

THE PRINCIPLE OF LINEAR SYSTEM

LINEAR BUSHING

by SAMICK the Linear Instinct



CATALOG NO. 0801E

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925-2, Wulam-Dong, Dalseo-Gu, Daegu, 704-833, Korea (South)
TEL : (053) 583-4661 FAX : (053) 583-4669
Web site : www.samickco.co.kr
E-mail : marketing@samickco.co.kr

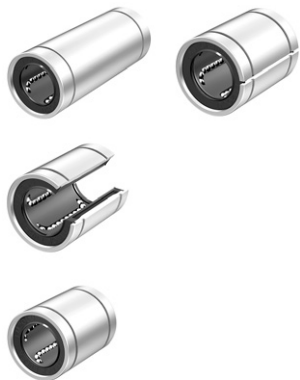
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Self-Aligning Linear Bushing

- 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 ($\pm 0.5^\circ$)
- 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
LMFP_P(L), LMEK_P(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



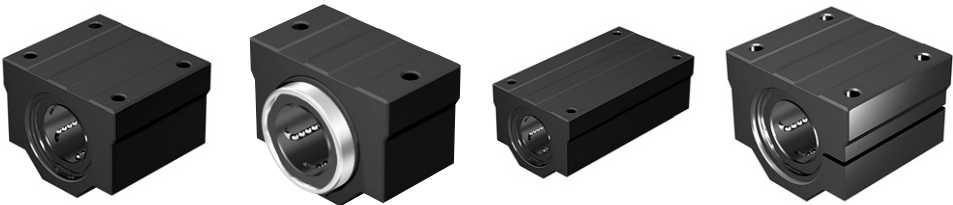
| PART NUMBER NOTATION |

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-plating (Standard) : Blank Ball plate nickel plating : N Stainless steel ball plating : M Ball plate Chrome plating : C		
Ball type (by corrosion resistance)							High carbon bearing steel ball (standard) : Blank Stainless steel ball : S	



| PART NUMBER NOTATION |

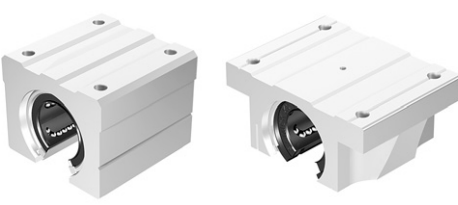
Linear Bushing	LM	E	F	P	20	L	UU	OP	-	A	N	S
Samick Linear Bushing												
Standards(Asia, Europe)					Asian Standard : Blank / European Standard : E							
Flange option				Standard : Blank Circular type : F Square type : K Oval type : H								
Flange Location					Standard : Blank Pilot : P Middle : 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 plating(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 plating(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 plating(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.



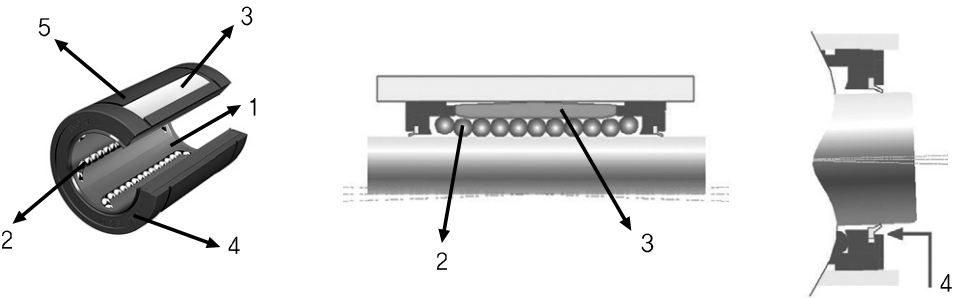
| PART NUMBER NOTATION |

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 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							
Shaft Length							
100~3000mm							

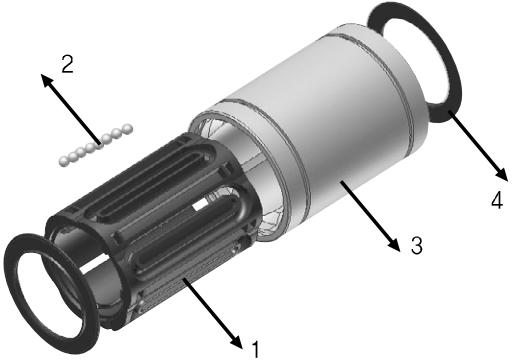
Shaft	SF	C	g6	30	-	1000	L
Samick LM Shaft							
Corrosion resistance treatment							
No plating (Standard) : Blank Chrome plated shaft : C Nickel plated shaft (Length Max 1m) : N Raydent treated shaft : R							
Shaft tolerance							
Asian standard g6 tolerance : Blank European standard h6 tolerance : 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 plating	- 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 plating	- 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

❖❖ 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 (Co), which sets the static load allowance limit, and basic dynamic load rating(C), which is using for calculating travel life.

Basic Static Load Rating (Co)

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 (fs)

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.

$$f_s = \frac{C_o}{P} \quad \text{or} \quad f_s = \frac{M_o}{M}$$

fs : Static safety factor

Co : Basic static load rating (N)

Mo : 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	1.0 ~ 1.3
	Receives vibration or impact	2.0 ~ 3.0
Machine tool	Receives no vibration or impact	1.0 ~ 1.5
	Receives vibration or impact	2.5 ~ 7.0

For large radial loads

$$\frac{f_H \cdot f_T \cdot f_C \cdot C_o}{P} \geq f_s$$

Co	: Basic static load rating (N)	P	: Calculated load (N)
fH	: Hardness factor	fT	: Temperature factor
fC	: Contact 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

$$L = \left(\frac{C}{P}\right)^3 \times 50$$
$$L_{100} = \left(\frac{C_{100}}{P}\right)^3 \times 100$$
$$\times C_{100} = \left(\frac{C}{1.26}\right)$$

For a linear motion system with rollers

$$L = \left(\frac{C}{P}\right)^{\frac{10}{3}} \times 100$$

L : Nominal life of 50km

L₁₀₀ : Nominal life of 100km

C : Basic dynamic load rating of 50km

C₁₀₀ : 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
C : Basic dynamic load rating of 50km
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)
L₁₀₀ : Nominal life of 100km
C₁₀₀ : Basic dynamic load rating of 100km

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

$$L_h = \frac{L \times 10^6}{2 \times l_s \times N_l \times 60}$$

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).

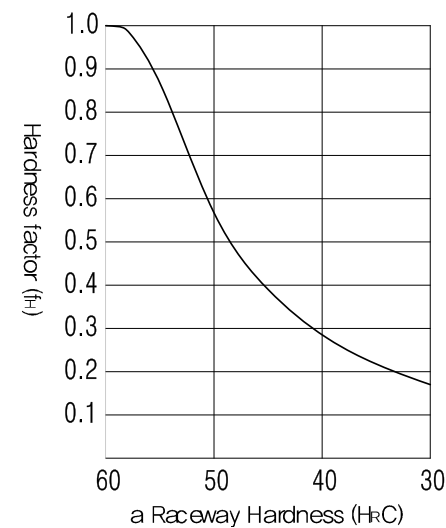


Fig1 Hardness factor (f_H)

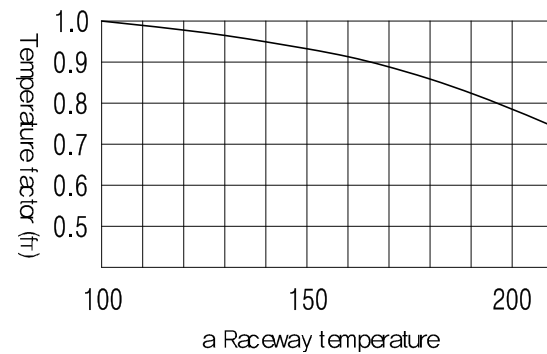


Fig2 Temperature factor (f_T)

Temperature factor (f_T)

For Linear Bushings used at ambient temperatures over 100°C, a temperature factor corresponding to the ambient temperature, selected from the diagram, must be taken into consideration. For higher than 80°C application, the seals, end plates and retainer must be changed for high temperature specifications (Temperature range: 20°C ~ 80°C). 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 C₀) 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.

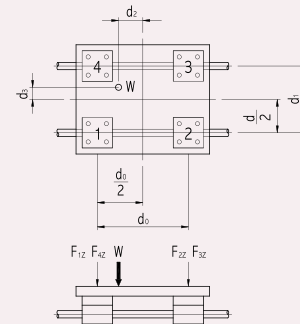
Horizontal Application | At the time of movement with uniform velocity or at the time of stop

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

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

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

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



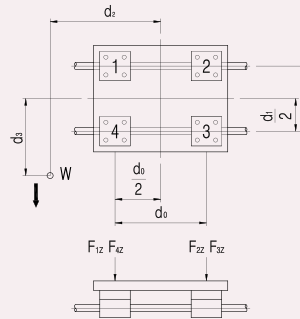
Horizontal Application | At the time of movement with uniform velocity or at the time of stop

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

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

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

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

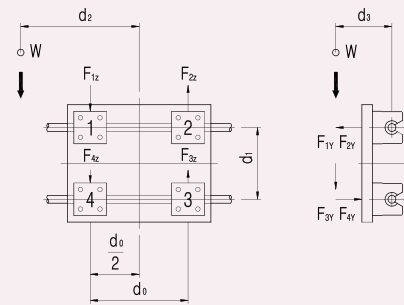


Side Mounted Application | At the time of movement with uniform velocity or at the time of stop

$$F_{1Y} \sim F_{4Y} = \frac{W}{2} \cdot \frac{d_3}{d_0}$$

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

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



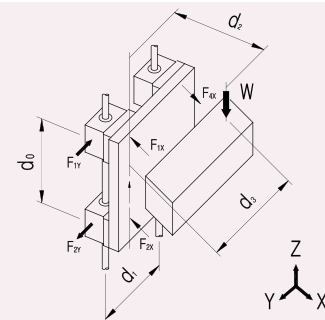
Vertical Application | At the time of movement with uniform velocity or at the time of stop.
At the time of start and stop, the load varies because of inertia

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

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

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

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



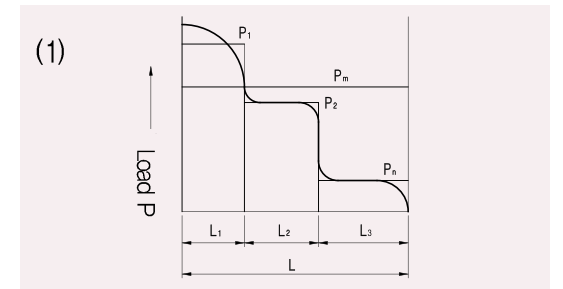
∴ Mean Effective Load at Varying Load

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

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

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

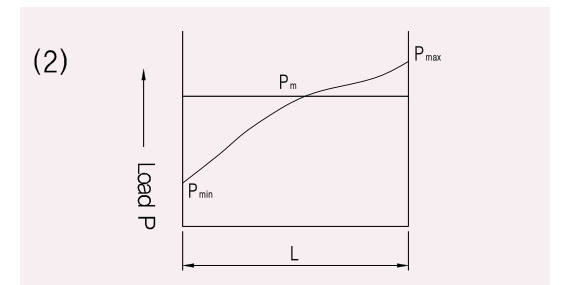


For loads that changes step wisely

For almost linearly varying load

$$P_m \approx \frac{1}{3} (P_{min} + 2 \cdot P_{max}) \quad \dots \dots \dots (2)$$

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

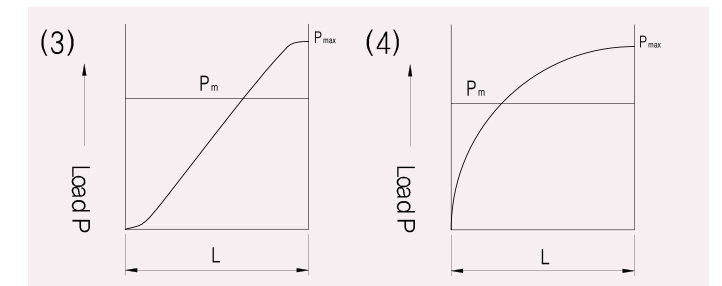


For loads that changes monotonously

When the load draws a sine curve

$$P_m \approx 0.65 P_{max} \quad \dots \dots \dots (3)$$

$$P_m \approx 0.75 P_{max} \quad \dots \dots \dots (4)$$



For loads that changes sinusoid ally

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

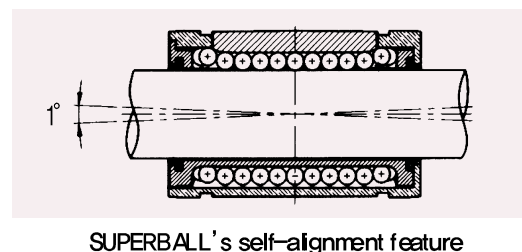
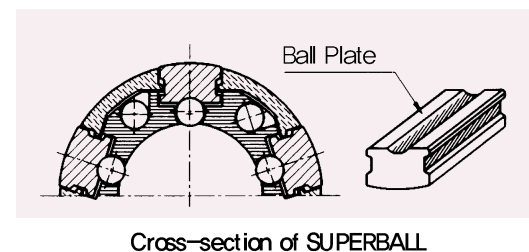
SUPERBALL has extremely smooth running due to the uniquely designed ball retainer and the outer sleeve. They are made of Engineering Polymer, which has light weight, low friction, and high wear-resistance. Due to them, the smooth and silent running can be obtained.

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.



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

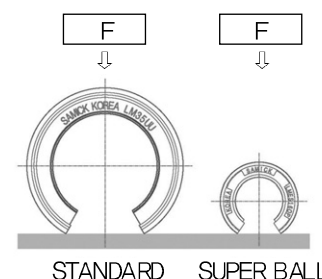
Compared to the same size conventional linear bushings, SUPERBALL will offer higher load rating and longer travel life.

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 load 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 load rating(basis:50km, unit: N)

C_{100} : Basic dynamic load 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 factor

f_T : Temperature factor

f_C : Contact factor

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

$$L_h = \frac{L \times 10^6}{2 \times l_s \times N_k \times 60}$$

L_h
: Travel life
(hour)

l_s
: Stroke
(mm)

N_k
: 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)	– Stroke	: 250mm (ℓ s)
– Number of strokes per minutes	: 60(N _k)	– Shaft Hardness	: HRC60 (f _H = 1.0)
– Operating speed	: 30m/min		

Operating Speed
V = 2×ℓ_s ×N_k
= 2×250×60
= 30000mm/min (f_w = 1.6)

Other factors (f_c, f_r) 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

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

$$\approx 13,417 \text{ km}$$

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

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 affed 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-C 58 to 64. The shaft with hardness less than H-C58 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

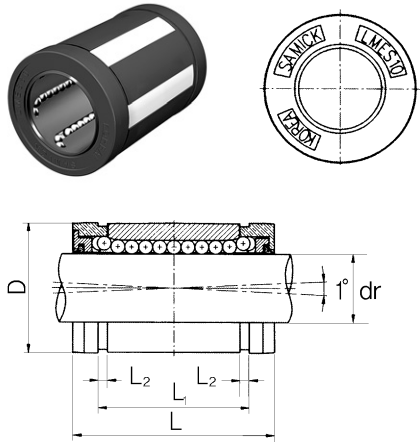


Part Number Notation

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-plating (Standard) : Blank Ball plate nickel plating : N Stainless steel ball plate : M* Ball plate Chrome plating : C							
Ball type (by corrosion resistance)	High carbon bearing steel ball (standard) : Blank Stainless steel ball : S							

* LMES1Q, LMES12 and LMBS4, LMBS6, LMBS8 only with stainless steel ball plate

LMES Self-Aligning Linear Bushing

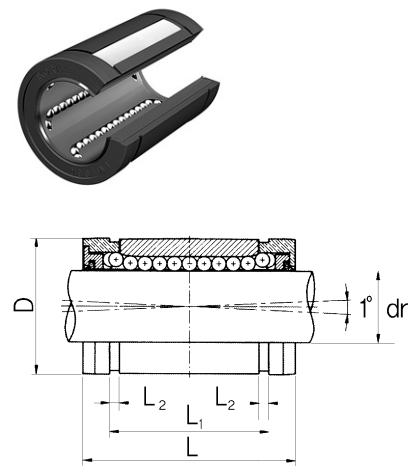


Self-Aligning linear Bushing	LMES	20	UU	-	N	S
Nominal Shaft Diameter						
Seal	No Seal : Blank One Side Seal : U Both Side Seal : UU					
Corrosion resistance type	No-plating (Standard) : Blank Ball plate nickel plating : N Ball plate Chrome plating : C Stainless steel ball plate : M****					
Ball type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

PART NUMBER	DIA METER dr.	TOLERANCE	D*	L ±0.2	L ₁ ±0.2	L ₂ mm	BASIC LOAD RATING(N) DYNAMIC**C _d	STATIC**C _s	NO. OF BALL CIRCUIT	WEIGHT (g)
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

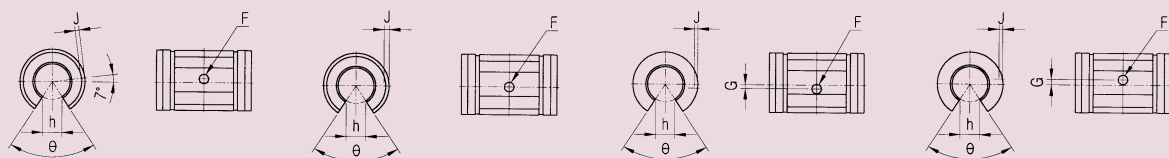
* Based on nominal housing bore
** Dynamic load rating is based on the nominal life of 50km. In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C₁₀₀ = 410 / 1.26 = 325.40N
*** Dimension : mm
**** LMES10, LMES12 only with stainless steel ball plate

| LMES_OP Self-Aligning Linear Bushing |



Self-Aligning linear 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-plating (Standard) : Blank						
Ball plate nickel plating : N						
Ball plate Chrome plating : C						
Stainless steel ball plate : M****						
Ball type (by corrosion resistance)						
High carbon bearing steel ball (standard) : Blank						
Stainless steel ball : S						

PART NUMBER	DIA METER		D*	L ±0.2	L ₁ ±0.2	L ₂ min	h	θ	F	G	J	BASIC LOAD RATING(N)		NO. OF BALL CIRCUIT	WEIGHT (g)
	dr.	TOLERANCE										DYNA M(Cc)	STATIC(Co)		
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 +0.001	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 +0.001	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	+0.001	75	100	77.4	2.7	22.5	54	5	2.5	2.3	11700	8100	5	480



