

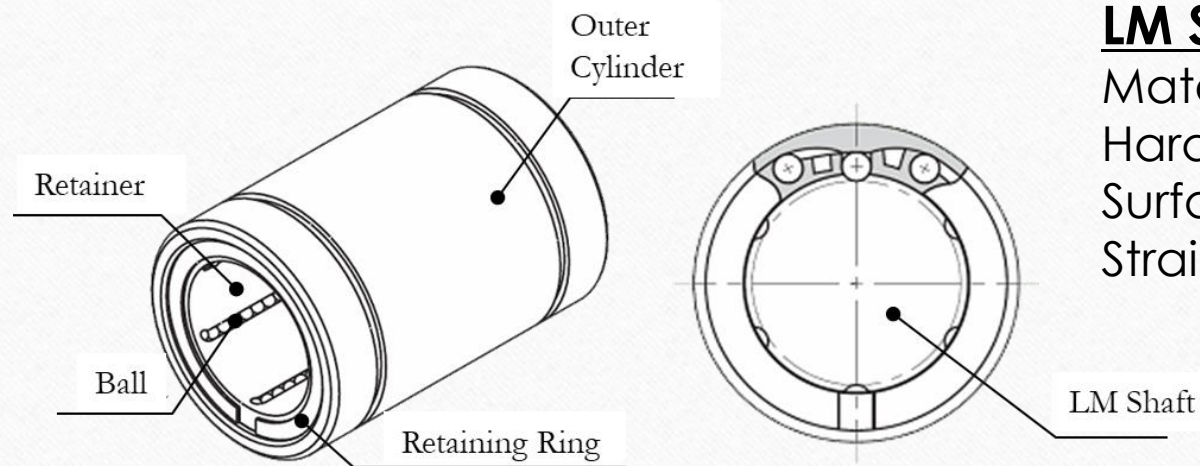


Introduction to THK's Linear Bushing Series

Linear Bushing

What is Linear Bushing?

Linear Bushing model LM guides are a linear motion system used in combination with a cylindrical LM shaft to perform infinite straight motion. The balls in the loaded area of the nut are in point contact with the LM shaft. This allows straight motion with minimal friction resistance and achieves highly accurate and smooth motion despite the small permissible load.



LM Shaft

Material: SUJ2, Equivalent to S55C and SUS440C

Hardness: 58 – 64 HRC

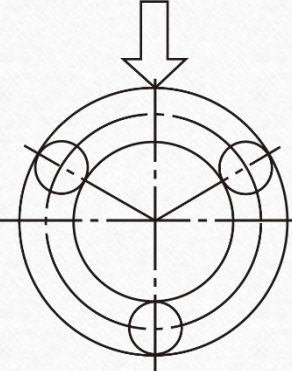
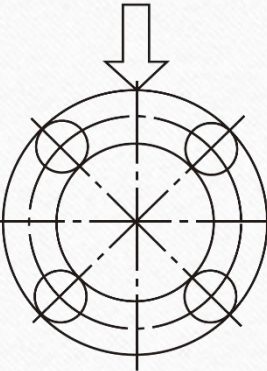
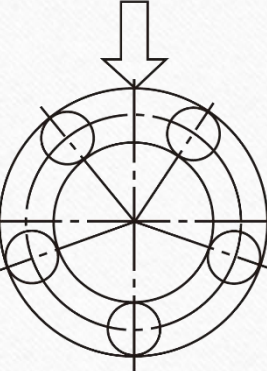
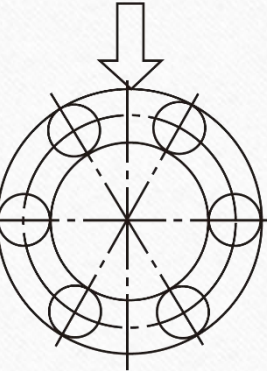
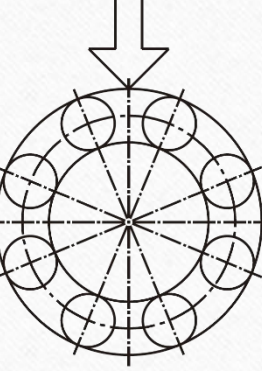
Surface Roughness: Ra 0.2 – 0.4

Straightness: Below 50 μ m/300mm



Rated Load of Linear Bushing

The rated load of the Linear Bushing varies according to the position of balls in relation to the load direction. The basic load ratings indicated in the specification tables each indicate the value when one row of balls receiving a load are directly under the load. If the Linear Bushing is mounted so that two rows of balls evenly receive the load in the load direction, the rated load changes, as shown below.

