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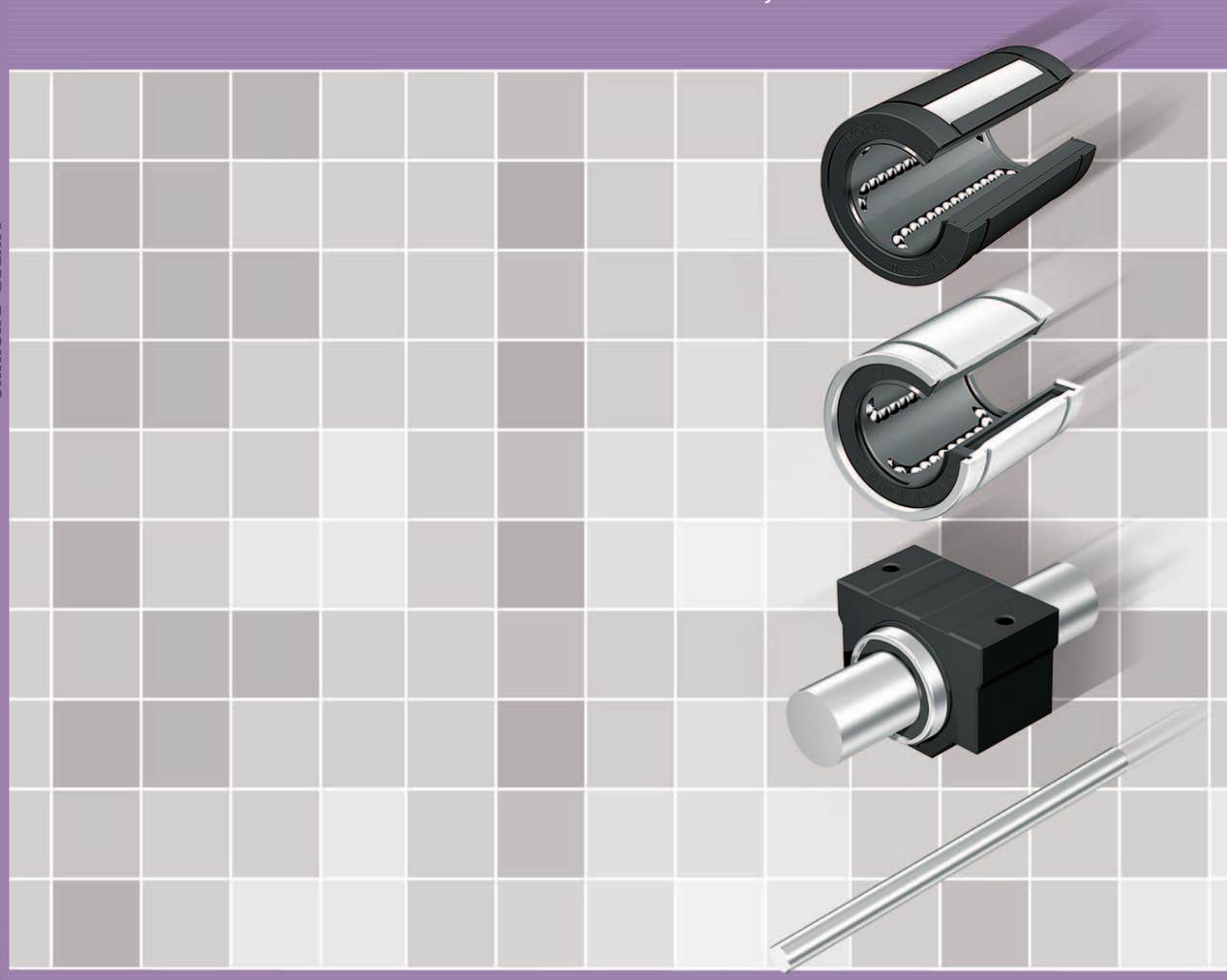
THE PRINCIPLE OF LINEAR SYSTEM **LINEAR BUSHING**

CATALOG NO. 0901E

THE PRINCIPLE OF LINEAR SYSTEM

LINEAR BUSHING

by **SAMICK** the Linear Instinct



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SAMICK PRECISION IND.CO.,LTD.

Brief page

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publication No. 0901E

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Overall Linear Bushing technology by SAMICK

Look at the technology here,
and feel the Instinct of Linear Art at the field.

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Product Overview

Self-Aligning Linear Bushing

- Up to 3 times higher load capacity and 27 times longer travel life compared to a standard linear bushing
- Interchangeable with standard linear bushing
- Travel speeds up to 10ft/s (3m/s)
- Smooth operation and reduced maintenance as a result of self-aligning Ball plates (±0.5°)
- Anti-Rusting: Nickel or Chrome plating, Raydent treatment of ball plate, Stainless-steel ball plate (Under LMES12, LMBS8), Stainless-steel ball

LMES, LMES_OP: European standard(mm), p29
LMBS, LMBS_OP: American standard(inch), p31

Standard Linear Bushing

- Allowed Max. 7650N the basic dynamic load rating
- Shaft diameter from 60mm to 5mm
- Provide low friction on high-speed movement
- Can be selected resin retainer (standard), and steel retainer (for high temperature & vacuum)
- Corrosion-resisting: the nickel-plated, Raydent treatment of Outer-sleeves, stainless steel ball

LM, LM_OP, LM_AJ, LM_L: Asian standard, p46
LME, LME_OP, LME_AJ, LME-L: European standard, p66

Flanged type Linear Bushing

- With a variety of design and ease of installation
- Used in case of passing the load of moving body directly to the Linear Bushing
- Installed without housing
- Can be selected resin retainer (standard), and steel retainer (for high temperature & vacuum)
- Corrosion-resisting: the nickel-plated, Raydent treatment of Outer-sleeves, stainless steel ball

LMF_(L), LMK_(L), LMH_(L): Asian standard, p50
LMEF_(L), LMEK_(L): European standard, p70

Pilot Flanged type Linear Bushing

- With a variety of design and ease of installation
- When the load of moving body passed directly to the Linear Bushing, the Pilot Flange can get more stable movement and being the most suitable for moment load
- Installed without housing
- Can be selected resin retainer (standard), and steel retainer (for high temperature & vacuum)
- Corrosion-resisting: the nickel-plated, Raydent treatment of Outer-sleeves, stainless steel ball

LMFP_(L), LMK_P(L), LMHP_(L): Asian standard, p56
LMEFP_(L), LMEKP_(L): European standard, p70

Middle Pilot Flanged type Linear Bushing

- With a variety of design and ease of installation
- When the load of moving body passed directly to the Linear Bushing, the Pilot Flange can get more stable movement and being the most suitable for moment load
- Installed without housing
- Can be selected resin retainer (standard), and steel retainer (for high temperature & vacuum)
- Corrosion-resisting: the nickel-plated, Raydent treatment of Outer-sleeves, stainless steel ball

LMFM, LMKM, LMHM: Asian standard, p62
LMEFM, LMEKM: European standard, p78

Aluminum Case Unit

- Combination product with Aluminum housing and standard or Self-Aligning linear bushing
- Aluminum housing with a high precision and lightweight
- Abnormal variant does not occur within reasonable load
- Minimized surface scratch

SC, SC_V, SC-W, SCJ: Asian standard, p82
SCE, SCE_V, SCE_W: European standard, p89

Aluminum Case Unit (Open type)

- Integration of open type aluminum housing and open type linear bushing
- Aluminum housing with a high hardness and lightweight
- Combined with support rail

SBR, TBR: Asian, European standard, p87

Shaft Rail Unit

- Integration of aluminum rail and shaft
- Combined with open type Aluminum Case Unit

SBS, TBS: Asian, European standard, p96

Shaft / Shaft Support

- High carbon bearing steel shaft (Surface treatment and chamfering is possible)
- Aluminum shaft support

SF: Shaft, Asian, European standard, p98
SK: Shaft support, Asian, European standard, p98

| PART NUMBER NOTATION |

Self-Aligning Linear Bushing	LM	ES	16	UU	OP	-	N	S

Samick Linear Bushing

Standards

Metric series (mm) : ES
Inch series (inch) : BS

Nominal Shaft Diameter

Metric (mm) : 10~50mm
Inch Series : #4~#32

Seal

No Seal : Blank
One Side Seal : U
Both Side Seal : UU

Type

Standard type : Blank
Open type (for support rail) : OP

Corrosion resistance type

No-plaiting (Standard) : Blank
Ball plate nickel plaiting : N
Stainless steel ball plaiting : M
Ball plate Chrome plaiting : C

Ball type (by corrosion resistance)

High carbon bearing steel ball (standard) : Blank
Stainless steel ball : S

| PART NUMBER NOTATION |

Linear Bushing	LM	E	F	P	20	L	UU	OP	-	A	N	S

Samick Linear Bushing

Standards(Asia, Europe)

Asian Standard : Blank / European Standard : E

Flange option

Standard : Blank
Circular type : F
Square type : K
Oval type : H

Flange Location

Standard : Blank
Pilot : P
Middle : M

Nominal Shaft Diameter

Standard : 5 ~ 60mm
Flange type : 6 ~ 60mm

Length

Standard : Blank
Long : L

Seal

No Seal : Blank
One Side Seal : U
Both Side Seal : UU

Sloting Type

Standard type : Blank
Open type : OP
Adjustable type : AJ

Retainer (by application temperature)

Resin retainer (Standard) : Blank
Steel retainer(High temperature) : A

Outer-sleeves (by corrosion resistance)

No plaiting(Standard) : Blank
Electroless nickel plating : N
Raydent treatment : R

Ball type (by corrosion resistance)

High carbon bearing steel ball (standard) : Blank
Stainless steel ball : S

| PART NUMBER NOTATION |

Aluminum Case Unit	SC	E	J	20	W	UU	–	A	N	S

Samick Aluminum Case Unit (with Standard Linear Bushing)

Standards (Asia, Europe)

Asian Standard : blank
European Standard : E

Clearance adjustable type*

Standard : blank
Clearance adjustable type (Asian standard only : J

Nominal Shaft Diameter Metric series (mm) : 8~50mm

Case unit length

Standard : blank
Compact type : V
Long type : W

Seal

No Seal : Blank
One Side Seal : U
Both Side Seal : UU

Retainer (by application temperature)**

Resin retainer (Standard) : Blank
Steel retainer(High temperature) : A

Outer-sleeves (by corrosion resistance)

No plaiting(Standard) : Blank
Electroless nickel plating : N
Raydent treatment : R

Ball type (by corrosion resistance)

High carbon bearing steel ball (standard) : Blank
Stainless steel ball : S

* Clearance adjustable type aluminum housing unit applies only to the Asian standard and the Nominal Shaft Diameter Selection is possible between 10mm to 50mm
** Steel retainer applies only to Asian standard and European standard
*** It can combine with self-aligning linear bushing (SCE type)

| PART NUMBER NOTATION |

Aluminum Case Unit (Open type)	SBR	20	UU	–	A	N	S

Samick open type Aluminum Case Unit

Open type Aluminum Case Unit(Standard type) : SBR
Open type Aluminum Case Unit(Clearance adjustable type) : TBR

Nominal Shaft Diameter* 16~50mm

Seal

No Seal : Blank
One Side Seal : U
Both Side Seal : UU

Retainer (by application temperature)**

Resin retainer (Standard) : Blank
Steel retainer(High temperature) : A

Outer-sleeves (by corrosion resistance)

No plaiting(Standard) : Blank
Electroless nickel plating : N
Raydent treatment : R

Ball type (by corrosion resistance)

High carbon bearing steel ball (standard) : Blank
Stainless steel ball : S

* SBR's nominal shaft diameter: 16~50mm, TBR's nominal shaft diameter: 16~50mm
** By default, open type case unit cannot combine with a self-aligning linear bushing but some of the model is available with self-aligning linear bushing. Please contact Samick.

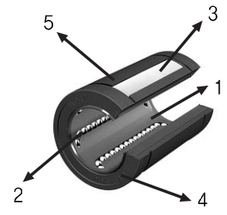
| PART NUMBER NOTATION |

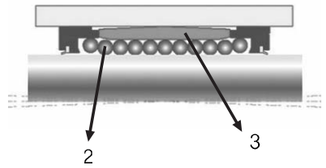
Support Rail Unit	SBS	C	g6	30	-	1000	L
Samick Support Rail Unit							
Support Rail Unit for SBR : SBS Support Rail Unit for TBR : TBS							
Shaft (by corrosion resistance)							
No plaiting (Standard) : Blank Chrome plaited shaft : C Nickel plaited shaft : N Raydent treated shaft : R							
Shaft tolerance							
Asian standard g6 tolerance shaft : blank European standard h6 tolerance shaft : h6							
Shaft Diameter							
Shaft Length						100~3000mm	

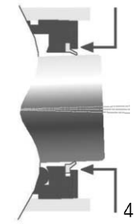
Shaft	SF	C	g6	30	-	1000	L
Samick LM Shaft							
Corrosion resistance treatment							
No plaiting (Standard) : Blank Chrome plaited shaft : C Nickel plaited shaft (Length Max 1m) : N Raydent treated shaft : R							
Shaft tolerance							
Asian standard g6 tolerance : Blank European standard h6 tolerance : h6							
Shaft Diameter				5~80mm			
Shaft Length						100~3000mm	

Shaft Support	SK	20
Samick Shaft Support (Aluminum)		
Shaft Diameter		6~40mm

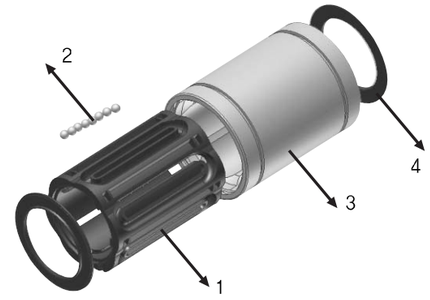
| Structure and Special Feature |







Part	Material	Special features and function
1 Retainer	- POM	- Guide ball's Motion - An essential element of unlimited linear stroke
2 Ball	- High carbon bearing steel - Stainless steel - Ceramic	- the support of the load by direct contact between shaft and ball plate - An essential element for low friction, high load capacity, high precision and high speed stroke
3 Ball plate	- High carbon bearing steel - Stainless steel * available Corrosion resistance plaiting	- Direct contact with the ball to hold the load - Stand on a high load with the specially designed ball groove. - A key part of the self-aligning
4 Rubber Seal	- NBR * optional item	- Direct contact with shaft - Blocking a foreign substance from outside - Blocking outflow of lubricant by sealing linear bushing - An floating seal to facilitate self-aligning
5 Outer Sleeve	- POM	- Support ball plate - Possible to run with highspeed and reduce the inertia force & noise because of low friction with lightweight



Part	Material	Special features and function
1 Retainer	- POM - Stainless Steel	- Guide ball's Motion - An essential element of unlimited linear stroke
2 Ball	- High carbon bearing steel - Stainless steel - Ceramic	- the support of the load by direct contact between shaft and ball plate - An essential element for low friction, high load capacity, high precision and high speed stroke
3 Outer Sleeve	- High carbon bearing steel - Stainless steel * available Corrosion resistance plaiting	- Direct contact with the ball to the receiving portion of the load - Direct contact part to housing - An essential element for high load capacity - Interchangeability
4 Rubber Seal	- NBR * optional item	- Blocking a foreign substance from outside - Blocking outflow of lubricant by sealing linear bushing

Overall Linear Bushing technology by SAMICK

Look at the technology here,
and feel the Instinct of Linear Art at the field.

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Technical information

Load Rating and Service Life of Linear Motion System

When determine a model that would best suit for service conditions of a linear motion system, the load rating and travel life of the model must be considered. To consider the load rating, you should know the static safety factor of the model, which is calculated based on the basic static load rating. The service life can be assessed by calculating the nominal life, based on the basic dynamic load rating, and you need to check if the values thus obtained meet your requirements.

Basic static load rating

There are two basic load ratings of a linear motion system: basic static load rating (C_0), which sets the static load allowance limit, and basic dynamic load rating(C), which is using for calculating travel life.

Basic Static Load Rating (C_0)

If a linear motion system, whether at rest or in motion, receives an excessive load or large impact, a local permanent deformation develops the raceway and rolling elements. And if the magnitude of the permanent deformation exceeds a certain limit, it hinders the smooth motion of the linear motion system. The basic static load rating refers to a static load in a given direction with given magnitude, which total permanent deformation of rolling elements and raceway at the contact area is approximately 0.0001 of the rolling element diameter. In a linear motion system, the basic static load rating is defined as the radial load. Thus, the limit of static load allowance is the basic static load rating. For the rating values of individual linear motion systems, see the respective specification table in this catalog.

Static Safety Factor (f_s)

A linear motion system may possibly receive an unpredictable external force due to the vibration or impact while it is at rest or in motion, or inertia as a result of starting and stopping. It is, therefore, necessary to consider the static safety factor against operating loads. The static safety factor(fs) indicates the ratio of a linear motion system load carrying capacity (basic static load rating, Co) to the load exerted there on.

$$f_s = \frac{C_0}{P} \quad \text{or} \quad f_s = \frac{M_0}{M}$$

f_s : Static safety factor
C_0 : Basic static load rating (N)
M_0 : Static permissible moment (N · mm)
P : Calculated load (N)
M : Calculated moment (N · mm)

To calculate a load exerted on the linear motion system, the mean load for calculating the service life and the maximum load for calculating the static safety factor must be obtained in advance. A system can receive unexpected excessive load when it is subject to frequent starts and stops, placed under machining loads, or when the severe moment is applied by overhanging loads. When selecting the correct type of a linear motion system for your application, be sure that the type you are considering can bear the maximum possible load when stopped and in operation. The table below specifies the standard values for the static safety factors.

Machine used	Loading conditions	fs lower limit
Ordinary Industrial Machine	Receives no vibration or impact Receives vibration or impact	1.0 ~ 1.3 2.0 ~ 3.0
Machine tool	Receives no vibration or impact Receives vibration or impact	1.0 ~ 1.5 2.5 ~ 7.0

For large radial loads	$\frac{f_H \cdot f_T \cdot f_C \cdot C_0}{P} \geq f_s$

Co : Basic static load rating (N)
f_H : Hardness factor
fc : Contact factor
P : Calculated load (N)
f_T : Temperature factor

Basic Dynamic Load Rating (C)

The basic dynamic load rating (C) refers to a load in a given direction with given magnitude such that when identical linear motion systems in a group are interlocked with one another under the same conditions, the nominal life (L) of the systems is 50km (L=50km) if the systems use balls, and 100km(L=100km) if they use rollers. The basic dynamic load rating (C) is used to calculate the service life of a set of linear motion systems, which are interlocked with one another in response to a load. For rating values of individual linear motion systems, see the respective specification tables in this catalog.

Nominal Life

The service lives of linear motion systems more or less vary from system to system even if they are manufactured to the same specifications and remain in service under the same operating conditions. Hence a guideline for determining the service life of a linear motion system is given based on nominal life, Which is defined as follows. The nominal life refers to the total running distance that 90% of identical linear motion systems in a group, when interlocked with one another under the same conditions, can achieve without flaking develops. The nominal life (L) of a linear motion system can be obtained from the basic dynamic load rating (C) and load imposed (P) using the following equations.

For linear motion system with balls	For a linear motion system with rollers
$L = (\frac{C}{P})^3 \times 50$ $L_{100} = (\frac{C_{100}}{P})^3 \times 100$ $※C_{100} = (\frac{C}{1.26})$	$L = (\frac{C}{P})^{\frac{10}{3}} \times 100$
L : Nominal life of 50km L_{100} : Nominal life of 100km C : Basic dynamic load rating of 50km C_{100} : Basic dynamic load rating of 100km P : Applied load	L : Nominal life of 100km

The travel life of the Linear Bushing can be obtained using the following equation

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

$$L_{100} = \left(\frac{f_H \times f_T \times f_C}{f_W} \times \frac{C_{100}}{P}\right)^3 \times 100$$

L	: Nominal life of 50km	L_{100}	: Nominal life of 100km
C	: Basic dynamic load rating of 50km	C_{100}	: Basic dynamic load rating of 100km
P	: Applied load	f_H	: Hardness factor (see Fig 1)
f_T	: Temperature (see Fig 2)	f_C	: Contact factor (see Table)
f_W	: Load factor (see Table)		

Once nominal life L is obtained using this equation, the Linear Bushing service life can be calculated using the following equation, if the stroke length and the number of reciprocating cycles are constant

$$L_h = \frac{L \times 10^6}{2 \times \ell_s \times N_\ell \times 60}$$

L_h	: Travel life in hours	ℓ_s	: Stroke
N_ℓ	: Number of strokes per minute		

Factors that affect the travel life

Hardness factor (f_H)

To ensure achievement of the optimum load rating of the Linear Bushing, the raceway hardness must be 58 to 64 HRC. At hardness below this range, the basic dynamic and static load ratings decrease. The ratings must therefore be multiplied by the respective hardness factors (f_H).

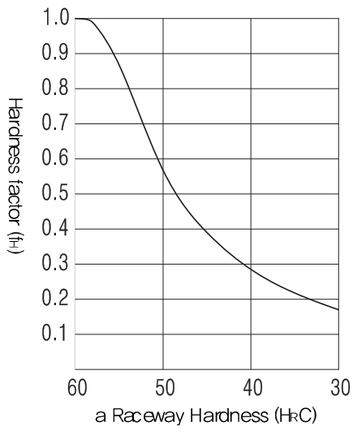


Fig1 Hardness factor (f_H)

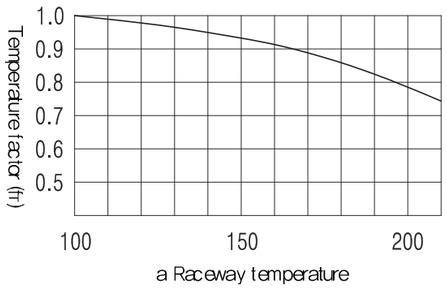


Fig2 Temperature factor (f_T)

Temperature factor (f_T)

For Linear Bushings used at ambient temperatures over 100℃, a temperature factor corresponding to the ambient temperature, selected from the diagram , must be taken into consideration. For higher than 80℃ application, the seals, end plates, and retainer must be changed for high temperature specifications. (Temperature range: 20℃ ~ 80℃)In addition, please note that the selected Linear Bushing itself must be a model with high-temperature specifications.

Contact factor (f_C)

When multiple Linear Bushings are used laid over one another, moments and mounting-surface precision will affect operation, making it difficult to achieve uniform load distribution. For Linear Bushings used laid over one another, multiply the basic load rating (C or CO) by a contact factor selected from the table below.

Number of linear bushings on a shaft	Contact factor(f_C)
2	0.81
3	0.72
4	0.66
5	0.61
Over 6	0.60
In normal use	1.0

Load factor (f_W)

In general, machines in reciprocal motion are likely to cause vibration and impact during operation, and it is particularly difficult to determine the magnitude of vibration that develops during high-speed operation, as well as that of impact during repeated starting and stopping in normal use. Therefore, where the effects of speed and vibration are estimated to be significant, divide the basic dynamic load rating (C) by a load factor selected from the table below.

Operating conditions		Load factor (f_W)
Load conditions	Speed	
No impact and vibration	Under 15m/min	1.0~1.5
Slight impact and vibration	Under 60m/min	1.5~2.0
Considerable impact and vibration	Over 60m/min	2.0~4.0

Load Consideration

When designing a linear motion system, it is necessary to consider how the variables of operation will affect performance. The following examples demonstrate how the position of the load and the center of gravity can influence the product selection. When evaluating your application, review each of the forces acting on your system and determine the product best for your needs.