LMES12-OP

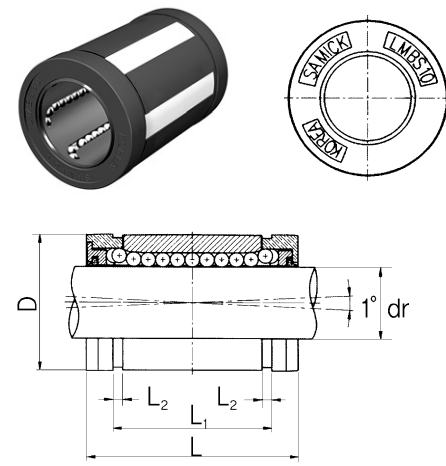
LMES16-OP, LMES20-OP

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 C₁₀₀ = 410 / 1.26 = 325.40N
- *** Dimension : mm
- **** LMES12 only with stainless steel ball plate

| LMBS Self-Aligning Linear Bushing |

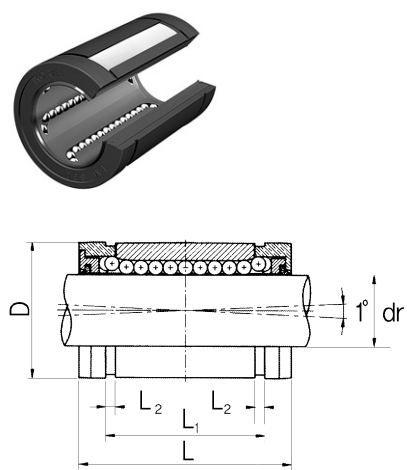


Self-Aligning linear Bushing LMBS	20	UU	-	N	S
Nominal Shaft Diameter					
Seal					
No Seal : Blank					
One Side Seal : U					
Both Side Seal : UU					
Corrosion resistance type					
No-plating (Standard) : Blank					
Ball plate nickel plating : N					
Ball plate Chrome plating : C					
Stainless steel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

PART NUMBER	DIA METER dr.	TOLERANCE	D*	L	L ₁	L ₂ min	BASIC LOAD RATING(N) DYNAMIC(lbf)	STATIC(lbf)	NO. OF BALL CIRCUIT	WEIGHT (lb)
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		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		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		3.0000	4.000/3.960	3.193/3.163	0.105	2230	2580	6	1.38

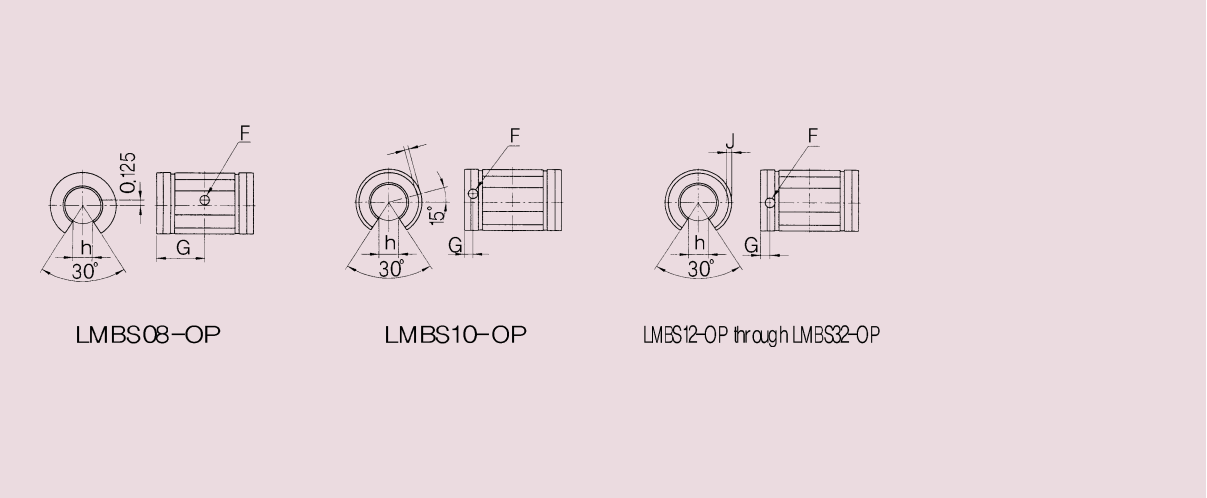
- * Based on nominal housing bore
- ** Dynamic load rating is based on the nominal life of 50km. In case of 100km, C on the table need to be divided by 1.26
Ex) LM12's 50km basis dynamic load rating C = 410N
LM12's 100km basis dynamic load rating C₁₀₀ = 410 / 1.26 = 325.40N
- *** Dimension : inch
- **** LMBS4, 6, 8 only with stainless steel ball plate

| LMBS_OP Self-Aligning Linear Bushing |



Self-Aligning linear 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-plating (Standard) : Blank Ball plate nickel plating : N Ball plate Chrome plating : C Stainless steel ball plate : M****					
Ball type (by corrosion resistance)	High carbon bearing steel ball (standard) : Blank Stainless steel ball : S					

PART NUMBER	DIA METER dr.	TOLERANCE	D*	L	L1	F	G	J	L2 min	h	BASIC LOAD RATING(N) DYNAMIC (lb)	STATIC (lb)	NO. OF BALLS	WEIGHT (lb)
LMBS8 OP	8		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	0	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	-0.0005	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	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	-0.0005	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 -0.0005	3.0000	4.000/3.960	3.193	0.27	0.31	Thru	0.105	1.00	2250	2580	5	1.10



* 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 C₁₀₀ = 410 / 1.26 = 325.40N
*** Dimension : inch
**** LMBS8OP only with stainless steel ball plate

Wonna be supported?

Hey, You've got SAMICK Support!

33

SAMICK Linear Bushing

:: 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.

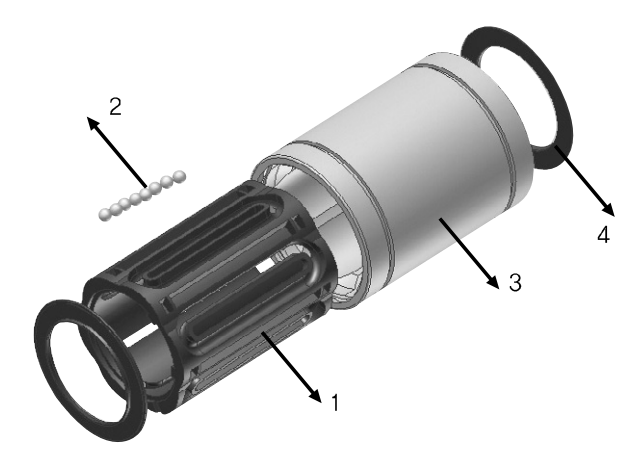
LM Case Unit

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 widely 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 Production: 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 (Acrylonitrile Butadiene Rubber)* ※ optional item



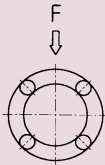
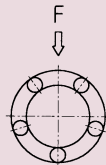
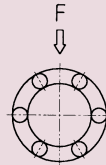
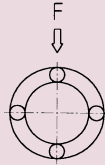
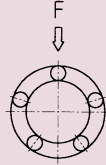
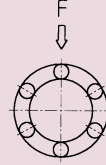
| PART NUMBER NOTATION |

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 plating(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			
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 load rating is maximum continuous bad 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 : Nominal life (basis:50km, unit: Km)
$L_{100} = [\frac{C_{100}}{P}]^3 \times 100$	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

$L = [\frac{f_H \times f_T \times f_C}{f_W} \times \frac{C}{P}]^3 \times 50$	f _W : Load factor
$L_{100} = [\frac{f_H \times f_T \times f_C}{f_W} \times \frac{C_{100}}{P}]^3 \times 100$	f _H : Hardness factor
	f _T : Tempeture factor
	f _C : Contact factor

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.

$P_U \cong K \cdot M$	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 folwning equation

$L_h = [\frac{L \times 10^6}{2 \times l_s \times N_k \times 60}]$	L _h : travel life(hr)
	l _s : Stroke(mm)
	N _k : Number of stroke per minute (cpm)

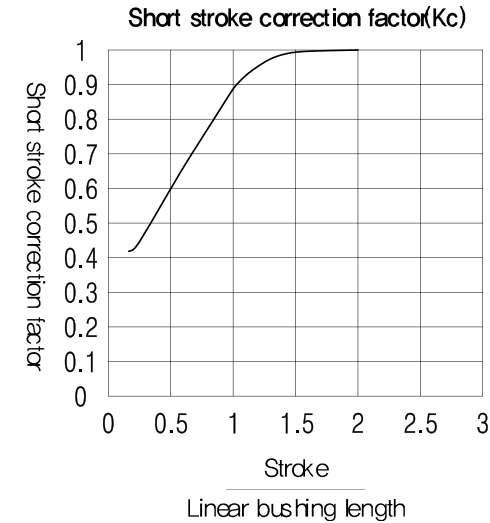
Equivalent factor for Linear Bushing

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	0.098	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/H-P 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

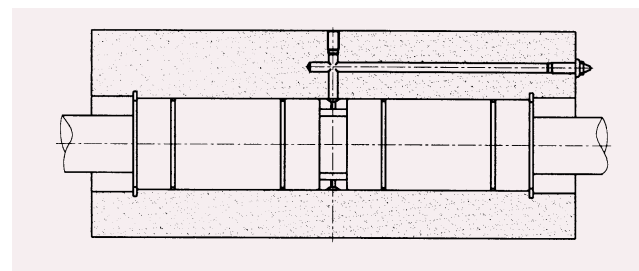
Linear Bushing is used with grease lubrication or oil lubrication but in some case, it is used without any lubrication.

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°C ~ 50°C	VG 15 ~ 46
50°C ~ 80°C	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.

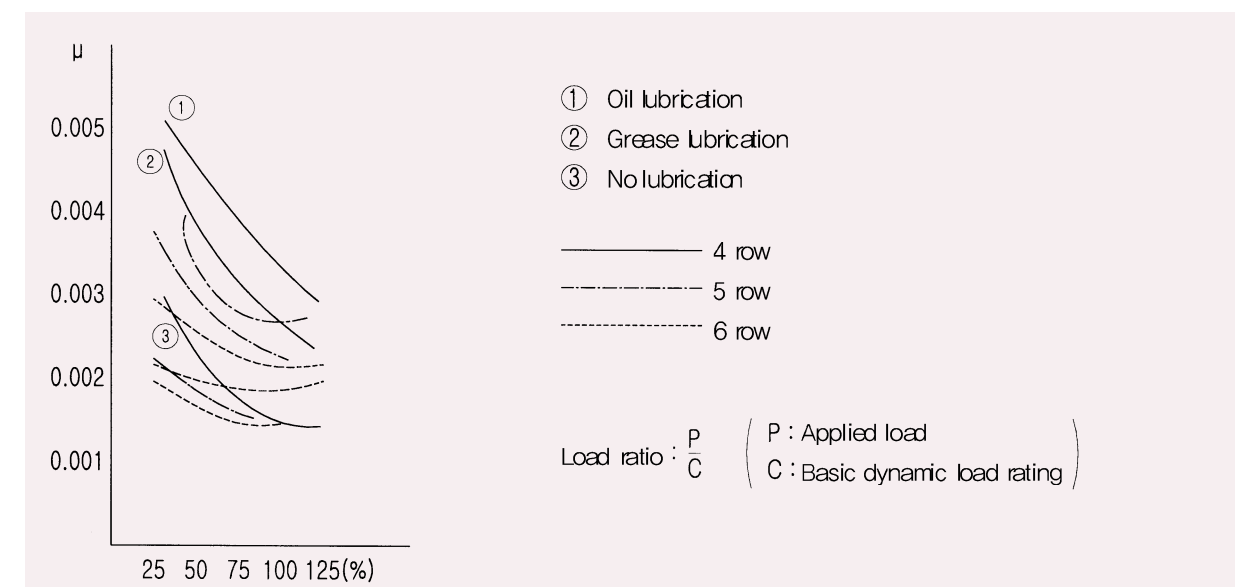
Coefficient of Friction

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.

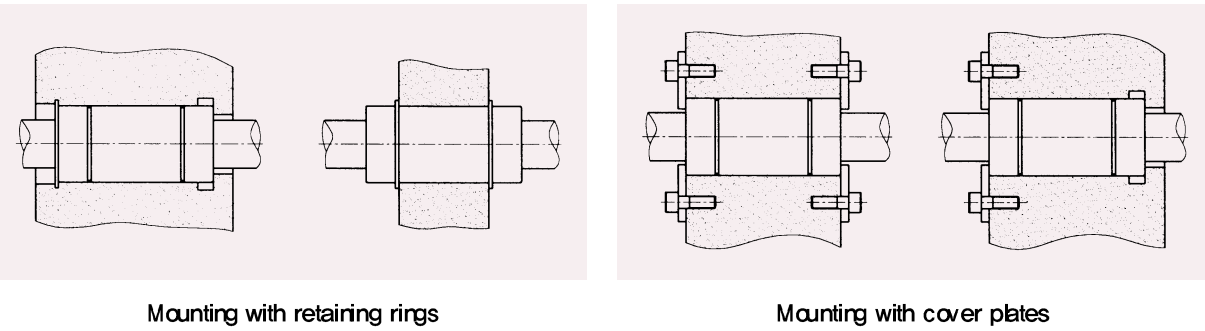
Radical Clearance(μm)																
Type \ Dr.	5	6	8S	8	10	12	13	16	20	25	30	35	40	50	60	
LM(μm)	-3	-5	-5	-5	-5	-5	-7	-7	-9	-9	-9	-13	-13	-13	-16	
LME(μm)	-5			-5		-7		-7	-9	-9	-9		-13	-13	-16	

Mounting

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

Standard type

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



Retaining ring for Mounting

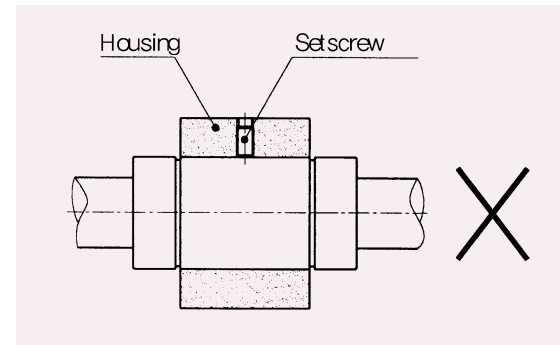
Retaining ring for LM type SAMICK Linear Bushing are used for mounting as shown in the table below

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

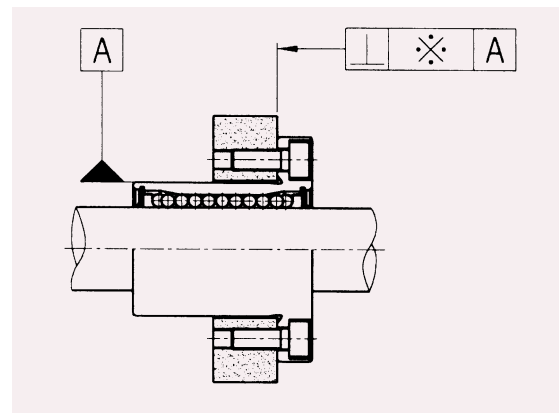
Mounting a Linear Bushing with a set screw as shown in Figure will cause deformation of the outer sleeve and should be avoided.



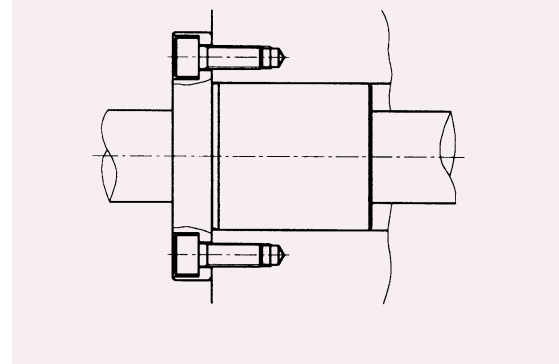
Mounting with setscrew

Flanged type

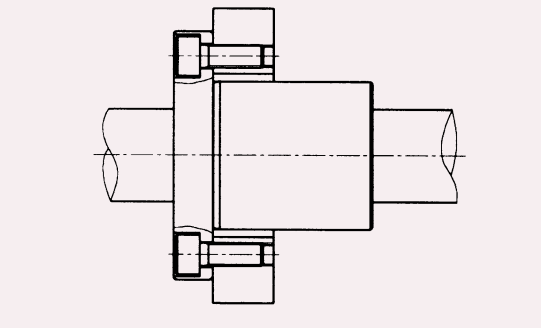
Mounting for LMF, LMK, LMH (included long type), only mounting the flange with mounting bolt can be all of mounting because of its single body shape. Geometric Dimensional Tolerance should be considered when the Outer Sleeve is the datum for installation.



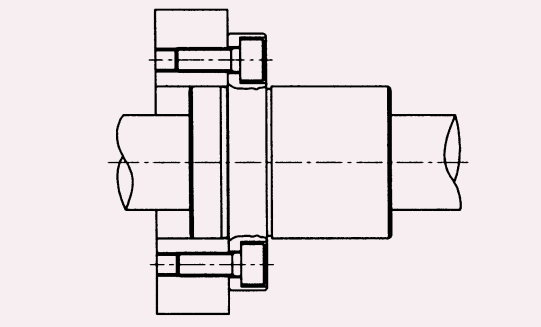
- Mounting with datum from Outer Sleeve



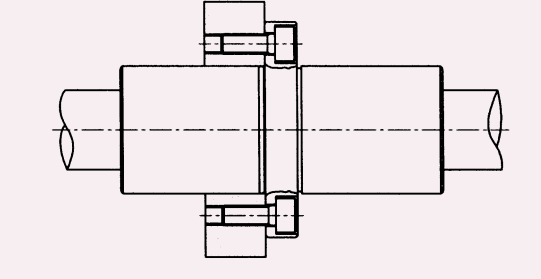
- Mounting of Flange with mounting bolt



- Mounting of Pilot flanged type



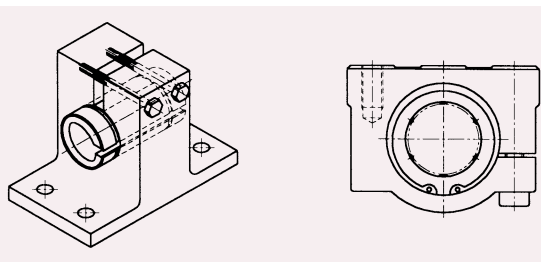
- Mounting of Middle flanged type



Flanged type mounting

Mounting of Adjustable type

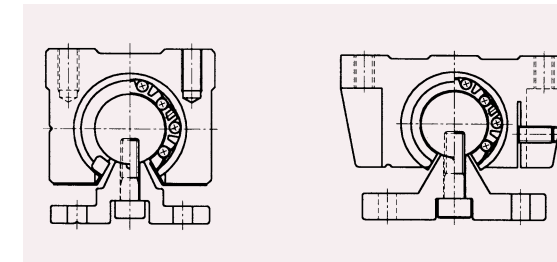
Adjustment of clearance for Adjustable type (AJ) and LM shaft can be obtained by assembling with the adjustable type Housing. In this case, the slotted side of Linear Bushing should be located at 90° of open side of Housing for equivalent deformation against radial direction.



Mounting of adjustable type

Mounting of Open type

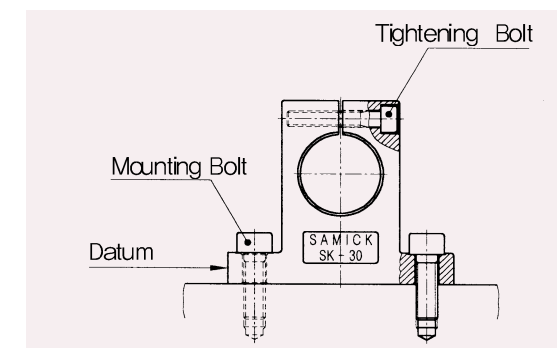
Open type(...OP) also can be used with clearance adjustable housing as shown on Figure. Light pre-load is applied for normal using, but heavy pre-load should be avoided.