Rows of balls	3 rows	4 rows	5 rows	6 rows	8 rows
Ball Position					
Load Rating	$1 \times C$	$1.41 \times C$	$1.46 \times C$	$1.28 \times C$	$1.25 \times C$

For specific values for "C" above, see the respective specification table.

Tips for Assembling Linear Bushings



Mounting a Standard Linear Bushing

Example mountings are shown in Fig. 1 and Fig. 2. Use snap rings or stopper plates to secure linear bushings. Securing the nut by pressing against the outer surface with one set screw as shown in Fig. 3 will cause the nut to be deformed.

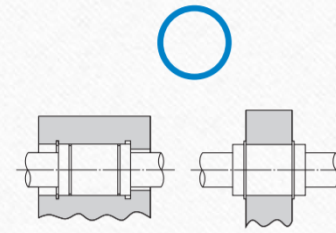


Fig. 1 Secured by snap ring

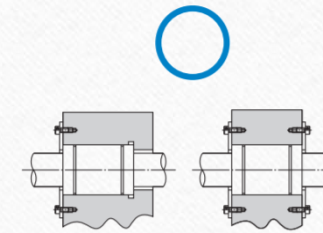


Fig. 2 Secured by stopper plate

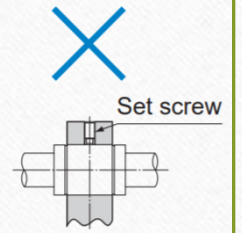
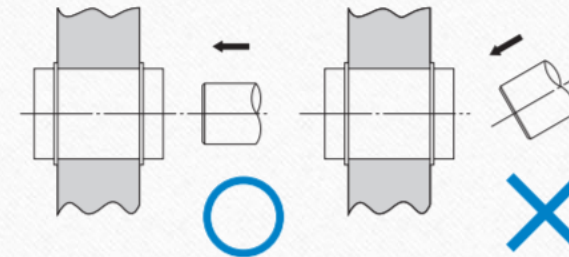


Fig. 3

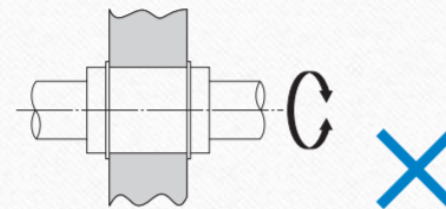
Inserting the LM Shaft

When inserting the LM shaft into the Linear Bushing, align the center of the shaft with that of the nut and gently insert the shaft straightforward into the nut. If the shaft is slanted while it is inserted, balls may fall off or the retainer may be deformed.



Rotational Use is Not Allowed

The Linear Bushing is not suitable for rotational use for a structural reason (See Fig.11). Forcibly rotating it may cause an unexpected accident.







[Click for More Tips](#)

Varieties of Linear Bushings



Cylindrical Type

With the Linear Bushing nut having the most accurate cylindrical shape, this type is widely used.

LM	LM-M(G)	LM-GA	LM-MGA
			
<div>SUJ 2</div> <div>Resin</div>	<div>SUS</div> <div>Resin</div>	<div>SUJ 2</div> <div>Metal</div>	<div>SUS</div> <div>Metal</div>