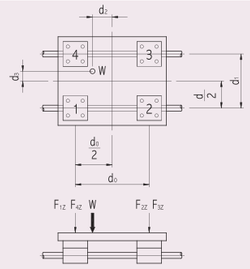
Horizontal Application | At the time of movement with uniform velocity or at the time of stop

$$F_{1Z} = \frac{W}{4} + (\frac{W}{2} \cdot \frac{d_2}{d_0}) - (\frac{W}{2} \cdot \frac{d_3}{d_1})$$

$$F_{2Z} = \frac{W}{4} - (\frac{W}{2} \cdot \frac{d_2}{d_0}) - (\frac{W}{2} \cdot \frac{d_3}{d_1})$$

$$F_{3Z} = \frac{W}{4} - (\frac{W}{2} \cdot \frac{d_2}{d_0}) + (\frac{W}{2} \cdot \frac{d_3}{d_1})$$

$$F_{4Z} = \frac{W}{4} + (\frac{W}{2} \cdot \frac{d_2}{d_0}) + (\frac{W}{2} \cdot \frac{d_3}{d_1})$$



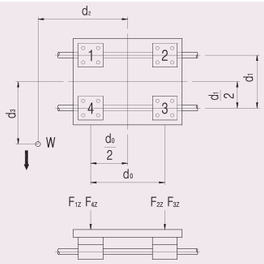
Horizontal Application | At the time of movement with uniform velocity or at the time of stop

$$F_{1Z} = \frac{W}{4} + (\frac{W}{2} \cdot \frac{d_2}{d_0}) - (\frac{W}{2} \cdot \frac{d_3}{d_1})$$

$$F_{2Z} = \frac{W}{4} - (\frac{W}{2} \cdot \frac{d_2}{d_0}) - (\frac{W}{2} \cdot \frac{d_3}{d_1})$$

$$F_{3Z} = \frac{W}{4} - (\frac{W}{2} \cdot \frac{d_2}{d_0}) + (\frac{W}{2} \cdot \frac{d_3}{d_1})$$

$$F_{4Z} = \frac{W}{4} + (\frac{W}{2} \cdot \frac{d_2}{d_0}) + (\frac{W}{2} \cdot \frac{d_3}{d_1})$$

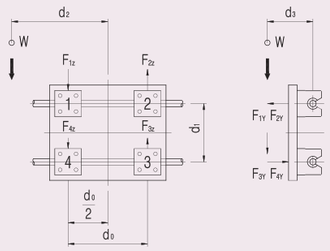


Side Mounted Application | At the time of movement with uniform velocity or at the time of stop

$$F_{1Y} \sim F_{2Y} = (\frac{W}{2} \cdot \frac{d_3}{d_0})$$

$$F_{1Z} = F_{4Z} = \frac{W}{4} + (\frac{W}{2} \cdot \frac{d_2}{d_0})$$

$$F_{2Z} = F_{3Z} = \frac{W}{4} - (\frac{W}{2} \cdot \frac{d_2}{d_0})$$



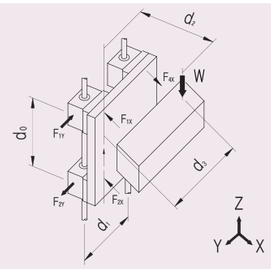
Vertical Application | At the time of movement with uniform velocity or at the time of stop.
At the time of start and stop, the load varies because of inertia

$$F_{1X} \sim F_{2X} = (\frac{W}{2} \cdot \frac{d_2}{d_0})$$

$$F_{1Y} \sim F_{2Y} = (\frac{W}{2} \cdot \frac{d_3}{d_0})$$

$$F_{1X} + F_{4X} \sim F_{2X} + F_{3X}$$

$$F_{1Y} + F_{4Y} \sim F_{2Y} + F_{3Y}$$



Mean Effective Load at Varying Load

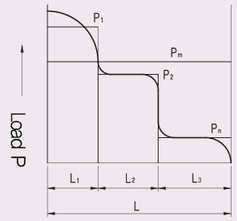
The load acting on a linear system changes depending on the application, for example, when the linear system starts or stops reciprocating motion, while it is operating at a fixed speed, and according to whether the linear system carries work or not. For a fluctuating load, it is important to obtain the mean effective load.

For stepped load according to the travelling distance

$$P_m = \sqrt[3]{\frac{1}{L}(P_1^3 \cdot L_1 + P_2^3 \cdot L_2 \cdots + P_n^3 \cdot L_n)} \quad \cdots\cdots (1)$$

P_m	: mean effective load in fluctuation	(N)
P_n	: floating load	(N)
L	: Total traveling distance	(mm)
L_n	: Traveling distance with carrying Pn	(mm)

(1)



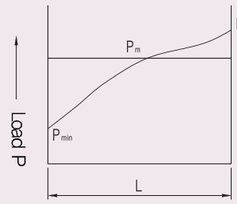
For loads that changes step wisely

For almost linearly varying load

$$P_m \fallingdotseq \frac{1}{3}(P_{mn} + 2 \cdot P_{max}) \quad \cdots\cdots (2)$$

P_m	: mean effective load in fluctuation	(N)
P_{mn}	: Minimum value of fluctuating bad	(N)
P_{max}	: Maximum value of fluctuating load	(N)

(2)



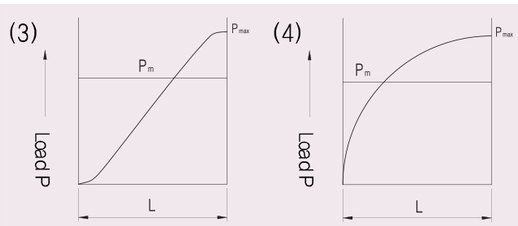
For loads that changes monotonously

When the load draws a sine curve

$$P_m \fallingdotseq 0.65\ P_{max} \quad \cdots\cdots (3)$$

$$P_m \fallingdotseq 0.75\ P_{max} \quad \cdots\cdots (4)$$

(3) (4)



For loads that changes sinusoid ally

Would you align, please?

No, I don't need!
I am Self-Aligning!

23

High Capacity Self-Aligning Linear Bushings

High Capacity Self-Aligning Linear Bushing - SUPERBALL

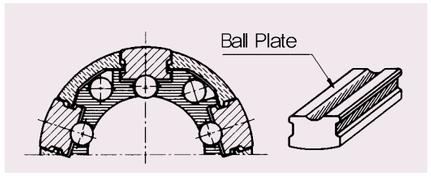
Higher Load Ratings and Travel Life
Specially designed ball plate is made of Hardened steel, and the precisely ground groove is slightly larger than the ball size, which provides greater contact area between the ball and the ball plate. In addition, this design provides 3 times higher load ratings and 27 times longer travel life compared to conventional Linear Bushing.

Self-Alignment
Ball plate has a convex shape to provide a pivot point at the center, which allows Self Alignment up to 0.5°. This Self Alignment capability eliminates any possibility of edge pressure caused by inaccurate machining, errors on mounting, or shaft deflection. Moreover, it obtains uniform load distribution and low friction motion.

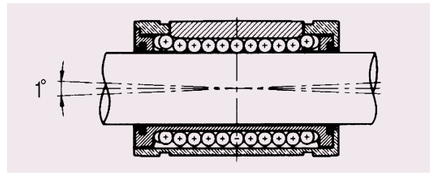
Smooth and Silent Running
SUPERBALL has extremely smooth running due to the uniquely designed ball retainer and the outer sleeve. They are made of Engineering Polymer, which has light weight, low friction, and high wear-resistance. Due to them, the smooth and silent running can be obtained.

Clearance Adjustment
SUPERBALL's ball plates are designed to float in the outer sleeve. This allows clearance between the balls and shaft to be adjusted for the best application environment by using with the housing.

Interchangeability
SUPERBALL is designed to be fully Interchangeable with conventional linear bushing.



Cross-section of SUPERBALL



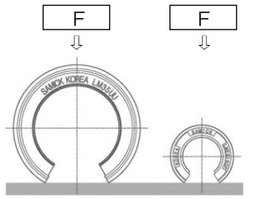
SUPERBALL's self-alignment feature

Cost Effectiveness

Lower cost on installation
Self-Alignment feature can compensate the inaccurate machining of the base, so less installation time and cost can be obtained

Higher load rating and longer travel life
Compared to the same size conventional linear bushings, SUPPERBALL will offer higher load rating and longer travel life.

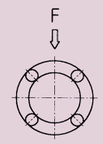
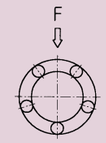
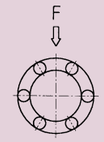
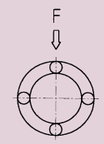
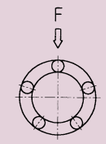
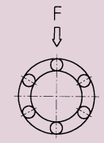
Reduction of material cost
SUPERBALL's higher load rating enables the use of smaller components, and reducing material cost.



Energy saving
SUPERBALL is designed with lightweight, lower inertia, and low friction, so it enables the moving parts to have rapid motion with lower driving power.

Load Ratings and Travel Life

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

	Orientation of Balls		
No. of Ball Row	4 Row	5 Row	6 Row
Max. Load			
Equation	$F = 1.41 \times C$	$F = 1.46 \times C$	$F = 1.26 \times C$
Min. Load			
Equation	$F = C$	$F = C$	$F = C$

Basic Dynamic load rating(C) and travel life
The travel life of a Linear Bushing is determined largely by the quality of the shaft. The Basic Dynamic bad rating is maximum continuous load that can be applied to the Linear Bushing with 90% of reliability achieving after 50km operation under normal conditions. The nominal travel life can be calculated by follow equation.

$$L = \left[\frac{C}{P}\right]^3 \times 50$$

$$L_{100} = \left[\frac{C_{100}}{P}\right]^3 \times 100$$

L : Nominal life(basis:50km, unit: Km)
L_{100} : Nominal life(basis:50km, unit: Km)
C : Basic dynamic bad rating(basis:50km, unit: N)
C_{100} : Basic dynamic bad rating(basis:10km, unit: N)
P : Applied load

Practically, other factors will affect the life as follows

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

$$L_{100} = \left[\frac{f_H \times f_T \times f_C}{f_W} \times \frac{C_{100}}{P}\right]^3 \times 100$$

f_W : Load factor
f_H : Hardness factorf
f_T : Tempeture factor
f_C : Contact factorf

From the above equations, the stroke and frequency are constant, the Travel Life can be calculated by follbwing equation

$$L_h = \frac{L \times 10^6}{2 \times \ell_s \times N_\ell \times 60}$$

L_h : Travel life (hour)
ℓ_s : Stroke (mm)
N_ℓ : Number of strokes per minute (cpm)

Examples of Calculation and Choosing a proper SUPERBALL

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

〈Working conditions〉

- Applied load : 250N(P)
- Number of strokes per minutes : 60(N_ℓ)
- Operating speed : 30m/min
- Stroke : 250mm (ℓ_s)
- Shaft Hardness : H_RC60 (f_H = 1.0)

Operating Speed $V = 2 \times \ell_s \times N_\ell$
$= 2 \times 250 \times 60$
$= 30000$mm/min (f_w = 1.6)

Other factors (f_C, f_T) are considered as 1.0

Calculation of expected travel life

Since, basic dynamic bad 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 LMES20UU with the above working conditions.

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

$$L_h = \frac{13,417 \times 10^6}{2 \times 0.250 \times 60 \times 60} \fallingdotseq 7,454 \text{ hours}$$

Choosing proper Linear Bushing

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

$$L = 15,000 \times 2 \times 250 \times 10^{-6} \times 60 \times 60 = 27,000\text{km}$$

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

Therefore, the proper SUPERBALL for above condition is LMES25UU which has 3800N as the Basic dynamic load rating.

Housing and Shaft

Housing

For SUPERBALL's application, Housing is required. Tolerance of Housing bore will affect the life and the accuracy of application. See the below Table However, if the tolerance of housing is H7, tight fitting can be occurred at both ends of outer– sleeves in case of LMES type

Table9. Housing and tight fitting

Part number(mm)	LMES10	LMES12	LMES16	LMES20	LMES25	LMES30	LMES40	LMES50	
Inner diameter(mm)	19	22	26	32	40	47	62	75	
Tolerance(H7)	+0.021 0			+0.025 0			+0.030 0		
Part number(Inch)	LMBS4	LMBS6	LMBS8	LMBS10	LMBS12	LMBS16	LMBS20	LMBS24	LMBS32
Inner diameter(Inch)	0.5	0.625	0.875	1.125	1.25	1.5625	2	2.375	3
Tolerance(H7)	0 +0.007	0 +0.007	0 +0.008	0 +0.008	0 +0.010	0 +0.010	0 +0.012	0 +0.012	0 +0.012

Shaft

Because the balls in SAMICK SUPERBALL as rolling elements are running directly on the shaft surface, the hardness, surface finish, and tolerance of shaft will largely affect on the traveling performance of SUPERBALL.
The shaft must be manufactured with following conditions:

1) Hardness

The hardness must be H_RC 58 to 64. The shaft with hardness less than H_RC58 will lead decreasing of travel life and permissible load.

2) Surface Finishing

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

3) Tolerance

The correct tolerance of the shaft diameter is recommended. See the below table.

Table10. Shaft and tight fitting

Part number(mm)	LMES10	LMES12	LMES16	LMES20	LMES25	LMES30	LMES40	LMES50	
diameter(mm)	10	12	16	20	25	30	40	50	
Tolerance(h6)	0 −0.009	0 −0.011	0 −0.011	0 −0.013	0 −0.013	0 −0.013	0 −0.016	0 −0.016	
Part number(Inch)	LMBS4	LMBS6	LMBS8	LMBS10	LMBS12	LMBS16	LMBS20	LMBS24	LMBS32
diameter(Inch)	0.25	0.375	0.500	0.625	0.750	1.000	1.250	1.500	2.000
Part number(g6)	−0.0002 −0.0006	−0.0002 −0.0006	−0.0002 −0.0007	−0.0002 −0.0007	−0.0003 −0.0008	−0.0003 −0.0008	−0.0004 −0.0010	−0.0004 −0.0010	−0.0004 −0.0012

Part Number Notation

Self-Aligning Linear Bushing	LM	ES	16	UU	OP	–	N	S

Samick Linear Bushing

Standards
Metric series (mm) : ES
Inch series (inch) : BS

Nominal Shaft Diameter
Metric series (mm) : 10~50mm
Inch Series : #4~#32

Seal
No Seal : Blank
One Side Seal : U
Both Side Seal : UU

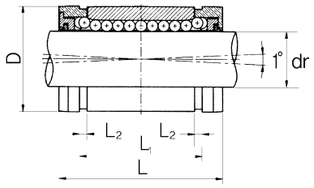
Type
Standard type : Blank
Open type (for support rail) : OP

Corrosion resistance type
No-plaiting (Standard) : Blank
Ball plate nickel plaiting : N
Stainless steel ball plate : M*
Ball plate Chrome plaiting : C

Ball type (by corrosion resistance)
High carbon bearing steel ball (standard) : Blank
Stainless steel ball : S

* LMES10, LMES12 and LMBS4, LMBS6, LMBS8 only with stainless steel ball plate

LMES Self-Aligning Linear Bushing



Self-Aligning linear Bushing	LMES	20	UU	–	N	S

Nominal Shaft Diameter

Seal
No Seal : Blank
One Side Seal : U
Both Side Seal : UU

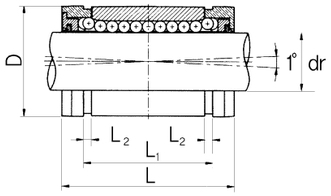
Corrosion resistance type
No-plaiting (Standard) : Blank
Ball plate nickel plaiting : N
Ball plate Chrome plaiting : C
Stainless steel ball plate : M****

Ball type(by corrosion resistance)
High carbon bearing steel ball (standard) : Blank
Stainless steel ball : S

PART NUMBER	DIAMETER dr.	TOLERANCE	D*	L ±0.2	L_1 ±0.2	L_2 min	BASIC LOAD RATING(N) DYNAMIC**(C)	STATIC**(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMES10	10	+0.008	19	29	21.7	1.35	750	550	5	17
LMES12	12	0	22	32	22.7	1.35	1230	1100	5	23
LMES16	16	+0.009	26	36	24.7	1.35	1550	1250	5	28
LMES20	20	+0.001	32	45	31.3	1.65	2580	1670	6	61
LMES25	25	+0.011	40	58	43.8	1.9	3800	2750	6	122
LMES30	30	+0.001	47	68	51.8	1.9	4710	2800	6	185
LMES40	40	+0.013	62	80	60.4	2.2	6500	5720	6	360
LMES50	50	+0.002	75	100	77.4	2.7	11460	7940	6	580

* Based on nominal housing bore
** Dynamic load rating is based on the nominal life of 50km. In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{00} = 410 / 1.26 = 325.40N
*** Dimension : mm
**** LMES10, LMES12 only with stainless steel ball plate

| LMES_OP Self-Aligning Linear Bushing |



Self-Aligning inear Bushing LMES	20	UU	OP	–	N	S

Nominal Shaft Diameter

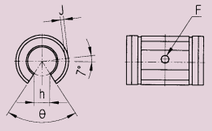
Seal
No Seal : Blank
One Side Seal : U
Both Side Seal : UU

Open type linear bushing

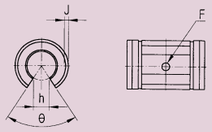
Corrosion resistance type
No-plaiting (Standard) : Blank
Ball plate nickel plaiting : N
Ball plate Chrome plaiting : C
Stainless steel ball plate : M****

Ball type (by corrosion resistance)
High carbon bearing steel ball (standard) : Blank
Stainless steel ball : S

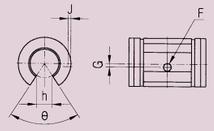
PART NUMBER	DIAMETER dr.	TOLERANCE	D*	L ±0.2	L1 ±0.2	L2 min	h	θ	F	G	J	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMES12 OP	12	+0.008 0	22	32	22.7	1.35	6.5	66	3	–	0.7	1290	1260	4	18
LMES16 OP	16	0.009	26	36	24.7	1.35	9	68	3	–	0.7	1640	1320	4	22
LMES20 OP	20	+0.001	32	45	31.3	1.65	9	55	3	–	0.9	2630	1720	5	51
LMES25 OP	25	+0.011	40	58	43.8	1.9	11.5	57	3	1.5	1.4	3910	2850	5	102
LMES30 OP	30	+0.001	47	68	51.8	1.9	14	57	3	2	2.2	4850	2900	5	155
LMES40 OP	40	+0.013 +0.001	62	80	60.4	2.2	19.5	56	3	1.5	2.7	8700	5900	5	300
LMES50 OP	50		75	100	77.4	2.7	22.5	54	5	2.5	2.3	11700	8100	5	480



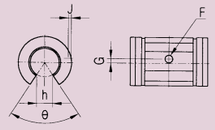
LMES12-OP



LMES16-OP, LMES20-OP



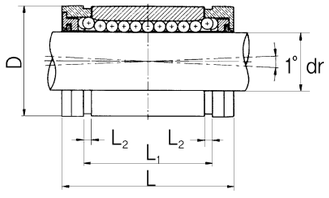
LMES25-OP



LMES30-OP, LMES40-OP, LMES50-OP

* Based on nominal housing bore
** Dynamic load rating is based on the nominal life of 50km. In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
*** Dimension : mm
**** LMES12 only with stainless steel ball plate

| LMBS Self-Aligning Linear Bushing |



Self-Aligning inear Bushing	LMBS	20	UU	–	N	S

Nominal Shaft Diameter

Seal
No Seal : Blank
One Side Seal : U
Both Side Seal : UU

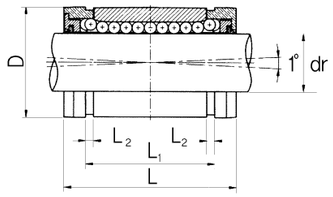
Corrosion resistance type
No-plaiting (Standard) : Blank
Ball plate nickel plaiting : N
Ball plate Chrome plaiting : C
Stainless steel ball plate : M****

Ball type (by corrosion resistance)
High carbon bearing steel ball (standard) : Blank
Stainless steel ball : S

PART NUMBER	DIAMETER dr.	TOLERANCE	D*	L	L1	L2 min	BASIC LOAD RATING(N) DYNAMIC(lbf)	STATIC(lbf)	NO. OF BALL CIRCUIT	WEIGHT (lbf)
LMBS4	0.2500		0.5000	0.750/0.735	0.511/0.501	0.039	57	49	4	0.01
LMBS6	0.3750		0.6250	0.875/0.860	0.699/0.689	0.039	78	66	4	0.02
LMBS8	0.5000		0.8750	1.250/1.230	1.032/1.012	0.050	210	190	4	0.05
LMBS10	0.6250	0 -0.0005	1.1250	1.500/1.480	1.105/1.095	0.056	290	340	5	0.08
LMBS12	0.7500		1.2500	1.625/1.605	1.270/1.250	0.056	500	430	6	0.14
LMBS16	1.0000		1.5625	2.250/2.230	1.884/1.864	0.070	820	780	6	0.29
LMBS20	1.2500	0 -0.0006	2.0000	2.625/2.600	2.004/1.984	0.068	1240	1270	6	0.40
LMBS24	1.5000		2.3750	3.000/2.970	2.410/2.390	0.086	1510	1540	6	0.80
LMBS32	2.0000	0 -0.008	3.0000	4.000/3.960	3.193/3.163	0.105	2230	2580	6	1.38

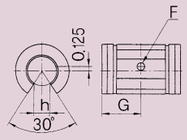
* Based on nominal housing bore
** Dynamic load rating is based on the nominal life of 50km. In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
*** Dimension : inch
**** LMBS4, 6, 8 only with stainless steel ball plate

| LMBS_OP Self-Aligning Linear Bushing |

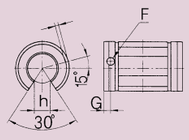


Self-Aligning inear Bushing LMBS	20	UU	OP	–	N	S	
Nominal Shaft Diameter							
Seal	No Seal : Blank One Side Seal : U Both Side Seal : UU						
Open type linear bushing							
Corrosion resistance type	No-plaiting (Standard) : Blank Ball plate nickel plaiting : N Ball plate Chrome plaiting : C Stainless steel ball plate : M****						
Ball type (by corrosion resistance)	High carbon bearing steel ball (standard) : Blank Stainless steel ball : S						

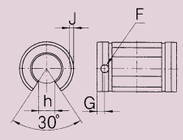
PART NUMBER	DIAMETER dr.	TOLERANCE	D*	L	L1	F	G	J	L2 min	h	BASIC LOAD RATING(N) DYNAMICC(lbf)	STATICC o(lbf)	NO. OF BALL CIRCUIT	WEIGHT (lbf)
LMBS8 OP	8	0 -0.0005	0.8750	1.250/1.230	1.032	0.14	0.63	Thru	0.050	0.32	210	190	3	0.03
LMBS10 OP	10		1.1250	1.500/1.480	1.105	0.11	0.13	0.039	0.056	0.38	320	340	4	0.06
LMBS12 OP	12		1.2500	1.625/1.605	1.270	0.14	0.13	0.059	0.056	0.43	510	430	5	0.11
LMBS16 OP	16		1.5625	2.250/2.230	1.884	0.14	0.13	0.047	0.070	0.56	830	780	5	0.21
LMBS20 OP	20	0 -0.0006	2.0000	2.625/2.600	2.004	0.20	0.19	0.090	0.068	0.63	1250	1270	5	0.35
LMBS24 OP	24		2.3750	3.000/2.970	2.410	0.20	0.19	0.090	0.086	0.75	1520	1540	5	0.67
LMBS32 OP	32	0 -0.0008	3.0000	4.000/3.960	3.193	0.27	0.31	Thru	0.105	1.00	2250	2580	5	1.10



LMBS08-OP



LMBS10-OP



LMBS12-OP through LMBS32-OP

* Based on nominal housing bore

** Dynamic load rating is based on the nominal life of 50km. In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N

*** Dimension : inch

**** LMBS8OP only with stainless steel ball plate

SAMICK 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. SAMICK Linear Bushing serves the alignment of the balls toward the LM Shaft by the single Retainer and cylindrical shape of Raceway. Outer Sleeve is made of high-carbon Chromium Bearing Steel, and inner and outer grinding processes are applied after Heat treatment.