Mounting of Open type

Mounting of Shaft support

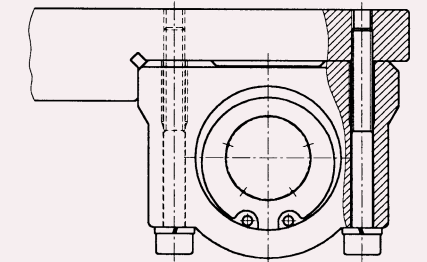
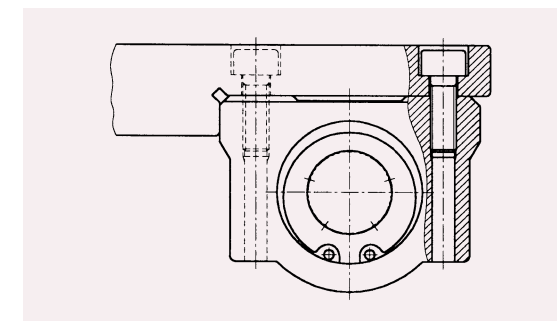
Shaft support, SK can be mounted with mounting bolt for table, and LM shaft can be mounted with tightening bolt



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.

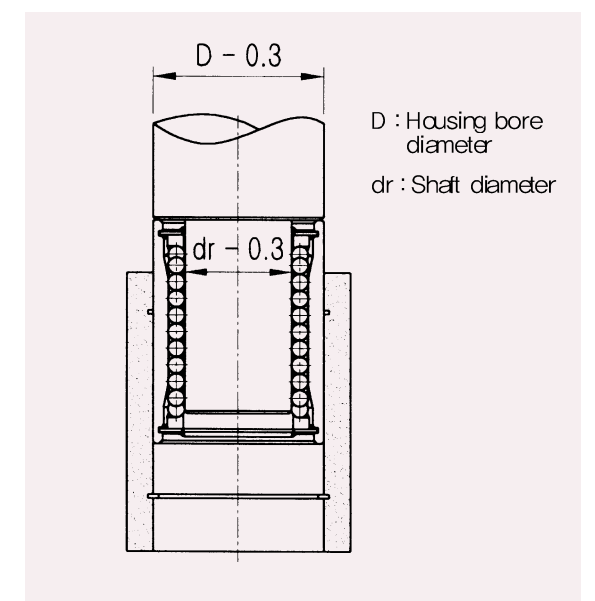


Mounting of Case unit

Application Tips

Mounting of Linear Bushing

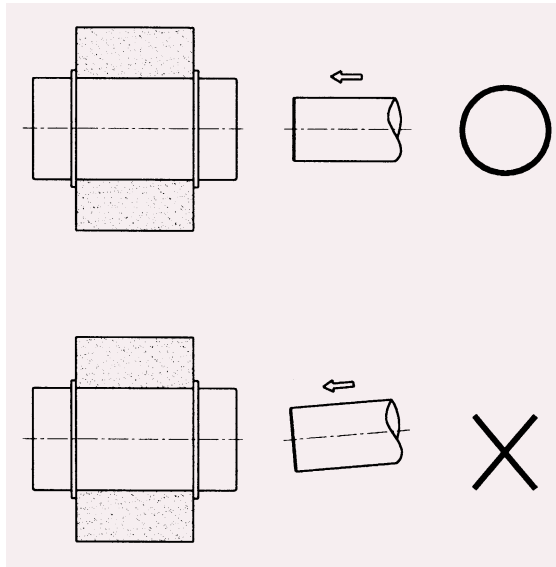
For mounting of standard type SAMICK Linear Bushing into the Housing, a jig should be used to avoid direct hitting on the outer sleeve or seal when installing. See Below.



Mounting into housing

Insertion of Shaft

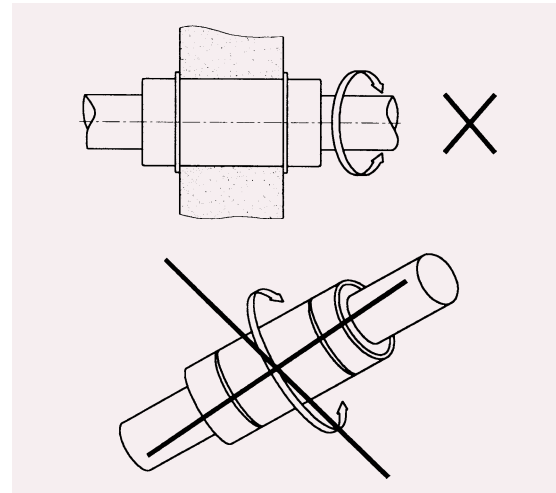
Care must be taken to align the bushing and the shaft when inserting a shaft into a linear bushing. If the shaft is inserted with slanted, balls may depart from the damaged or deformed retainer.



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.



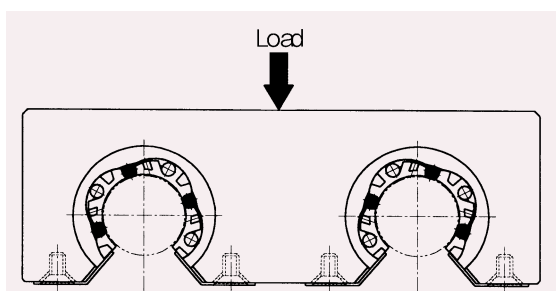
The Rotational Motion Prohibited

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.

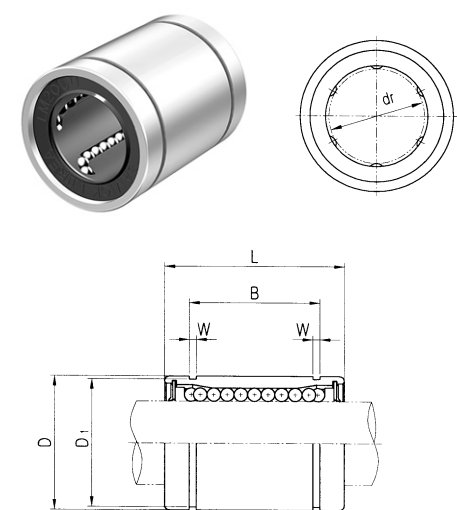
Mounting of open type Linear Bushing with three ball rows

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 |

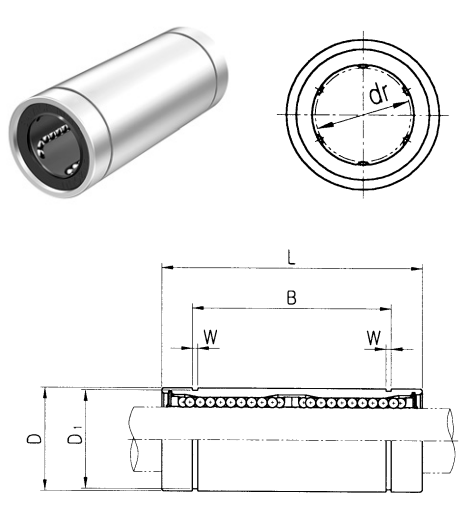


Samick Linear Bushing	LM	20	UU	-	A	N	S
Nominal Shaft Diameter							
Seal							
Blank : No Seal							
U : One Side Seal							
UU : Both Side Seal							
Retainer							
Blank : Resin retainer(Standard)							
A : Steel retainer(High temperature)							
Outer-sleeves							
(by corrosion resistance 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		DIAMETER	TOLERANCE	OUTER DIAMETER	TOLERANCE	L	B	W	D _i	BASIC LOAD RATING(N)		NO. OF BALLS	WEIGHT (g)
Resin	Steel									DYNAMIC(C)	STATIC(C ₀)		
LM5	LM5-A	5	-0.003	10	-0.003	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	LM8S-A	8		15	-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	-0.003	19		29	22.0	1.3	18	370	540	4	30
LM12	LM12-A	12		21	-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	-0.010	40	-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	-0.012	60	-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	-0.015	90	-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 |

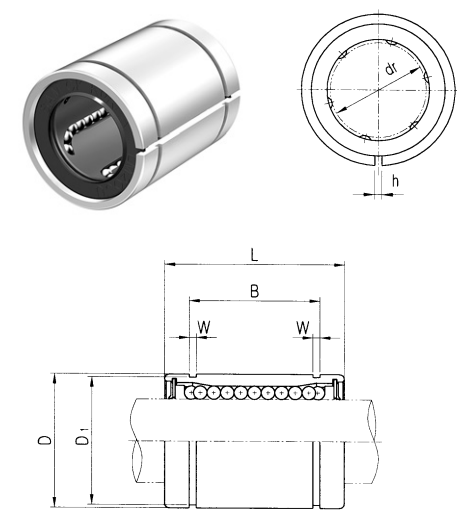


Samick Linear Bushing	LM	20	L	UU	-	A	N	S
Nominal Shaft Diameter								
Linear Bushing Long type (for high load)								
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal							
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)							
Outer-sleeves (by corrosion 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		DIAMETER	TOLERANCE	OUTER DIAMETER	TOLERANCE	L	B	W	D _i	BASIC LOAD RATING(N)		NO. OF BALLS	WEIGHT (g)
Resin	Steel									DYNAMIC(C)	STATIC(C ₀)		
LM6L	LM6L-A	6		12	-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		19	-0.010	55	44	1.3	18	580	1100	4	62
LM12L	LM12L-A	12		21	-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	-0.012	40	-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	-0.015	60	-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	-0.020	90	-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 |

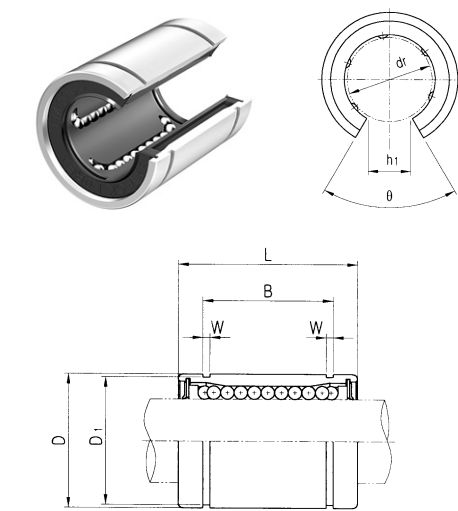


Samick Linear Bushing	LM	20	UU	AJ	-	A	N	S
Nominal Shaft Diameter								
Seal								
Blank : No Seal								
U : One Side Seal								
UU : Both Side Seal								
Linear Bushing Adjustable type								
Retainer								
Blank : Resin retainer(Standard)								
A : Steel retainer(High temperature)								
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		DIAMETER dr.	TOLERANCE	OUTER DIAMETER D	TOLERANCE	L	B	W	h	D ₁	BASIC LOAD RATING(N)		NO. OF BALL	CROUIT	WEIGHT (g)
Resin	Steel										DYNAMIC(C)	STATIC(C ₀)			
LM6 AJ	LM6 AJ-A	6		12		19	13.5	1.1	1	11.5	200	260	4		8
LM8S AJ	LM8S AJ-A	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 C₁₀₀ = 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 |

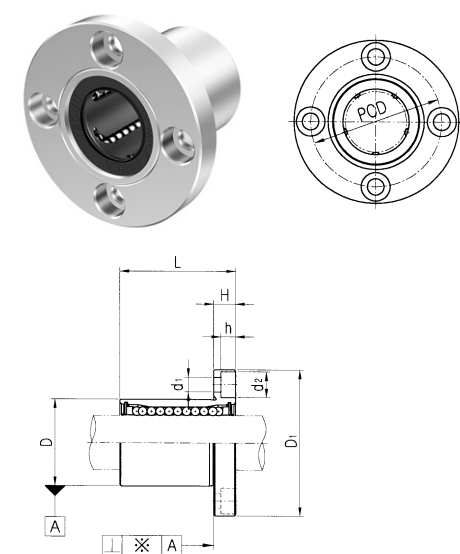


Samick Linear Bushing	LM	20	UU	OP	-	A	N	S
Nominal Shaft Diameter								
Seal								
Blank : No Seal								
U : One Side Seal								
UU : Both Side Seal								
Linear Bushing Open type								
Retainer								
Blank : Resin retainer(Standard)								
A : Steel retainer(High temperature)								
Outer-sleeves								
(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		DIAMETER dr.	TOLERANCE	D	TOLERANCE	L	B	W	h ₁	θ	BASIC LOAD RATING(N)		NO. OF BALL	CROUIT	WEIGHT (g)
Resin	Steel										DYNAMIC(C)	STATIC(C ₀)			
LM12 OP		12		21	⁰ _{-0.013}	30	23.0	1.3	8	80	410	590	3		31.5
LM13 OP		13	⁰ _{-0.009}	23		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 C₁₀₀ = 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

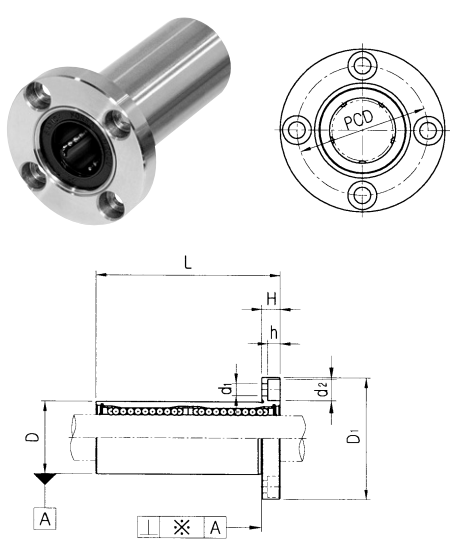


Samick Circular Flanged Linear Bushing		LMF	20	UU	-	A	N	S
Nominal Shaft Diameter								
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance type)		Blank : No-plating(Standard) 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		DIAMETER D	D TOLERANCE	L	D ₁	H	PCD	d ₁	d ₂	h	SQUARENESS ※(mm)	BASIC LOAD RATING(N)		NO. OF BALL ORCUT	WEIGHT (g)
Resin	Steel											DYNAMIC(C)	STATIC(C ₀)		
LMF 6	LMF6-A	6	12	19	28	5	20	3.4	6.5	3.3	12	200	260	4	26.5
LMF 8S	LMF8S-A	8	15 ⁰ _{-0.011}	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 ⁰ _{-0.009}	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 ⁰ _{-0.013}	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	40 ⁰ _{-0.010}	59	62	8	51	5.5	9.5	5.4	15	980	1560	6	340
LMF 30		30	45 ⁰ _{-0.016}	64	74	10	60	6.6	11.0	6.5	15	1560	2740	6	460
LMF 35		35	52 ⁰ _{-0.019}	70	82	10	67	6.6	11.0	6.5	20	1660	3130	6	795
LMF 40		40	60 ⁰ _{-0.012}	80	96	13	78	9.0	14.0	8.6	20	2150	4010	6	1054
LMF 50		50	80 ⁰ _{-0.015}	100	116	13	98	9.0	14.0	8.6	20	3820	7930	6	2200
LMF 60		60	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

LMF_L FLANGED LINEAR BUSHING LONG

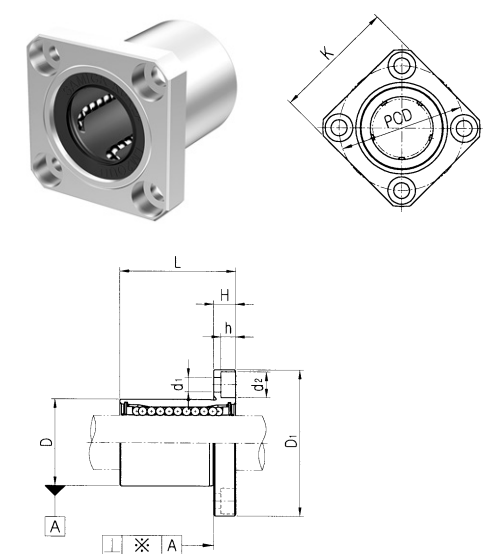


Samick Circular Flanged Linear Bushing		LMF	20	L	UU	-	A	N	S
Nominal Shaft Diameter									
Linear Bushing Long type (for high load)									
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal								
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)								
Outer-sleeves (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		DIAMETER D	D TOLERANCE	L	D ₁	H	PCD	d ₁	d ₂	h	SQUARENESS ※(mm)	BASIC LOAD RATING(N)		NO. OF BALL ORCUT	WEIGHT (g)
Resin	Steel											DYNAMIC(C)	STATIC(C ₀)		
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 ⁰ _{-0.010}	45	32	5	24	3.4	6.5	3.3	15	430	780	4	53
LMF10 L	LMF10L-A	10	19 ⁰ _{-0.016}	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 ⁰ _{-0.016}	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 ⁰ _{-0.012}	80	54	8	43	5.5	9.5	5.4	20	1400	2750	5	260
LMF25 L	LMF25L-A	25	40 ⁰ _{-0.019}	112	62	8	51	5.5	9.5	5.4	20	1560	3140	6	515
LMF30 L		30	45 ⁰ _{-0.022}	123	74	10	60	6.6	11.0	6.5	20	2490	5490	6	655
LMF35 L		35	52 ⁰ _{-0.022}	135	82	10	67	6.6	11.0	6.5	25	2650	6470	6	970
LMF40 L		40	60 ⁰ _{-0.015}	154	96	13	78	9.0	14.0	8.6	25	3430	8040	6	1560
LMF50 L		50	80 ⁰ _{-0.020}	192	116	13	98	9.0	14.0	8.6	25	6080	15900	6	3500
LMF60 L		60	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

LMK FLANGED LINEAR BUSHING

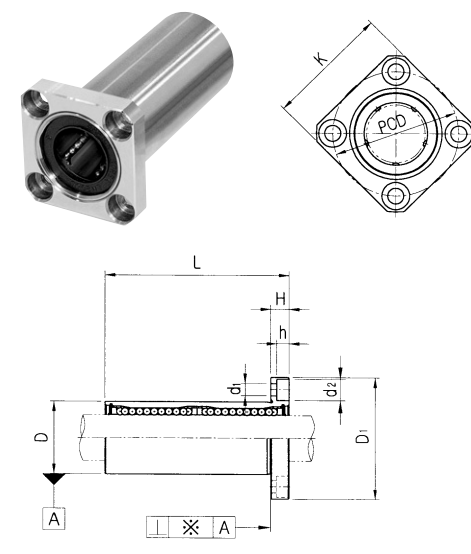


Samick Square Flanged Linear Bushing LMK		20	UU	-	A	N	S
Nominal Shaft Diameter							
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal					
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)					
Outer-sleeves (by corrosion resistance type)		Blank : No-plating(Standard) 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		DIAMETER D	D ₁	L	H	PCD	K	d ₁	d ₂	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N)		NO. OF BALL CIRCUIT	WEIGHT (gf)	
Resin	Steel											TOLERANCE	TOLERANCE			DYNAMIC(C)
LMK6	LMK6-A	6	12	19	28	5	20	22	3.4	6.5	3.3	12	200	260	4	26.5
LMK8S	LMK8S-A	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	19 ⁰ _{-0.009}	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 ⁰ _{-0.013}	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	40 ⁰ _{-0.010}	59	62	8	51	50	5.5	9.5	5.4	15	980	1560	6	340
LMK30		30	45 ⁰ _{-0.016}	64	74	10	60	58	6.6	11.0	6.5	15	1560	2740	6	460
LMK35		35	52 ⁰ _{-0.019}	70	82	10	67	64	6.6	11.0	6.5	20	1660	3130	6	795
LMK40		40	60 ⁰ _{-0.012}	80	96	13	78	75	9.0	14.0	8.6	20	2150	4010	6	1054
LMK50		50	80 ⁰ _{-0.022}	100	116	13	98	92	9.0	14.0	8.6	20	3820	7930	6	2200
LMK60		60	90 ⁰ _{-0.015}	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

