	7	M6×12	ø 5.2	40	53	90	106	28.3	SCE20UU
ø 25	26	38	76	51.5	41	12	54	11	M8×18	ø 6.8	50	67	119	136	40.4	SCE25UU
ø 30	30	39	78	59.5	49	15	58	10	M8×18	ø 6.8	58	76	132	154	48.4	SCE30UU
ø 40	40	51	102	78	62	20	80	11	M10×25	ø 8.6	60	90	150	180	56.4	SCE40UU
ø 50	52	61	122	102	80	24	100	11	M10×25	ø 8.6	80	110	200	230	72.3	SCE50UU

Linear Bushing Case Unit SCJ Series



Part number	Installed L/B	Load Ratings		Shaft Dia.	Dimensions (mm)												Wgt. (g)
		C(N)	C0(N)		h	D	W	H	G	A	J	E	S1×l	K	L	M	
SCJ10UU	LM10UUAJ	370	540	ø10	13	20	40	26	21	8	28	6	M5×12	21	35	M4	90
SCJ12UU	LM12UUAJ	410	590	ø12	15	21	42	28	24	7.4	30.5	5.75	M5×12	26	36	M4	112
SCJ13UU	LM13UUAJ	500	770	ø13	15	22	44	30	24.5	8	33	5.5	M5×12	26	39	M4	123
SCJ16UU	LM16UUAJ	770	1170	ø16	19	25	50	38.5	32.5	9	36	7	M5×12	34	44	M4	189
SCJ20UU	LM20UUAJ	860	1370	ø20	21	27	54	41	35	11	40	7	M6×12	40	50	M5	237
SCJ25UU	LM25UUAJ	980	1560	ø25	26	38	76	51.5	41	12	54	11	M8×18	50	67	M6	555
SCJ30UU	LM30UUAJ	1560	2740	ø30	30	39	78	59.5	49	15	58	10	M8×18	58	72	M6	685
SCJ35UU	LM35UUAJ	1660	3130	ø35	34	45	90	68	54	18	70	10	M8×18	60	80	M6	1100
SCJ40UU	LM40UUAJ	2150	4010	ø40	40	51	102	78	62	20	80	11	M10×25	60	90	M8	1600
SCJ50UU	LM50UUAJ	3820	7930	ø50	52	61	122	102	80	24	100	11	M10×25	80	110	M8	3350