Interchangeability
The Dimensions of SAMICK Linear Bushing are standardized to have full interchangeability. LM shaft is provided with the cylindrical grinding to have high precision fitting clearance.

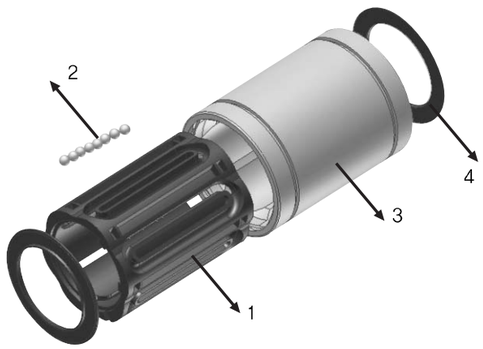
Rigid Outer Sleeve
Hardened and Precisely ground Outer Sleeve is made of Bearing steel, and can be direct assembled with the needle bearing on outer surface.

High precision Retainer
The single body retainer guides 4~6 ball circuits, and it makes 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 circuit orientation of Linear Bushing against the direction of load.

Application
SAMICK Linear Bushing are 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.

Structure



part	Material
1 Retainer	– POM – Stainless Steel
2 Ball	– High carbon bearing steel – Stainless steel – Ceramic
3 Outer-sleeve	– High carbon bearing steel ※ available Corrosion resistance plating
4 Rubber Seal	– NBR (Acryloritrile Butadiene Rubber)* ※ optional item

●● The Principle of Linear System Linear Bushing

| PART NUMBER NOTATION |

Linear Bushing	LM	E	F	P	20	L	UU	OP	-	A	N	S

Samick Linear Bushing

Standards(Asia, Europe)
Asian Standard : Blank / European Standard : E

Flange option
Standard : Blank
Circular type : F
Square type : K
Oval type : H

Flange Location
Standard : Blank
Pilot : P
Middle : M

Nominal Shaft Diameter
Standard : 5 ~ 60mm
Flange type : 6 ~ 60mm

Length
Standard : Blank
Long : L

Seal
No Seal : Blank
One Side Seal : U
Both Side Seal : UU

Sloting Type
Standard type : Blank
Open type : OP
Adjustable type : AJ

Retainer (by application temperature)
Resin retainer (Standard) : Blank
Steel retainer(High temperature) : A

Outer-sleeves (by corrosion resistance)
No plaiting(Standard) : Blank
Electroless nickel plating : N
Raydent treatment : R

Ball type (by corrosion resistance)
High carbon bearing steel ball (standard) : Blank
Stainless steel ball : S

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 Table, If the Ball are located on symmetrical position against the Load, the Load rating will be increased and the travel life will be extended.

Load ratings and Orientation of Balls

	Orientation of Balls		
No. of Ball Row	4 Row	5 Row	6 Row
Max. Load	F ⇩ 	F ⇩ 	F ⇩ 
Equation	F = 1.41 × C	F = 1.46 × C	F = 1.26 × C
Min. Load	F ⇩ 	F ⇩ 	F ⇩ 
Equation	F = C	F = C	F = C

Basic Dynamic load rating(C) and travel life

The travel life of a Linear Bushing is determined largely by the quality of the shaft. The Basic Dynamic load rating is maximum continuous load that can be applied to the Linear Bushing with 90% of reliability achieving after 50km traveling under normal conditions. The nominal travel life can be calculated by follow equation.

$$L = [\frac{C}{P}]^3 \times 50$$

$$L_{100} = [\frac{C_{100}}{P}]^3 \times 100$$

L : Nominal life (basis:50km, unit: Km)
L_{100} : Nominal life (basis:50km, unit: Km)
C : Basic dynamic load rating(basis:50km, unit: N)
C_{100} : Basic dynamic load rating(basis:10km, unit: N)
P : Applied load

Practically, other factors (Hardness factor, Load factor, Contact factor, etc) will affect the life as follows

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

$$L_{100} = [\frac{f_H \times f_T \times f_C}{f_W} \times \frac{C_{100}}{P}]^3 \times 100$$

f_W : Load factor
f_H : Hardness factorf
f_T : Tempeture factor
f_C : Contact factorf

Equivalent factor and Travel life

If a Linear Bushing or two Linear Bushings laid beside one another on one shaft, and the moment load is applied, calculate the Equivalent load.

$$P_U \fallingdotseq K \cdot M$$

P_U : Equivalent Load when the moment applied
K : Equivalent factor(see Table below)
M : Applied Moment where Pv should be up to Basic load rating(C_0)

If the moment load and the radial 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 frequency are constant; the travel life can be calculated by following equation

$$L_h = [\frac{L \times 10^6}{2 \times \ell_s \times N_\ell \times 60}]$$

L_h : travel life (hr)
ℓ_s : Stroke(mm)
N_ℓ : Number of stroke per minute (cpm)

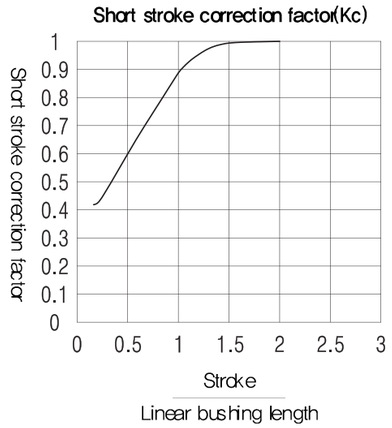
Equivalent factor for Linear Bushing

Equivalent factor (K)							
P/N	1EA	2EA	P/N	1EA	P/N	1EA	2EA
LM 5	1.253	0.178	LM 5L	0.223	LME 5	0.669	0.123
LM 6	0.553	0.162	LM 6L	0.201	LME 8	0.514	0.116
LM 8S	0.708	0.166	LM 8L	0.151	LME 12	0.389	0.090
LM 8	0.442	0.128	LM 10L	0.118	LME 16	0.343	0.081
LM 10	0.389	0.101	LM 12L	0.113	LME 20	0.291	0.063
LM 12	0.389	0.097	LM 13L	0.107	LME 25	0.209	0.052
LM 13	0.343	0.093	LM 16L	0.096	LME 30	0.167	0.045
LM 16	0.279	0.084	LM 20L	0.082	LME 40	0.127	0.039
LM 20	0.257	0.071	LM 25L	0.060	LME 50	0.105	0.031
LM 25	0.163	0.054	LM 30L	0.053	LME 60	0.093	0.024
LM 30	0.153	0.049	LM 35L	0.050			
LM 35	0.143	0.045	LM 40L	0.043			
LM 40	0.117	0.040	LM 50L	0.034			
LM 50	0.096	0.032	LM 60L	0.031			
LM 60	0.093	0.028					

Note 1) The equivalent factor for LMF/K/H, LMFP/KP/HP and SC types are same as LM type.
Note 2) The equivalent factor for LMF-L, LMK-L, LMH-L and SCW types are same as LM-L type.
Note 1) The equivalent factor for LMEF/K/H and SCE types are same as LME type.

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 shot stroke correction factor (Kc) found on Fig right side.



Lubrication and Friction

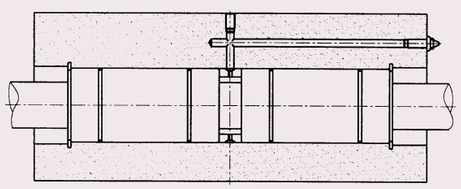
Linear Bushing is used with grease lubrication or oil lubrication but in some case, it is used without any lubrication.

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 both side sealed type (UU), and applying same as above or applying on the shaft for without sealed type. Lithium soap radical of viscosity mark (JIS No. 2) is recommended for use.

Oil Lubrication

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



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. 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). However, dropping lubrication is not used in both seal type because the seal remove oil, because. Contact SAMICK for Linear Bushing with lubrication hole for user's demands.

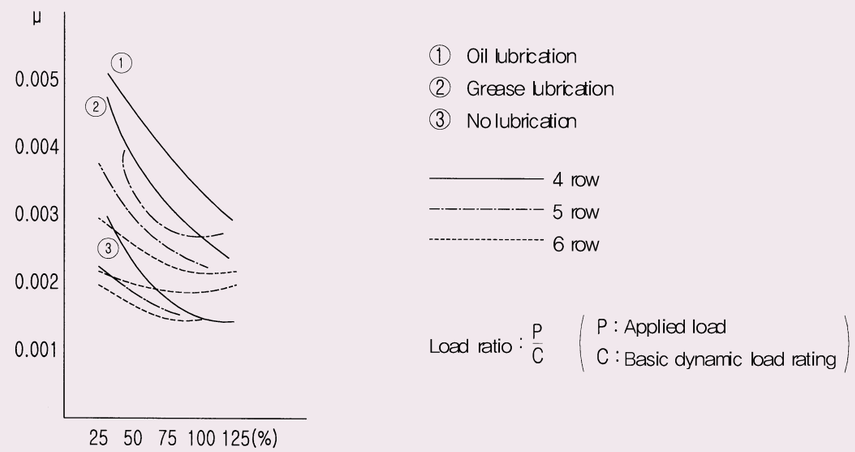
Coefficient of Friction

Linear Bushing has balls as rolling elements, so it gives rise to reduces the frictional resistance. Static friction, in particular, 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 normal friction coefficient is on Fig below, and the Friction resistance can be calculated by following equation.

$F = \mu \cdot P + f_s$

- F : Friction resistance force (N)
- f_s : Resistant of Seal (0.3 ~ 2.4N)
- P : Applied External load (Perpendicular Load against shaft core) (N)
- μ : Friction Coefficient(Static or Dynamic)

Coefficient of Kinetic Friction



Coefficient of Kinetic Friction

Installation Guide

Recommended Tolerance of Housing bore for SAMICK Linear Bushing are in Table. Normal fit is standard, but for without clearance, pressed fit is also available.

Type		Case	
Part number	Grade	Normal fit	Pressed fit
LM	Higher(H)	H7	J7
LME	–	H7	K6, J6
LMF / FP LMK / KP LMH / HP LM _ L LMF / FP _ L LMK / KP _ L LMH / HP _ L LMFM	–	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 available. Next table shows outer diameter tolerance of shaft.

Type		LM Shaft	
Part number	Grade	Normal fit	Tight fit
LM	Higher(H)	f6, g6	h6
LME	–	h7	K6
LMF / FP LMK / KP LMH / HP LM _ L LMF / FP _ L LMK / KP _ L LMH / HP _ L LMFM	–	f6, g6	h6

Negative diametric clearance should not exceed what is specified in the dimension table.

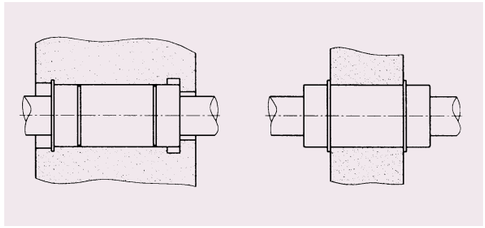
Radical Clearance(㎛)															
Type \ Dr.	5	6	8S	8	10	12	13	16	20	25	30	35	40	50	60
LM(㎛)	-3	-5	-5	-5	-5	-5	-7	-7	-9	-9	-9	-13	-13	-13	-16
LME(㎛)	-5			-5		-7		-7	-9	-9	-9		-13	-13	-16

Mounting

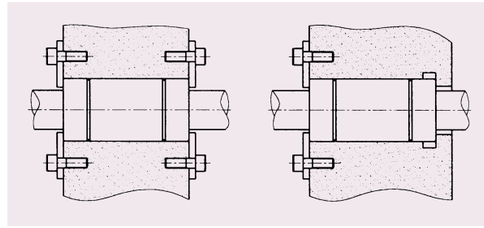
High holding strength toward LM shaft direction is not required, but just press fit only for mounting is not recommended.

Standard type

Feasble mounting methods are illustrated in Fig 8 and Fig 9. At this moment, fix the linear bushing with retaining rings and cover plates



Mounting with retaining rings



Mounting with cover plates

Retaining ring for Mounting

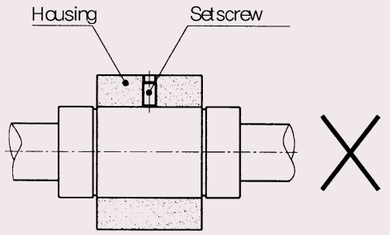
Retaining ring for LM type SAMICK Linear Bushing are used for mounting as shown in the table below

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

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

Setscrew mounting prohibited

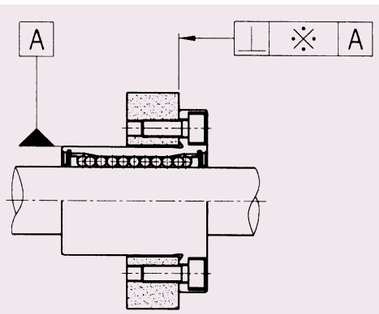
Mounting a Linear Bushing with a set screw as show in Figure will cause deformation of the outer sleeve and should be avoided.



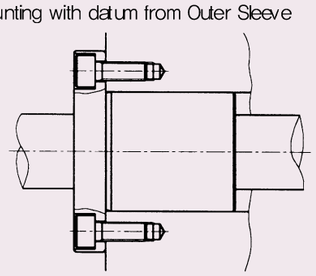
Mounting with setscrew

Flanged type

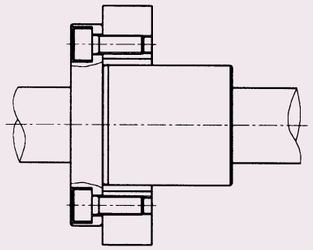
Mounting for LMF, LMK, LMH (included long type), only mounting the flange with mounting bolt can be all of mounting because of its single body shape. Geometric Dimensional Tolerance should be considered when the Outer Sleeve is the datum for installation.



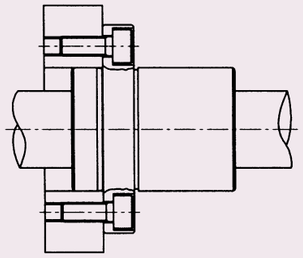
• Mounting with datum from Outer Sleeve



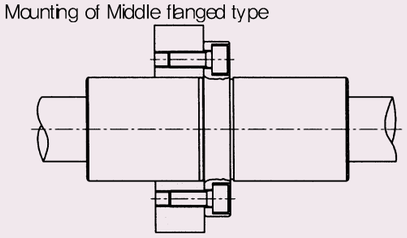
• Mounting of Flange with mounting bolt



• Mounting of Pilot flanged type



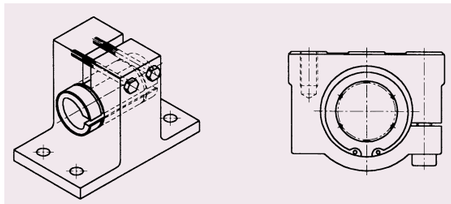
• Mounting of Middle flanged type



Flanged type mounting

Mounting of Adjustable type

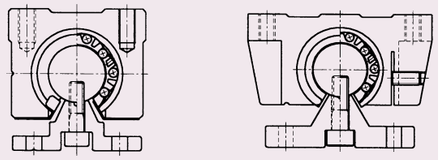
Adjustment of clearance for Adjustable type (AJ) and LM shaft can be obtained by assembling with the adjustable type Housing. In this case, the slotted side of Linear Bushing should be located at 90° of open side of Housing for equivalent deformation against radial direction.



Mounting of adjustable type

Mounting of Open type

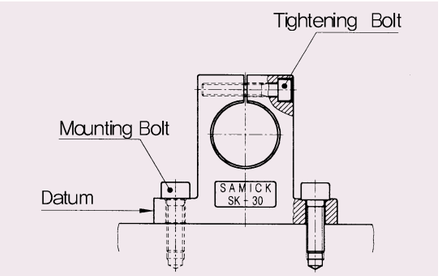
Open type(...OP) also can be used with clearance adjustable housing as shown on Figure. Light pre-load is applied for normal using, but heavy pre-load should be avoided.



Mounting of Open type

Mounting of Shaft support

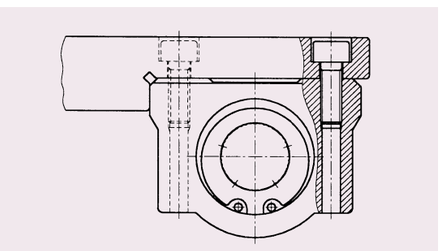
Shaft support, SK can be mounted with mounting bolt for table, and LM shaft can be mounted with tightening bolt

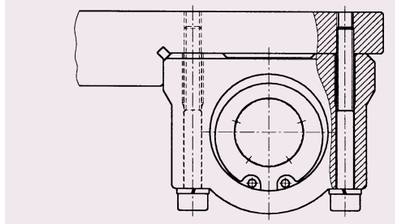


Mounting of Shaft support

Mounting of LM Case Unit

Mounting of SC type Both side mounting of SC(E), SC(E)_W, SC(E)_V type from the top and the bottom side with mounting bolt are both available, and it gives you minimum mounting time.



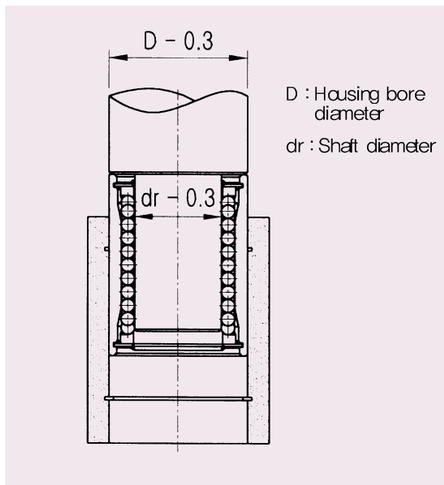


Mounting of Case unit

Application Tips

Mounting of Linear Bushing

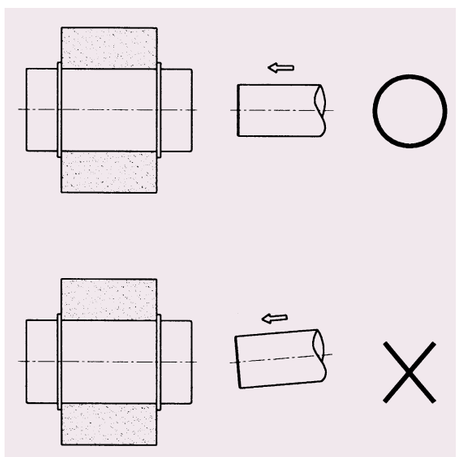
For mounting of standard type SAMICK Linear Bushing into the Housing, a jig should be used to avoid direct hitting on the outer sleeve or seal when installing. See Below.



Mounting into housing

Insertion of Shaft

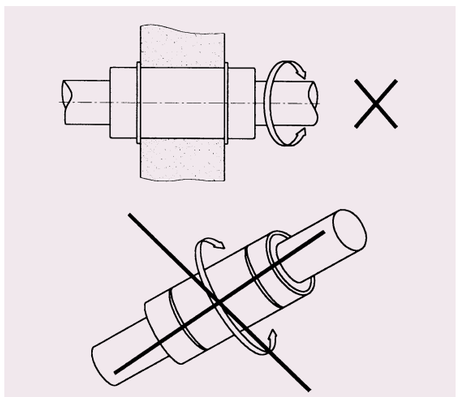
Care must be taken to align the bushing and the shaft when inserting a shaft into a linear bushing. If the shaft is inserted with slanted, balls may depart from the damaged or deformed retainer.



Insertion of shaft into Linear Bearing

The Rotational Motion Prohibited

Linear Bushing is not suitable for rotational motion. If the Linear Bushing is exposed to rotational motion it may lead unexpected accidents.



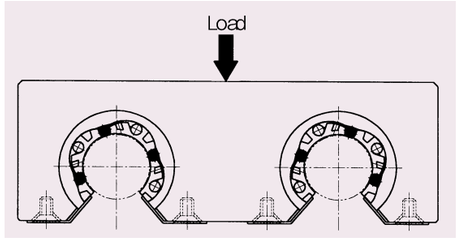
The Rotational Motion Prohibited

When Moment loads applied

External loads should be distributed uniformly on a Linear Bushing. When moment loads are applied, two or more Linear Bushings should be used on one LM shaft, and the distance between two Linear Bushings should have enough distance. When the moment loads are applied, calculate the equivalent load and choose the proper Linear Bushing.

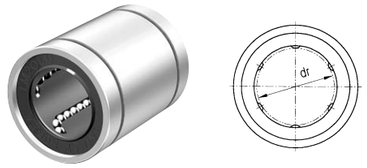
Mounting of open type Linear Bushing with three ball rows

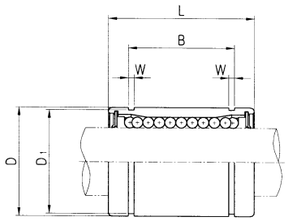
Please mount the open type Linear Bushings with three ball circuit as same as Figure for considering of load distribution.