LMK_L FLANGED LINEAR BUSHING LONG

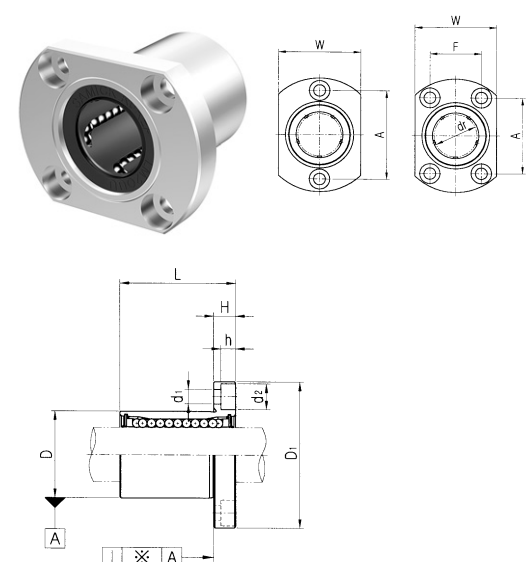


Samick Square Flanged Linear Bushing LMK		20	L	UU	-	A	N	S
Nominal Shaft Diameter								
Linear Bushing Long type (for high load)								
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (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		DIAMETER dr.	D TOLERANCE	L	D ₁	H	PCD	K	d ₁	d ₂	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N)		NO. OF BALL CIRCUIT	WEIGHT (gf)
Resin	Steel												DYNAMIC(C)	STATIC(C ₀)		
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 ⁰ _{-0.010}	45	32	5	24	25	3.4	6.5	3.3	15	430	780	4	53
LMK10 L	LMK10L-A	10	19 ⁰ _{-0.010}	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 ⁰ _{-0.016}	61	43	6	33	34	4.5	8.0	4.4	15	810	1570	4	130
LMK16 L	LMK16L-A	16	28 ⁰ _{-0.012}	70	48	6	38	37	4.5	8.0	4.4	15	1230	2350	5	187
LMK20 L	LMK20L-A	20	32 ⁰ _{-0.019}	80	54	8	43	42	5.5	9.5	5.4	20	1400	2750	5	260
LMK25 L	LMK25L-A	25	40 ⁰ _{-0.012}	112	62	8	51	50	5.5	9.5	5.4	20	1560	3140	6	515
LMK30 L		30	45 ⁰ _{-0.015}	123	74	10	60	58	6.6	11.0	6.5	20	2490	5490	6	655
LMK35 L		35	52 ⁰ _{-0.022}	135	82	10	67	64	6.6	11.0	6.5	25	2650	6470	6	970
LMK40 L		40	60 ⁰ _{-0.015}	154	96	13	78	75	9.0	14.0	8.6	25	3430	8040	6	1560
LMK50 L		50	80 ⁰ _{-0.020}	192	116	13	98	92	9.0	14.0	8.6	25	6080	15900	6	3500
LMK60 L		60	90 ⁰ _{-0.020}	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMH FLANGED LINEAR BUSHING |

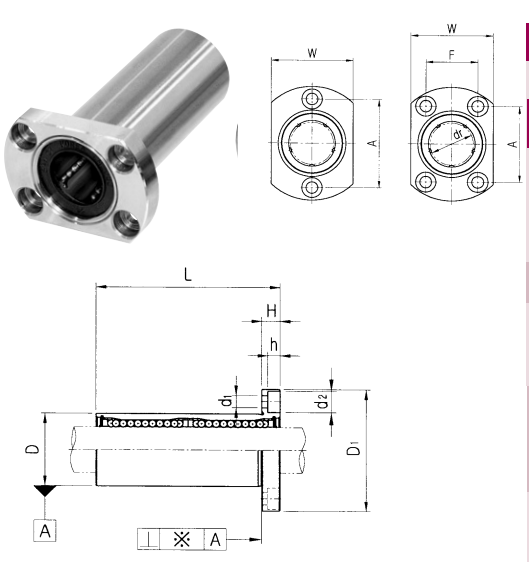


Samick Oval Flanged Linear Bushing		LMH	20	UU	-	A	N	S
Nominal Shaft Diameter								
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance type)		Blank : No-plating(Standard) 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		DIAMETER dr.	D TOLERANCE	L	D ₁	H	W	A	F	d ₁	d ₂	h	SQUARENESS μm	BASIC LOAD RATING(N)		NO. OF BALL ORQUIT	WEIGHT (g)
Resin	Steel													DYNAMIC(C)	STATIC(C ₀)		
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 ⁰ _{-0.009}	24	32	5	21	24	-	3.4	6.5	3.3	12	260	400	4	40
LMH10	LMH10-A	10	19 ⁰ _{-0.010}	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 ⁰ _{-0.016}	32	43	6	29	33	-	4.5	8.0	4.4	12	500	770	4	94
LMH16	LMH16-A	16	28 ⁰ _{-0.012}	37	48	6	34	31	22	4.5	8.0	4.4	12	770	1170	5	134
LMH20	LMH20-A	20	32 ⁰ _{-0.019}	42	54	8	38	36	24	5.5	9.5	5.4	15	860	1370	5	180
LMH25	LMH25-A	25	40 ⁰ _{-0.016}	59	62	8	46	40	32	5.5	9.5	5.4	15	980	1560	6	340
LMH30		30	45 ⁰ _{-0.019}	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMH_L FLANGED LINEAR BUSHING LONG |

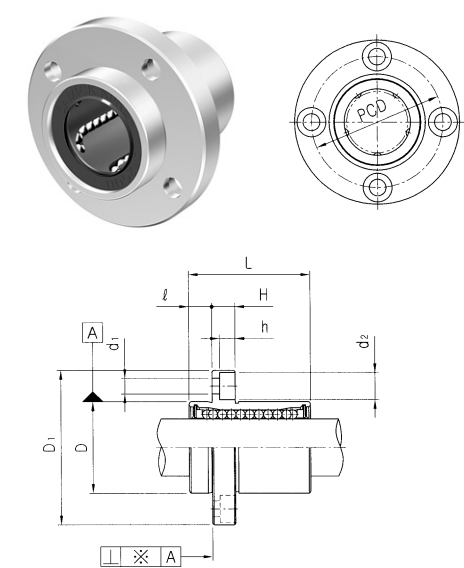


Samick Oval Flanged Linear Bushing	LMH	20	L	UU	-	A	N	S
Nominal Shaft Diameter								
Linear Bushing Long type (for high load)								
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (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		DIAMETER dr.	D TOLERANCE	L	D ₁	H	W	A	F	d ₁	d ₂	h	SQUARENESS μm	BASIC LOAD RATING(N)		NO. OF BALL ORQUIT	WEIGHT (g)
Resin	Steel													DYNAMIC(C)	STATIC(C ₀)		
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 ⁰ _{-0.010}	45	32	5	21	24	-	3.4	6.5	3.3	15	430	780	4	53
LMH10 L	LMH10L-A	10	19 ⁰ _{-0.016}	55	40	6	25	29	-	4.5	8.0	4.4	15	580	1100	4	105
LMH12 L	LMH12L-A	12	21 ⁰ _{-0.019}	57	42	6	27	32	-	4.5	8.0	4.4	15	650	1200	4	100
LMH13 L	LMH13L-A	13	23 ⁰ _{-0.012}	61	43	6	29	33	-	4.5	8.0	4.4	15	810	1570	4	130
LMH16 L	LMH16L-A	16	28 ⁰ _{-0.019}	70	48	6	34	31	22	4.5	8.0	4.4	15	1230	2350	5	187
LMH20 L	LMH20L-A	20	32 ⁰ _{-0.012}	80	54	8	38	36	24	5.5	9.5	5.4	20	1400	2750	5	260
LMH25 L	LMH25L-A	25	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 ⁰ _{-0.019}	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMFP FLANGED LINEAR BUSHING |

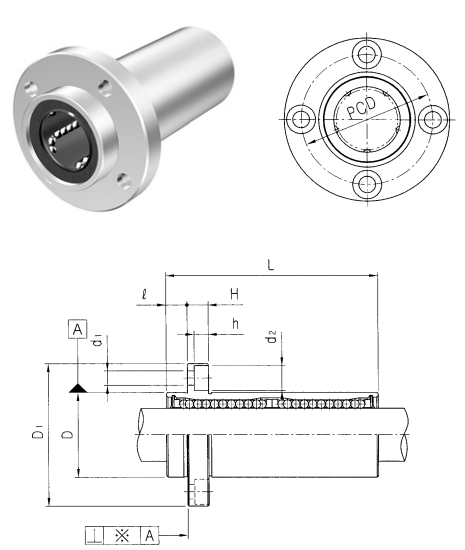


Samick Circular Pilot Flanged Linear Bushing		LMFP	20	UU	-	A	N	S
Nominal Shaft Diameter								
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance type)		Blank : 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		DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D ₁	l	H	PCD	d ₁	d ₂	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N)		NO. OF BALL ORUIT	WEIGHT (gf)
Resin	Steel												DYNAMIC(C)	STATIC(C ₀)		
LMFP6	LMFP6-A	6	12	19	28	5	5	20	3.4	6.5	3.3	12	200	260	4	26.5
LMFP8	LMFP8-A	8	15 ^{-0.011}	24	32	5	5	24	3.4	6.5	3.3	12	260	400	4	40
LMFP10	LMFP10-A	10	19 ^{-0.009}	29	40	6	6	29	4.5	8	4.4	12	370	540	4	76
LMFP12	LMFP12-A	12	21 ^{-0.013}	30	42	6	6	32	4.5	8	4.4	12	410	590	4	78
LMFP13	LMFP13-A	13	23 ^{-0.013}	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 ^{-0.010}	40 ^{-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 ^{-0.012}	60 ^{-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 ^{-0.015}	90 ^{-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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMFP_L FLANGED LINEAR BUSHING LONG |

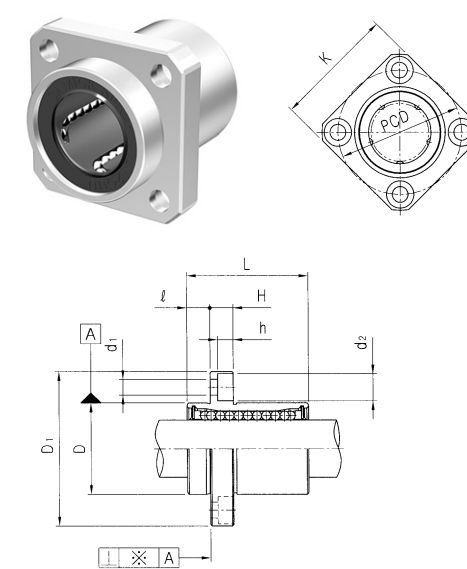


Samick Circular Pilot Flanged Linear Bushing		LMFP	20	L	UU	-	A	N	S
Nominal Shaft Diameter									
Linear Bushing Long type (for high load)									
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal								
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)								
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		DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D ₁	l	H	PCD	d ₁	d ₂	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N)		NO. OF BALL ORUIT	WEIGHT (gf)
Resin	Steel												DYNAMIC(C)	STATIC(C ₀)		
LMFP6L	LMFP6L-A	6	12 ^{-0.013}	35	28	5	5	20	3.4	6.5	3.3	15	320	520	4	31
LMFP8L	LMFP8L-A	8	15 ^{-0.013}	45	32	5	5	24	3.4	6.5	3.3	15	430	780	4	53
LMFP10L	LMFP10L-A	10	19 ^{-0.010}	55	40	6	6	29	4.5	8	4.4	15	580	1100	4	105
LMFP12L	LMFP12L-A	12	21 ^{-0.016}	57	42	6	6	32	4.5	8	4.4	15	650	1200	4	100
LMFP13L	LMFP13L-A	13	23 ^{-0.016}	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 ^{-0.012}	40 ^{-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 ^{-0.015}	60 ^{-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 ^{-0.020}	90 ^{-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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMKP FLANGED LINEAR BUSHING |

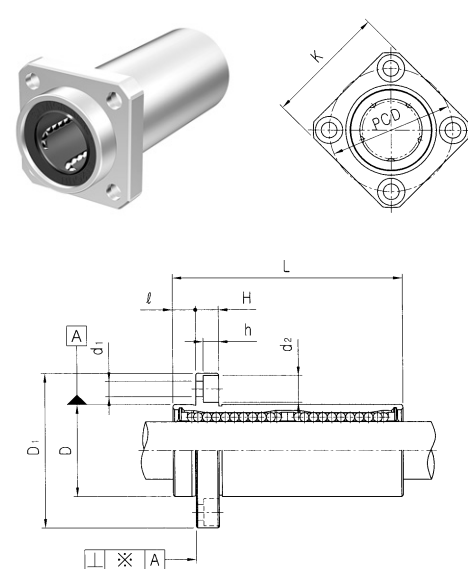


Samick Square Pilot Flanged Linear Bushing		LMKP	20	UU	-	A	N	S
Nominal Shaft Diameter								
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance type)		Blank : No-plating(Standard) 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		DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D ₁	ℓ	H	PCD	K	d ₁	d ₂	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N)		NO. OF BALL ORUIT	WEIGHT (gf)
Resin	Steel													DYNAMIC(C)	STATIC(C ₀)		
LMKP6	LMKP6-A	6	12	19	28	5	5	20	22	3.4	6.5	3.3	12	200	260	4	26.5
LMKP8	LMKP8-A	8	15 ^{-0.011}	24	32	5	5	24	25	3.4	6.5	3.3	12	260	400	4	40
LMKP10	LMKP10-A	10	19 ^{-0.009}	29	40	6	6	29	30	4.5	8	4.4	12	370	540	4	76
LMKP12	LMKP12-A	12	21 ^{-0.013}	30	42	6	6	32	32	4.5	8	4.4	12	410	590	4	78
LMKP13	LMKP13-A	13	23 ^{-0.016}	32	43	6	6	33	34	4.5	8	4.4	12	500	770	4	94
LMKP16	LMKP16-A	16	28 ^{-0.019}	37	48	6	6	38	37	4.5	8	4.4	12	770	1170	5	134
LMKP20	LMKP20-A	20	32 ^{-0.022}	42	54	8	8	43	42	5.5	9.5	5.4	15	860	1370	5	180
LMKP25	LMKP25-A	25	40 ^{-0.025}	59	62	8	8	51	50	5.5	9.5	5.4	15	980	1560	6	340
LMKP30		30	45 ^{-0.028}	64	74	10	10	60	58	6.6	11	6.5	15	1560	2740	6	460
LMKP35		35	52 ^{-0.031}	70	82	10	10	67	64	6.6	11	6.5	20	1660	3130	6	795
LMKP40		40	60 ^{-0.034}	80	96	13	13	78	75	9	14	8.6	20	2150	4010	6	1054
LMKP50		50	80 ^{-0.040}	100	116	13	13	98	92	9	14	8.6	20	3820	7930	6	2200
LMKP60		60	90 ^{-0.047}	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMKP_L FLANGED LINEAR BUSHING LONG |

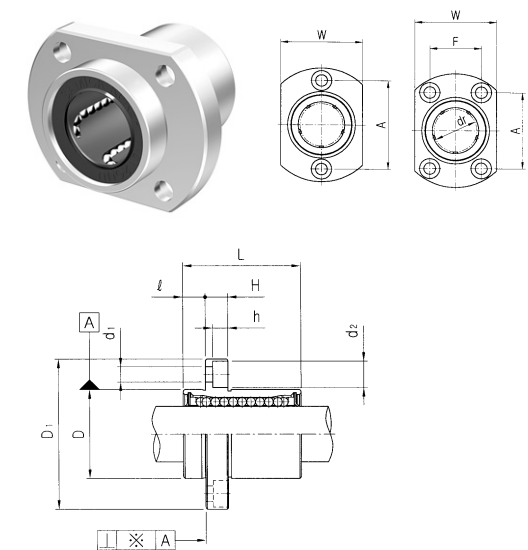


Samick Square Pilot Flanged Linear Bushing		LMKP	20	L	UU	-	A	N	S
Nominal Shaft Diameter									
Linear Bushing Long type (for high load)									
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal								
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)								
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		DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D ₁	ℓ	H	PCD	K	d ₁	d ₂	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N)		NO. OF BALL ORUIT	WEIGHT (gf)
Resin	Steel													DYNAMIC(C)	STATIC(C ₀)		
LMKP6L	LMKP6L-A	6	12	35	28	5	5	20	22	3.4	6.5	3.3	15	320	520	4	31
LMKP8L	LMKP8L-A	8	15 ^{-0.013}	45	32	5	5	24	25	3.4	6.5	3.3	15	430	780	4	53
LMKP10L	LMKP10L-A	10	19 ^{-0.010}	55	40	6	6	29	30	4.5	8	4.4	15	580	1100	4	105
LMKP12L	LMKP12L-A	12	21 ^{-0.016}	57	42	6	6	32	32	4.5	8	4.4	15	650	1200	4	100
LMKP13L	LMKP13L-A	13	23 ^{-0.019}	61	43	6	6	33	34	4.5	8	4.4	15	810	1570	4	130
LMKP16L	LMKP16L-A	16	28 ^{-0.022}	70	48	6	6	38	37	4.5	8	4.4	15	1230	2350	5	187
LMKP20L	LMKP20L-A	20	32 ^{-0.025}	80	54	8	8	43	42	5.5	9.5	5.4	20	1400	2750	5	260
LMKP25L	LMKP25L-A	25	40 ^{-0.028}	112	62	8	8	51	50	5.5	9.5	5.4	20	1560	3140	6	515
LMKP30L		30	45 ^{-0.031}	123	74	10	10	60	58	6.6	11	6.5	20	2490	5490	6	655
LMKP35L		35	52 ^{-0.034}	135	82	10	10	67	64	6.6	11	6.5	25	2650	6470	6	970
LMKP40L		40	60 ^{-0.037}	154	96	13	13	78	75	9	14	8.6	25	3430	8040	6	1560
LMKP50L		50	80 ^{-0.040}	192	116	13	13	98	92	9	14	8.6	25	6080	15900	6	3500
LMKP60L		60	90 ^{-0.043}	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMHP FLANGED LINEAR BUSHING |