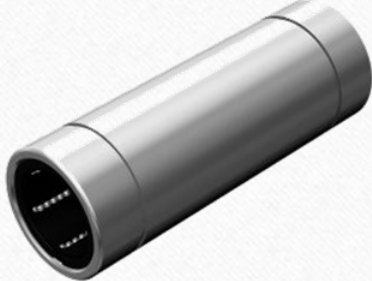
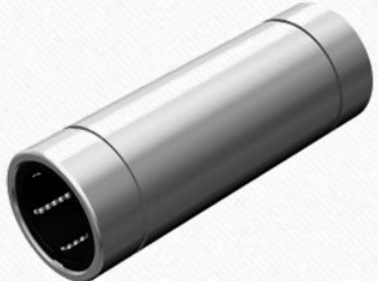
Nut Material

Retainer Material

Varieties of Linear Bushings



Cylindrical Type

LME	LME-GA	LM-L	LM-ML
			
SUJ 2	SUJ 2	SUJ 2	SUS
Resin	Metal	Metal	Resin

Cylindrical Type (L): Containing two units of the standard retainer plate, this type is optimal for locations where a moment load is present and reduces man-hours in installation.

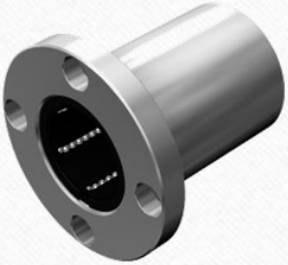
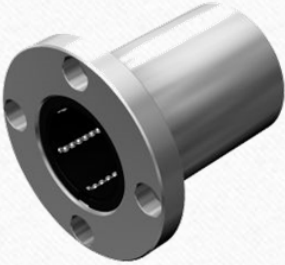
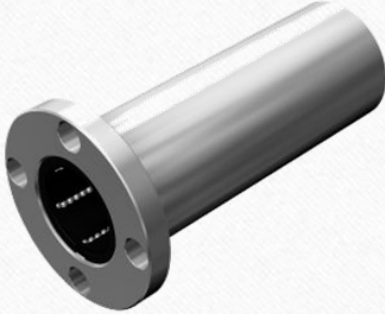
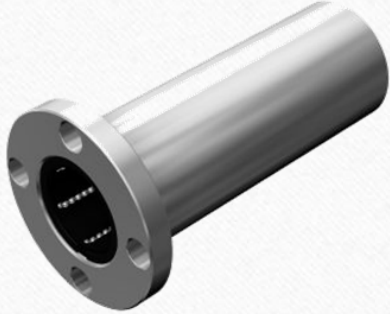
Nut Material

Retainer Material

Varieties of Linear Bushings

Flanged Type – Round Shape

The nut of the standard type Linear Bushing is integrated with a flange. This enables the Linear Bushing to be directly mounted onto the housing with bolts, thus achieving easy installation.

LMF	LMF-M	LMF-L	LMF-ML
			
SUJ 2	SUS	SUJ 2	SUS
Resin	Resin	Resin	Resin


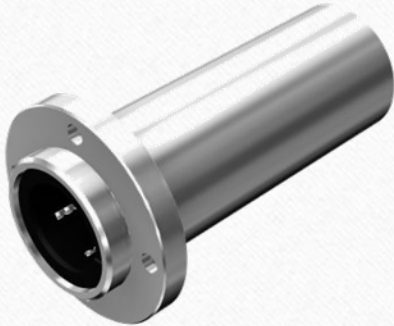
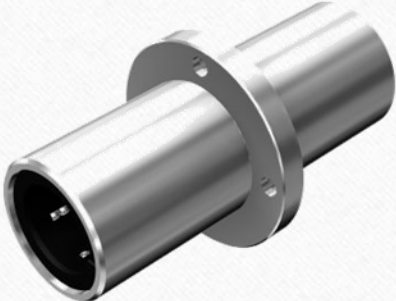
Nut Material

Retainer Material

Varieties of Linear Bushings



Flanged Type – Round Shape

LMIF	LMIF-L	LMCF-L
		
<div>SUJ 2</div> <div>Resin</div>	<div>SUJ2</div> <div>Resin</div>	<div>SUJ 2</div> <div>Resin</div>