Installation example of LM12, LM13

| LM CLOSED LINEAR BUSHING |



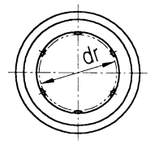


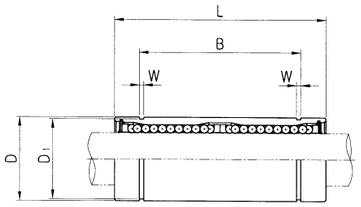
Samick Linear Bushing	LM	20	UU	–	A	N	S
Nominal Shaft Diameter							
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance type)	Blank : No-plating(Standard) N : Electroless nickel plating R : Raydent treatment						
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball						

PART NUMBER Resin	Steel	DIAMETER dr.	TOLERANCE	OUTER DIAMETER D	TOLERANCE	L	B	W	D1	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(C0)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LM5		5	0 -0.008	10	0 -0.008	15	10.2	1.1	9.6	167	206	4	4
LM6	LM6-A	6		12		19	13.5	1.1	11.5	200	260	4	8
LM8S		8		15	0 -0.011	17	11.5	1.1	14.3	170	220	4	11
LM8	LM8-A	8		15		24	17.5	1.1	14.3	260	400	4	16
LM10	LM10-A	10	0 -0.009	19		29	22.0	1.3	18	370	540	4	30
LM12	LM12-A	12		21	0 -0.013	30	23.0	1.3	20	410	590	4	31.5
LM13	LM13-A	13		23		32	23.0	1.3	22	500	770	4	43
LM16	LM16-A	16		28		37	26.5	1.6	27	770	1170	5	69
LM20	LM20-A	20		32		42	30.5	1.6	30.5	860	1370	5	87
LM25	LM25-A	25	0 -0.010	40	0 -0.016	59	41.0	1.85	38	980	1560	6	220
LM30		30		45		64	44.5	1.85	43	1560	2740	6	250
LM35		35		52		70	49.5	2.1	49	1660	3130	6	390
LM40		40	0 -0.012	60	0 -0.019	80	60.5	2.1	57	2150	4010	6	585
LM50		50		80		100	74.0	2.6	76.5	3820	7930	6	1580
LM60		60	0 -0.015	90	0 -0.022	110	85.0	3.15	86.5	4700	9990	6	2000

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LM_L LONG LINEAR BUSHING |



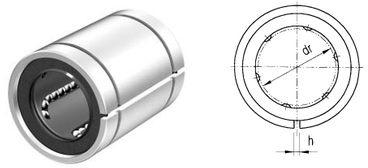


Samick Linear Bushing	LM	20	L	UU	–	A	N	S
Nominal Shaft Diameter								
Linear Bushing Long type (for high load)								
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal							
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)							
Outer-sleeves (by corrosion resistance type)	Blank : No-plating(Standard) N : Electroless nickel plating R : Raydent treatment							
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball							

PART NUMBER Resin	Steel	DIAMETER dr.	TOLERANCE	OUTER DIAMETER D	TOLERANCE	L	B	W	D1	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(C0)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LM6L	LM6L-A	6		12	0 -0.013	35	27	1.1	11.5	320	520	4	16
LM8L	LM8L-A	8		15		45	35	1.1	14.3	430	780	4	31
LM10L	LM10L-A	10	0 -0.010	19		55	44	1.3	18	580	1100	4	62
LM12L	LM12L-A	12		21	0 -0.016	57	46	1.3	20	650	1200	4	80
LM13L	LM13L-A	13		23		61	46	1.3	22	810	1570	4	90
LM16L	LM16L-A	16		28		70	53	1.6	27	1230	2350	5	145
LM20L	LM20L-A	20		32		80	61	1.6	30.5	1400	2750	5	180
LM25L	LM25L-A	25	0 -0.012	40	0 -0.019	112	82	1.85	38	1560	3140	6	440
LM30L		30		45		123	89	1.85	43	2490	5490	6	580
LM35L		35		52		135	99	2.1	49	2650	6470	6	795
LM40L		40	0 -0.015	60	0 -0.022	154	121	2.1	57	3430	8040	6	1170
LM50L		50		80		192	148	2.6	76.5	6080	15900	6	3100
LM60L		60	0 -0.020	90	0 -0.025	211	170	3.15	86.5	7650	20000	6	3500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LM_AJ ADJUSTABLE LINEAR BUSHING |



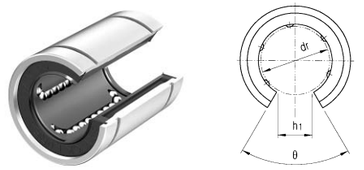
Samick Linear Bushing LM 20 UU AJ – A N S

- Nominal Shaft Diameter
- Seal
  - Blank : No Seal
  - U : One Side Seal
  - UU : Both Side Seal
- Linear Bushing Adjustable type
- Retainer
  - Blank : Resin retainer(Standard)
  - A : Steel retainer(High temperature)
- Outer-sleeves (by corrosion resistance type)
  - Blank : No-plating(Standard)
  - N : Electroless nickel plating
  - R : Raydent treatment
- Ball type (by corrosion resistance)
  - Blank : High carbon bearing steel ball (standard)
  - S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr.	TOLERANCE	OUTER DIAMETER D	TOLERANCE	L	B	W	h	D1	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LM6 AJ	LM6 AJ-A	6		12		19	13.5	1.1	1	11.5	200	260	4	8
LM8S AJ		8		15	0 -0.011	17	11.5	1.1	1	14.3	170	220	4	11
LM8 AJ	LM8 AJ-A	8		15		24	17.5	1.1	1	14.3	260	400	4	16
LM10 AJ	LM10 AJ-A	10	0 -0.009	19		29	22.0	1.3	1	18	370	540	4	30
LM12 AJ	LM12 AJ-A	12		21	0 -0.013	30	23.0	1.3	1.5	20	410	590	4	31.5
LM13 AJ	LM13 AJ-A	13		23	0 -0.013	32	23.0	1.3	1.5	22	500	770	4	43
LM16 AJ	LM16 AJ-A	16		28		37	26.5	1.6	1.5	27	770	1170	5	69
LM20 AJ	LM20 AJ-A	20		32		42	30.5	1.6	1.5	30.5	860	1370	5	87
LM25 AJ	LM25 AJ-A	25	0 -0.010	40	0 -0.016	59	41.0	1.85	2	38	980	1560	6	220
LM30 AJ	LM30 AJ-A	30		45		64	44.5	1.85	2.5	43	1560	2740	6	250
LM35 AJ	LM35 AJ-A	35		52		70	49.5	2.1	2.5	49	1660	3130	6	390
LM40 AJ	LM40 AJ-A	40	0 -0.012	60	0 -0.019	80	60.5	2.1	3	57	2150	4010	6	585
LM50 AJ	LM50 AJ-A	50		80		100	74.0	2.6	3	76.5	3820	7930	6	1580
LM60 AJ	LM60 AJ-A	60	0 -0.015	90	0 -0.022	110	85.0	3.15	3	86.5	4700	9990	6	2000

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm
Note 4) Outer diameter is the obtained value before the slotting process.

| LM_OP OPEN LINEAR BUSHING |



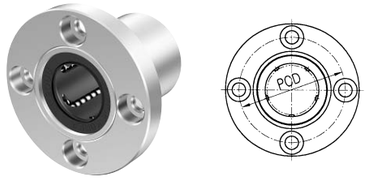
Samick Linear Bushing LM 20 UU OP – A N S

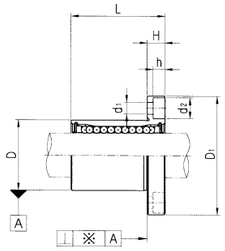
- Nominal Shaft Diameter
- Seal
  - Blank : No Seal
  - U : One Side Seal
  - UU : Both Side Seal
- Linear Bushing Open type
- Retainer
  - Blank : Resin retainer(Standard)
  - A : Steel retainer(High temperature)
- Outer-sleeves (by corrosion resistance type)
  - Blank : No-plating(Standard)
  - N : Electroless nickel plating
  - R : Raydent treatment
- Ball type (by corrosion resistance)
  - Blank : High carbon bearing steel ball (standard)
  - S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr.	TOLERANCE	D	TOLERANCE	L	B	W	h1	θ	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LM12 OP		12		21		30	23.0	1.3	8	80	410	590	3	31.5
LM13 OP		13	0 -0.009	23	0 -0.013	32	23.0	1.3	9	80	500	770	3	43
LM16 OP		16		28		37	26.5	1.6	11	80	770	1170	4	69
LM20 OP		20		32		42	30.5	1.6	11	60	860	1370	4	87
LM25 OP		25	0 -0.010	40	0 -0.016	59	41.0	1.85	12	50	980	1560	5	220
LM30 OP		30		45		64	44.5	1.85	15	50	1560	2740	5	250
LM35 OP		35		52		70	49.5	2.1	17	50	1660	3130	5	390
LM40 OP		40	0 -0.012	60	0 -0.019	80	60.5	2.1	20	50	2150	4010	5	585
LM50 OP		50		80		100	74.0	2.6	25	50	3820	7930	5	1580
LM60 OP		60	0 -0.015	90	0 -0.022	110	85.0	3.15	30	50	4700	9990	5	2000

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm
Note 4) Outer diameter is the obtained value before the slotting process.

| LMF FLANGED LINEAR BUSHING |



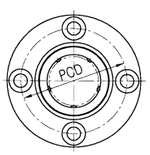


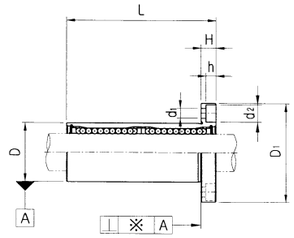
Samick Circular Flanged Linear Bushing	LMF	20	UU	–	A	N	S
Nominal Shaft Diameter							
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance type)	Blank : No-plating(Standard) N : Electroless nickel plating R : Raydent treatment						
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball						

PART NUMBER Resin	PART NUMBER Steel	DIAMETER dr.	DIAMETER TOLERANCE	D	D TOLERANCE	L	D1	H	PCD	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMF 6	LMF6-A	6	0 -0.009	12	0 -0.011	19	28	5	20	3.4	6.5	3.3	12	200	260	4	26.5
LMF 8S		8		15		17	32	5	24	3.4	6.5	3.3	12	170	220	4	34
LMF 8	LMF8-A	8		15		24	32	5	24	3.4	6.5	3.3	12	260	400	4	40
LMF 10	LMF10-A	10		19		29	40	6	29	4.5	8.0	4.4	12	370	540	4	78
LMF 12	LMF12-A	12		21	0 -0.013	30	42	6	32	4.5	8.0	4.4	12	410	590	4	76
LMF 13	LMF13-A	13		23		32	43	6	33	4.5	8.0	4.4	12	500	770	4	94
LMF 16	LMF16-A	16		28		37	48	6	38	4.5	8.0	4.4	12	770	1170	5	134
LMF 20	LMF20-A	20		32		42	54	8	43	5.5	9.5	5.4	15	860	1370	5	180
LMF 25	LMF25-A	25	0 -0.010	40	0 -0.016	59	62	8	51	5.5	9.5	5.4	15	980	1560	6	340
LMF 30		30		45		64	74	10	60	6.6	11.0	6.5	15	1560	2740	6	460
LMF 35		35		52		70	82	10	67	6.6	11.0	6.5	20	1660	3130	6	795
LMF 40		40	0 -0.012	60	0 -0.019	80	96	13	78	9.0	14.0	8.6	20	2150	4010	6	1054
LMF 50		50		80		100	116	13	98	9.0	14.0	8.6	20	3820	7930	6	2200
LMF 60		60	0 -0.015	90	0 -0.022	110	134	18	112	11.0	17.5	10.8	25	4700	9990	6	2960

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMF_L FLANGED LINEAR BUSHING LONG |



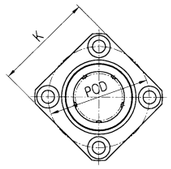


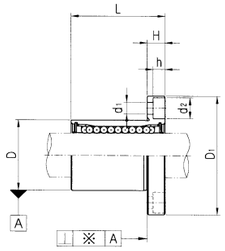
Samick Circular Flanged Linear Bushing	LMF	20	L	UU	–	A	N	S
Nominal Shaft Diameter								
Linear Bushing Long type (for high load)								
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal							
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)							
Outer-sleeves (by corrosion resistance type)	Blank : No-plating(Standard) N : Electroless nickel plating R : Raydent treatment							
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball							

PART NUMBER Resin	PART NUMBER Steel	DIAMETER D dr.	DIAMETER D TOLERANCE	D	D TOLERANCE	L	D1	H	PCD	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMF6 L	LMF6L-A	6		12	0 -0.013	35	28	5	20	3.4	6.5	3.3	15	320	520	4	31
LMF8 L	LMF8L-A	8		15		45	32	5	24	3.4	6.5	3.3	15	430	780	4	53
LMF10 L	LMF10L-A	10	0 -0.010	19		55	40	6	29	4.5	8.0	4.4	15	580	1100	4	105
LMF12 L	LMF12L-A	12		21	0 -0.016	57	42	6	32	4.5	8.0	4.4	15	650	1200	4	100
LMF13 L	LMF13L-A	13		23		61	43	6	33	4.5	8.0	4.4	15	810	1570	4	130
LMF16 L	LMF16L-A	16		28		70	48	6	38	4.5	8.0	4.4	15	1230	2350	5	187
LMF20 L	LMF20L-A	20		32		80	54	8	43	5.5	9.5	5.4	20	1400	2750	5	260
LMF25 L	LMF25L-A	25	0 -0.012	40	0 -0.019	112	62	8	51	5.5	9.5	5.4	20	1560	3140	6	515
LMF30 L		30		45		123	74	10	60	6.6	11.0	6.5	20	2490	5490	6	655
LMF35 L		35		52		135	82	10	67	6.6	11.0	6.5	25	2650	6470	6	970
LMF40 L		40	0 -0.015	60	0 -0.022	154	96	13	78	9.0	14.0	8.6	25	3430	8040	6	1560
LMF50 L		50		80		192	116	13	98	9.0	14.0	8.6	25	6080	15900	6	3500
LMF60 L		60	0 -0.020	90	0 -0.025	211	134	18	112	11.0	17.5	10.8	25	7650	20000	6	4500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMK FLANGED LINEAR BUSHING |





Samick Square Flanged Linear Bushing **LMK** **20** **UU** **–** **A** **N** **S**

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

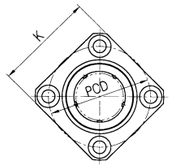
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

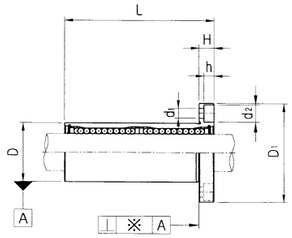
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	PART NUMBER Steel	DIAMETER dr.	TOLERANCE	D	TOLERANCE	L	D1	H	PCD	K	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMK6	LMK6-A	6		12		19	28	5	20	22	3.4	6.5	3.3	12	200	260	4	26.5
LMK8S		8		15	0 -0.011	17	32	5	24	25	3.4	6.5	3.3	12	170	220	4	34
LMK8	LMK8-A	8		15		24	32	5	24	25	3.4	6.5	3.3	12	260	400	4	40
LMK10	LMK10-A	10	0 -0.009	19		29	40	6	29	30	4.5	8.0	4.4	12	370	540	4	78
LMK12	LMK12-A	12		21	0 -0.013	30	42	6	32	32	4.5	8.0	4.4	12	410	590	4	76
LMK13	LMK13-A	13		23		32	43	6	33	34	4.5	8.0	4.4	12	500	770	4	94
LMK16	LMK16-A	16		28		37	48	6	38	37	4.5	8.0	4.4	12	770	1170	5	134
LMK20	LMK20-A	20		32		42	54	8	43	42	5.5	9.5	5.4	15	860	1370	5	180
LMK25	LMK25-A	25	0 -0.010	40	0 -0.016	59	62	8	51	50	5.5	9.5	5.4	15	980	1560	6	340
LMK30		30		45		64	74	10	60	58	6.6	11.0	6.5	15	1560	2740	6	460
LMK35		35		52		70	82	10	67	64	6.6	11.0	6.5	20	1660	3130	6	795
LMK40		40	0 -0.012	60	0 -0.019	80	96	13	78	75	9.0	14.0	8.6	20	2150	4010	6	1054
LMK50		50		80		100	116	13	98	92	9.0	14.0	8.6	20	3820	7930	6	2200
LMK60		60	0 -0.015	90	0 -0.022	110	134	18	112	106	11.0	17.5	10.8	25	4700	9990	6	2960

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMK_L FLANGED LINEAR BUSHING LONG |





Samick Square Flanged Linear Bushing **LMK** **20** **L** **UU** **–** **A** **N** **S**

Nominal Shaft Diameter

Linear Bushing Long type (for high load)

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

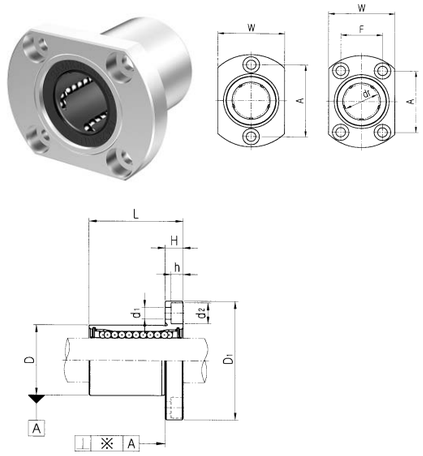
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	PART NUMBER Steel	DIAMETER dr.	TOLERANCE	D	TOLERANCE	L	D1	H	PCD	K	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMK6 L	LMK6L-A	6		12	0 -0.013	35	28	5	20	22	3.4	6.5	3.3	15	320	520	4	31
LMK8 L	LMK8L-A	8		15		45	32	5	24	25	3.4	6.5	3.3	15	430	780	4	53
LMK10 L	LMK10L-A	10	0 -0.010	19		55	40	6	29	30	4.5	8.0	4.4	15	580	1100	4	105
LMK12 L	LMK12L-A	12		21	0 -0.016	57	42	6	32	32	4.5	8.0	4.4	15	650	1200	4	100
LMK13 L	LMK13L-A	13		23		61	43	6	33	34	4.5	8.0	4.4	15	810	1570	4	130
LMK16 L	LMK16L-A	16		28		70	48	6	38	37	4.5	8.0	4.4	15	1230	2350	5	187
LMK20 L	LMK20L-A	20		32		80	54	8	43	42	5.5	9.5	5.4	20	1400	2750	5	260
LMK25 L	LMK25L-A	25	0 -0.012	40	0 -0.019	112	62	8	51	50	5.5	9.5	5.4	20	1560	3140	6	515
LMK30 L		30		45		123	74	10	60	58	6.6	11.0	6.5	20	2490	5490	6	655
LMK35 L		35		52		135	82	10	67	64	6.6	11.0	6.5	25	2650	6470	6	970
LMK40 L		40	0 -0.015	60	0 -0.022	154	96	13	78	75	9.0	14.0	8.6	25	3430	8040	6	1560
LMK50 L		50		80		192	116	13	98	92	9.0	14.0	8.6	25	6080	15900	6	3500
LMK60 L		60	0 -0.020	90	0 -0.025	211	134	18	112	106	11.0	17.5	10.8	25	7650	20000	6	4500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMH FLANGED LINEAR BUSHING |



Samick Oval Flanged Linear Bushing	LMH	20	UU	–	A	N	S

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

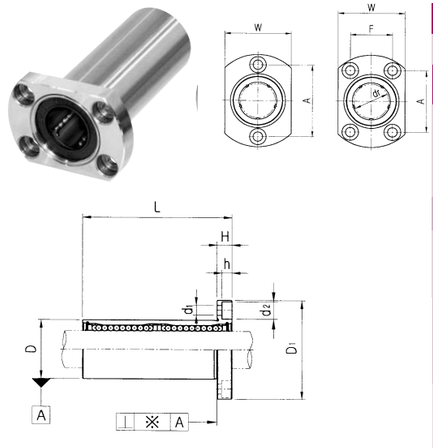
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr.	TOLERANCE	D	TOLERANCE	L	D1	H	W	A	F	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMH6	LMH6-A	6		12	0 -0.011	19	28	5	18	20	–	3.4	6.5	3.3	12	200	260	4	26.5
LMH8	LMH8-A	8		15		24	32	5	21	24	–	3.4	6.5	3.3	12	260	400	4	40
LMH10	LMH10-A	10	0 -0.009	19		29	40	6	25	29	–	4.5	8.0	4.4	12	370	540	4	78
LMH12	LMH12-A	12		21	0 -0.013	30	42	6	27	32	–	4.5	8.0	4.4	12	410	590	4	76
LMH13	LMH13-A	13		23		32	43	6	29	33	–	4.5	8.0	4.4	12	500	770	4	94
LMH16	LMH16-A	16		28		37	48	6	34	31	22	4.5	8.0	4.4	12	770	1170	5	134
LMH20	LMH20-A	20		32		42	54	8	38	36	24	5.5	9.5	5.4	15	860	1370	5	180
LMH25	LMH25-A	25	0 -0.010	40	0 -0.016	59	62	8	46	40	32	5.5	9.5	5.4	15	980	1560	6	340
LMH30		30		45		64	74	10	51	49	35	6.6	11.0	6.5	15	1560	2740	6	460

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMH_L FLANGED LINEAR BUSHING LONG |



Samick Oval Flanged Linear Bushing	LMH	20	L	UU	–	A	N	S

Nominal Shaft Diameter

Linear Bushing Long type (for high load)

Seal
Blank : No Seal
U : One Side Seal
UU: Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

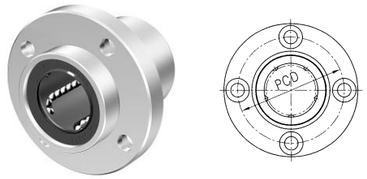
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

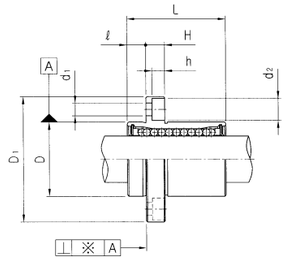
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETE dr.	TOLERANCE	D	TOLERANCE	L	D1	H	W	A	F	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMH6 L	LMH6L-A	6		12	0 -0.013	35	28	5	18	20	–	3.4	6.5	3.3	15	320	520	4	31
LMH8 L	LMH8L-A	8		15		45	32	5	21	24	–	3.4	6.5	3.3	15	430	780	4	53
LMH10 L	LMH10L-A	10	0 -0.010	19		55	40	6	25	29	–	4.5	8.0	4.4	15	580	1100	4	105
LMH12 L	LMH12L-A	12		21	0 -0.016	57	42	6	27	32	–	4.5	8.0	4.4	15	650	1200	4	100
LMH13 L	LMH13L-A	13		23		61	43	6	29	33	–	4.5	8.0	4.4	15	810	1570	4	130
LMH16 L	LMH16L-A	16		28		70	48	6	34	31	22	4.5	8.0	4.4	15	1230	2350	5	187
LMH20 L	LMH20L-A	20		32		80	54	8	38	36	24	5.5	9.5	5.4	20	1400	2750	5	260
LMH25 L	LMH25L-A	25	0 -0.012	40	0 -0.019	112	62	8	46	40	32	5.5	9.5	5.4	20	1560	3140	6	515
LMH30 L		30		45		123	74	10	51	49	35	6.6	11.0	6.5	20	2490	5490	6	655

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMFP FLANGED LINEAR BUSHING |



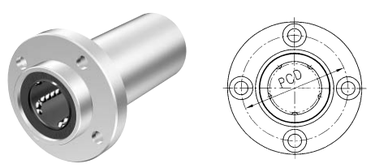


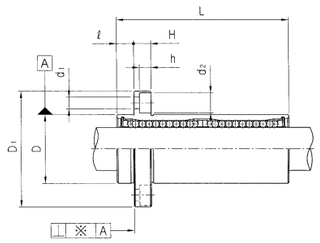
Samick Circular Pitch Flanged Linear Bushing	LMFP	20	UU	–	A	N	S
Nominal Shaft Diameter							
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance type)	Blank : No-plating(Standard) N : Electroless nickel plating R : Raydent treatment						
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball						

PART NUMBER Resin	PART NUMBER Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	ℓ	H	PCD	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMFP6	LMFP6-A	6	12 0 -0.011	19	28	5	5	20	3.4	6.5	3.3	12	200	260	4	26.5
LMFP8	LMFP8-A	8	15 0 -0.011	24	32	5	5	24	3.4	6.5	3.3	12	260	400	4	40
LMFP10	LMFP10-A	10	19	29	40	6	6	29	4.5	8	4.4	12	370	540	4	76
LMFP12	LMFP12-A	12 0 -0.009	21 0 -0.013	30	42	6	6	32	4.5	8	4.4	12	410	590	4	78
LMFP13	LMFP13-A	13	23	32	43	6	6	33	4.5	8	4.4	12	500	770	4	94
LMFP16	LMFP16-A	16	28	37	48	6	6	38	4.5	8	4.4	12	770	1170	5	134
LMFP20	LMFP20-A	20	32	42	54	8	8	43	5.5	9.5	5.4	15	860	1370	5	180
LMFP25	LMFP25-A	25 0 -0.010	40 0 -0.016	59	62	8	8	51	5.5	9.5	5.4	15	980	1560	6	340
LMFP30		30	45	64	74	10	10	60	6.6	11	6.5	15	1560	2740	6	460
LMFP35		35	52	70	82	10	10	67	6.6	11	6.5	20	1660	3130	6	795
LMFP40		40 0 -0.012	60 0 -0.019	80	96	13	13	78	9	14	8.6	20	2150	4010	6	1054
LMFP50		50	80	100	116	13	13	98	9	14	8.6	20	3820	7930	6	2200
LMFP60		60 0 -0.015	90 0 -0.022	110	134	18	18	112	11	17.5	10.8	25	4700	9990	6	2960