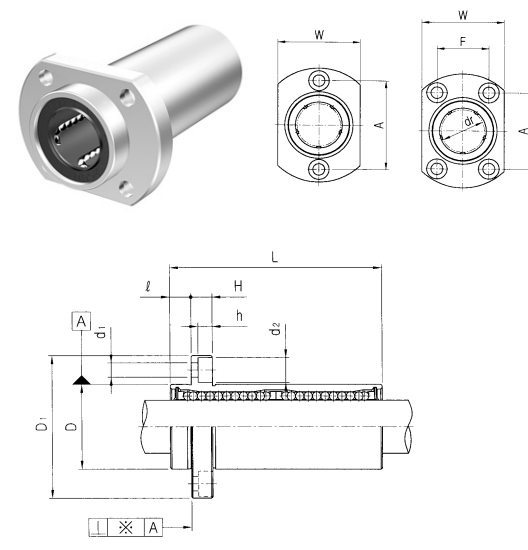


Samick Oval Pilot Flanged Linear Bushing		LMHP	20	UU	-	A	N	S
Nominal Shaft Diameter								
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance type)		Blank : No-plating(Standard) 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		DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D ₁	ℓ	H	W	A	F	d ₁	d ₂	h	SQUARENESS μm	BASIC LOAD RATING(N)		NO. OF BALL CIRCUIT	WEIGHT (g)
Resin	Steel														DYNAMIC(C)	STATIC(C ₀)		
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 _{-0.009}	24	32	5	5	21	24		3.4	6.5	3.3	12	260	400	4	40
LMHP10	LMHP10-A	10	19 ⁰ _{-0.010}	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 _{-0.016}	32	43	6	6	29	33		4.5	8	4.4	12	500	770	4	94
LMHP16	LMHP16-A	16	28	37	48	6	6	34	31	22	4.5	8	4.4	12	770	1170	5	134
LMHP20	LMHP20-A	20	32	42	54	8	8	38	36	24	5.5	9.5	5.4	15	860	1370	5	180
LMHP25	LMHP25-A	25	40 ⁰ _{-0.012}	59	62	8	8	46	40	32	5.5	9.5	5.4	15	980	1560	6	340
LMHP30		30	45	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMHP_L FLANGED LINEAR BUSHING LONG |

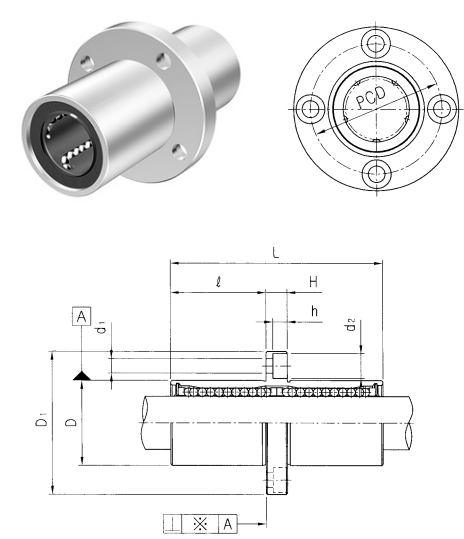


Samick Oval Plot Flanged Linear Bushing		LMHP	20	L	UU	—	A	N	S
Nominal Shaft Diameter									
Linear Bushing Long type(for high load)									
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal							
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)							
Outer-sleeves (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		DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D ₁	ℓ	H	W	A	F	d ₁	d ₂	h	SQUARENESS μm	BASIC LOAD RATING(N)		NO. OF BALL CIRCUIT	WEIGHT (g)
Resin	Steel														DYNAMIC(C)	STATIC(C ₀)		
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 _{-0.010}	45	32	5	5	21	24		3.4	6.5	3.3	15	430	780	4	53
LMHP10L	LMHP10L-A	10	19 ⁰ _{-0.016}	55	40	6	6	25	29		4.5	8	4.4	15	580	1100	4	105
LMHP12L	LMHP12L-A	12	21 ⁰ _{-0.019}	57	42	6	6	27	32		4.5	8	4.4	15	650	1200	4	100
LMHP13L	LMHP13L-A	13	23	61	43	6	6	29	33		4.5	8	4.4	15	810	1570	4	130
LMHP16L	LMHP16L-A	16	28	70	48	6	6	34	31	22	4.5	8	4.4	15	1230	2350	5	187
LMHP20L	LMHP20L-A	20	32	80	54	8	8	38	36	24	5.5	9.5	5.4	20	1400	2750	5	260
LMHP25L	LMHP25L-A	25	40 ⁰ _{-0.012}	112	62	8	8	46	40	32	5.5	9.5	5.4	20	1560	3140	6	515
LMHP30L		30	45	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMFM FLANGED LINEAR BUSHING LONG |

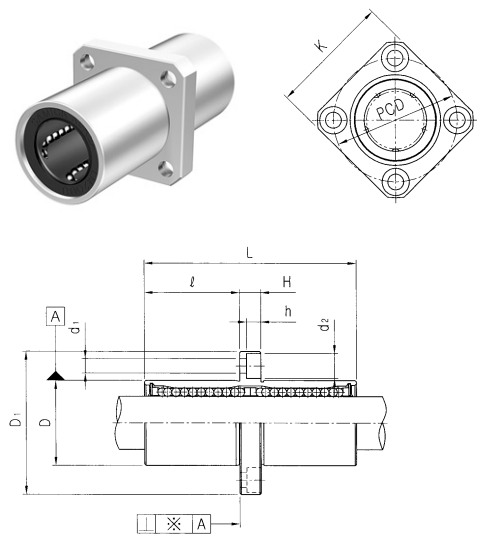


Samick Circular Middle Ranged Linear Bushing		LMFM	20	UU	-	A	N	S
Nominal Shaft Diameter								
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance type)		Blank : 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		DIAMETER		D	L	D ₁	l	H	PCD	d ₁	d ₂	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N)		NO. OF BALL ORQUIT	WEIGHT (g)
Resin	Steel	dr.	TOLERANCE											DYNAMIC(C)	STATIC(C ₀)		
LMFM6	LMFM6-A	6		12	35	28	15	5	20	3.4	6.5	3.3	15	320	520	4	31
LMFM8	LMFM8-A	8		15	45	32	20	5	24	3.4	6.5	3.3	15	430	780	4	53
LMFM10	LMFM10-A	10		19	55	40	24.5	6	29	4.5	8	4.4	15	580	1100	4	105
LMFM12	LMFM12-A	12		21	57	42	25.5	6	32	4.5	8	4.4	15	650	1200	4	100
LMFM13	LMFM13-A	13		23	61	43	27.5	6	33	4.5	8	4.4	15	810	1570	4	130
LMFM16	LMFM16-A	16		28	70	48	32	6	38	4.5	8	4.4	15	1230	2350	5	187
LMFM20	LMFM20-A	20		32	80	54	36	8	43	5.5	9.5	5.4	20	1400	2750	5	260
LMFM25	LMFM25-A	25		40	112	62	52	8	51	5.5	9.5	5.4	20	1560	3140	6	515
LMFM30		30		45	123	74	56.5	10	60	6.6	11	6.5	20	2940	5490	6	655
LMFM35		35		52	135	82	62.5	10	67	6.6	11	6.5	25	2650	6470	6	970
LMFM40		40		60	154	96	70.5	13	78	9	14	8.6	25	3430	8040	6	1560
LMFM50		50		80	192	116	89.5	13	98	9	14	8.6	25	6080	15900	6	3500
LMFM60		60		90	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMKM FLANGED LINEAR BUSHING LONG |

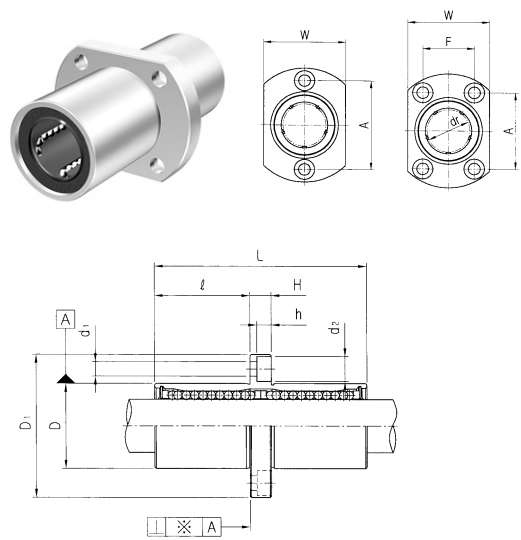


Samick Square Middle Ranged Linear Bushing		LMKM	20	UU	-	A	N	S
Nominal Shaft Diameter								
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance type)		Blank : No-plating(Standard) 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		DIAMETER		D	L	D ₁	l	H	PCD	K	d ₁	d ₂	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N)		NO. OF BALL ORQUIT	WEIGHT (g)
Resin	Steel	dr.	TOLERANCE												DYNAMIC(C)	STATIC(C ₀)		
LMKM6	LMKM6-A	6		12	35	28	15	5	20	22	3.4	6.5	3.3	15	320	520	4	31
LMKM8	LMKM8-A	8		15	45	32	20	5	24	25	3.4	6.5	3.3	15	430	780	4	53
LMKM10	LMKM10-A	10		19	55	40	24.5	6	29	30	4.5	8	4.4	15	580	1100	4	105
LMKM12	LMKM12-A	12		21	57	42	25.5	6	32	32	4.5	8	4.4	15	650	1200	4	100
LMKM13	LMKM13-A	13		23	61	43	27.5	6	33	34	4.5	8	4.4	15	810	1570	4	130
LMKM16	LMKM16-A	16		28	70	48	32	6	38	37	4.5	8	4.4	15	1230	2350	5	187
LMKM20	LMKM20-A	20		32	80	54	36	8	43	42	5.5	9.5	5.4	20	1400	2750	5	260
LMKM25	LMKM25-A	25		40	112	62	52	8	51	50	5.5	9.5	5.4	20	1560	3140	6	515
LMKM30		30		45	123	74	56.5	10	60	58	6.6	11	6.5	20	2940	5490	6	655
LMKM35		35		52	135	82	62.5	10	67	64	6.6	11	6.5	25	2650	6470	6	970
LMKM40		40		60	154	96	70.5	13	78	75	9	14	8.6	25	3430	8040	6	2560
LMKM50		50		80	192	116	89.5	13	98	92	9	14	8.6	25	6080	15900	6	3500
LMKM60		60		90	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMHM FLANGED LINEAR BUSHING |



Samick Square Middle 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		DIAMETER		D	L	D _i	ℓ	H	W	A	F	d ₁	d ₂	h	SQUARENESS BASIC LOAD RATING(N)			NO. OF BALL	WEIGHT	
Resin	Steel	dr.	TOLERANCE												mm	TOLERANCE	※(μm)			DYNAMIC(C)
LMHM6	LMHM6-A	6	<div><div></div><div></div><div></div><div></div><div></div></div>	12	0 -0.013	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	<div><div></div><div></div><div></div><div></div><div></div></div>	28	0 -0.016	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 C₁₀₀ = 410 / 1.26 = 325.40N

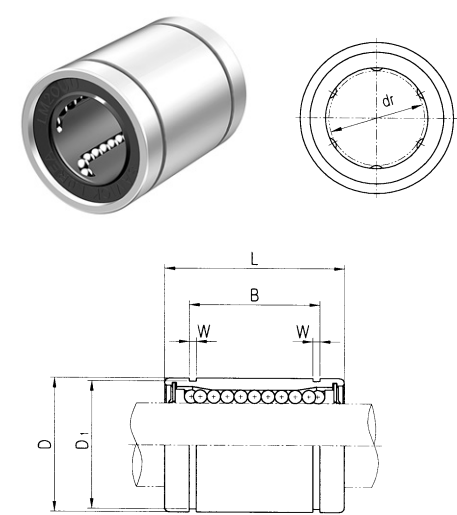
Note 2) Based on the weight of resin retainer

Note 3) Dimension : mm

65

European Standard

| LME CLOSED LINEAR BUSHING |

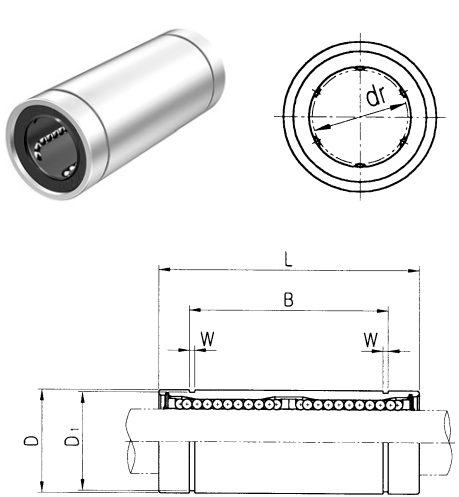


European Standard Samick Linear Bushing									
LME 20 UU - A N S									
Nominal Shaft Diameter									
Seal									
Blank : No Seal									
U : One Side Seal									
UU : Both Side Seal									
Retainer									
Blank : Resin retainer(Standard)									
A : Steel retainer(High temperature)									
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		DIAMETER		D	L	B	W	D ₁	BASIC LOAD RATING(N)		NO. OF BALL CIRCUIT	WEIGHT (gf)
Resin	Steel	dr.	TOLERANCE						DYNAMIC(C)	STATIC(C ₀)		
LME5		5		12	22	14.5	1.1	11.5	200	260	4	12
LME8	LME8-A	8	$\begin{smallmatrix} +0.008 \\ 0 \end{smallmatrix}$	16	25	16.5	1.1	15.2	260	400	4	20
LME12	LME12-A	12		22	32	22.9	1.3	21	410	590	4	41
LME16	LME16-A	16	$\begin{smallmatrix} +0.008 \\ -0.001 \end{smallmatrix}$	26	36	24.9	1.3	24.9	770	1170	5	57
LME20	LME20-A	20		32	45	31.5	1.6	30.3	860	1370	5	91
LME25	LME25-A	25	$\begin{smallmatrix} +0.011 \\ -0.001 \end{smallmatrix}$	40	58	44.1	1.85	37.5	980	1560	6	215
LME30		30	$\begin{smallmatrix} +0.011 \\ -0.001 \end{smallmatrix}$	47	68	52.1	1.85	44.5	1560	2740	6	325
LME40		40		62	80	60.6	2.15	59	2150	4010	6	705
LME50		50	$\begin{smallmatrix} +0.013 \\ -0.002 \end{smallmatrix}$	75	100	77.6	2.65	72	3820	7930	6	1130
LME60		60		90	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LME_L LONG LINEAR BUSHING |

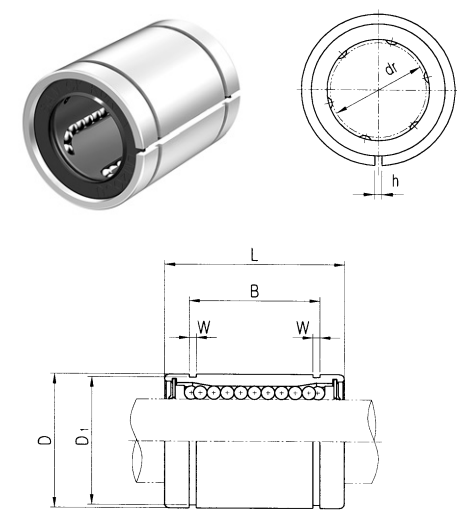


European Standard Samick Linear Bushing									
LME 20 L UU - A N S									
Nominal Shaft Diameter									
Linear Bushing Long type (for high load)									
Seal									
Blank : No Seal									
U : One Side Seal									
UU : Both Side Seal									
Retainer									
Blank : Resin retainer(Standard)									
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		DIAMETER		D	L	B	W	D ₁	BASIC LOAD RATING(N)		NO. OF BALL CIRCUIT	WEIGHT (gf)
Resin	Steel	dr.	TOLERANCE						DYNAMIC(C)	STATIC(C ₀)		
LME8L	LME8L-A	8	$\begin{smallmatrix} +0.008 \\ -0.001 \end{smallmatrix}$	16	45	33	1.1	15.2	430	780	4	31
LME12L	LME12L-A	12		22	57	45.8	1.3	21	650	1200	4	80
LME16L	LME16L-A	16	$\begin{smallmatrix} +0.011 \\ -0.001 \end{smallmatrix}$	26	70	49.8	1.3	24.9	1230	2350	5	145
LME20L	LME20L-A	20		32	80	61	1.6	30.3	1400	2750	5	180
LME25L	LME25L-A	25	$\begin{smallmatrix} +0.013 \\ -0.002 \end{smallmatrix}$	40	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	154	121.2	2.15	59	3430	8040	6	1170
LME50L		50	$\begin{smallmatrix} +0.016 \\ -0.004 \end{smallmatrix}$	75	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LME_AJ ADJUSTABLE LINEAR BUSHING |

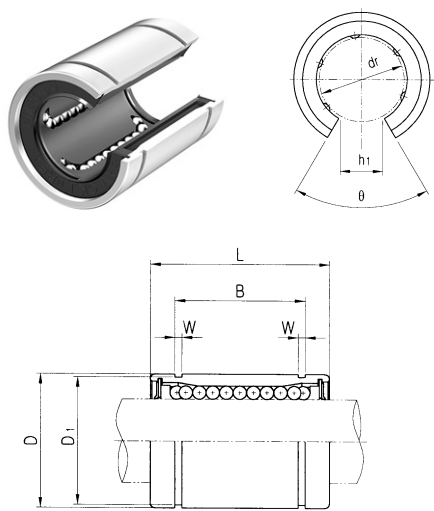


European Standard Samick Linear Bushing LME 20 UU AJ - A N S											
Nominal Shaft Diameter											
Seal											
Blank : No Seal											
U : One Side Seal											
UU : Both Side Seal											
Linear Bushing Adjustable type											
Retainer											
Blank : Resin retainer(Standard)											
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		DIAMETER		D	L	B	W	D _i	h	BASIC LOAD RATING(N)		NO. OF BALL ORQUIT	WEIGHT (gf)
Resin	Steel	dr.	TOLERANCE							DYNAMIC(C)	STATIC(C ₀)		
LME5AJ		5		12 ₀ ^{-0.008}	22	14.5	1.1	11.5	1	200	260	4	12
LME8AJ	LME8AJ-A	8	₀ ^{+0.008}	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 ^{+0.009}	26 ₀ ^{-0.009}	36	24.9	1.3	24.9	1.5	770	1170	5	57
LME20AJ	LME20AJ-A	20	₀ ^{+0.009}	32 ₀ ^{-0.011}	45	31.5	1.6	30.3	2	860	1370	5	91
LME25AJ	LME25AJ-A	25	₀ ^{+0.011}	40 ₀ ^{-0.011}	58	44.1	1.85	37.5	2	980	1560	6	215
LME30AJ		30	₀ ^{+0.011}	47 ₀ ^{-0.011}	68	52.1	1.85	44.5	2	1560	2740	6	325
LME40AJ		40		62 ₀ ^{-0.013}	80	60.6	2.15	59	3	2150	4010	6	705
LME50AJ		50	₀ ^{+0.013}	75 ₀ ^{-0.015}	100	77.6	2.65	72	3	3820	7930	6	1130
LME60AJ		60	₀ ^{+0.013}	90 ₀ ^{-0.015}	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 C₁₀₀ = 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 |