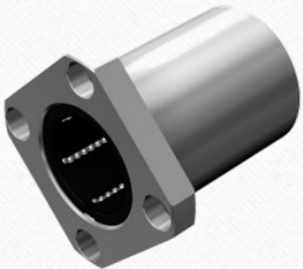

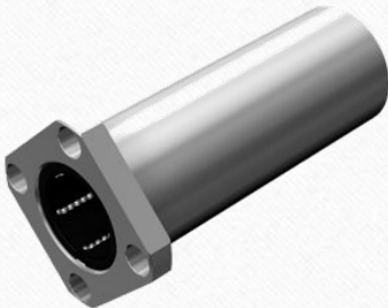

Nut Material

Retainer Material

Varieties of Linear Bushings

Flanged Type – Square Shape

Like model LMF, this type also has a flange, but the flange is cut to a square shape. Since the height is lower than the circular flange type, compact design is allowed.

LMK	LMK-M	LMK-L	LMK-ML
			
<div>SUJ 2</div>	<div>SUS</div>	<div>SUJ 2</div>	<div>SUS</div>
<div>Resin</div>	<div>Resin</div>	<div>Resin</div>	<div>Resin</div>

Nut Material

Retainer Material

Varieties of Linear Bushings



Flanged Type – Square Shape

LMIK	LMIK-L	LMCK-L
		
<div>SUJ 2</div> <div>Resin</div>	<div>SUJ2</div> <div>Resin</div>	<div>SUJ 2</div> <div>Resin</div>



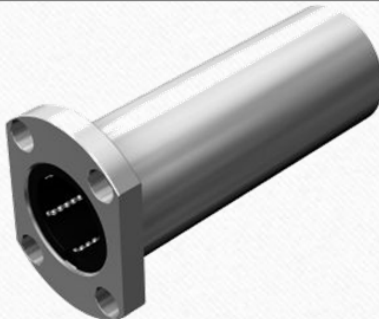
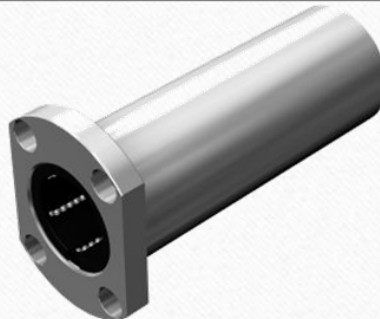
Nut Material

Retainer Material

Varieties of Linear Bushings

Flanged Type – Cut Flange

The nut is integrated with a cut flange. Since the height is lower than model LMK, compact design is allowed. Since the rows of balls in the Linear Bushing are arranged so that two rows receive the load from the flat side, a long service life can be achieved.

LMH	LMH-M	LMH-L	LMH-ML
			
<div>SUJ 2</div>	<div>SUS</div>	<div>SUJ 2</div>	<div>SUS</div>
<div>Resin</div>	<div>Resin</div>	<div>Resin</div>	<div>Resin</div>


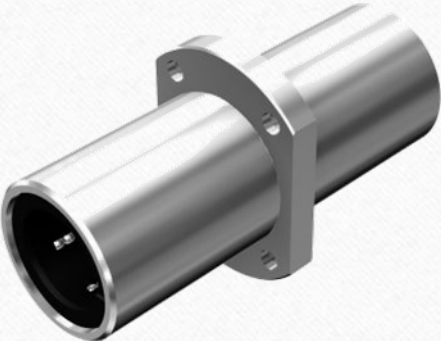
Nut Material

Retainer Material

Varieties of Linear Bushings



Flanged Type – Cut Flange

LMIH	LMIH-L	LMCH-L
		
<div>SUJ 2</div>	<div>SUJ2</div>	<div>SUJ 2</div>
<div>Resin</div>	<div>Resin</div>	<div>Resin</div>


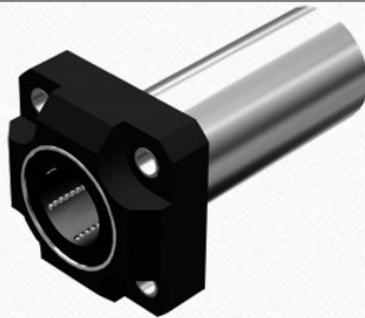
Nut Material

Retainer Material

Varieties of Linear Bushings

Flanged Type – Lightweight Flange

Weight reduction of the housing is achieved by adopting a high-strength plastic instead of the conventional metal for the flange (25% lighter than the metal type). This is best utilized in a moving portion of an application.