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMFP_L FLANGED LINEAR BUSHING LONG |



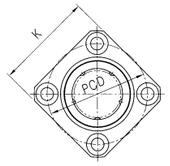


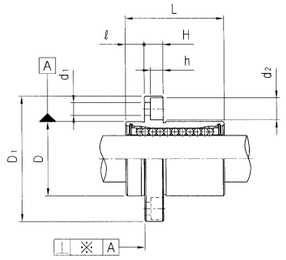
Samick Circular Pitch Flanged Linear Bushing	LMFP	20	L	UU	–	A	N	S
Nominal Shaft Diameter								
Linear Bushing Long type (for high load)								
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal							
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)							
Outer-sleeves (by corrosion resistance type)	Blank : No-plating(Standard) N : Electroless nickel plating R : Raydent treatment							
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball							

PART NUMBER Resin	PART NUMBER Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	ℓ	H	PCD	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMFP6L	LMFP6L-A	6	12 0 -0.013	35	28	5	5	20	3.4	6.5	3.3	15	320	520	4	31
LMFP8L	LMFP8L-A	8	15 0 -0.013	45	32	5	5	24	3.4	6.5	3.3	15	430	780	4	53
LMFP10L	LMFP10L-A	10	19	55	40	6	6	29	4.5	8	4.4	15	580	1100	4	105
LMFP12L	LMFP12L-A	12 0 -0.010	21 0 -0.016	57	42	6	6	32	4.5	8	4.4	15	650	1200	4	100
LMFP13L	LMFP13L-A	13	23	61	43	6	6	33	4.5	8	4.4	15	810	1570	4	130
LMFP16L	LMFP16L-A	16	28	70	48	6	6	38	4.5	8	4.4	15	1230	2350	5	187
LMFP20L	LMFP20L-A	20	32	80	54	8	8	43	5.5	9.5	5.4	20	1400	2750	5	260
LMFP25L	LMFP25L-A	25 0 -0.012	40 0 -0.019	112	62	8	8	51	5.5	9.5	5.4	20	1560	3140	6	515
LMFP30L		30	45	123	74	10	10	60	6.6	11	6.5	20	2490	5490	6	655
LMFP35L		35	52	135	82	10	10	67	6.6	11	6.5	25	2650	6470	6	970
LMFP40L		40 0 -0.015	60 0 -0.022	154	96	13	13	78	9	14	8.6	25	3430	8040	6	1560
LMFP50L		50	80	192	116	13	13	98	9	14	8.6	25	6080	15900	6	3500
LMFP60L		60 0 -0.020	90 0 -0.025	211	134	18	18	112	11	17.5	10.8	25	7650	20000	6	4500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMKP FLANGED LINEAR BUSHING |





Samick Square Pilot Flanged Linear Bushing **LMKP** 20 UU – A N S

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

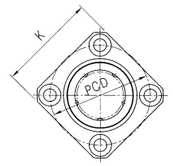
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

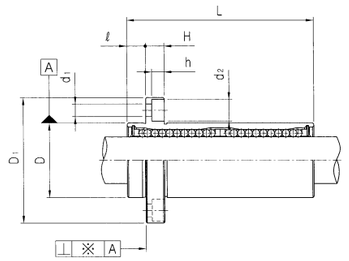
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	PART NUMBER Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	ℓ	H	PCD	K	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMKP6	LMKP6-A	6	12 $^{0}_{-0.011}$	19	28	5	5	20	22	3.4	6.5	3.3	12	200	260	4	26.5
LMKP8	LMKP8-A	8	15 $^{0}_{-0.011}$	24	32	5	5	24	25	3.4	6.5	3.3	12	260	400	4	40
LMKP10	LMKP10-A	10 $^{0}_{-0.009}$	19 $^{0}_{-0.013}$	29	40	6	6	29	30	4.5	8	4.4	12	370	540	4	76
LMKP12	LMKP12-A	12 $^{0}_{-0.009}$	21 $^{0}_{-0.013}$	30	42	6	6	32	32	4.5	8	4.4	12	410	590	4	78
LMKP13	LMKP13-A	13 $^{0}_{-0.009}$	23 $^{0}_{-0.013}$	32	43	6	6	33	34	4.5	8	4.4	12	500	770	4	94
LMKP16	LMKP16-A	16 $^{0}_{-0.009}$	28 $^{0}_{-0.013}$	37	48	6	6	38	37	4.5	8	4.4	12	770	1170	5	134
LMKP20	LMKP20-A	20 $^{0}_{-0.010}$	32 $^{0}_{-0.016}$	42	54	8	8	43	42	5.5	9.5	5.4	15	860	1370	5	180
LMKP25	LMKP25-A	25 $^{0}_{-0.010}$	40 $^{0}_{-0.016}$	59	62	8	8	51	50	5.5	9.5	5.4	15	980	1560	6	340
LMKP30		30 $^{0}_{-0.012}$	45 $^{0}_{-0.019}$	64	74	10	10	60	58	6.6	11	6.5	15	1560	2740	6	460
LMKP35		35 $^{0}_{-0.012}$	52 $^{0}_{-0.019}$	70	82	10	10	67	64	6.6	11	6.5	20	1660	3130	6	795
LMKP40		40 $^{0}_{-0.012}$	60 $^{0}_{-0.019}$	80	96	13	13	78	75	9	14	8.6	20	2150	4010	6	1054
LMKP50		50 $^{0}_{-0.015}$	80 $^{0}_{-0.022}$	100	116	13	13	98	92	9	14	8.6	20	3820	7930	6	2200
LMKP60		60 $^{0}_{-0.015}$	90 $^{0}_{-0.022}$	110	134	18	18	112	106	11	17	10.8	25	4700	9990	6	2960

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMKP_L FLANGED LINEAR BUSHING LONG |





Samick Square Pilot Flanged Linear Bushing **LMKP** 20 **L** UU – A N S

Nominal Shaft Diameter

Linear Bushing Long type (for high load)

Seal
Blank : No Seal
U : One Side Seal
UU: Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

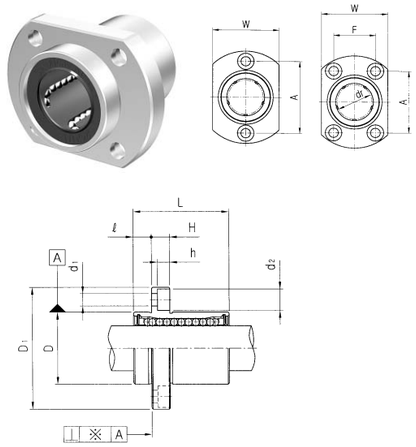
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	PART NUMBER Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	ℓ	H	PCD	K	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMKP6L	LMKP6L-A	6	12 $^{0}_{-0.013}$	35	28	5	5	20	22	3.4	6.5	3.3	15	320	520	4	31
LMKP8L	LMKP8L-A	8	15 $^{0}_{-0.013}$	45	32	5	5	24	25	3.4	6.5	3.3	15	430	780	4	53
LMKP10L	LMKP10L-A	10 $^{0}_{-0.010}$	19 $^{0}_{-0.016}$	55	40	6	6	29	30	4.5	8	4.4	15	580	1100	4	105
LMKP12L	LMKP12L-A	12 $^{0}_{-0.010}$	21 $^{0}_{-0.016}$	57	42	6	6	32	32	4.5	8	4.4	15	650	1200	4	100
LMKP13L	LMKP13L-A	13 $^{0}_{-0.010}$	23 $^{0}_{-0.016}$	61	43	6	6	33	34	4.5	8	4.4	15	810	1570	4	130
LMKP16L	LMKP16L-A	16 $^{0}_{-0.010}$	28 $^{0}_{-0.016}$	70	48	6	6	38	37	4.5	8	4.4	15	1230	2350	5	187
LMKP20L	LMKP20L-A	20 $^{0}_{-0.012}$	32 $^{0}_{-0.019}$	80	54	8	8	43	42	5.5	9.5	5.4	20	1400	2750	5	260
LMKP25L	LMKP25L-A	25 $^{0}_{-0.012}$	40 $^{0}_{-0.019}$	112	62	8	8	51	50	5.5	9.5	5.4	20	1560	3140	6	515
LMKP30L		30 $^{0}_{-0.015}$	45 $^{0}_{-0.022}$	123	74	10	10	60	58	6.6	11	6.5	20	2490	5490	6	655
LMKP35L		35 $^{0}_{-0.015}$	52 $^{0}_{-0.022}$	135	82	10	10	67	64	6.6	11	6.5	25	2650	6470	6	970
LMKP40L		40 $^{0}_{-0.015}$	60 $^{0}_{-0.022}$	154	96	13	13	78	75	9	14	8.6	25	3430	8040	6	1560
LMKP50L		50 $^{0}_{-0.020}$	80 $^{0}_{-0.025}$	192	116	13	13	98	92	9	14	8.6	25	6080	15900	6	3500
LMKP60L		60 $^{0}_{-0.020}$	90 $^{0}_{-0.025}$	211	134	18	18	112	106	11	17	10.8	25	7650	20000	6	4500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMHP FLANGED LINEAR BUSHING |

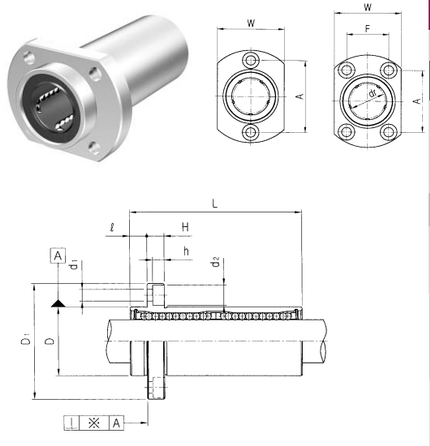


Samick Oval Pilot Flanged Linear Bushing	LMHP	20	UU	–	A	N	S
Nominal Shaft Diameter							
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance type)	Blank : No-plating(Standard) N : Electroless nickel plating R : Raydent treatment						
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball						

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	ℓ	H	W	A	F	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMHP6	LMHP6-A	6	12 0 -0.011	19	28	5	5	18	20		3.4	6.5	3.3	12	200	260	4	26.5
LMHP8	LMHP8-A	8	15 0 -0.011	24	32	5	5	21	24		3.4	6.5	3.3	12	260	400	4	40
LMHP10	LMHP10-A	10	19 0 -0.009	29	40	6	6	25	29		4.5	8	4.4	12	370	540	4	76
LMHP12	LMHP12-A	12	21 0 -0.013	30	42	6	6	27	32		4.5	8	4.4	12	410	590	4	78
LMHP13	LMHP13-A	13	23 0 -0.013	32	43	6	6	29	33		4.5	8	4.4	12	500	770	4	94
LMHP16	LMHP16-A	16	28 0 -0.013	37	48	6	6	34	31	22	4.5	8	4.4	12	770	1170	5	134
LMHP20	LMHP20-A	20	32 0 -0.016	42	54	8	8	38	36	24	5.5	9.5	5.4	15	860	1370	5	180
LMHP25	LMHP25-A	25	40 0 -0.016	59	62	8	8	46	40	32	5.5	9.5	5.4	15	980	1560	6	340
LMHP30		30	45 0 -0.016	64	74	10	10	51	49	35	6.6	11	6.5	15	1560	2740	6	460

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMHP_L FLANGED LINEAR BUSHING LONG |

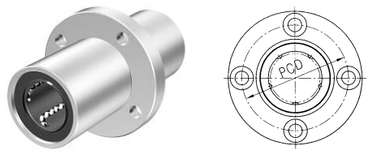


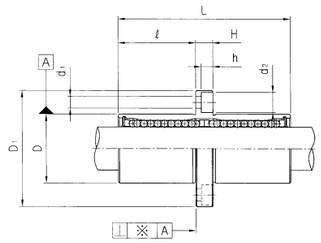
Samick Oval Pilot Flanged Linear Bushing	LMHP	20	L	UU	–	A	N	S
Nominal Shaft Diameter								
Linear Bushing Long type(for high load)								
Seal	Blank : No Seal U : One Side Seal UU: Both Side Seal							
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)							
Outer-sleeves (by corrosion resistance type)	Blank : No-plating(Standard) N : Electroless nickel plating R : Raydent treatment							
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball							

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	ℓ	H	W	A	F	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMHP6L	LMHP6L-A	6	12 0 -0.013	35	28	5	5	18	20		3.4	6.5	3.3	15	320	520	4	31
LMHP8L	LMHP8L-A	8	15 0 -0.013	45	32	5	5	21	24		3.4	6.5	3.3	15	430	780	4	53
LMHP10L	LMHP10L-A	10	19 0 -0.010	55	40	6	6	25	29		4.5	8	4.4	15	580	1100	4	105
LMHP12L	LMHP12L-A	12	21 0 -0.016	57	42	6	6	27	32		4.5	8	4.4	15	650	1200	4	100
LMHP13L	LMHP13L-A	13	23 0 -0.016	61	43	6	6	29	33		4.5	8	4.4	15	810	1570	4	130
LMHP16L	LMHP16L-A	16	28 0 -0.016	70	48	6	6	34	31	22	4.5	8	4.4	15	1230	2350	5	187
LMHP20L	LMHP20L-A	20	32 0 -0.019	80	54	8	8	38	36	24	5.5	9.5	5.4	20	1400	2750	5	260
LMHP25L	LMHP25L-A	25	40 0 -0.019	112	62	8	8	46	40	32	5.5	9.5	5.4	20	1560	3140	6	515
LMHP30L		30	45 0 -0.019	123	74	10	10	51	49	35	6.6	11	6.5	20	2940	5490	6	655

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMFM FLANGED LINEAR BUSHING LONG |





Samick Circular Middle Flanged Linear Bushing **LMFM** 20 UU – A N S

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

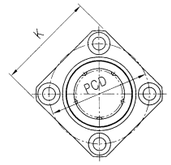
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

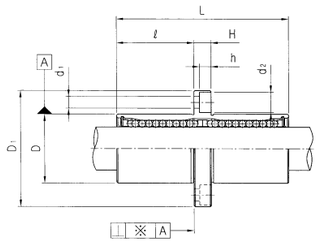
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm	TOLERANCE	L	D1	ℓ	H	PCD	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(C0)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMFM6	LMFM6-A	6	12	0 -0.011	35	28	15	5	20	3.4	6.5	3.3	15	320	520	4	31
LMFM8	LMFM8-A	8	15	0 -0.011	45	32	20	5	24	3.4	6.5	3.3	15	430	780	4	53
LMFM10	LMFM10-A	10	19	0 -0.013	55	40	24.5	6	29	4.5	8	4.4	15	580	1100	4	105
LMFM12	LMFM12-A	12	21	0 -0.013	57	42	25.5	6	32	4.5	8	4.4	15	650	1200	4	100
LMFM13	LMFM13-A	13	23	0 -0.013	61	43	27.5	6	33	4.5	8	4.4	15	810	1570	4	130
LMFM16	LMFM16-A	16	28	0 -0.013	70	48	32	6	38	4.5	8	4.4	15	1230	2350	5	187
LMFM20	LMFM20-A	20	32	0 -0.013	80	54	36	8	43	5.5	9.5	5.4	20	1400	2750	5	260
LMFM25	LMFM25-A	25	40	0 -0.016	112	62	52	8	51	5.5	9.5	5.4	20	1560	3140	6	515
LMFM30		30	45	0 -0.016	123	74	56.5	10	60	6.6	11	6.5	20	2940	5490	6	655
LMFM35		35	52	0 -0.016	135	82	62.5	10	67	6.6	11	6.5	25	2650	6470	6	970
LMFM40		40	60	0 -0.019	154	96	70.5	13	78	9	14	8.6	25	3430	8040	6	1560
LMFM50		50	80	0 -0.019	192	116	89.5	13	98	9	14	8.6	25	6080	15900	6	3500
LMFM60		60	90	0 -0.022	211	134	96.5	18	112	11	17.5	10.8	25	7650	20000	6	4500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMKM FLANGED LINEAR BUSHING LONG |





Samick Square Middle Flanged Linear Bushing **LMKM** 20 UU – A N S

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

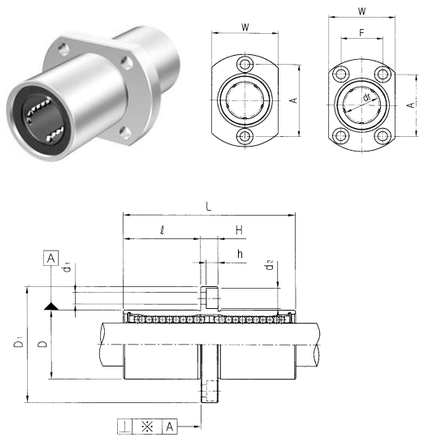
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm	TOLERANCE	L	D1	ℓ	H	PCD	K	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(C0)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMKM6	LMKM6-A	6	12	0 -0.013	35	28	15	5	20	22	3.4	6.5	3.3	15	320	520	4	31
LMKM8	LMKM8-A	8	15	0 -0.013	45	32	20	5	24	25	3.4	6.5	3.3	15	430	780	4	53
LMKM10	LMKM10-A	10	19	0 -0.016	55	40	24.5	6	29	30	4.5	8	4.4	15	580	1100	4	105
LMKM12	LMKM12-A	12	21	0 -0.016	57	42	25.5	6	32	32	4.5	8	4.4	15	650	1200	4	100
LMKM13	LMKM13-A	13	23	0 -0.016	61	43	27.5	6	33	34	4.5	8	4.4	15	810	1570	4	130
LMKM16	LMKM16-A	16	28	0 -0.016	70	48	32	6	38	37	4.5	8	4.4	15	1230	2350	5	187
LMKM20	LMKM20-A	20	32	0 -0.016	80	54	36	8	43	42	5.5	9.5	5.4	20	1400	2750	5	260
LMKM25	LMKM25-A	25	40	0 -0.019	112	62	52	8	51	50	5.5	9.5	5.4	20	1560	3140	6	515
LMKM30		30	45	0 -0.019	123	74	56.5	10	60	58	6.6	11	6.5	20	2940	5490	6	655
LMKM35		35	52	0 -0.019	135	82	62.5	10	67	64	6.6	11	6.5	25	2650	6470	6	970
LMKM40		40	60	0 -0.022	154	96	70.5	13	78	75	9	14	8.6	25	3430	8040	6	2560
LMKM50		50	80	0 -0.022	192	116	89.5	13	98	92	9	14	8.6	25	6080	15900	6	3500
LMKM60		60	90	0 -0.025	211	134	96.5	18	112	106	11	17.5	10.8	25	7650	20000	6	4500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMHM FLANGED LINEAR BUSHING |



Samick Square Midde Flanged Linear Bushing	LMHM	20	UU	–	A	N	S

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

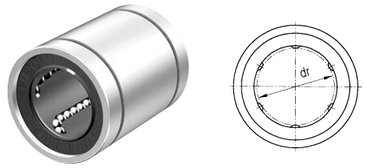
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

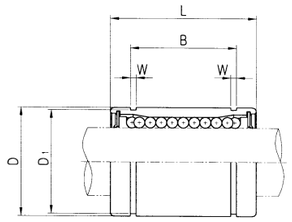
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	PART NUMBER Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	ℓ	H	W	A	F	d1	d2	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMHM6	LMHM6-A	6	12	35	28	15	5	18	20	3.4	6.5	3.3		15	320	520	4	31
LMHM8	LMHM8-A	8	15	45	32	20	5	21	24	3.4	6.5	3.3		15	430	780	4	53
LMHM10	LMHM10-A	10	19	55	40	24.5	6	25	29	4.5	8	4.4		15	580	1100	4	105
LMHM12	LMHM12-A	12	21	57	42	25.5	6	27	32	4.5	8	4.4		15	650	1200	4	100
LMHM13	LMHM13-A	13	23	61	43	27.5	6	29	33	4.5	8	4.4		15	810	1570	4	130
LMHM16	LMHM16-A	16	28	70	48	32	6	34	31	22	4.5	8	4.4	15	1230	2350	5	187
LMHM20	LMHM20-A	20	32	80	54	36	8	38	36	24	5.5	9.5	5.4	20	1400	2750	5	260
LMHM25	LMHM25-A	25	40	112	62	52	8	46	40	32	5.5	9.5	5.4	20	1560	3140	6	515
LMHM30		30	45	123	74	56.5	10	51	49	35	6.6	11	6.5	20	2940	5490	6	655

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LME CLOSED LINEAR BUSHING |





European Standard Samick Linear Bushing **LME** 20 UU – A N S

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

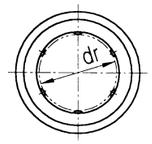
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

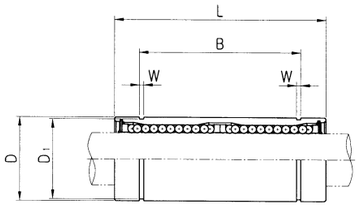
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	B	W	D1	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LME5		5	12 $^{0}_{-0.008}$	22	14.5	1.1	11.5	200	260	4	12
LME8	LME8-A	8 $^{+0.008}_{0}$	16 $^{0}_{-0.008}$	25	16.5	1.1	15.2	260	400	4	20
LME12	LME12-A	12 $^{+0.011}_{-0.001}$	22 $^{0}_{-0.009}$	32	22.9	1.3	21	410	590	4	41
LME16	LME16-A	16 $^{+0.013}_{-0.002}$	26 $^{0}_{-0.011}$	36	24.9	1.3	24.9	770	1170	5	57
LME20	LME20-A	20	32 $^{0}_{-0.013}$	45	31.5	1.6	30.3	860	1370	5	91
LME25	LME25-A	25	40	58	44.1	1.85	37.5	980	1560	6	215
LME30		30	47	68	52.1	1.85	44.5	1560	2740	6	325
LME40		40	62 $^{0}_{-0.015}$	80	60.6	2.15	59	2150	4010	6	705
LME50		50 $^{+0.016}_{-0.004}$	75 $^{0}_{-0.015}$	100	77.6	2.65	72	3820	7930	6	1130
LME60		60	90 $^{0}_{-0.020}$	125	101.7	3.15	86.5	4700	9990	6	2220

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LME_L LONG LINEAR BUSHING |





European Standard Samick Linear Bushing **LME** 20 **L** UU – A N S

Nominal Shaft Diameter

Linear Bushing Long type (for high load)

Seal
Blank : No Seal
U : One Side Seal
UU: Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

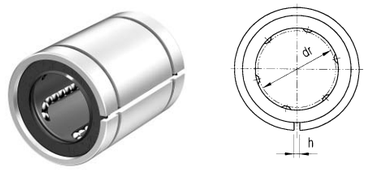
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