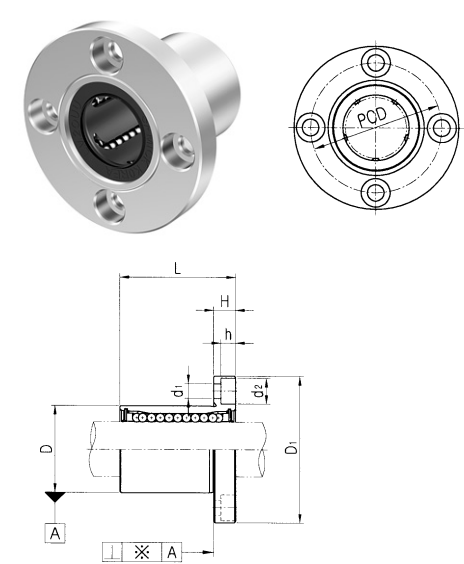


European Standard Samick Linear Bushing LME 20 UU OP - A N S											
Nominal Shaft Diameter											
Seal											
Blank : No Seal											
U : One Side Seal											
UU : Both Side Seal											
Linear Bushing Open type											
Retainer											
Blank : Resin retainer(Standard)											
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		DIAMETER		D	L	B	W	D _i	h ₁	θ	BASIC LOAD RATING(N)		NO. OF BALL ORQUIT	WEIGHT (gf)
Resin	Steel	dr.	TOLERANCE								DYNAMIC(C)	STATIC(C ₀)		
LME120P	LME120P-A	12	₀ ^{+0.008}	22 ₀ ^{-0.009}	32	22.9	1.3	21	7.5	78°	410	590	3	41
LME160P	LME160P-A	16	₀ ^{+0.009}	26 ₀ ^{-0.009}	36	24.9	1.3	24.9	10	78°	770	1170	4	57
LME200P	LME200P-A	20	₀ ^{+0.009}	32 ₀ ^{-0.011}	45	31.5	1.6	30.3	10	60°	860	1370	4	91
LME250P	LME250P-A	25	₀ ^{+0.011}	40 ₀ ^{-0.011}	58	44.1	1.85	37.5	12.5	60°	980	1560	5	215
LME300P		30	₀ ^{+0.011}	47 ₀ ^{-0.011}	68	52.1	1.85	44.5	12.5	50°	1560	2740	5	325
LME400P		40		62 ₀ ^{-0.013}	80	60.6	2.15	59	16.8	50°	2150	4010	5	705
LME500P		50	₀ ^{+0.013}	75 ₀ ^{-0.015}	100	77.6	2.65	72	21	50°	3820	7930	5	1130
LME600P		60	₀ ^{+0.013}	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 C₁₀₀ = 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 |

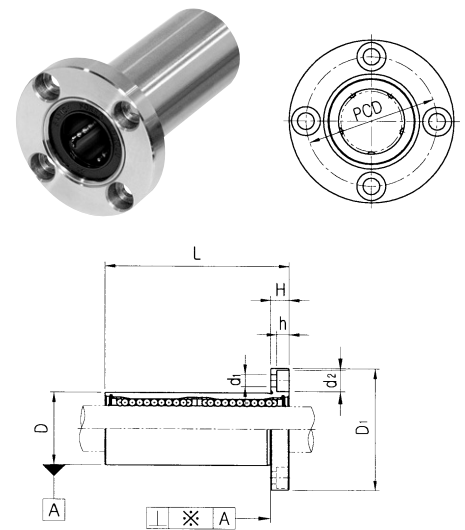


European Standard Samick Circular Flanged Linear Bushing LMEF 20 UU - A N S									
Nominal Shaft Diameter									
Seal									
Blank : No Seal									
U : One Side Seal									
UU : Both Side Seal									
Retainer									
Blank : Resin retainer(Standard)									
A : Steel retainer(High temperature)									
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		DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D ₁	H	PCD	d ₁	d ₂	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N)		NO. OF BALL ORUIT	WEIGHT (gf)
Resin	Steel											DYNAMIC(C)	STATIC(C ₀)		
LMEF8	LMEF8-A	8 _{^{+0.003}₀}	16 _{⁰_{-0.003}}	25	32	5	24	3.4	6.5	3.3	12	260	400	4	44
LMEF12	LMEF12-A	12 _{^{+0.003}₀}	22 _{⁰_{-0.003}}	32	42	6	32	4.5	8	4.4	12	410	590	4	86
LMEF16	LMEF16-A	16 _{^{+0.003}_{-0.001}}	26 _{⁰_{-0.003}}	36	46	6	36	4.5	8	4.4	12	770	1170	5	120
LMEF20	LMEF20-A	20 _{^{+0.003}_{-0.001}}	32 _{⁰_{-0.003}}	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 _{^{+0.011}_{-0.001}}	47 _{⁰_{-0.011}}	68	76	10	62	6.6	11	6.5	15	1560	2740	6	545
LMEF40		40 _{^{+0.013}_{-0.002}}	62 _{⁰_{-0.013}}	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 _{^{+0.013}_{-0.002}}	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMEF_L FLANGED LINEAR BUSHING |

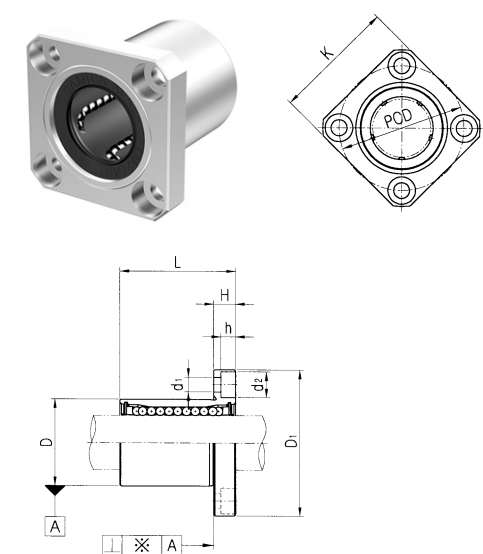


European Standard Samick Circular Flanged Linear Bushing LMEF 20 L UU - A N S									
Nominal Shaft Diameter									
Linear Bushing Long type(for high load)									
Seal									
Blank : No Seal									
U : One Side Seal									
UU : Both Side Seal									
Retainer									
Blank : Resin retainer(Standard)									
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		DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D ₁	H	PCD	d ₁	d ₂	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N)		NO. OF BALL ORUIT	WEIGHT (gf)
Resin	Steel											DYNAMIC(C)	STATIC(C ₀)		
LMEF8L	LMEF8L-A	8 _{^{+0.003}_{-0.001}}	16 _{⁰_{-0.003}}	45	32	5	24	3.4	6.5	3.3	15	430	780	4	53
LMEF12L	LMEF12L-A	12 _{^{+0.003}_{-0.001}}	22 _{⁰_{-0.003}}	57	42	6	32	4.5	8	4.4	15	650	1200	4	100
LMEF16L	LMEF16L-A	16 _{^{+0.011}_{-0.001}}	26 _{⁰_{-0.003}}	70	46	6	36	4.5	8	4.4	15	1230	2350	5	187
LMEF20L	LMEF20L-A	20 _{^{+0.011}_{-0.001}}	32 _{⁰_{-0.003}}	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 _{^{+0.013}_{-0.002}}	47 _{⁰_{-0.013}}	123	76	10	62	6.6	11	6.5	17	2490	5490	6	655
LMEF40L		40 _{^{+0.016}_{-0.004}}	62 _{⁰_{-0.016}}	154	98	13	80	9	14	8.6	20	3430	8040	6	1560
LMEF50L		50 _{^{+0.016}_{-0.004}}	75 _{⁰_{-0.016}}	192	112	13	94	9	14	8.6	20	6080	15900	6	3500
LMEF60L		60 _{^{+0.016}_{-0.004}}	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMEK FLANGED LINEAR BUSHING |

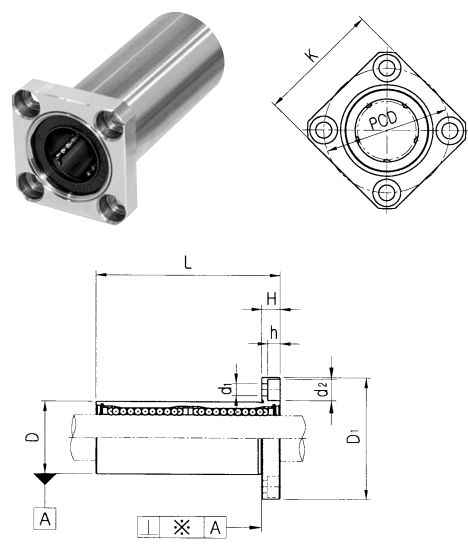


European Standard Samick Square Flanged Linear Bushing									
LMEK		20	UU	-	A	N	S		
Nominal Shaft Diameter									
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal							
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)							
Outer-sleeves (by corrosion resistance 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		DIAMETER		D		L		D ₁	H	PCD		K	d ₁	d ₂	h	SQUARENESS	BASIC LOAD RATING(N)	NO. OF		WEIGHT	
Resin	Steel	dr.	TOLERANCE	mm	TOLERANCE	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	μm	DYNAMIC(C)	STATIC(Co)	BALL	CIRCUIT	(g)
LMEK8	LMEK8-A	8		16		25	32	5	24	25	3.4	6.5	3.3	12	260	400	4	44			
LMEK12	LMEK12-A	12		22		32	42	6	32	32	4.5	8	4.4	12	410	590	4	86			
LMEK16	LMEK16-A	16		26		36	46	6	36	35	4.5	8	4.4	12	770	1170	5	120			
LMEK20	LMEK20-A	20		32		45	54	8	43	42	5.5	9.5	5.4	15	860	1370	5	184			
LMEK25	LMEK25-A	25		40		58	62	8	51	50	5.5	9.5	5.4	15	980	1560	6	335			
LMEK30		30		47		68	76	10	62	60	6.6	11	6.5	15	1560	2740	6	545			
LMEK40		40		62		80	98	13	80	75	9	14	8.6	20	2150	4010	6	1185			
LMEK50		50		75		100	112	13	94	88	9	14	8.6	20	3820	7930	6	1730			
LMEK60		60		90		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 |

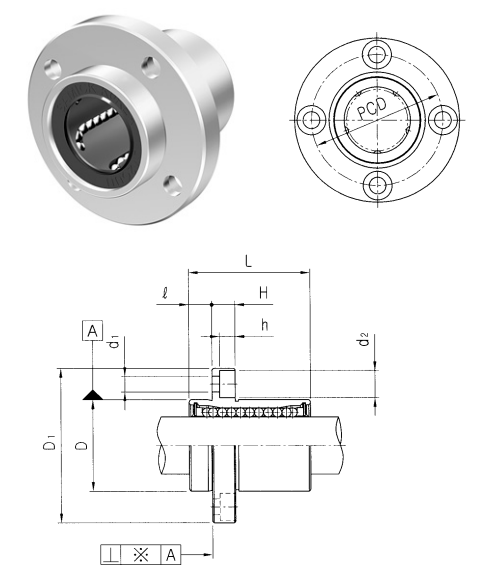


European Standard Samick Square Flanged Linear Bushing									
LMEK		20	L	UU	-	A	N	S	
Nominal Shaft Diameter									
Linear Bushing Long type(for high bad)									
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal							
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High 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		DIAMETER		D		L		D ₁	H	PCD	K	d ₁	d ₂	h	SQUARENESS	BASIC LOAD RATING(N)	NO. OF	WEIGHT	
Resin	Steel	dr.	TOLERANCE	mm	TOLERANCE	mm	mm	mm	mm	mm	mm	mm	mm	mm	※(μm)	DYNAMIC(C)	STATIC(Co)	BALL CIRCUIT	(gf)
LMEK8L	LMEK8L-A	8	<div><div></div><div>+0.009 -0.001</div></div>	16	<div><div></div><div>0 -0.009</div></div>	45	32	5	24	25	3.4	6.5	3.3	15	430	780	4	53	
LMEK12L	LMEK12L-A	12	<div><div></div><div>0 -0.001</div></div>	22	<div><div></div><div>0 -0.0011</div></div>	57	42	6	32	32	4.5	8	4.4	15	650	1200	4	100	
LMEK16L	LMEK16L-A	16	<div><div></div><div>+0.011 -0.001</div></div>	26	<div><div></div><div>0 -0.011</div></div>	70	46	6	36	35	4.5	8	4.4	15	1230	2350	5	187	
LMEK20L	LMEK20L-A	20	<div><div></div><div>+0.011 -0.001</div></div>	32	<div><div></div><div>0 -0.011</div></div>	80	54	8	43	42	5.5	9.5	5.4	17	1400	2750	5	260	
LMEK25L	LMEK25L-A	25	<div><div></div><div>+0.013 -0.002</div></div>	40	<div><div></div><div>0 -0.013</div></div>	112	62	8	51	50	5.5	9.5	5.4	17	1560	3140	6	515	
LMEK30L		30	<div><div></div><div>+0.013 -0.002</div></div>	47	<div><div></div><div>0 -0.013</div></div>	123	76	10	62	60	6.6	11	6.5	17	2490	5490	6	655	
LMEK40L		40	<div><div></div><div>+0.013 -0.002</div></div>	62	<div><div></div><div>0 -0.013</div></div>	154	98	13	80	75	9	14	8.6	20	3430	8040	6	1560	
LMEK50L		50	<div><div></div><div>+0.016 -0.004</div></div>	75	<div><div></div><div>0 -0.016</div></div>	192	112	13	94	88	9	14	8.6	20	6080	15900	6	3500	
LMEK60L		60	<div><div></div><div>0 -0.020</div></div>	90	<div><div></div><div>0 -0.020</div></div>	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 |

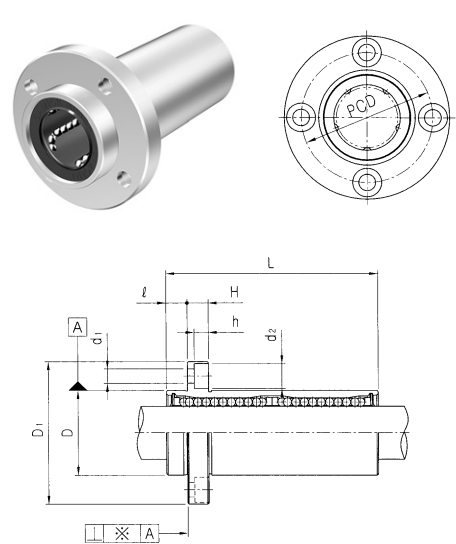


European Standard Samick Circular Flange Linear Bushing		LMEFP	20	UU	-	A	N	S
Nominal Shaft Diameter								
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance type)		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		DIAMETER		D									SQUARENESS	BASIC LOAD RATING(N)		NO. OF	WEIGHT	
Resin	Steel	dr.	TOLERANCE	mm	D ₁	ℓ	H	PCD	d ₁	d ₂	h	μm	DYNAMIC(C)	STATIC(C ₀)	BALLS	CRUIT	(g)	
LMEFP8	LMEFP8-A	8		16		25	32	5	5	24	3.4	6.5	3.3	12	260	400	4	44
LMEFP12	LMEFP12-A	12		22		32	42	6	6	32	4.5	8	4.4	12	410	590	4	86
LMEFP16	LMEFP16-A	16		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		40		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		75		100	112	13	13	94	9	14	8.6	20	3820	7930	6	1730
LMEFP60		60		90		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 C₁₀₀ = 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 Flange 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		DIAMETER		D	L	D ₁	ℓ	H	PCD	d ₁	d ₂	h	SQUARENESS	BASIC LOAD RATING(N)		NO. OF	WEIGHT	
Resin	Steel	dr.	TOLERANCE	mm	TOLERANCE								μ(m)	DYNAMIC(C)	STATIC(C ₀)	BALLS	CRUIT	(g)
LMEFP8L	LMEFP8L-A	8	$\begin{matrix} +0.009 \\ -0.001 \end{matrix}$	16	$\begin{matrix} 0 \\ -0.009 \end{matrix}$	45	32	5	5	24	3.4	6.5	3.3	15	430	780	4	53
LMEFP12L	LMEFP12L-A	12	$\begin{matrix} +0.009 \\ -0.001 \end{matrix}$	22	$\begin{matrix} 0 \\ -0.011 \end{matrix}$	57	42	6	6	32	4.5	8	4.4	15	650	1200	4	100
LMEFP16L	LMEFP16L-A	16	$\begin{matrix} +0.011 \\ -0.001 \end{matrix}$	26	$\begin{matrix} 0 \\ -0.013 \end{matrix}$	70	46	6	6	36	4.5	8	4.4	15	1230	2350	5	187
LMEFP20L	LMEFP20L-A	20	$\begin{matrix} +0.011 \\ -0.001 \end{matrix}$	32	$\begin{matrix} 0 \\ -0.013 \end{matrix}$	80	54	8	8	43	5.5	9.5	5.4	17	1400	2750	5	260
LMEFP25L	LMEFP25L-A	25	$\begin{matrix} +0.013 \\ -0.002 \end{matrix}$	40	$\begin{matrix} 0 \\ -0.015 \end{matrix}$	112	62	8	8	51	5.5	9.5	5.4	17	1560	3140	6	515
LMEFP30L		30	$\begin{matrix} +0.013 \\ -0.002 \end{matrix}$	47	$\begin{matrix} 0 \\ -0.015 \end{matrix}$	123	76	10	10	62	6.6	11	6.5	17	2490	5490	6	655
LMEFP40L		40	$\begin{matrix} 0 \\ -0.015 \end{matrix}$	62	$\begin{matrix} 0 \\ -0.020 \end{matrix}$	154	98	13	13	80	9	14	8.6	20	3430	8040	6	1560
LMEFP50L		50	$\begin{matrix} +0.016 \\ -0.004 \end{matrix}$	75	$\begin{matrix} 0 \\ -0.020 \end{matrix}$	192	112	13	13	94	9	14	8.6	20	6080	15900	6	3500
LMEFP60L		60	$\begin{matrix} 0 \\ -0.020 \end{matrix}$	90	$\begin{matrix} 0 \\ -0.020 \end{matrix}$	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 C₁₀₀ = 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 Flange 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		DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	l	H	PCD	K	d1	d2	h	SQUARENESS μm	BASIC LOAD RATING(N)		NO. OF BALL CIRCUIT	WEIGHT (g)
Resin	Steel													DYNAMIC(C)	STATIC(C0)		
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 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} _{-0.001}	26 ^{-0.009} ₀	36	46	6	6	36	35	4.5	8	4.4	12	770	1170	5	120
LMEKP20	LMEKP20-A	20 ^{+0.009} _{-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 ^{+0.011} _{-0.001}	47 ⁰ _{-0.011}	68	76	10	10	62	60	6.6	11	6.5	15	1560	2740	6	545
LMEKP40		40 ⁰ ₀	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 ^{-0.013} ₀	100	112	13	13	94	88	9	14	8.6	20	3820	7930	6	1730
LMEKP60		60 ⁰ _{-0.015}	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 C₁₀₀ = 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 Flange 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