LMJH	LMJK-L
	
SUJ 2	SUJ2
Resin	Resin

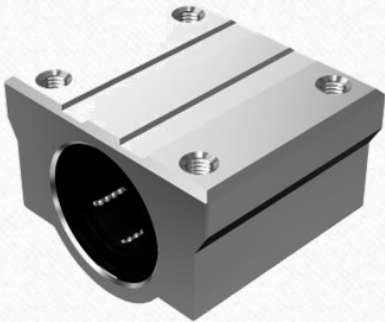
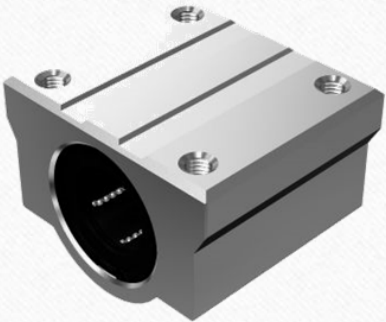
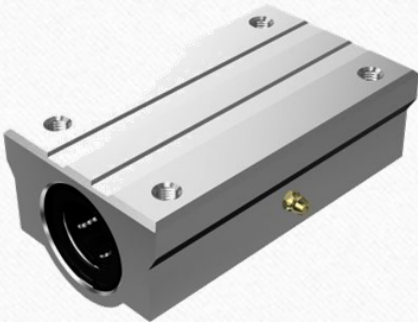

Nut Material

Retainer Material

Varieties of Linear Bushings

Flanged Type – Pillow Block Type

It is a case unit where the standard type of Linear Bushing is incorporated into a small, lightweight aluminum casing. This model can easily be mounted simply by securing it to the table with bolts.

SC	SC-M	SL	SL-M
			
<div>SUJ 2</div> <div>Resin</div> <div>Aluminum</div>	<div>SUS</div> <div>Resin</div> <div>Aluminum</div>	<div>SUJ 2</div> <div>Resin</div> <div>Aluminum</div>	<div>SUS</div> <div>Resin</div> <div>Aluminum</div>



Nut Material

Retainer Material

Case Material

Varieties of Linear Bushings

Flanged Type – Pillow Block Type

SH	SH-L
	
<div>SUJ 2</div> <div>Resin</div> <div>Aluminum</div>	<div>SUS</div> <div>Resin</div> <div>Aluminum</div>

Nut Material



Retainer Material

Case Material

Varieties of Linear Bushings

Clearance Adjustable Type

This type has the same dimensions as the standard type, but the nut has a slit in the direction of the LM shaft. This allows the linear bushing to be installed in a housing whose inner diameter is adjustable and enables the clearance between the LM shaft and the housing to easily be adjusted.

LM-AJ	LM-GA-AJ
	
SUJ 2	SUJ2
Resin	Metal

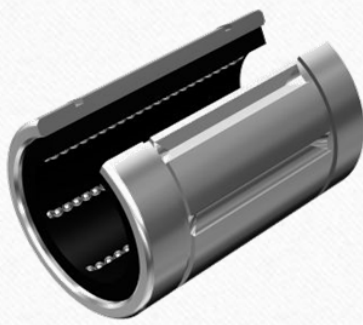
Nut Material

Retainer Material

Varieties of Linear Bushings

Open Type

The nut is partially cut open by one row of balls (50 to 80 degrees). This enables the Linear Bushing to be used even in locations where the LM shaft is supported by a column or fulcrum. In addition, a clearance can easily be adjusted.

LM-OP	LM-GA-OP
	
<div>SUJ 2</div>	<div>SUJ2</div>
<div>Resin</div>	<div>Metal</div>

Nut Material

Retainer Material

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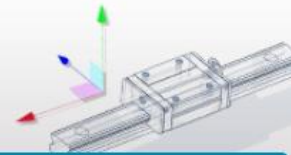
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