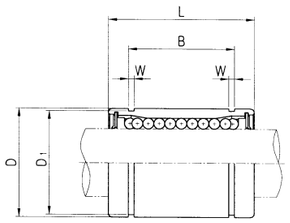
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	B	W	D1	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LME8L	LME8L-A	8 $^{+0.009}_{+0.001}$	16 $^{0}_{-0.009}$	45	33	1.1	15.2	430	780	4	31
LME12L	LME12L-A	12 $^{-0.001}_{-0.009}$	22 $^{0}_{-0.011}$	57	45.8	1.3	21	650	1200	4	80
LME16L	LME16L-A	16 $^{+0.011}_{+0.001}$	26 $^{0}_{-0.013}$	70	49.8	1.3	24.9	1230	2350	5	145
LME20L	LME20L-A	20 $^{-0.001}_{-0.011}$	32	80	61	1.6	30.3	1400	2750	5	180
LME25L	LME25L-A	25 $^{+0.013}_{-0.002}$	40 $^{0}_{-0.013}$	112	82	1.85	38	1560	3140	6	440
LME30L		30	47	123	104.2	1.85	44.5	2490	5490	6	580
LME40L		40	62 $^{0}_{-0.015}$	154	121.2	2.15	59	3430	8040	6	1170
LME50L		50 $^{+0.016}_{-0.004}$	75 $^{0}_{-0.020}$	192	155.2	2.65	72	6080	15900	6	3100
LME60L		60	90	211	170	3.15	86.5	7650	20000	6	3500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LME_AJ ADJUSTABLE LINEAR BUSHING |





European Standard Samick Linear Bushing **LME** 20 UU **AJ** – A N S

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Linear Bushing Adjustable type

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

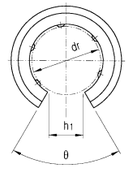
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

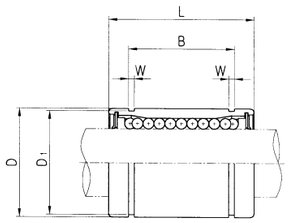
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	B	W	D1	h	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LME5AJ		5	12 $^{0}_{-0.008}$	22	14.5	1.1	11.5	1	200	260	4	12
LME8AJ	LME8AJ-A	8 $^{+0.008}_{0}$	16 $^{0}_{-0.008}$	25	16.5	1.1	15.2	1	260	400	4	20
LME12AJ	LME12AJ-A	12	22 $^{0}_{-0.009}$	32	22.9	1.3	21	1.5	410	590	4	41
LME16AJ	LME16AJ-A	16 $^{+0.009}_{-0.001}$	26 $^{0}_{-0.009}$	36	24.9	1.3	24.9	1.5	770	1170	5	57
LME20AJ	LME20AJ-A	20	32 $^{0}_{-0.011}$	45	31.5	1.6	30.3	2	860	1370	5	91
LME25AJ	LME25AJ-A	25 $^{+0.011}_{-0.001}$	40 $^{0}_{-0.011}$	58	44.1	1.85	37.5	2	980	1560	6	215
LME30AJ		30	47 $^{0}_{-0.013}$	68	52.1	1.85	44.5	2	1560	2740	6	325
LME40AJ		40	62 $^{0}_{-0.015}$	80	60.6	2.15	59	3	2150	4010	6	705
LME50AJ		50 $^{+0.013}_{-0.002}$	75 $^{0}_{-0.015}$	100	77.6	2.65	72	3	3820	7930	6	1130
LME60AJ		60	90 $^{0}_{-0.020}$	125	101.7	3.15	86.5	3	4700	9990	6	2220

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm
Note 4) Outer diameter is the obtained value before the slotting process.

| LME_OP OPEN LINEAR BUSHING |





European Standard Samick Linear Bushing **LME** 20 UU **OP** – A N S

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Linear Bushing Open type

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

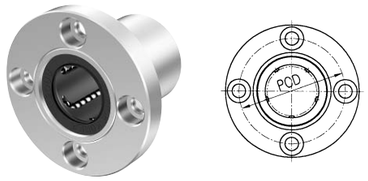
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

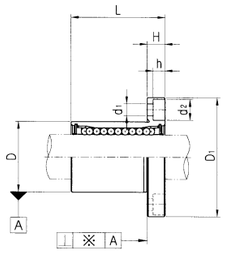
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	B	W	D1	h1	θ	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LME12OP		12 $^{+0.008}_{0}$	22 $^{0}_{-0.009}$	32	22.9	1.3	21	7.5	78°	410	590	3	41
LME16OP		16 $^{+0.009}_{-0.001}$	26 $^{0}_{-0.009}$	36	24.9	1.3	24.9	10	78°	770	1170	4	57
LME20OP		20	32 $^{0}_{-0.011}$	45	31.5	1.6	30.3	10	60°	860	1370	4	91
LME25OP		25 $^{+0.011}_{-0.001}$	40 $^{0}_{-0.011}$	58	44.1	1.85	37.5	12.5	60°	980	1560	5	215
LME30OP		30	47 $^{0}_{-0.013}$	68	52.1	1.85	44.5	12.5	50°	1560	2740	5	325
LME40OP		40	62 $^{0}_{-0.013}$	80	60.6	2.15	59	16.8	50°	2150	4010	5	705
LME50OP		50 $^{+0.013}_{-0.002}$	75 $^{0}_{-0.013}$	100	77.6	2.65	72	21	50°	3820	7930	5	1130
LME60OP		60	90 $^{0}_{-0.015}$	125	101.7	3.15	86.5	27.2	54°	4700	9990	5	2220

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm
Note 4) Outer diameter is the obtained value before the slotting process.

| LMEF FLANGED LINEAR BUSHING |





European Standard Samick Circular Flanged Linear Bushing **LMEF** **20** **UU** **–** **A** **N** **S**

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

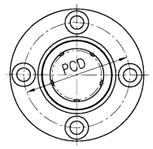
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

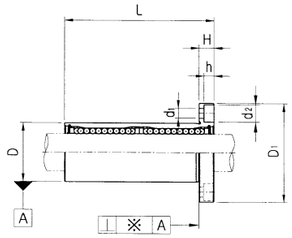
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	H	PCD	d1	d2	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(C0)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMEF8	LMEF8-A	8 +0.008 0	16 0 -0.008	25	32	5	24	3.4	6.5	3.3	12	260	400	4	44
LMEF12	LMEF12-A	12	22	32	42	6	32	4.5	8	4.4	12	410	590	4	86
LMEF16	LMEF16-A	16 +0.009 -0.001	26 0 -0.009	36	46	6	36	4.5	8	4.4	12	770	1170	5	120
LMEF20	LMEF20-A	20	32	45	54	8	43	5.5	9.5	5.4	15	860	1370	5	184
LMEF25	LMEF25-A	25 +0.011 -0.001	40 0 -0.011	58	62	8	51	5.5	9.5	5.4	15	980	1560	6	335
LMEF30		30	47	68	76	10	62	6.6	11	6.5	15	1560	2740	6	545
LMEF40		40	62	80	98	13	80	9	14	8.6	20	2150	4010	6	1185
LMEF50		50 +0.013 -0.002	75 0 -0.013	100	112	13	94	9	14	8.6	20	3820	7930	6	1730
LMEF60		60	90 0 -0.015	125	134	18	112	11	17.5	10.8	25	4700	9990	6	3180

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMEF_L FLANGED LINEAR BUSHING |





European Standard Samick Circular Flanged Linear Bushing **LMEF** **20** **L** **UU** **–** **A** **N** **S**

Nominal Shaft Diameter

Linear Bushing Long type(for high load)

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

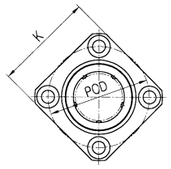
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

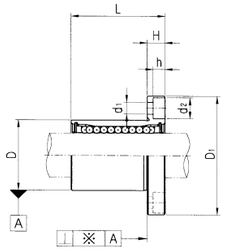
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	H	PCD	d1	d2	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(C0)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMEF8L	LMEF8L-A	8 +0.009 -0.001	16 0 -0.009	45	32	5	24	3.4	6.5	3.3	15	430	780	4	53
LMEF12L	LMEF12L-A	12	22	57	42	6	32	4.5	8	4.4	15	650	1200	4	100
LMEF16L	LMEF16L-A	16 +0.011 -0.001	26 0 -0.0011	70	46	6	36	4.5	8	4.4	15	1230	2350	5	187
LMEF20L	LMEF20L-A	20	32	80	54	8	43	5.5	9.5	5.4	17	1400	2750	5	260
LMEF25L	LMEF25L-A	25 +0.013 -0.002	40 0 -0.013	112	62	8	51	5.5	9.5	5.4	17	1560	3140	6	515
LMEF30L		30	47	123	76	10	62	6.6	11	6.5	17	2490	5490	6	655
LMEF40L		40	62	154	98	13	80	9	14	8.6	20	3430	8040	6	1560
LMEF50L		50 +0.016 -0.004	75 0 -0.015	192	112	13	94	9	14	8.6	20	6080	15900	6	3500
LMEF60L		60	90 0 -0.020	211	134	18	112	11	17.5	10.8	25	7650	20000	6	4500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMEK FLANGED LINEAR BUSHING |





European Standard Samick Square Flanged Linear Bushing **LMEK** 20 UU – A N S

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

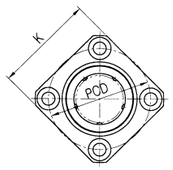
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

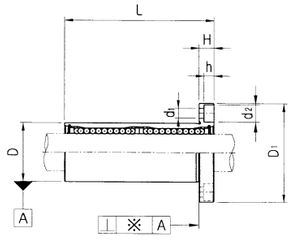
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm	D TOLERANCE	L	D1	H	PCD	K	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMEK8	LMEK8-A	8 +0 -0.008	16	0 -0.008	25	32	5	24	25	3.4	6.5	3.3	12	260	400	4	44
LMEK12	LMEK12-A	12 +0 -0.008	22	0 -0.009	32	42	6	32	32	4.5	8	4.4	12	410	590	4	86
LMEK16	LMEK16-A	16 +0.009 -0.001	26	0 -0.009	36	46	6	36	35	4.5	8	4.4	12	770	1170	5	120
LMEK20	LMEK20-A	20 +0.009 -0.001	32	0 -0.011	45	54	8	43	42	5.5	9.5	5.4	15	860	1370	5	184
LMEK25	LMEK25-A	25 +0.011 -0.001	40	0 -0.011	58	62	8	51	50	5.5	9.5	5.4	15	980	1560	6	335
LMEK30		30 +0.011 -0.001	47	0 -0.011	68	76	10	62	60	6.6	11	6.5	15	1560	2740	6	545
LMEK40		40 +0.013 -0.002	62	0 -0.013	80	98	13	80	75	9	14	8.6	20	2150	4010	6	1185
LMEK50		50 +0.013 -0.002	75	0 -0.013	100	112	13	94	88	9	14	8.6	20	3820	7930	6	1730
LMEK60		60 +0.015 -0.002	90	0 -0.015	125	134	18	112	106	11	17.5	10.8	25	4700	9990	6	3180

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMEK_L FLANGED LINEAR BUSHING LONG |





European Standard Samick Square Flanged Linear Bushing **LMEK** 20 **L** UU – A N S

Nominal Shaft Diameter

Linear Bushing Long type(for high load)

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

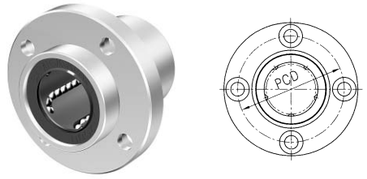
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

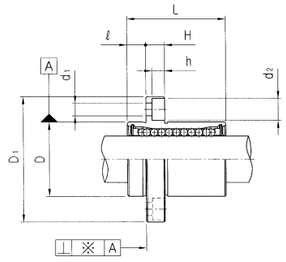
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm	D TOLERANCE	L	D1	H	PCD	K	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMEK8L	LMEK8L-A	8 +0.009 -0.001	16	0 -0.009	45	32	5	24	25	3.4	6.5	3.3	15	430	780	4	53
LMEK12L	LMEK12L-A	12 +0.009 -0.001	22	0 -0.009	57	42	6	32	32	4.5	8	4.4	15	650	1200	4	100
LMEK16L	LMEK16L-A	16 +0.011 -0.001	26	0 -0.011	70	46	6	36	35	4.5	8	4.4	15	1230	2350	5	187
LMEK20L	LMEK20L-A	20 +0.009 -0.001	32	0 -0.011	80	54	8	43	42	5.5	9.5	5.4	17	1400	2750	5	260
LMEK25L	LMEK25L-A	25 +0.013 -0.002	40	0 -0.013	112	62	8	51	50	5.5	9.5	5.4	17	1560	3140	6	515
LMEK30L		30 +0.013 -0.002	47	0 -0.013	123	76	10	62	60	6.6	11	6.5	17	2490	5490	6	655
LMEK40L		40 +0.016 -0.004	62	0 -0.015	154	98	13	80	75	9	14	8.6	20	3430	8040	6	1560
LMEK50L		50 +0.016 -0.004	75	0 -0.015	192	112	13	94	88	9	14	8.6	20	6080	15900	6	3500
LMEK60L		60 +0.020 -0.004	90	0 -0.020	211	134	18	112	106	11	17.5	10.8	25	7650	20000	6	4500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMEFP FLANGED LINEAR BUSHING |





European Standard Samick Circular Pilot Flanged Linear Bushing **LMEFP** 20 UU – A N S

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

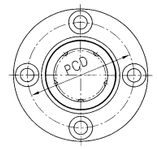
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

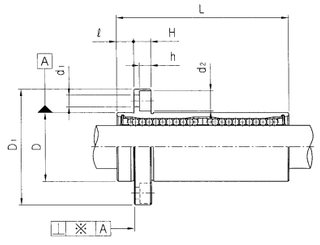
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	ℓ	H	PCD	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CRCUIT	WEIGHT (gf)
LMEFP8	LMEFP8-A	8 +0.008 0	16 0 -0.008	25	32	5	5	24	3.4	6.5	3.3	12	260	400	4	44
LMEFP12	LMEFP12-A	12 +0 -0.008	22 0 -0.009	32	42	6	6	32	4.5	8	4.4	12	410	590	4	86
LMEFP16	LMEFP16-A	16 +0.009 -0.001	26	36	46	6	6	36	4.5	8	4.4	12	770	1170	5	120
LMEFP20	LMEFP20-A	20	32	45	54	8	8	43	5.5	9.5	5.4	15	860	1370	5	184
LMEFP25	LMEFP25-A	25 +0.011 -0.001	40 0 -0.011	58	62	8	8	51	5.5	9.5	5.4	15	980	1560	6	335
LMEFP30		30	47	68	76	10	10	62	6.6	11	6.5	15	1560	2740	6	545
LMEFP40		40	62	80	98	13	13	80	9	14	8.6	20	2150	4010	6	1185
LMEFP50		50 +0.013 -0.002	75 0 -0.013	100	112	13	13	94	9	14	8.6	20	3820	7930	6	1730
LMEFP60		60	90 0 -0.015	125	134	18	18	112	11	17.5	10.8	25	4700	9990	6	3180

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMEFP_L FLANGED LINEAR BUSHING LONG |





European Standard Samick Circular Pilot Flanged Linear Bushing **LMEFP** 20 **L** UU – A N S

Nominal Shaft Diameter

Linear Bushing Long type(for high load)

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

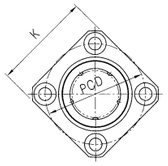
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

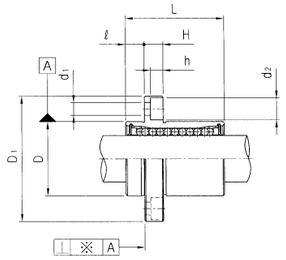
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	ℓ	H	PCD	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CRCUIT	WEIGHT (gf)
LMEFP8L	LMEFP8L-A	8 +0.009 -0.001	16 0 -0.009	45	32	5	5	24	3.4	6.5	3.3	15	430	780	4	53
LMEFP12L	LMEFP12L-A	12	22 0 -0.011	57	42	6	6	32	4.5	8	4.4	15	650	1200	4	100
LMEFP16L	LMEFP16L-A	16 +0.011	26	70	46	6	6	36	4.5	8	4.4	15	1230	2350	5	187
LMEFP20L	LMEFP20L-A	20 -0.001	32	80	54	8	8	43	5.5	9.5	5.4	17	1400	2750	5	260
LMEFP25L	LMEFP25L-A	25 +0.013 -0.002	40 0 -0.013	112	62	8	8	51	5.5	9.5	5.4	17	1560	3140	6	515
LMEFP30L		30	47	123	76	10	10	62	6.6	11	6.5	17	2490	5490	6	655
LMEFP40L		40	62	154	98	13	13	80	9	14	8.6	20	3430	8040	6	1560
LMEFP50L		50 +0.016 -0.004	75 0 -0.015	192	112	13	13	94	9	14	8.6	20	6080	15900	6	3500
LMEFP60L		60	90 0 -0.020	211	134	18	18	112	11	17.5	10.8	25	7650	20000	6	4500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMEKP FLANGED LINEAR BUSHING |





European Standard Samick Square Pilot Flanged Linear Bushing **LMEKP** 20 UU – A N S

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

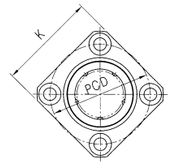
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

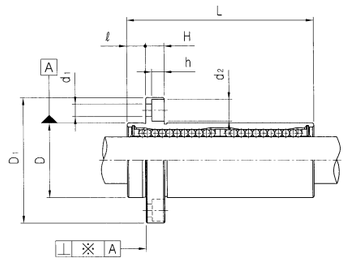
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	ℓ	H	PCD	K	d1	d2	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMEKP8	LMEKP8-A	8 +0.008 0	16 0 -0.008	25	32	5	5	24	25	3.4	6.5	3.3	12	260	400	4	44
LMEKP12	LMEKP12-A	12 +0.008 0	22 0 -0.009	32	42	6	6	32	32	4.5	8	4.4	12	410	590	4	86
LMEKP16	LMEKP16-A	16 +0.009 0	26 0 -0.009	36	46	6	6	36	35	4.5	8	4.4	12	770	1170	5	120
LMEKP20	LMEKP20-A	20 +0.011 -0.001	32 0 -0.011	45	54	8	8	43	42	5.5	9.5	5.4	15	860	1370	5	184
LMEKP25	LMEKP25-A	25 +0.011 -0.001	40 0 -0.011	58	62	8	8	51	50	5.5	9.5	5.4	15	980	1560	6	335
LMEKP30		30 +0.013 -0.002	47 0 -0.013	68	76	10	10	62	60	6.6	11	6.5	15	1560	2740	6	545
LMEKP40		40 +0.013 -0.002	62 0 -0.013	80	98	13	13	80	75	9	14	8.6	20	2150	4010	6	1185
LMEKP50		50 +0.013 -0.002	75 0 -0.013	100	112	13	13	94	88	9	14	8.6	20	3820	7930	6	1730
LMEKP60		60 +0.015 -0.002	90 0 -0.015	125	134	18	18	112	106	11	17.5	10.8	25	4700	9990	6	3180

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMEKP_L FLANGED LINEAR BUSHING LONG |





European Standard Samick Square Pilot Flanged Linear Bushing **LMEKP** 20 **L** UU – A N S

Nominal Shaft Diameter

Linear Bushing Long type(for high load)

Seal
Blank : No Seal
U : One Side Seal
UU: Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

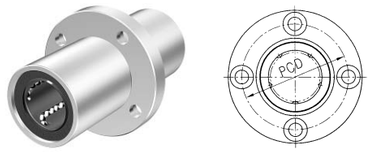
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

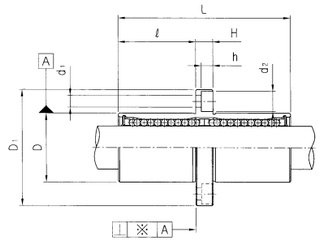
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	ℓ	H	PCD	K	d1	d2	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMEKP8L	LMEKP8L-A	8 +0.009 -0.001	16 0 -0.009	45	32	5	5	24	25	3.4	6.5	3.3	15	430	780	4	53
LMEKP12L	LMEKP12L-A	12 +0.009 -0.001	22 0 -0.011	57	42	6	6	32	32	4.5	8	4.4	15	650	1200	4	100
LMEKP16L	LMEKP16L-A	16 +0.011 -0.001	26 0 -0.011	70	46	6	6	36	35	4.5	8	4.4	15	1230	2350	5	187
LMEKP20L	LMEKP20L-A	20 +0.011 -0.001	32 0 -0.013	80	54	8	8	43	42	5.5	9.5	5.4	17	1400	2750	5	260
LMEKP25L	LMEKP25L-A	25 +0.013 -0.002	40 0 -0.013	112	62	8	8	51	50	5.5	9.5	5.4	17	1560	3140	6	515
LMEKP30L		30 +0.013 -0.002	47 0 -0.013	123	76	10	10	62	60	6.6	11	6.5	17	2490	5490	6	655
LMEKP40L		40 +0.016 -0.004	62 0 -0.015	154	98	13	13	80	75	9	14	8.6	20	3430	8040	6	1560
LMEKP50L		50 +0.016 -0.004	75 0 -0.015	192	112	13	13	94	88	9	14	8.6	20	6080	15900	6	3500
LMEKP60L		60 +0.018 -0.004	90 0 -0.020	211	134	18	18	112	106	11	17.5	10.8	25	7650	20000	6	4500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMEFM FLANGED LINEAR BUSHING LONG |





European Standard Samick Circular Metal Flanged Linear Bushing **LMEFM** 20 UU – A N S

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

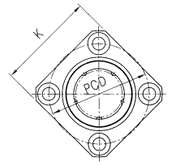
Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

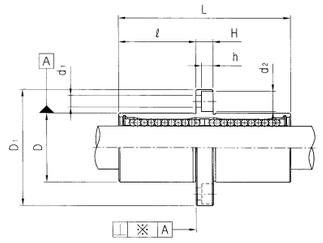
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm	TOLERANCE	L	D1	ℓ	H	PCD	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMEFM8	LMEFM8-A	8 +0.009 −0.001	16	0 −0.009	45	32	20	5	24	3.4	6.5	3.3	15	430	780	4	53
LMEFM12	LMEFM12-A	12 +0.009 −0.001	22	0 −0.009	57	42	25.5	6	32	4.5	8	4.4	15	650	1200	4	100
LMEFM16	LMEFM16-A	16 +0.011	26	0 −0.011	70	46	32	6	36	4.5	8	4.4	15	1230	2350	5	187
LMEFM20	LMEFM20-A	20 −0.001	32		80	54	36	8	43	5.5	9.5	5.4	17	1400	2750	5	260
LMEFM25	LMEFM25-A	25 +0.013 −0.002	40	0 −0.013	112	62	52	8	51	5.5	9.5	5.4	17	1560	3140	6	515
LMEFM30		30 −0.002	47		123	76	56.5	10	62	6.6	11	6.5	17	2400	5490	6	655
LMEFM40		40	62	0 −0.015	154	98	70.5	13	80	9	14	8.6	20	3430	8040	6	1560
LMEFM50		50 +0.016 −0.004	75		192	112	89.5	13	94	9	14	8.6	20	6080	15900	6	3500
LMEFM60		60	90	0 −0.020	211	134	96.5	18	112	11	17.5	10.8	25	7650	20000	6	4500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMEKM FLANGED LINEAR BUSHING LONG |