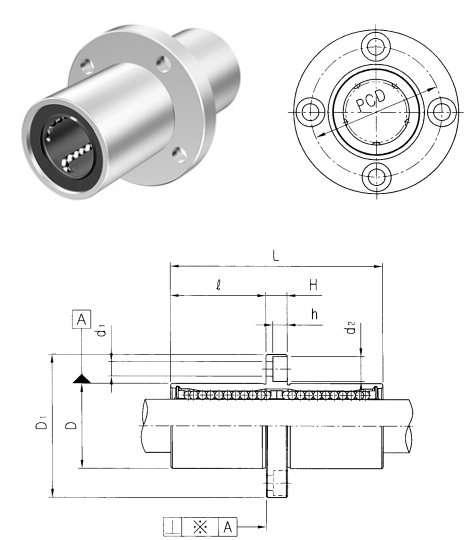
PART NUMBER		DIAMETER dr. TOLERANCE	D mm TOLERANCE	L	D1	l	H	PCD	K	d1	d2	h	SQUARENESS μm	BASIC LOAD RATING(N)		NO. OF BALL CIRCUIT	WEIGHT (g)
Resin	Steel													DYNAMIC(C)	STATIC(C0)		
LMEKP8L	LMEKP8L-A	8 ^{+0.009} _{-0.001}	16 ⁰ _{-0.009}	45	32	5	5	24	25	3.4	6.5	3.3	15	430	780	4	53
LMEKP12L	LMEKP12L-A	12 ⁰ ₀	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 ^{-0.011} ₀	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 _{-0.015}	123	76	10	10	62	60	6.6	11	6.5	17	2490	5490	6	655
LMEKP40L		40 ⁰ ₀	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 ^{-0.015} ₀	192	112	13	13	94	88	9	14	8.6	20	6080	15900	6	3500
LMEKP60L		60 ⁰ _{-0.020}	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 C₁₀₀ = 410 / 1.26 = 325.40N

Note 2) Based on the weight of resin retainer

Note 3) Dimension : mm

| LMEFM FLANGED LINEAR BUSHING LONG |

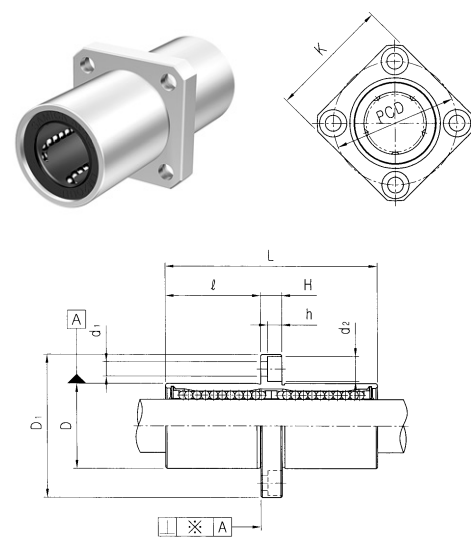


European Standard Samick Circular Model Flanged Linear Bushing		LMEFM	20	UU	-	A	N	S
Nominal Shaft Diameter								
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance 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		DIAMETER		D		L	D ₁	ℓ	H	PCD	d ₁	d ₂	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N)		NO. OF BALL ORQUIT	WEIGHT (g)
Resin	Steel	dr.	TOLERANCE	mm	TOLERANCE										DYNAMIC(C)	STATIC(C ₀)		
LMEFM8	LMEFM8-A	8	<div><div></div><div>+0.009 -0.001</div></div>	16	<div><div></div><div>0 -0.009</div></div>	45	32	20	5	24	3.4	6.5	3.3	15	430	780	4	53
LMEFM12	LMEFM12-A	12	<div><div></div><div>0 -0.001</div></div>	22	<div><div></div><div>0 -0.011</div></div>	57	42	25.5	6	32	4.5	8	4.4	15	650	1200	4	100
LMEFM16	LMEFM16-A	16	<div><div></div><div>+0.011 -0.001</div></div>	26	<div><div></div><div>0 -0.011</div></div>	70	46	32	6	36	4.5	8	4.4	15	1230	2350	5	187
LMEFM20	LMEFM20-A	20	<div><div></div><div>+0.011 -0.001</div></div>	32	<div><div></div><div>0 -0.013</div></div>	80	54	36	8	43	5.5	9.5	5.4	17	1400	2750	5	260
LMEFM25	LMEFM25-A	25	<div><div></div><div>+0.013 -0.002</div></div>	40	<div><div></div><div>0 -0.013</div></div>	112	62	52	8	51	5.5	9.5	5.4	17	1560	3140	6	515
LMEFM30		30	<div><div></div><div>+0.013 -0.002</div></div>	47	<div><div></div><div>0 -0.015</div></div>	123	76	56.5	10	62	6.6	11	6.5	17	2400	5490	6	655
LMEFM40		40	<div><div></div><div>0 -0.015</div></div>	62	<div><div></div><div>0 -0.015</div></div>	154	98	70.5	13	80	9	14	8.6	20	3430	8040	6	1560
LMEFM50		50	<div><div></div><div>+0.016 -0.004</div></div>	75	<div><div></div><div>0 -0.015</div></div>	192	112	89.5	13	94	9	14	8.6	20	6080	15900	6	3500
LMEFM60		60	<div><div></div><div>0 -0.020</div></div>	90	<div><div></div><div>0 -0.020</div></div>	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| LMEKM FLANGED LINEAR BUSHING LONG |

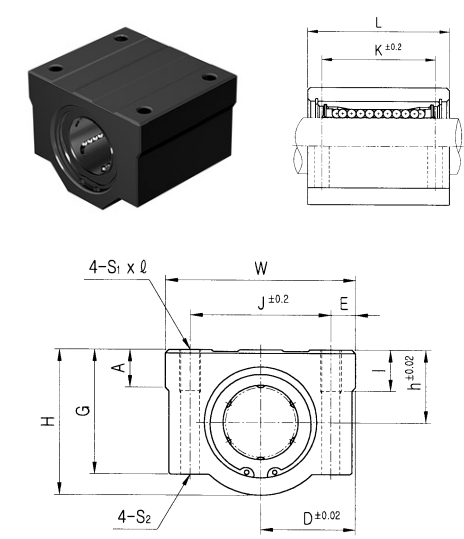


European Standard Samick Square Model Flanged Linear Bushing		LMEKM	20	UU	-	A	N	S
Nominal Shaft Diameter								
Seal		Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer		Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Outer-sleeves (by corrosion resistance 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		DIAMETER		D	L	D ₁	ℓ	H	PCD	K	d ₁	d ₂	h	SQUARENESS ※(μm)	BASIC LOAD RATING(N)			NO. OF BALL ORQUIT	WEIGHT (g)
Resin	Steel	dr.	TOLERANCE												mm	TOLERANCE	DYNAMIC(C)		
LMEKM8	LMEKM8-A	8		16		45	32	20	5	24	25	3.4	6.5	3.3	15	430	780	4	53
LMEKM12	LMEKM12-A	12		22		57	42	25.5	6	32	32	4.5	8	4.4	15	650	1200	4	100
LMEKM16	LMEKM16-A	16		26		70	46	32	6	36	35	4.5	8	4.4	15	1230	2350	5	187
LMEKM20	LMEKM20-A	20		32		80	54	36	8	43	42	5.5	9.5	5.4	17	1400	2750	5	260
LMEKM25	LMEKM25-A	25		40		112	62	52	8	51	50	5.5	9.5	5.4	17	1560	3140	6	515
LMEKM30		30		47		123	76	56.5	10	62	60	6.6	11	6.5	17	2490	5490	6	655
LMEKM40		40		62		154	98	70.5	13	80	75	9	14	8.6	20	3430	8040	6	1560
LMEKM50		50		75		192	112	89.5	13	94	88	9	14	8.6	20	6080	15900	6	3500
LMEKM60		60		90		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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SC ALUMINUM CASE UNIT |

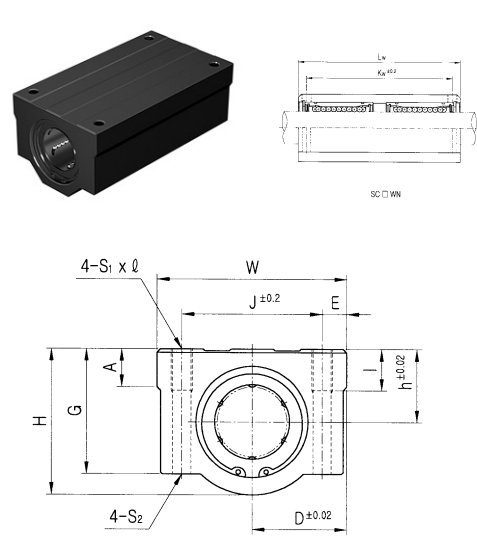


Aluminum Case Unit	SC	20	UU	N	-	A	S
Nominal Shaft Diameter							
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal						
New type							
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Ball type (by corrosion resistance)	Blank : High carbon bearing steel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

PART NUMBER	L/B	h	D	W	H	G	A	J	E	S ₁ ×l	S ₂	K	L	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(C ₀)	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SCW ALUMINUM CASE UNIT LONG |

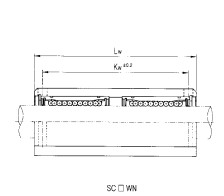



Aluminum Case Unit	SC	20	W	UU	-	A	S
Nominal Shaft Diameter							
Long type (for high load)							
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal						
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)						
Ball type (by corrosion resistance)	Blank : High carbon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

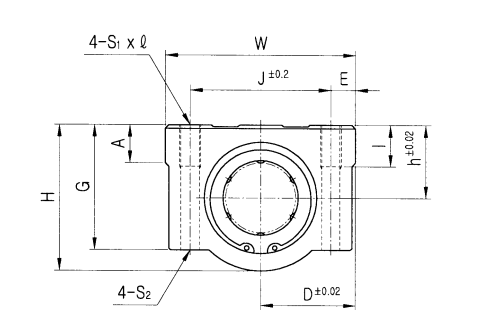
PART NUMBER	L/B	h	D	W	H	G	A	J	E	S ₁ ×l	S ₂	K _w	L _w	BASIC LOAD RATING(N) DYNAMIC(C)	STATIC(C ₀)	WEIGHT (gf)
SC8W-B	LM8U	11	17	34	22	18	6	24	5	M4×8	Φ3.4	42	58	410	800	94
SC10W-B	LM10U	13	20	40	26	21	8	28	6	M5×10	Φ4.3	46	68	590	1080	147
SC12W-B	LM12U	15	22	44	30	24.5	8	33	5.5	M5×10	Φ4.3	64	77	650	1180	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SCW_N ALUMINUM CASE UNIT LONG |



SCW_N



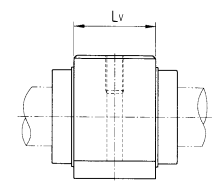

4-S₁ x ℓ W J ± 0.2 E H G A L ± 0.02 4-S₂ D ± 0.02

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							

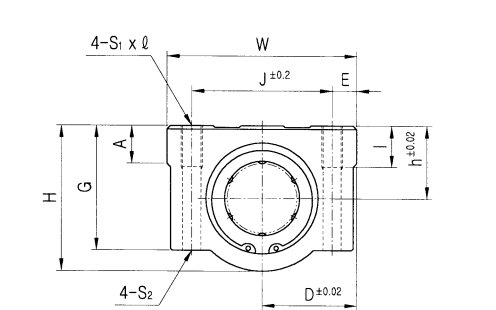
PART NUMBER	L/B	h	D	W	H	G	A	J	E	S ₁ ×ℓ	S ₂	K _w	L _w	BASIC LOAD RATING(N) DYNAMIC(C) STATIC(C ₀)		WEIGHT (gf)
SC8WN-B	LM8U×2	11	17	34	22	18	6	24	5	M4×8	Φ3.4	42	58	410	800	94
SC10WN-B	LM10U×2	13	20	40	26	21	8	28	6	M5×12	Φ4.3	46	68	590	1080	147
SC12WN-B	LM12U×2	15	21	42	28	24	7.4	30.5	5.5	M5×12	Φ4.3	50	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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SCV ALUMINUM CASE UNIT |



SCV



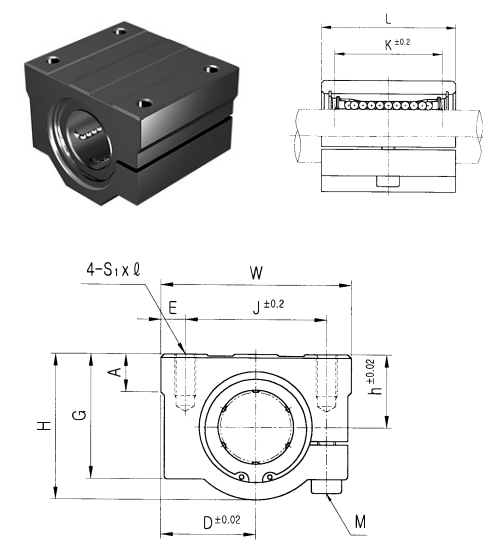
4-S₁ x ℓ W J ± 0.2 E H G A L ± 0.02 4-S₂ D ± 0.02

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	S ₁ ×ℓ	S ₂	L _v	BASIC LOAD RATING(N) DYNAMIC(C) STATIC(C ₀)		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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SCJ ADJUSTABLE ALUMINUM CASE UNIT |

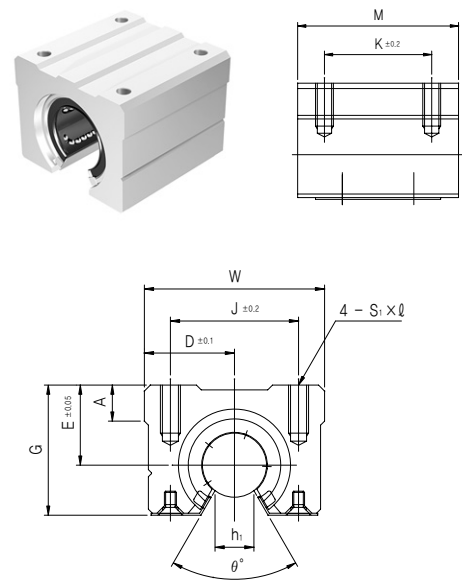


Aluminum Case Unit(Adjustable type)	SCJ	20	UU	-	A	S
Nominal Shaft Diameter						
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal					
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)					
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (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)	STATIC(C0)	OUTER DIAMETER	WEIGHT (g)
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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SBR ALUMINUM CASE UNIT OPEN |

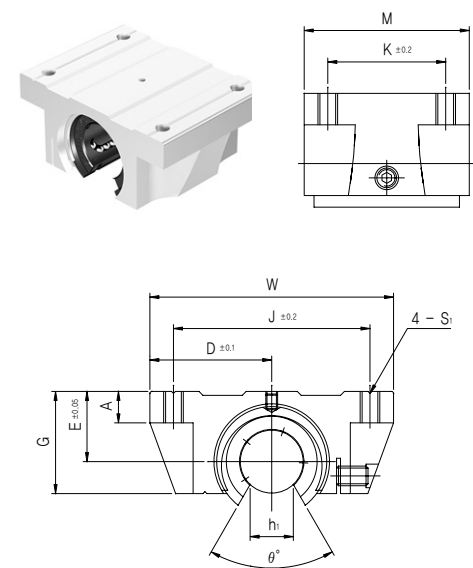


Aluminum Case Unit(Open type)	SBR	20	UU	-	A	S
Nominal Shaft Diameter						
Seal	Blank : No Seal U : One Side Seal UU : Both Side Seal					
Retainer	Blank : Resin retainer(Standard) A : Steel retainer(High temperature)					
Ball type (by corrosion resistance)	Blank : High carbon bearing steel ball (standard)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

PART NUMBER	L/B	D	W	G	θ	A	M	S×ℓ	h ₁	E	J	K	BASIC LOAD RATING(N) DYNAMIC(C) STATIC(C ₀)		WEIGHT (g)
SBR16UU	LM16UUOP	22.5	45	33	80°	9	45	M5×12	11	20	32	30	770	1170	0.15
SBR20UU	LM20UUOP	24	48	39	60°	11	50	M6×12	11	23	35	35	860	1370	0.20
SBR25UU	LM25UUOP	30	60	47	50°	14	65	M6×12	12	27	40	40	980	1560	0.45
SBR30UU	LM30UUOP	35	70	56	50°	15	70	M8×18	15	33	50	50	1560	2740	0.63
SBR35UU	LM35UUOP	40	80	63	50°	18	80	M8×18	17	37	55	55	1660	3130	0.92
SBR40UU	LM40UUOP	45	90	72	50°	20	90	M10×20	20	42	65	65	2150	4010	1.33
SBR50UU	LM50UUOP	60	120	91	50°	25	110	M10×20	25	53	94	80	3820	7930	3.00

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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| TBR ALUMINUM CASE UNIT OPEN |

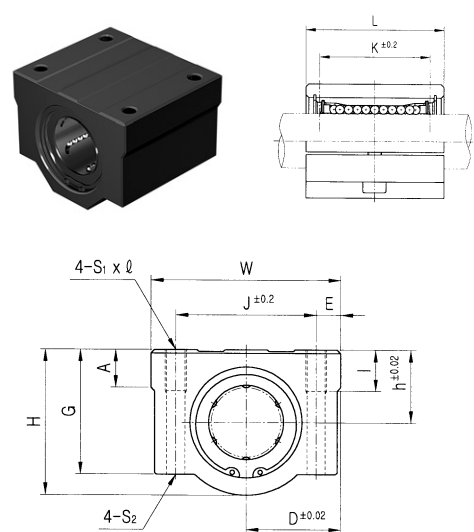


Aluminum Case Unit(Open type)	TBR	20	UU	-	A	S
Nominal Shaft Diameter						
Seal						
Blank : No Seal						
U : One Side Seal						
UU : Both Side Seal						
Retainer						
Blank : Resin retainer(Standard)						
A : Steel retainer(High temperature)						
Ball type						
(by corrosion resistance)				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

PART NUMBER	L/B	D	W	G	θ	A	M	S ₁	h ₁	E	JK	BASIC LOAD RATING(N)		WEIGHT
												DYNAMIC(C)	STATIC(C ₀)	(gf)
TBR16UU	LM16UUOP	31	62	26	80°	8	42	M5	11	18	50	392	490	0.18
TBR20UU	LM20UUOP	34	68	31	60°	10	51	M6	11	21	54	784	1176	0.3
TBR25UU	LM25UUOP	41	82	41	50°	12	65	M8	12	28	65	1568	2352	0.6
TBR30UU	LM30UUOP	45.5	91	48	50°	12	75	M8	15	34	75	1764	2940	0.9

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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SCE ALUMINUM CASE UNIT |

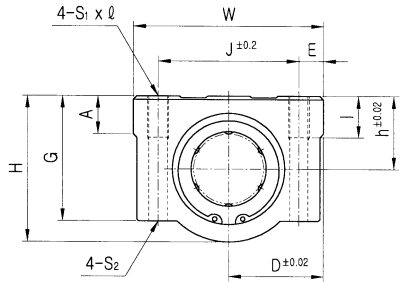
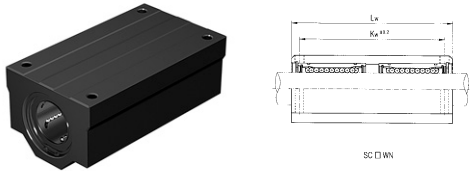