European Standard Samick Square Metal Flanged Linear Bushing **LMEKM** 20 UU – A N S

Nominal Shaft Diameter

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

Outer-sleeves (by corrosion resistance type)
Blank : No-plating(Standard)
N : Electroless nickel plating
R : Raydent treatment

Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER Resin	Steel	DIAMETER dr. TOLERANCE	D mm	TOLERANCE	L	D1	ℓ	H	PCD	K	d1	d2	h	SQUARENESS ※(㎛)	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	NO. OF BALL CIRCUIT	WEIGHT (gf)
LMEKM8	LMEKM8-A	8 +0.009 −0.001	16	0 −0.009	45	32	20	5	24	25	3.4	6.5	3.3	15	430	780	4	53
LMEKM12	LMEKM12-A	12 +0.009 −0.001	22	0 −0.009	57	42	25.5	6	32	32	4.5	8	4.4	15	650	1200	4	100
LMEKM16	LMEKM16-A	16 +0.011	26	0 −0.011	70	46	32	6	36	35	4.5	8	4.4	15	1230	2350	5	187
LMEKM20	LMEKM20-A	20 −0.001	32		80	54	36	8	43	42	5.5	9.5	5.4	17	1400	2750	5	260
LMEKM25	LMEKM25-A	25 +0.013 −0.002	40	0 −0.013	112	62	52	8	51	50	5.5	9.5	5.4	17	1560	3140	6	515
LMEKM30		30 −0.002	47		123	76	56.5	10	62	60	6.6	11	6.5	17	2490	5490	6	655
LMEKM40		40	62	0 −0.015	154	98	70.5	13	80	75	9	14	8.6	20	3430	8040	6	1560
LMEKM50		50 +0.016 −0.004	75		192	112	89.5	13	94	88	9	14	8.6	20	6080	15900	6	3500
LMEKM60		60	90	0 −0.020	211	134	96.5	18	112	106	11	17.5	10.8	25	7650	20000	6	4500

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

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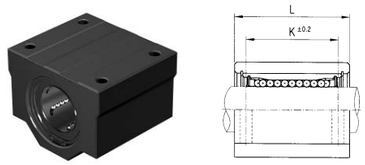
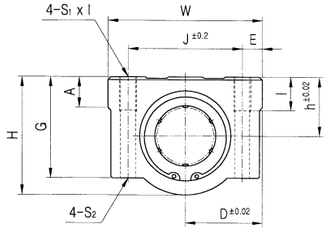
Aluminum Case Unit

| SC ALUMINUM CASE UNIT |



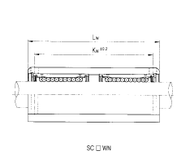


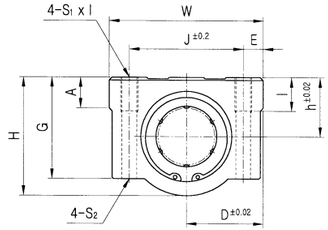
Aluminum Case Unit	SC	20	UU	N	–	A	S
Nominal Shaft Diameter							
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal						
New type							
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball						

PART NUMBER	L/B	h	D	W	H	G	A	J	E	S1×ℓ	S2	K	L	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	WEIGHT (gf)
SC8-B	LM8UU	11	17	34	22	18	6	24	5	M4×8	Φ3.4	18	30	260	400	56
SC10-B	LM10UU	13	20	40	26	21	8	28	6	M5×10	Φ4.3	21	35	370	540	90
SC12-B	LM12UU	15	22	44	30	24.5	8	33	5.5	M5×10	Φ4.3	26	39	410	590	112
SC12N-B	LM12UU	15	21	42	28	24	7.4	30.5	5.5	M5×12	Φ4.3	26	36	410	590	112
SC13-B	LM13UU	15	22	44	30	24.5	8	33	5.5	M5×10	Φ4.3	26	39	500	770	123
SC16-B	LM16UU	19	25	50	38.5	32.5	9	36	7	M5×12	Φ4.3	34	44	770	1170	189
SC20-B	LM20UU	21	27	54	41	35	11	40	7	M6×12	Φ5.2	40	50	860	1370	237
SC25-B	LM25UU	26	38	76	51.5	41	12	54	11	M8×18	Φ6.8	50	67	980	1560	555
SC30-B	LM30UU	30	39	78	59.5	49	15	58	10	M8×18	Φ6.8	58	72	1560	2740	685
SC35-B	LM35UU	34	45	90	68	54	18	70	10	M8×18	Φ6.8	60	80	1660	3130	1100
SC40-B	LM40UU	40	51	102	78	62	20	80	11	M10×25	Φ8.6	60	90	2150	4010	1600
SC50-B	LM50UU	52	61	122	102	80	24	100	11	M10×25	Φ8.6	80	110	3820	7930	3350

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SCW ALUMINUM CASE UNIT LONG |



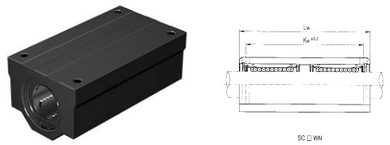


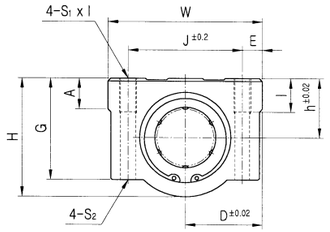
Aluminum Case Unit	SC	20	W	UU	–	A	S
Nominal Shaft Diameter							
Long type (for high load)							
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball						

PART NUMBER	L/B	h	D	W	H	G	A	J	E	S1×ℓ	S2	Kw	Lw	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	WEIGHT (gf)
SC8W-B	LM8U	11	17	34	22	18	6	24	5	M4×8	Φ3.4	42	58	410	800	94
SC10W-B	LM10U	13	20	40	26	21	8	28	6	M5×10	Φ4.3	46	68	590	1080	147
SC12W-B	LM12U	15	22	44	30	24.5	8	33	5.5	M5×10	Φ4.3	64	77	650	1180	220
SC13W-B	LM13U	15	22	44	30	24.5	8	33	5.5	M5×10	Φ4.3	64	77	800	1540	245
SC16W-B	LM16U	19	25	50	38.5	32.5	9	36	7	M5×12	Φ4.3	79	89	1230	2340	376
SC20W-B	LM20U	21	27	54	41	35	11	40	7	M6×12	Φ5.2	90	100	1370	2470	476
SC25W-B	LM25U	26	38	76	51.5	41	12	54	11	M8×18	Φ6.8	119	136	1560	3120	1115
SC30W-B	LM30U	30	39	78	59.5	49	15	58	10	M8×18	Φ6.8	132	146	2490	5480	1375
SC35W-B	LM35U	34	45	90	68	54	18	70	10	M8×18	Φ6.8	140	160	2650	6260	2200
SC40W-B	LM40U	40	51	102	78	62	20	80	11	M10×25	Φ8.6	150	180	3440	8020	3200
SC50W-B	LM50U	52	61	122	102	80	24	100	11	M10×25	Φ8.6	200	230	6110	15860	6720

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SCW_N ALUMINUM CASE UNIT LONG |



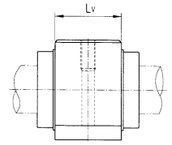


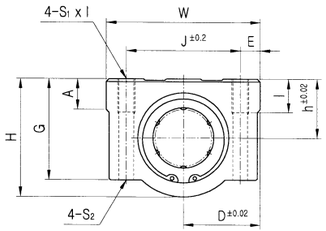
Aluminum Case Unit	SC	20	W	UU	N	–	A	S								
Nominal Shaft Diameter																
Long type (for high load)																
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal															
New type																
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)															
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball															

PART NUMBER	L/B	h	D	W	H	G	A	J	E	S1×ℓ	S2	Kw	Lw	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	WEIGHT (gf)
SC8WN-B	LM8U×2	11	17	34	22	18	6	24	5	M4×8	Φ3.4	42	58	410	800	94
SC10WN-B	LM10U×2	13	20	40	26	21	8	28	6	M5×12	Φ4.3	46	68	590	1080	147
SC12WN-B	LM12U×2	15	21	42	28	24	7.4	30.5	5.5	M5×12	Φ4.3	50	70	650	1180	220
SC13WN-B	LM13U×2	15	22	44	30	24.5	8	33	5.5	M5×12	Φ4.3	50	75	800	1540	245
SC16WN-B	LM16U×2	19	25	50	38.5	32.5	9	36	7	M5×12	Φ4.3	60	85	1230	2340	376
SC20WN-B	LM20U×2	21	27	54	41	35	11	40	7	M6×12	Φ5.2	70	96	1370	2470	476
SC25WN-B	LM25U×2	26	38	76	51.5	41	12	54	11	M8×18	Φ6.8	100	130	1560	3120	1115
SC30WN-B	LM30U×2	30	39	78	59.5	49	15	58	10	M8×18	Φ6.8	110	140	2490	5480	1375
SC35WN-B	LM35U×2	34	45	90	68	54	18	70	10	M8×18	Φ6.8	120	155	2650	6260	2200
SC40WN-B	LM40U×2	40	51	102	78	62	20	80	11	M10×25	Φ8.6	140	175	3440	8020	3200
SC50WN-B	LM50U×2	52	61	122	102	80	24	100	11	M10×25	Φ8.6	160	215	6110	15860	6720

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SCV ALUMINUM CASE UNIT |



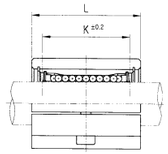


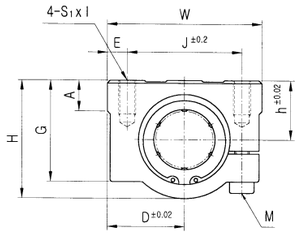
Aluminum Case Unit	SC	20	V	UU	–	A	S									
Nominal Shaft Diameter																
Compact type																
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal															
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)															
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball															

PART NUMBER	L/B	h	D	W	H	G	A	J	E	S1×ℓ	S2	Lv	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	WEIGHT (gf)
SC8V-B	LM8UU	11	17	34	22	18	6	24	5	M4×8	Φ3.4	15.4	260	400	36
SC10V-B	LM10UU	13	20	40	26	21	8	28	6	M5×10	Φ4.3	19.5	370	540	63
SC12V-B	LM12UU	15	22	44	30	24.5	8	33	5.5	M5×10	Φ4.3	20.5	410	590	74
SC12VN-B	LM12UU	15	21	42	28	24	7.4	30.5	5.5	M5×12	Φ4.3	20.5	410	590	74
SC13V-B	LM13UU	15	22	44	30	24.5	8	33	5.5	M5×10	Φ4.3	20.5	500	770	85
SC16V-B	LM16UU	19	25	50	38.5	32.5	9	36	7	M5×12	Φ4.3	23.5	770	1170	132
SC20V-B	LM20UU	21	27	54	41	35	11	40	7	M6×12	Φ5.2	27.4	860	1370	170
SC25V-B	LM25UU	26	38	76	51.5	41	12	54	11	M8×18	Φ6.8	37.4	980	1560	405
SC30V-B	LM30UU	30	39	78	59.5	49	15	58	10	M8×18	Φ6.8	40.9	1560	2740	495
SC35V-B	LM35UU	34	45	90	68	54	18	70	10	M8×18	Φ6.8	45.4	1660	3130	790
SC40V-B	LM40UU	40	51	102	78	62	20	80	11	M10×25	Φ8.6	56.4	2150	4010	1220
SC50V-B	LM50UU	52	61	122	102	80	24	100	11	M10×25	Φ8.6	68.9	3820	7930	2300

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SCJ ADJUSTABLE ALUMINUM CASE UNIT |



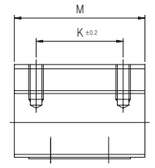


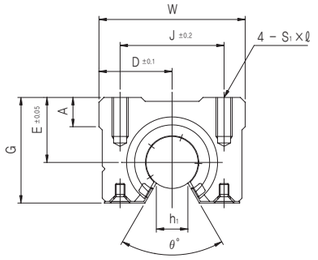
Aluminum Case Unit(Adjustable type)	SCJ	20	UU	–	A	S
Nominal Shaft Diameter						
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal					
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)					
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball					

PART NUMBER	L/B	h	D	W	H	G	A	J	E	S1×ℓ	K	L	M	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	OUTER DIAMETER	WEIGHT (gf)
SCJ10UU	LM10UUAJ	13	20	40	26	21	8	28	6	M5×12	21	35	M4	370	540	Φ10	90
SCJ12UU	LM12UUAJ	15	21	42	28	24	7.4	30.5	5.75	M5×12	26	36	M4	410	590	Φ12	112
SCJ13UU	LM13UUAJ	15	22	44	30	24.5	8	33	5.5	M5×12	26	39	M4	500	770	Φ13	123
SCJ16UU	LM16UUAJ	19	25	50	38.5	32.5	9	36	7	M5×12	34	44	M4	770	1170	Φ16	189
SCJ20UU	LM20UUAJ	21	27	54	41	35	11	40	7	M6×12	40	50	M5	860	1370	Φ20	237
SCJ25UU	LM25UUAJ	26	38	76	51.5	41	12	54	11	M8×18	50	67	M6	980	1560	Φ25	555
SCJ30UU	LM30UUAJ	30	39	78	59.5	49	15	58	10	M8×18	58	72	M6	1560	2740	Φ30	685
SCJ35UU	LM35UUAJ	34	45	90	68	54	18	70	10	M8×18	60	80	M6	1660	3130	Φ35	1100
SCJ40UU	LM40UUAJ	40	51	102	78	62	20	80	11	M10×25	60	90	M8	2150	4010	Φ40	1600
SCJ50UU	LM50UUAJ	52	61	122	102	80	24	100	11	M10×25	80	110	M8	3820	7930	Φ50	3350

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SBR ALUMINUM CASE UNIT OPEN |



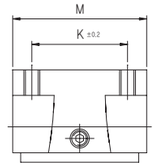


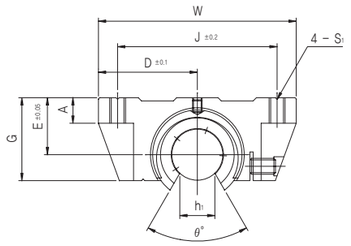
Aluminum Case Unit(Open type)	SBR	20	UU	–	A	S
Nominal Shaft Diameter						
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal					
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)					
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard) S : Stainless steel ball					

PART NUMBER	L/B	D	W	G	θ	A	M	Si×ℓ	h1	E	J	K	BASIC LOAD RATING(N) DYNAMIC(C)	BASIC LOAD RATING(N) STATIC(Co)	WEIGHT (gf)
SBR16UU	LM16UUOP	22.5	45	33	80°	9	45	M5×12	11	20	32	30	770	1170	150
SBR20UU	LM20UUOP	24	48	39	60°	11	50	M6×12	11	23	35	35	860	1370	200
SBR25UU	LM25UUOP	30	60	47	50°	14	65	M6×12	12	27	40	40	980	1560	450
SBR30UU	LM30UUOP	35	70	56	50°	15	70	M8×18	15	33	50	50	1560	2740	630
SBR35UU	LM35UUOP	40	80	63	50°	18	80	M8×18	17	37	55	55	1660	3130	920
SBR40UU	LM40UUOP	45	90	72	50°	20	90	M10×20	20	42	65	65	2150	4010	1330
SBR50UU	LM50UUOP	60	120	91	50°	25	110	M10×20	25	53	94	80	3820	7930	3000

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| TBR ALUMINUM CASE UNIT OPEN |



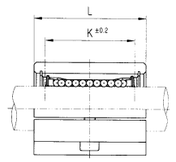


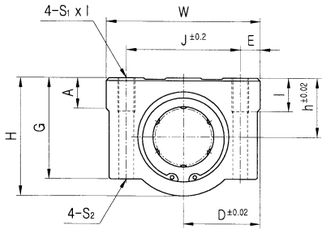
Aluminum Case Unit(Open type)	TBR	20	UU	–	A	S
Nominal Shaft Diameter						
Seal			Blank : No Seal U : One Side Seal UU : Both Side Seal			
Retainer					Blank : Resin retainer(Standard) A : Steel retainer(High temperature)	
Ball type (by corrosion resistance)						Blank : High carbon bearing steel ball (standard) S : Stainless steel ball

PART NUMBER	L/B	D	W	G	θ	A	M	S1	h1	E	J	K	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(C0)	WEIGHT (gf)
TBR16UU	LM16UUOP	31	62	26	80°	8	42	M5	11	18	50	30	392	490	180
TBR20UU	LM20UUOP	34	68	31	60°	10	51	M6	11	21	54	37	784	1176	300
TBR25UU	LM25UUOP	41	82	41	50°	12	65	M8	12	28	65	50	1568	2352	600
TBR30UU	LM30UUOP	45.5	91	48	50°	12	75	M8	15	34	75	60	1764	2940	900

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SCE ALUMINUM CASE UNIT |



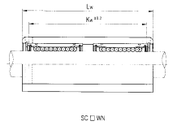


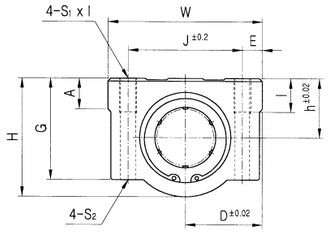
European Standard Aluminum Case Unit	SCE	20	UU	–	A	S
Nominal Shaft Diameter						
Seal			Blank : No Seal U : One Side Seal UU : Both Side Seal			
Retainer					Blank : Resin retainer(Standard) A : Steel retainer(High temperature)	
Ball type (by corrosion resistance)						Blank : High carbon bearing steel ball (standard) S : Stainless steel ball

PART NUMBER	L/B	L	h	D	W	H	G	A	J	E	S1×ℓ	S2	K	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(C0)	WEIGHT (gf)
SCE8-B	LME8UU	30	11	17	34	22	18	6	24	5	M4×8	Φ3.4	18	260	400	60
SCE12-B	LME12UU	39	15	22	44	30	24.5	8	33	5.5	M5×10	Φ4.3	26	410	590	118
SCE16-B	LME16UU	44	19	25	50	38.5	32.5	9	36	7	M5×12	Φ4.3	34	770	1170	180
SCE20-B	LME20UU	53	21	27	54	41	35	11	40	7	M6×12	Φ5.2	40	860	1370	245
SCE25-B	LME25UU	67	26	38	76	51.5	41	12	54	11	M8×18	Φ6.8	50	980	1560	550
SCE30-B	LME30UU	76	30	39	78	59.5	49	15	58	10	M8×18	Φ6.8	58	1560	2740	760
SCE40-B	LME40UU	90	40	51	102	78	62	20	80	11	M10×25	Φ8.6	60	2150	4010	1700
SCE50-B	LME50UU	110	52	61	122	102	80	24	100	11	M10×25	Φ8.6	80	3820	7930	2950

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SCE_W ALUMINUM CASE UNIT LONG |





European Standard Aluminum Case Unit **SCE** 20 **W** UU – A S

Nominal Shaft Diameter

Long type (for high load)

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

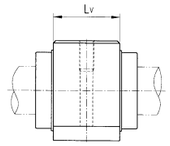
Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

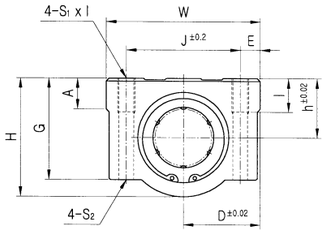
Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER	L/B	h	D	W	H	G	A	J	E	S1×ℓ	S2	Kw	Lw	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	WEIGHT (gf)
SCE8W-B	LME8U×2	11	17	34	22	18	6	24	5	M4×8	Φ3.4	42	58	410	800	98
SCE12W-B	LME12U×2	15	22	44	30	24.5	8	33	5.5	M5×10	Φ4.3	64	77	650	1180	232
SCE16W-B	LME16U×2	19	25	50	38.5	32.5	9	36	7	M5×12	Φ4.3	79	89	1230	2340	360
SCE20W-B	LME20U×2	21	27	54	41	35	11	40	7	M6×12	Φ5.2	90	106	1370	2740	490
SCE25W-B	LME25U×2	26	38	76	51.5	41	12	54	11	M8×18	Φ6.8	119	136	1560	3120	1100
SCE30W-B	LME30U×2	30	39	78	59.5	49	15	58	10	M8×18	Φ6.8	132	154	2490	5480	1525
SCE40W-B	LME40U×2	40	51	102	78	62	20	80	11	M10×25	Φ8.6	150	180	3440	8020	3400
SCE50W-B	LME50U×2	52	61	122	102	80	24	100	11	M10×25	Φ8.6	200	230	6110	15860	5920

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SCE_V ALUMINUM CASE UNIT |





European Standard Aluminum Case Unit **SCE** 20 **V** UU N – A S

Nominal Shaft Diameter

Compact type

Seal
Blank : No Seal
U : One Side Seal
UU : Both Side Seal

New type

Retainer
Blank : Resin retainer(Standard)
A : Steel retainer(High temperature)

Ball type (by corrosion resistance)
Blank : High carbon bearing steel ball (standard)
S : Stainless steel ball

PART NUMBER	L/B	h	D	W	H	G	A	J	E	S1×ℓ	S2	Lv	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(Co)	WEIGHT (gf)
SCE8V-B	LME8UU	11	17	34	22	18	6	24	5	M4×8	Φ3.4	14.4	260	400	40
SCE12V-B	LME12UU	15	22	44	30	24.5	8	33	5.5	M5×10	Φ4.3	20.3	410	590	82
SCE16V-B	LME16UU	19	25	50	38.5	32.5	9	36	7	M5×12	Φ4.3	22.3	770	1170	122
SCE20V-B	LME20UU	21	27	54	41	35	11	40	7	M6×12	Φ5.2	28.3	860	1370	176
SCE25V-B	LME25UU	26	38	76	51.5	41	12	54	11	M8×18	Φ6.8	40.4	980	1560	400
SCE30V-B	LME30UU	30	39	78	59.5	49	15	58	10	M8×18	Φ6.8	48.4	1560	2740	570
SCE40V-B	LME40UU	40	51	102	78	62	20	80	11	M10×25	Φ8.6	56.4	2150	4010	1320
SCE50V-B	LME50UU	52	61	122	102	80	24	100	11	M10×25	Φ8.6	72.3	3820	7930	1900

Note 1) Dynamic load rating is based on the nominal life of 50km.
In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C_{100} = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

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Shaft and Supports

SAMICK Support Rail Unit

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

Support Rail Unit	SBS	C	h6	30	–	1000	L
SAMICK Support Rail Unit	Support Rail Unit for SBR : SBS Support Rail Unit for TBR : TBS						
Shaft(by corrosion resistance)		No plating (Standard) : Blank Chrome plated shaft : C Nickel plated shaft : N Raydent treated shaft : R					
Shaft tolerance				Asian standard g6 tolerance shaft : blank European standard h6 tolerance shaft : h6			
Shaft Diameter					16~50mm		
Shaft Length						100~3000mm	

SAMICK LM Shaft

SAMICK supply precision LM shaft for SAMICK Linear Bushing. The hardness, surface finishing, and tolerance of shaft must be considered for choosing the proper shaft because the balls are running directly on the shaft surface. Shaft dimensions are as follows

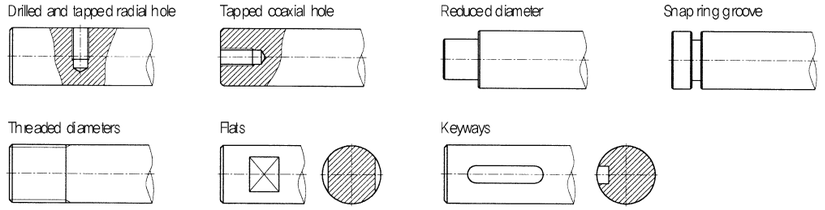
- Material : High carbon chromium bearing steel
- Hardness : $H_RC58 \sim 64$
- Hardened depth : 0.8 ~ 2.5mm
- Surface finishing : 0.8S ~ 1.6S
- Straightness : 0.05mm / 300mm

LM Shaft	SF	C	h6	30	–	1000	L
SAMICK Support Rail Unit							
Shaft(by corrosion resistance)		No plating (Standard) : Blank Chrome plated shaft : C Nickel plated shaft : N Raydent treated shaft : R					
Shaft tolerance				Asian standard g6 tolerance shaft : blank European standard h6 tolerance shaft : h6			
Shaft Diameter					5~80mm		
Shaft Length						100~3000mm	

Shaft Special Machining

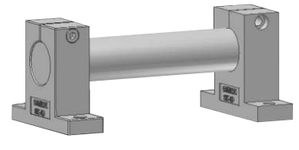
SAMICK also supply specially machined shaft as shown in the below figure. The drilled and tapped holes on LM shaft for mounting on the Support Rail are also available.

〈Example of machining〉



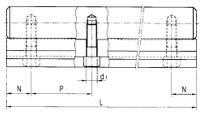
SAMICK Shaft Support

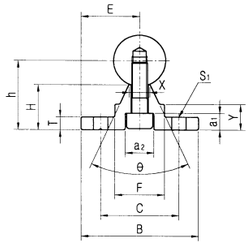
Support for Shaft ends, SAMICK Shaft Support is made of aluminum with compact design, and able to fix the LM shaft by tightening bolt at the axial direction slot.



Shaft Support	SK	20
SAMICK Shaft Support (Aluminum)		
LM Shaft diameter		6~40mm

| SBS SUPPORT RAIL UNIT |





SUPPORT RAIL UNIT	SBS	C	h6	30	–	1000	L

Type

Support Rail Unit for SBR : SBS

Shaft(by corrosion resistance)

No plaiting (Standard) : Blank
Chrome plaited shaft : C
Nickel plaited shaft : N
Raydent treated shaft : R

Shaft tolerance

Asian standard g6 tolerance shaft : Blank
European standard h6 tolerance shaft : h6

Shaft Diameter 16~50mm

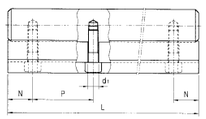
Shaft Length 100~3000m

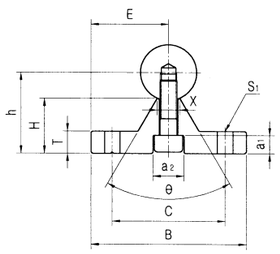
PART NUMBER	Shaft Outer diameter	E	h	B	H	T	F	X	Y	C	Θ	S1	a1	a2	d1	WEIGHT (kgf/m)
SBS16	16	20	25	40	17.79	5	18.5	8	11.7	30	80	5.5	6	9.5	5.5	2.56
SBS20	20	22.5	27	45	17.72	5	19	8	10	30	50	5.5	6.5	11	6.6	3.50
SBS25	25	27.5	33	55	21.13	6	21.5	8	12	35	50	6.6	6.5	11	6.6	5.30
SBS30	30	30	37	60	22.85	7	26.5	10.3	13	40	50	6.6	8.5	14	9	7.38
SBS35	35	32.5	43	65	26.62	8	28	13	15.5	45	50	9	8.5	14	9	9.68
SBS40	40	37.5	48	75	29.43	9	38	16	17	55	50	9	8.5	14	9	12.69
SBS45	45	47.5	62	95	38.79	11	45	20	21	70	50	11	12.5	19	11	20.46

PART NUMBER	Max. Length (mm)	P	N×NH 500	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	3000
SBS16	3000	150	25×3	75×3	100×4	50×6	75×7	25×9	50×10	75×11	25×13	50×14	75×15	25×17	75×19
SBS20	3000	150	25×3	75×3	100×4	50×6	75×7	25×9	50×10	75×11	25×13	50×14	75×15	25×17	75×19
SBS25	3000	200	50×2	100×2	100×3	100×4	100×5	100×6	100×7	75×11	25×13	50×14	75×15	25×17	75×19
SBS30	3000	200	50×2	100×2	100×3	100×4	100×5	100×6	100×7	75×11	25×13	50×14	75×15	25×17	75×19
SBS35	3000	200	50×2	100×2	100×3	100×4	100×5	100×6	100×7	75×11	25×13	50×14	75×15	25×17	75×19
SBS40	3000	200	50×2	100×2	100×3	100×4	100×5	100×6	100×7	75×11	25×13	50×14	75×15	25×17	75×19
SBS50	3000	200	50×2	100×2	100×3	100×4	100×5	100×6	100×7	75×11	25×13	50×14	75×15	25×17	75×19

Note 1) N values can vary depending on length of Shaft.
Note 2) NH (Number of Holes): the number of mounting hole according to pitch value.
Note 3) P & N value must specified when orders.

| TBS SUPPORT RAIL UNIT |





SUPPORT RAIL UNIT	TBS	C	h6	30	–	1000	L

Type

Support Rail Unit for TBR : TBS

Shaft(by corrosion resistance)

No plaiting (Standard) : Blank
Chrome plaited shaft : C
Nickel plaited shaft : N
Raydent treated shaft : R

Shaft tolerance

Asian standard g6 tolerance shaft : Blank
European standard h6 tolerance shaft : h6

Shaft Diameter 16~50mm

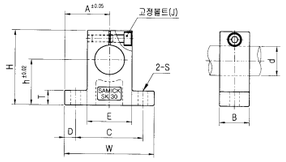
Shaft Length 100~3000mm

PART NUMBER	OUTER DIAMETER	E	h	B	H	T	X	C	θ	S1	a1	a2	d1	WEIGHT (kgf/m)
TBS16A	Φ16	25	22	50	14.79	6	8	37	60°	Φ5.5	6	9.5	5.5	2.66
TBS20A	Φ20	27.5	29	55	19.72	8	8	40	50°	Φ5.5	6.5	11	6.6	4.23
TBS25A	Φ25	32.5	32	65	20.13	10	8	45	50°	Φ6.6	6.5	11	6.6	5.85
TBS30A	Φ30	37.5	36.5	75	22.35	12	10.3	55	50°	Φ6.6	8.5	14	9	8.28

PART NUMBER	Max. Length (mm)	P	NXNH 500	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	3000
TBS16	3000	150	25×3	75×3	100×4	50×6	75×7	25×9	50×10	75×11	25×13	50×14	75×15	25×17	75×19
TBS20	3000	150	25×3	75×3	100×4	50×6	75×7	25×9	50×10	75×11	25×13	50×14	75×15	25×17	75×19
TBS25	3000	200	50×2	100×2	100×3	100×4	100×5	100×6	100×7	100×8	100×9	100×10	100×11	100×12	100×14
TBS30	3000	200	50×2	100×2	100×3	100×4	100×5	100×6	100×7	100×8	100×9	100×10	100×11	100×12	100×14

Note 1) N values can vary depending on length of Shaft.
Note 2) NH (Number of Holes): the number of mounting hole according to pitch value.
Note 3) P & N value must specified when orders.

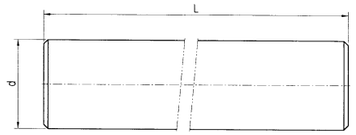
| SK Shaft Support |



SHAFT SUPPORT	SK	20
Samick Shaft Support(Aluminum)		
Shaft Diameter		

PART NUMBER	Shaft Outer diameter	h	A	W	H	T	E	D	C	B	S	J	WEIGHT (gf)
SK8	8	20	21	42	32.8	6	18	5	32	14	5.5	M4	24
SK10	10	20	21	42	32.8	6	18	5	32	14	5.5	M4	24
SK12	12	23	21	42	38	6	20	5	32	14	5.5	M4	30
SK13	13	23	21	42	38	6	20	5	32	14	5.5	M4	30
SK16	16	27	24	48	44	8	25	5	38	16	5.5	M4	40
SK20	20	31	30	60	51	10	30	7.5	45	20	6.6	M5	70
SK25	25	35	35	70	60	12	38	7	56	24	6.6	M6	130
SK30	30	42	42	84	70	12	44	10	64	28	9	M6	180
SK35	35	50	49	98	85	15	50	12	74	32	11	M8	270
SK40	40	60	57	114	96	15	60	12	90	36	11	M8	420

| SF Shaft |



Shaft	SF	C	h6	30	–	1000	L
Samick LM Shaft							
Corrosion resistance treatment							
No plaiting (Standard) : Blank							
Chrome plaited shaft : C							
Nickel plaited shaft (Length Max 1m) : N							
Raydent treated shaft : R							
Shaft tolerance							
Asian standard g6 tolerance shaft : Blank							
European standard h6 tolerance shaft : h6							
Shaft Diameter 16~50mm							
Shaft Length 100~3000mm							

diameter	6	8	10	12	13	16	20	25	30	35	40	50	60	80
Diameter tolerance(g6)	-0.004	-0.005		-0.006			-0.007			-0.009			-0.010	
	-0.012	-0.014		-0.017			-0.020			-0.025			-0.029	
WEIGHT (kg/m)	0.22	0.39	0.62	0.89	1.04	1.58	2.46	3.85	5.55	7.55	9.86	15.41	22.18	39.44
Max Length(mm)	500	500	2000	2000	2000	3000	3000	3000	3000	3000	3000	3000	3000	3000

■ Shaft dimensions are as follows

- Material : SUJ2(High carbon chromium bearing steel)
- Hardened depth : 0.8~2.5mm
- Straightness : 0.05mm/300mm
- Hardness : HRC58~64
- Surface finishing : 0.8S~1.6S

Hardness Conversion Table

Rockwell C Scale H_RC	Vickers[1] Hardness Hv	Brinell Hardness H_B		Rockwell Hardness		Shore Hardness Hs
		Standard Ball	Tungsten Carbon Ball	H_RA A Scale	H_RB B Scale	
68	940	–	–	85.6	–	97
67	900	–	–	85.0	–	95
66	865	–	–	84.5	–	92
65	832	–	739	83.9	–	91
64	800	–	722	83.4	–	88
63	772	–	705	82.8	–	87
62	746	–	688	82.3	–	85
61	720	–	670	81.8	–	83
60	697	–	654	81.2	–	81
59	674	–	634	80.7	–	80
58	653	–	615	80.1	–	78
57	633	–	595	79.6	–	76
56	613	–	577	79.0	–	75
55	595	–	560	78.5	–	74
54	577	–	543	78.0	–	72
53	560	–	525	77.4	–	71
52	544	500	512	76.8	–	69
51	528	487	496	76.3	–	68
50	513	475	481	75.9	–	67
49	498	464	469	75.2	–	66
48	484	451	455	74.7	–	64
47	471	442	443	74.1	–	63
46	458	432	432	73.6	–	62
45	446	421	421	73.0	–	60
44	434	409	409	72.5	–	58
43	423	400	400	72.0	–	57
42	412	390	390	71.5	–	56
41	402	381	381	70.9	–	55
40	392	371	371	70.4	–	54
39	382	362	362	69.9	–	52
38	372	353	353	69.4	–	51
37	363	344	344	68.9	–	50
36	354	336	336	68.4	(109.0)	49
35	345	327	327	67.9	108.5	48
34	336	319	319	67.4	108.0	47
33	327	311	311	66.8	107.5	46
32	318	301	301	66.3	107.0	44
31	310	294	294	65.8	106.0	43
30	302	286	286	65.3	105.5	42
29	294	279	279	64.7	104.5	41
28	286	271	271	64.3	104.0	41
27	279	264	264	63.8	103.0	40
26	272	258	258	63.3	102.5	38
25	266	253	253	62.8	101.5	38
24	260	247	247	62.4	101.0	37
23	254	243	243	62.0	100.0	36
22	248	237	237	61.5	99.0	35
21	243	231	231	61.0	98.5	35
20	238	226	226	60.5	97.8	34
(18)	230	219	219	–	96.7	33
(16)	222	212	212	–	95.5	32
(14)	213	203	203	–	93.9	31
(12)	204	194	194	–	92.3	29
(10)	196	187	187	–	90.7	28
(8)	188	179	179	–	89.5	27
(6)	180	171	171	–	87.1	26
(4)	173	165	165	–	85.5	25
(2)	166	158	158	–	83.5	24
0	160	152	152	–	81.7	24

Fitting Tolerances for Shaft and Housing Bore Diameter (Metric Series)

Nominal Diameter (mm)		Tolerance of Shaft Diameter																				Tolerance of Housing Bore Diameter																			
		f		g			h			js		j			k			H			JS			J		K			M													
over	incl	f5	f6	g5	g6	g7	h5	h6	h7	js5	js6	js7	j5	j6	k5	k6	k7	H5	H6	H7	JS5	JS6	JS7	J6	J7	K6	K7	K8	M6	M7	M8											
–	3	−6 −10	−6 −12	−2 −6	−2 −8	−2 −12	0 −4	0 −6	0 −10	±2	±3	±5	+2 −2	+4 −2	+4 0	+6 0	+10 0	+4 0	+6 0	+10 0	±2	±3	±5	+2 −4	+4 −6	0 −6	0 −10	0 −14	−2 −8	−2 −12	−2 −16											
3	6	−10 −15	−10 −18	−4 −9	−4 −12	−4 −16	0 −5	0 −8	0 −12	±2.5	±4	±6	+3 −2	+6 −2	+6 +1	+9 +1	+13 +1	+5 0	+8 0	+12 0	±2.5	±4	±6	+5 −3	+8 −3	+2 −6	+3 −9	+5 −13	−1 −9	0 −12	+2 −16											
6	10	−13 −19	−13 −22	−5 −11	−5 −14	−5 −20	0 −6	0 −9	0 −15	±3	±4.5	±7	+4 −2	+7 −2	+7 +1	+10 +1	+16 +1	+6 0	+9 0	+15 0	±3	±4.5	±7	+5 −4	+8 −5	+2 −7	+5 −10	+6 −16	−3 −12	−3 −15	+1 −21											
10	14	−16 −24	−16 −27	−6 −14	−6 −17	−6 −24	0 −8	0 −11	0 −18	±4	±5.5	±9	+5 −3	+8 −3	+9 +1	+12 +1	+19 +1	+8 0	+11 0	+18 0	±4	±5.5	±9	+6 −5	+10 −8	+2 −9	+6 −12	+8 −19	−4 −15	−4 −18	+2 −25											
14	18																														+4 −29											
18	24	−20 −29	−20 −33	−7 −16	−7 −20	−7 −28	0 −9	0 −13	0 −21	±4.5	±6.5	±10	+5 −4	+9 −4	+11 +2	+15 +2	+23 +2	+9 0	+13 0	+21 0	±4.5	±6.5	±10	+8 −5	+12 −9	+2 −11	+6 −15	+10 −23	−4 −17	0 −21	+4 −29											
24	30																														+5 −34											
30	40	−25 −36	−25 −41	−9 −20	−9 −25	−9 −34	0 −11	0 −16	0 −25	±5.5	±8	±12	+6 −5	+11 −5	+13 +2	+18 +2	+27 +2	+11 0	+16 0	+25 0	±5.5	±8	±12	+10 −6	+14 −11	+3 −13	+7 −18	+12 −27	−4 −20	−4 −25	+5 −34											
40	50																														+5 −41											
50	65	−30 −43	−30 −49	−10 −23	−10 −29	−10 −40	0 −13	0 −19	0 −30	±6.5	±9.5	±15	+6 −7	+12 −7	+15 +2	+21 +2	+32 +2	+13 0	+19 0	+30 0	±6.5	±9.5	±15	+13 −6	+18 −12	+4 −15	+9 −21	+14 −32	−5 −24	0 −30	+5 −41											
65	80																														+6 −48											
80	100	−36 −51	−36 −58	−12 −27	−12 −34	−12 −47	0 −15	0 −22	0 −35	±7.5	±11	±17	+6 −9	+13 −9	+18 +3	+25 +3	+38 +3	+16 0	+22 0	+35 0	±7.5	±11	±17	+16 −6	+22 −13	+4 −18	+10 −25	+16 −38	−6 −28	0 −35	+6 −48											
100	120																														+8 −55											
120	140	−43 −61	−43 −68	−14 −32	−14 −39	−14 −54	0 −18	0 −25	0 −40	±9	±12.5	±20	+7 −11	+14 −11	+21 +3	+28 +3	+43 +3	+18 0	+25 0	+40 0	±9	±12.5	±20	+18 −7	+26 −14	+4 −21	+12 −28	+20 −43	−8 −33	0 −40	+8 −55											
140	160																																										
160	180																																										

Fitting Tolerances for Shaft and Housing Bore Diameter (Inch Series)

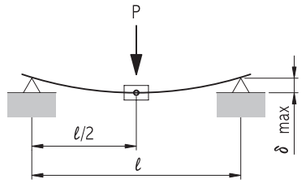
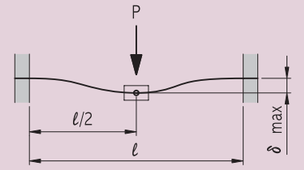
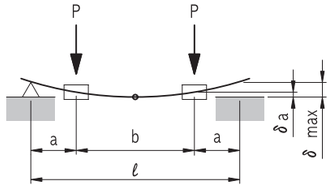
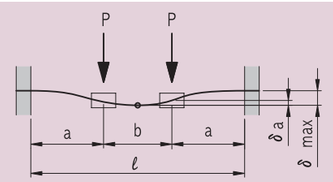
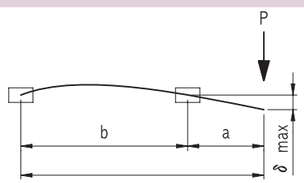
Tolerance of hosing bore

	SIZE		H5		H6		H7		H8	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
OVER	0.1181	3	0.0002	0.005	0.0003	0.008	0.0004	0.012	0.0007	0.018
BELOW	0.2362	6	0	0	0	0	0	0	0	0
OVER	0.2362	6	0.0002	0.006	0.0003	0.009	0.0003	0.015	0.0008	0.022
BELOW	0.3937	10	0	0	0	0	0	0	0	0
OVER	0.3937	10	0.0003	0.008	0.004	0.011	0.0007	0.018	0.0010	0.027
BELOW	0.7087	18	0	0	0	0	0	0	0	0
OVER	0.7087	18	0.0003	0.009	0.0005	0.013	0.0008	0.021	0.0013	0.033
BELOW	1.1811	30	0	0	0	0	0	0	0	0
OVER	1.1181	30	0.0004	0.011	0.0006	0.016	0.0009	0.025	0.0015	0.039
BELOW	1.9685	50	0	0	0	0	0	0	0	0
OVER	1.9685	50	0.0005	0.013	0.007	0.019	0.0011	0.030	0.0018	0.046
BELOW	3.1496	80	0	0	0	0	0	0	0	0
OVER	3.1496	80	0.0005	0.015	0.008	0.022	0.0013	0.035	0.0021	0.054
BELOW	4.7244	120	0	0	0	0	0	0	0	0

Tolerance of shaft

	SIZE		g5		g6		g7		h5		h6		h7	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
OVER	0.1181	3	−0.0001	−0.004	−0.0001	−0.004	−0.0001	−0.004	0	0	0	0	0	0
BELOW	0.2362	6	−0.0003	−0.009	−0.00004	−0.012	−0.0006	−0.016	−0.0002	−0.005	−0.0003	−0.008	−0.0004	−0.012
OVER	0.2362	6	−0.0002	−0.005	−0.0002	−0.005	−0.0002	−0.005	0	0	0	0	0	0
BELOW	0.3937	10	−0.0004	−0.011	−0.0005	−0.014	−0.0007	−0.020	−0.0002	−0.006	−0.0003	−0.009	−0.0006	−0.015
OVER	0.3937	10	−0.0002	−0.006	−0.0002	−0.006	−0.0002	−0.006	0	0	0	0	0	0
BELOW	0.7087	18	−0.0005	−0.014	−0.0006	−0.017	−0.0009	−0.024	−0.0003	−0.008	−0.0004	−0.011	−0.0007	−0.018
OVER	0.7087	18	−0.0002	−0.007	−0.0002	−0.007	−0.0002	−0.007	0	0	0	0	0	0
BELOW	1.1811	30	−0.0006	−0.016	−0.0007	−0.020	−0.0011	−0.028	−0.0003	−0.009	−0.0005	−0.013	−0.0008	−0.021
OVER	1.1811	30	−0.0003	−0.009	−0.0003	−0.009	−0.0003	−0.009	0	0	0	0	0	0
BELOW	1.9685	50	−0.0007	−0.020	−0.0009	−0.025	−0.0013	−0.034	−0.0004	−0.011	−0.0006	−0.016	−0.0009	−0.025
OVER	1.9685	50	−0.0004	−0.010	−0.0004	−0.010	−0.0004	−0.010	0	0	0	0	0	0
BELOW	3.1496	80	−0.0009	−0.023	−0.0011	−0.029	−0.0015	−0.04	−0.0005	−0.013	−0.0007	−0.019	−0.011	−0.030
OVER	3.1496	80	−0.0004	−0.012	−0.0004	−0.012	−0.0004	−0.012	0	0	0	0	0	0
BELOW	4.7244	120	−0.00010	−0.027	−0.0013	−0.034	−0.0018	−0.047	−0.0006	−0.015	−0.0008	−0.022	−0.0013	−0.035

Equations for shaft deflection amount calculation

Variations of support and Load	Equation for Deflection Amount (mm)
	$\delta max = \frac{P \cdot \ell^3}{48 \cdot E \cdot I} = 2.021 \times 10^{-5} \frac{P \cdot \ell^3}{d^4}$
	$\delta max = \frac{P \cdot \ell^3}{192 \cdot E \cdot I} = 5.053 \times 10^{-6} \frac{P \cdot \ell^3}{d^4}$
	$\delta a = \frac{P \cdot a^2}{6 \cdot E \cdot I} (2a+3b) = 1.617 \times 10^{-4} \frac{P \cdot a^2 (2a+3b)}{d^4}$ $\delta max = \frac{P \cdot a^2}{24 \cdot E \cdot I} (3\ell - 4a^3) = 4.042 \times 10^{-5} \frac{P \cdot a \cdot (3\ell^2 - 4a^2)}{d^4}$
	$\delta a = \frac{P \cdot a^3}{6 \cdot E \cdot I} \left(2 - \frac{3a}{\ell}\right) = 1.617 \times 10^{-4} \frac{P \cdot a^3}{d^4} \left(2 - \frac{3a}{\ell}\right)$ $\delta max = \frac{P \cdot a^2}{24 \cdot E \cdot I} (2a+3b) = 4.042 \times 10^{-5} \frac{P \cdot a^2 \cdot (2a+3b)}{d^4}$
	$\delta max = \frac{P \cdot a^2 \ell}{3 \cdot E \cdot I} = 3.234 \times 10^{-4} \frac{P \cdot a^2 \ell}{d^4}$

E : Modulus of Longitudinal Elasticity 2.1×10^4(kgf/㎟)
P : Applying Load (kgf)
I : Geometrical Moment of Inertia(㎟) ; $I = \pi d^4 / 64$, Hollow shaft : $I = \pi (d^4 - di^4)/64$
di : Shaft inner-diameter(㎜), d : Shaft Outer-diameter (㎜)