European Standard Aluminum Case Unit	SCE	20	UU	-	A	S
Nominal Shaft Diameter						
Seal						
Blank : No Seal						
U : One Side Seal						
UU : Both Side Seal						
Retainer						
Blank : Resin retainer(Standard)						
A : Steel retainer(High temperature)						
Ball type						
(by corrosion resistance)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

PART NUMBER	L/B	L	h	D	W	H	G	A	J	E	S ₁ ×ℓ	S ₂	K	BASIC LOAD RATING(N)		WEIGHT
														DYNAMIC(C)	STATIC(C ₀)	(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 C₁₀₀ = 410 / 1.26 = 325.40N
Note 2) Based on the weight of resin retainer
Note 3) Dimension : mm

| SCE_W ALUMINUM CASE UNIT LONG |

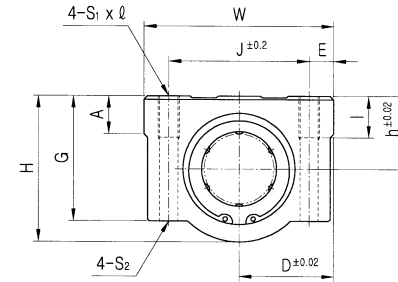
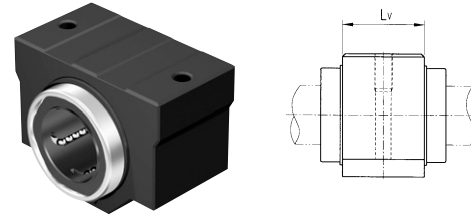


European Standard Aluminum Case Unit	SCE	20	W	UU	—	A	S
Nominal Shaft Diameter							
Long type (for high load)							
Seal							
Blank : No Seal U : One Side Seal UU : Both Side Seal							
Retainer							
Blank : Resin retainer(Standard) A : Steel retainer(High temperature)							
Ball type (by corrosion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

Part Number	L/B	h	D	W	H	G	A	J	E	S×ℓ	S _z	K _w	L _w	Basic Load Rating(N) Dynamic(C ₁) Static(C ₂)		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 (stdard) S : Stainless steel ball							

Part Number	L/B	h	D	W	H	G	A	J	E	S ₁ × \varnothing	S ₂	L _v	Basic Load Rating(N) Dynamic (C) Static (C ₀)		Weight (g)
SCE8V-B	LME8JU	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	LME16JU	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	LME25JU	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 $C_{50} = 410 / 1.26 = 325.40\text{N}$

Note 2) Based on the weight of resin retainer

Note 3) Dimension : mm

:: 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

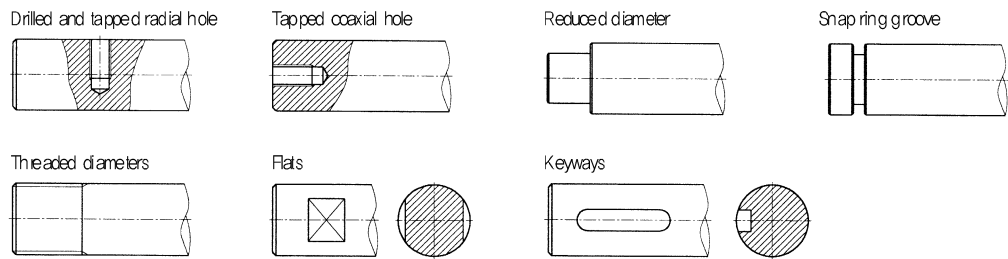
- Material : High carbon chromium bearing steel
- Hardness : Hrc58 ~ 64
- Hardened depth : 0.8 ~ 2.5mm
- Surface finishing : 0.8S ~ 1.6S
- Straightness : 0.05mm / 300mm

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

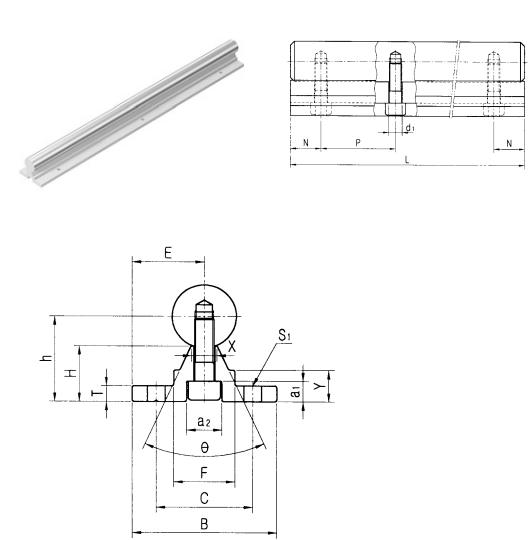


:: SAMICK Shaft Support

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 |



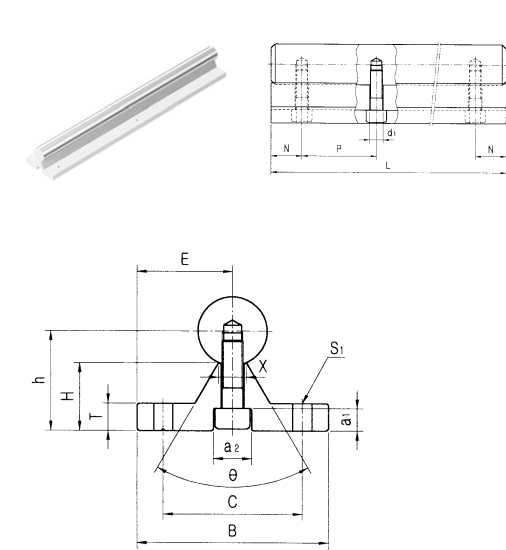
SUPPORT RAIL UNIT	SBS	C	h6	30	-	1000	L
Type	Support Rail Unit for SER : SBS						
Shaft(by corrosion resistance)	No plating (Standard) : Blank Chrome plated shaft : C Nickel plated shaft : N Raydent treated shaft : R						
Shaft tolerance	Asian standard g6 tolerance shaft : Blank European standard h6 tolerance shaft : h6						
Shaft Diameter	16~50mm						
Shaft Length	100~3000m						

PART NUMBER	Shaft Outer diameter	E	h	B	H	T	F	X	Y	C	θ	S _i	a ₁	a ₂	d ₁	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	500	600	800	1000	1200	1400	N × NH		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 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						

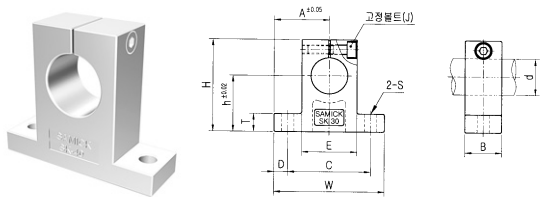
PART NUMBER	OUTER DIAMETER	E	h	B	H	T	X	C	θ	S _i	a ₁	a ₂	d ₁	WEIGHT (kgf/m)
TBS16A	Φ16	25	22	50	14.79	6	8	37	60°	Φ5.5	6	9.5	5.5	2.66
TBS20A	Φ20	27.5	29	55	19.72	8	8	40	50°	Φ5.5	6.5	11	6.6	4.23
TBS25A	Φ25	32.5	32	65	20.13	10	8	45	50°	Φ6.6	6.5	11	6.6	5.85
TBS30A	Φ30	37.5	36.5	75	22.35	12	10.3	55	50°	Φ6.6	8.5	14	9	8.28

PART NUMBER	Max. Length (mm)	P	500	600	800	1000	1200	1400	N × NH		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.

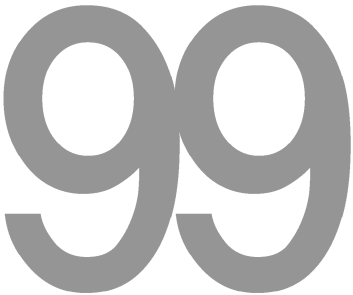
Dimension Table

| SK Shaft Support |



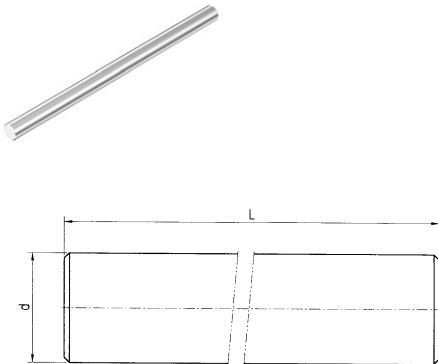
SHAFT SUPPORT	SK	20
Samick Shaft Support(Aluminum)		
Shaft Diameter		

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



References

| SF Shaft |



Shaft	SF	C	h6	30	-	1000	L
Samick LM Shaft							
Corrosion resistance treatment							
No plating (Standard) : Blank							
Chrome plated shaft : C							
Nickel plated 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	-0.004	-0.005		-0.006			-0.007			-0.009			-0.010	
tolerance(g6)	-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)

• Hardness : H:C58~64

• Hardened depth : 0.8~2.5mm

• Surface finishing : 0.8S~1.6S

• Straightness : 0.05mm/300mm

Hardness Conversion Table

Rockwell C Scale H _C	Vickers' Hardness H _v	Brinell Hardness H _b		Rockwell Hardness		Shore Hardness H _s
		Standard Ball	Tungsten Carbon Ball	H _A A Scale	H _B 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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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over	ind	-6 -10 -12 -16	-6 -8 -12	-2 -4 -5	-11 -14 -20	-6 -8 -12	-4 -6 -10 -14	0	-4 -6 -10 -14	-5 -8 -12 -18	0	-6 -9 -5 -22	0	-8 -11 -18 -27	0	-9 -13 -21 -33	-7 -20 -28	-6 -17 -24	-16 -27 -34	-20 -33 -41	-25 -41 -50	-30 -43 -49 -60	-36 -49 -60	-10 -23 -29 -40	-12 -34 -47	-13 -19 -30 -46	-16 -25 -39	-9 -20 -25 -34	-30 -43 -49 -60	-36 -51 -58 -71	-43 -61 -68 -83	-43 -54 -63	-14 -32 -39 -54	-16 -24 -31 -54	-17 -27 -34 -54	-18 -28 -35 -54	-19 -29 -36 -54	-20 -30 -37 -54	-21 -31 -38 -54	-22 -32 -39 -54	-23 -33 -40 -54	-24 -34 -41 -54	-25 -35 -42 -54	-26 -36 -43 -54	-27 -37 -44 -54	-28 -38 -45 -54	-29 -39 -46 -54	-30 -40 -47 -54	-31 -41 -48 -54	-32 -42 -49 -54	-33 -43 -50 -54	-34 -44 -51 -54	-35 -45 -52 -54	-36 -46 -53 -54	-37 -47 -54 -54	-38 -48 -55 -54	-39 -49 -56 -54	-40 -50 -57 -54	-41 -51 -58 -54	-42 -52 -59 -54	-43 -53 -60 -54	-44 -54 -61 -54	-45 -55 -62 -54	-46 -56 -63 -54	-47 -57 -64 -54	-48 -58 -65 -54	-49 -59 -66 -54	-50 -60 -67 -54	-51 -61 -68 -54	-52 -62 -69 -54	-53 -63 -70 -54	-54 -64 -71 -54	-55 -65 -72 -54	-56 -66 -73 -54	-57 -67 -74 -54	-58 -68 -75 -54	-59 -69 -76 -54	-60 -70 -77 -54	-61 -71 -78 -54	-62 -72 -79 -54	-63 -73 -80 -54	-64 -74 -81 -54	-65 -75 -82 -54	-66 -76 -83 -54	-67 -77 -84 -54	-68 -78 -85 -54	-69 -79 -86 -54	-70 -80 -87 -54	-71 -81 -88 -54	-72 -82 -89 -54	-73 -83 -90 -54	-74 -84 -91 -54	-75 -85 -92 -54	-76 -86 -93 -54	-77 -87 -94 -54	-78 -88 -95 -54	-79 -89 -96 -54	-80 -90 -97 -54	-81 -91 -98 -54	-82 -92 -99 -54	-83 -93 -100 -54	-84 -94 -101 -54	-85 -95 -102 -54	-86 -96 -103 -54	-87 -97 -104 -54	-88 -98 -105 -54	-89 -99 -106 -54	-90 -100 -107 -54	-91 -101 -108 -54	-92 -102 -109 -54	-93 -103 -110 -54	-94 -104 -111 -54	-95 -105 -112 -54	-96 -106 -113 -54	-97 -107 -114 -54	-98 -108 -115 -54	-99 -109 -116 -54	-100 -110 -117 -54	-101 -111 -118 -54	-102 -112 -119 -54	-103 -113 -120 -54	-104 -114 -121 -54	-105 -115 -122 -54	-106 -116 -123 -54	-107 -117 -124 -54	-108 -118 -125 -54	-109 -119 -126 -54	-110 -120 -127 -54	-111 -121 -128 -54	-112 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-54	-480 -490 -497 -54	-481 -491 -

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

●● Tolerance of hosing bore

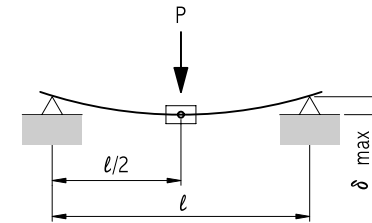
	SIZE		H5		H6		H7		H8	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
OVER BELOW	0.1181 0.2362	3 6	0.0002 0	0.005 0	0.0003 0	0.008 0	0.0004 0	0.012 0	0.0007 0	0.018 0
OVER BELOW	0.2362 0.3937	6 10	0.0002 0	0.006 0	0.0003 0	0.009 0	0.0003 0	0.015 0	0.0008 0	0.022 0
OVER BELOW	0.3937 0.7087	10 18	0.0003 0	0.008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

●● Tolerance of shaft

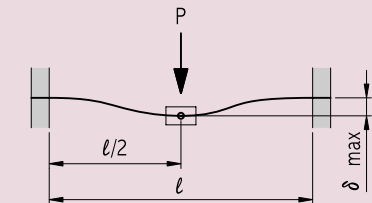
	SIZE		g5		g6		g7		h5		h6		h7	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
OVER BELOW	0.1181 0.2362	3 6	-0.0001 -0.0003	-0.004 -0.009	-0.0001 -0.0004	-0.004 -0.012	-0.0001 -0.0006	-0.004 -0.016	0 -0.0002	0 -0.005	0 -0.0003	0 -0.008	0 -0.0004	0 -0.012
OVER BELOW	0.2362 0.3937	6 10	-0.0002 -0.0004	-0.005 -0.011	-0.0002 -0.0005	-0.005 -0.014	-0.0002 -0.0007	-0.005 -0.020	0 -0.0002	0 -0.006	0 -0.0003	0 -0.009	0 -0.0006	0 -0.015
OVER BELOW	0.3937 0.7087	10 18	-0.0002 -0.0005	-0.006 -0.014	-0.0002 -0.0006	-0.006 -0.017	-0.0002 -0.0009	-0.006 -0.024	0 -0.0003	0 -0.008	0 -0.0004	0 -0.011	0 -0.0007	0 -0.018
OVER BELOW	0.7087 1.1811	18 30	-0.0002 -0.0006	-0.007 -0.016	-0.0002 -0.0007	-0.007 -0.020	-0.0002 -0.0011	-0.007 -0.028	0 -0.0003	0 -0.009	0 -0.0005	0 -0.013	0 -0.0008	0 -0.021
OVER BELOW	1.1811 1.9685	30 50	-0.0003 -0.0007	-0.009 -0.020	-0.0003 -0.0009	-0.009 -0.025	-0.0003 -0.0013	-0.009 -0.034	0 -0.0004	0 -0.011	0 -0.0006	0 -0.016	0 -0.0009	0 -0.025
OVER BELOW	1.9685 3.1496	50 80	-0.0004 -0.0009	-0.010 -0.023	-0.0004 -0.0011	-0.010 -0.029	-0.0004 -0.0015	-0.010 -0.04	0 -0.0005	0 -0.013	0 -0.0007	0 -0.019	0 -0.011	0 -0.030
OVER BELOW	3.1496 4.7244	80 120	-0.0004 -0.0010	-0.012 -0.027	-0.0004 -0.0013	-0.012 -0.034	-0.0004 -0.0018	-0.012 -0.047	0 -0.0006	0 -0.015	0 -0.0008	0 -0.022	0 -0.0013	0 -0.035

Equations for shaft deflection amount calculation

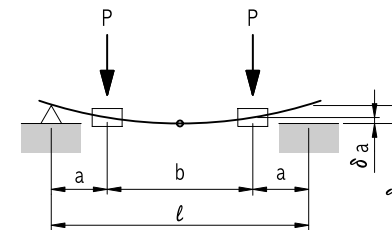
Variations of support and Load



$$\delta_{\max} = \frac{P \cdot l^3}{48 \cdot E \cdot I} = 2.021 \times 10^{-5} \frac{P \cdot l^3}{d^4}$$

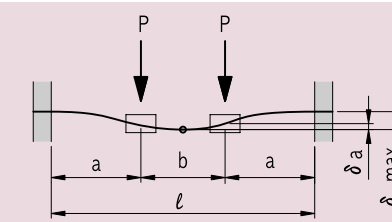


$$\delta_{\max} = \frac{P \cdot l^3}{192 \cdot E \cdot I} = 5.053 \times 10^{-6} \frac{P \cdot l^3}{d^4}$$



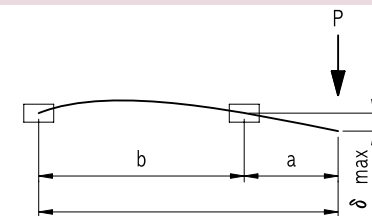
$$\delta_a = \frac{P \cdot a^2}{6 \cdot E \cdot I} (2a+3b) = 1.617 \times 10^{-4} \frac{P \cdot a^2 (2a+3b)}{d^4}$$

$$\delta_{\max} = \frac{P \cdot a^2}{24 \cdot E \cdot I} (3l-4a^2) = 4.042 \times 10^{-5} \frac{P \cdot a^2 (3l-4a^2)}{d^4}$$



$$\delta_a = \frac{P \cdot a^3}{6 \cdot E \cdot I} (2 - \frac{3a}{l}) = 1.617 \times 10^{-4} \frac{P \cdot a^3}{d^4} (2 - \frac{3a}{l})$$

$$\delta_{\max} = \frac{P \cdot a^2}{24 \cdot E \cdot I} (2a+3b) = 4.042 \times 10^{-5} \frac{P \cdot a^2 (2a+3b)}{d^4}$$



$$\delta_{\max} = \frac{P \cdot a^2 l}{3 \cdot E \cdot I} = 3.234 \times 10^{-4} \frac{P \cdot a^2 l}{d^4}$$

E : Modulus of Longitudinal Elasticity 2.1×10^4 (kgf/mm²)

P : Applying Load (kgf)

I : Geometrical Moment of Inertia(mm⁴) ; $I = \pi d^4 / 64$, Hollow shaft : $I = \pi (d^4 - d_i^4) / 64$

d_i : Shaft inner-diameter(mm), d : Shaft Outer-diameter (mm)